

**SIEMENS**

# SINUMERIK 840D sl Type 1B

Equipment for Machine Tools

Motion Control

Catalog  
NC 62

Edition  
2012

Answers for industry.

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## CD-ROM for Catalog NC 62 · 2012

In the CD-ROM that accompanies Catalog NC 62 · 2012, you will find:



- Information about planning/configuring based on the technical documentation; additional technical documentation can be found under:  
[www.siemens.com/automation/support](http://www.siemens.com/automation/support)
- Dimensional drawings of our motors in PDF/ DXF format or via CAD CREATOR  
[www.siemens.com/cadcreator](http://www.siemens.com/cadcreator)
- Glossary for the explanation of terms and functions
- Catalog NC 62 · 2012 in electronic form (PDF format)

### Hardware and software requirements:

- Intel Pentium 1 GHz or higher
- Minimum 512 MB of RAM
- Screen resolution 1024 × 768 pixels
- CD-Rom drive, at least 16x
- Windows XP/Vista/7
- Acrobat Reader 7.0 or higher
- Microsoft Internet Explorer V6.0 (SP2) or higher

### Start

Insert the CD-ROM into the CD-ROM drive.

The program starts automatically.

If the AutoRun function is not activated in your system, start file start.hta from the CD-ROM using the Windows Explorer.

### Note

Installation is not necessary to view the information on this CD-ROM. This does not apply, however, when using dimensional drawings in DXF format.

### Hotline

Please send any questions or suggestions to:

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# Motion Control

## SINUMERIK 840D sl Type 1B

### Equipment for Machine Tools

Catalog NC 62 • 2012



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The products contained in this catalog can also be found in the Interactive Catalog CA 01.

Order No.:

E86060-D4001-A510-D2-7600

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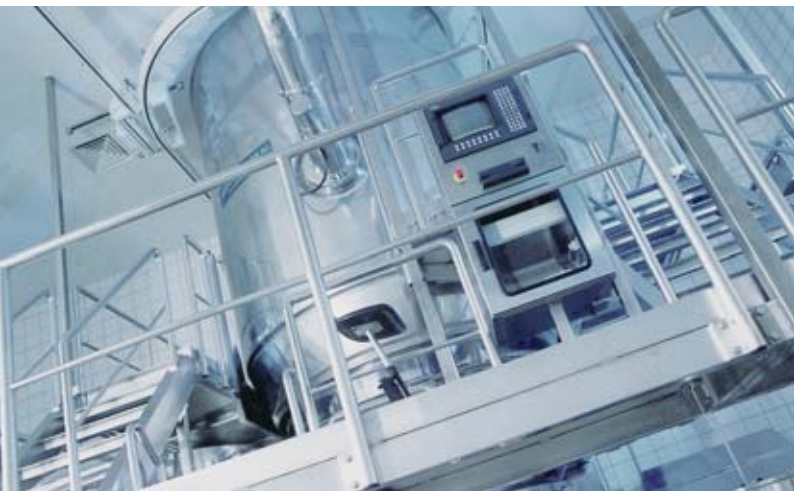
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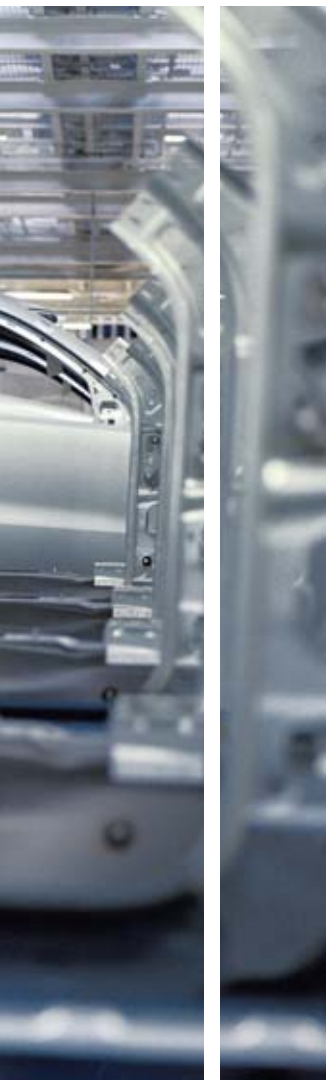
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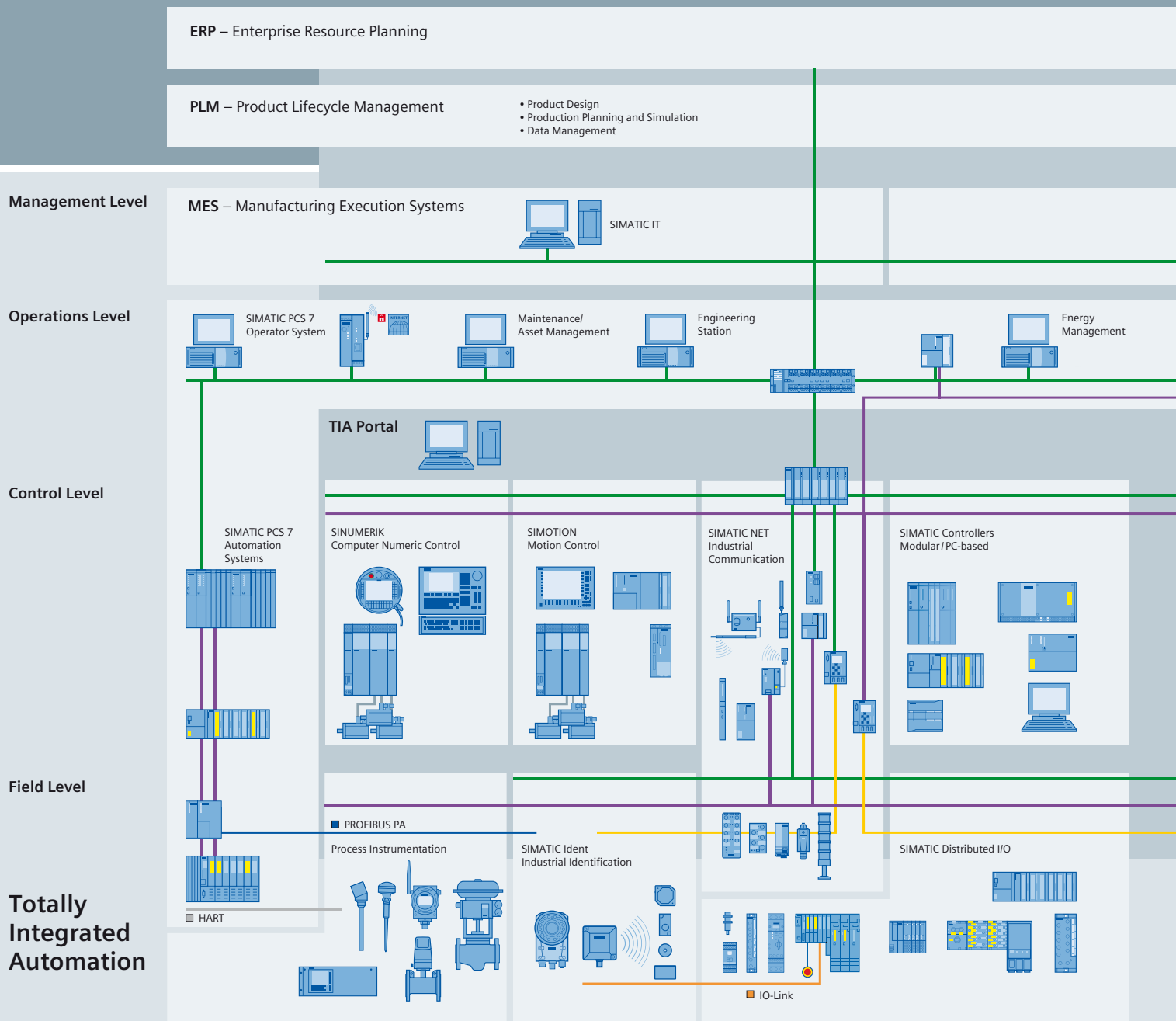
## Answers for industry.

Siemens Industry answers the challenges in the manufacturing and the process industry as well as in the building automation business. Our drive and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are employed in all kinds of industry. In the manufacturing and the process industry. In industrial as well as in functional buildings.

Siemens offers automation, drive, and low-voltage switching technology as well as industrial software from standard products up to entire industry solutions. The industry software enables our industry customers to optimize the entire value chain – from product design and development through manufacture and sales up to after-sales service. Our electrical and mechanical components offer integrated technologies for the entire drive train – from couplings to gear units, from motors to control and drive solutions for all engineering industries. Our technology platform TIP offers robust solutions for power distribution.

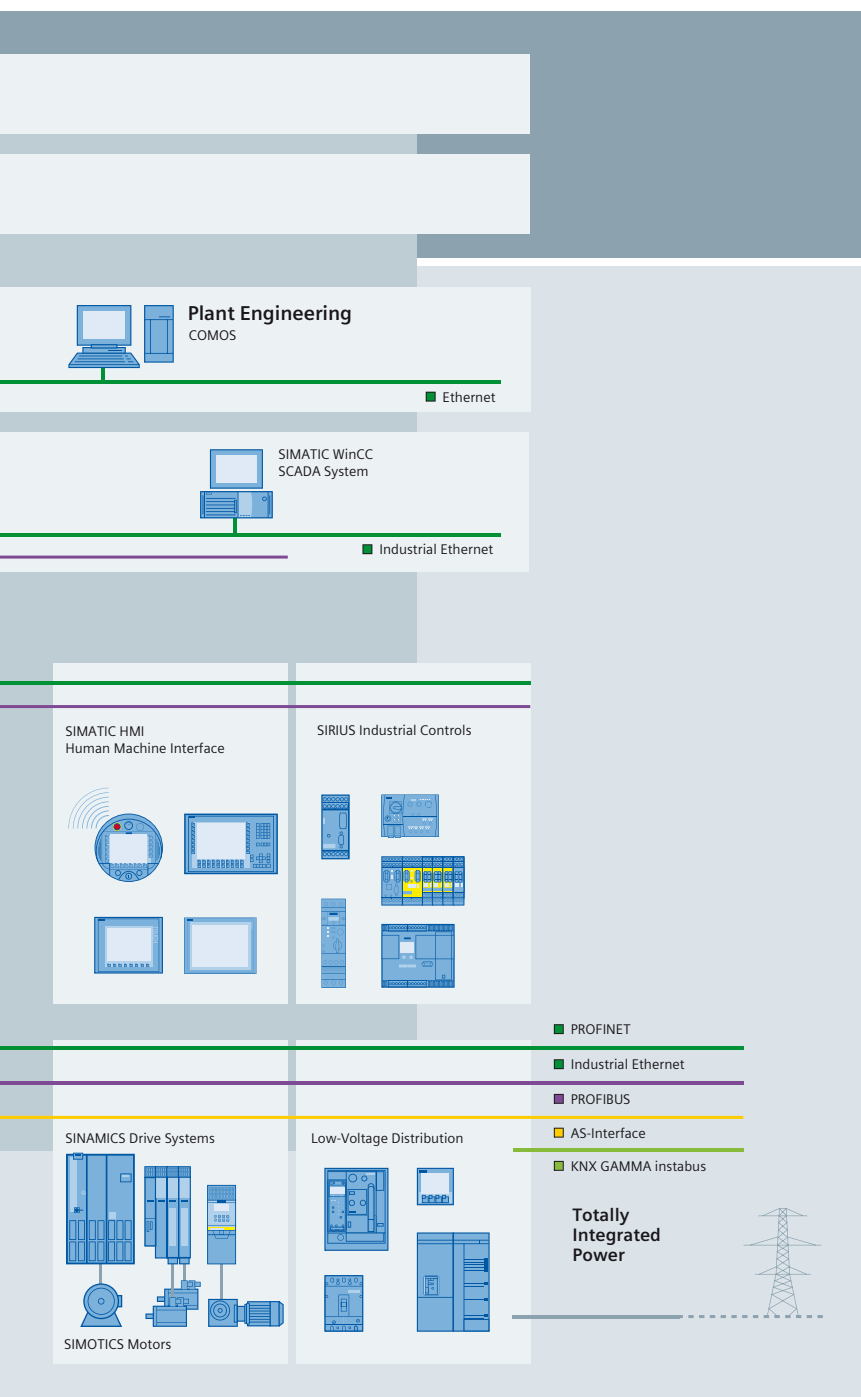
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Check out the opportunities our automation and drive solutions provide. And discover how you can sustainably enhance your competitive edge with us.



# Setting standards in productivity and competitiveness.

**Totally Integrated Automation.**



### TIA is characterized by its unique continuity.

It provides maximum transparency at all levels with reduced interfacing requirements – covering the field level, production control level, up to the corporate management level. With TIA you also profit throughout the complete life cycle of your plant – starting with the initial planning steps through operation up to modernization, where we offer a high measure of investment security resulting from continuity in the further development of our products and from reducing the number of interfaces to a minimum.

### The unique continuity is already a defined characteristic at the development stage of our products and systems.

The result: maximum interoperability – covering the controller, HMI, drives, up to the process control system. This reduces the complexity of the automation solution in your plant. You will experience this, for example, in the engineering phase of the automation solution in the form of reduced time requirements and cost, or during operation using the continuous diagnostics facilities of Totally Integrated Automation for increasing the availability of your plant.

Thanks to Totally Integrated Automation, Siemens provides an integrated basis for the implementation of customized automation solutions – in all industries from inbound to outbound.





# Introduction



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# Introduction

## SINUMERIK 840D sl Type 1B – Open, flexible, powerful

1

### Overview

The SINUMERIK 840D sl is an open, flexible and powerful CNC-system based on the design of SINAMICS S120 for up to 93 axes.

With characteristics that describe it as decentralized, scalable, open, network-capable and offering a broad range of functions, the SINUMERIK 840D sl is suitable for use in almost every machining technology and sets benchmarks for dynamic response, precision and network integratability.

The SINUMERIK 840D sl offers the user uniformity in its programming, operation and machining cycles. With its efficiency in programming, installation and commissioning, this system platform is characterized by its optimum design, innovative NC-functionality, communication and openness.

The SINUMERIK 840D sl is available in several performance variants and can thus be perfectly customized to the machine and the machining operation in the appropriate field of technology or sector.

The SINUMERIK 840D sl premium CNC is the ideal control for every machining technology – whether it is turning, milling, grinding or a combination of these for multi-tasking machines.

#### *Simply innovative*

Once again, the SINUMERIK 840D sl proves its innovative power with new, high-performance milling and turning functions, extremely short machining times coupled with excellent surface finish and perfect integration of turn-milling and mill-turning applications.

SINUMERIK 840D sl is the premium CNC system for multi-tasking machines. Several performance variants provide even greater flexibility and openness so that machines can be individually configured when required.

The modern SINUMERIK Operate user interface permits simple and efficient operation on multi-channel machines.

With the programSYNC option, it is possible to synchronize multi-channel machining operations easily and efficiently.

Through the use of simulation, an exemplary quality of visualization of multichannel machining operations is attainable with SINUMERIK 840D sl. Handling modules or tool changes, for example, can also be controlled, programmed and visualized in another channel. For even more flexible and cost-effective manufacturing.

#### *Versatile*

The system platform provides an extensive range of options for all machining technologies as well as innovative functions for all machine tool applications. SINUMERIK 840D sl can be deployed around the world in a variety of machining technologies, such as turning, drilling, milling, grinding, laser, nibbling, stamping, as well as in multi-tasking machines, i.e. for mill-turning and turn-milling applications.

The SINUMERIK 840D sl is the ideal control for tool and mold making, high-speed-cutting applications, woodworking and glass processing, composite machining in the aviation and aerospace industries, for manufacturing in the Power Generation and medical technology sectors, for handling applications, in transfer lines, on rotary indexing machines and for mass production and shopfloor manufacturing.

Overview (continued)



# Introduction

## SINUMERIK 840D sl Type 1B – Open, flexible, powerful

1

### Design

SINUMERIK 840D sl can be configured to suit your individual requirements. The consistently modular CNC-concept makes it possible to implement innovative machines which are tailored to individual needs. The hardware and software can be scaled independently of one another. The system can be configured flexibly for each machine and every manufacturing environment, even when the operating conditions are tough.

#### *Distributed and flexible structure*

One important feature of the SINUMERIK 840D sl is its distributed and simplified system structure – fully integrated into the design and communications structure of the SINAMICS S120 drive system. SINUMERIK 840D sl combines CNC, HMI, PLC, closed-loop control and communication tasks on one SINUMERIK NC-Unit (NCU). For increased operating performance (HMI), the SINUMERIK PCU 50.5 industrial PC can be used. The number of NC-axes can be increased to 93 with NCU-Link.

The rugged CNC system platform offers great scope for positioning components in the machine thanks to the distributed components for operation, drive and I/O. The components can be positioned at a distance of up to 100 m (328 ft) from each other. It is therefore possible, for example, to simultaneously connect up to four distributed OPs to one NCU/PCU. Thanks to the provision of an intelligent suppression mechanism, it is also possible to use more than four operator panels. Even the powerful multiprocessor NCU modules can be set up separately at a distance of up to 100 m from the SINAMICS S120 drive system.



SINUMERIK 840D sl BASIC –  
Entry into the premium class with up to 6 axes.



SINUMERIK 840D sl Type 1B –  
The new, higher-performance ratings class.



# Introduction

## SINUMERIK 840D sl Type 1B – Open, flexible, powerful

1

### Design (continued)

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HMI          |     <br>   <br>SINUMERIK OP 08T      SINUMERIK OP 010C      SINUMERIK OP 012      SINUMERIK OP 015A/OP 015AT/TP 015A/TP 015AT      SINUMERIK OP 019<br>SINUMERIK MCP/MPP      Mini handheld unit      SINUMERIK HT 2      SINUMERIK HT 8 |
| PCU          | Higher performance for HMI-Performance<br> <br>SINUMERIK PCU 50.5-C      SINUMERIK PCU 50.5-P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NCU          | <div> SINUMERIK 840D sl BASIC <br/>  <br/> NCU 710.3 PN </div> <div> SINUMERIK 840D sl Type 1B <br/>    <br/> NCU 710.3 PN      NCU 720.3 PN      NCU 730.3 PN </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Drive system | <div> SINAMICS S120 <br/>   <br/> Combi      Booksize Compact </div> <div> SINAMICS S120 <br/>    <br/> Blocksize      Booksize      Chassis </div>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Motors       |   <br>SIMOTICS S-1FK7      SIMOTICS S-1FT7      SIMOTICS T-1FW6<br>   <br>SIMOTICS L-1FN3/1FN6      SIMOTICS M-1PH8      SIMOTICS M-1FE1      Motor spindles 2SP1                                                                                                                                                                                                                            |

G\_NC01\_EN\_00495

Components for the SINUMERIK 840D sl Type 1B.

# Introduction

## SINUMERIK MDynamics – Milling expertise in a package

1

### Overview

SINUMERIK MDynamics offers technology packages that consist of CNC hardware, intelligent CNC functions and CAD/CAM solutions for 3-axis and 5-axis milling machines.

Whether the emphasis is focused on precise machining, perfect surface finishes or high process reliability – milling during high-speed cutting places high demands on the process chain.

With this in mind, Siemens has bundled its entire milling expertise in the SINUMERIK MDynamics technology packages for 3-axis and 5-axis milling – including the innovative Advanced Surface motion control for perfect surfaces. This ensures that the best technological know-how is available to every sector that demands high precision, quality and speed. And this all coupled with simplicity of operation and a continuous CAD/CAM/CNC process chain.



### SINUMERIK MDynamics scope of functions for SINUMERIK 840D sl

#### 3-axis/3-axis and 2-axis machining

#### 5-axis machining

#### Functions included in the package

- |                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Advanced Surface</li> <li>• User memory on user CF card</li> <li>• Spline interpolation</li> <li>• Transmit and cylinder surface transformation</li> <li>• Automatic measuring cycles</li> <li>• Simultaneous recording of 3D simulation</li> <li>• ShopMill/ShopTurn machining step programming</li> <li>• Residual material detection</li> </ul> | <ul style="list-style-type: none"> <li>• Advanced Surface</li> <li>• User memory on user CF card</li> <li>• Spline interpolation</li> <li>• Transmit and cylinder surface transformation</li> <li>• Automatic measuring cycles</li> <li>• Simultaneous recording of 3D simulation</li> <li>• ShopMill/ShopTurn machining step programming</li> <li>• Residual material detection</li> <li>• 5-axis machining package</li> <li>• 3D tool radius compensation</li> <li>• Measure kinematics</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### Optional functions

- |                                                                                                                        |                                                                                          |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Measure kinematics</li> <li>• Volumetric compensation system (VCS)</li> </ul> | <ul style="list-style-type: none"> <li>• Volumetric compensation system (VCS)</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|



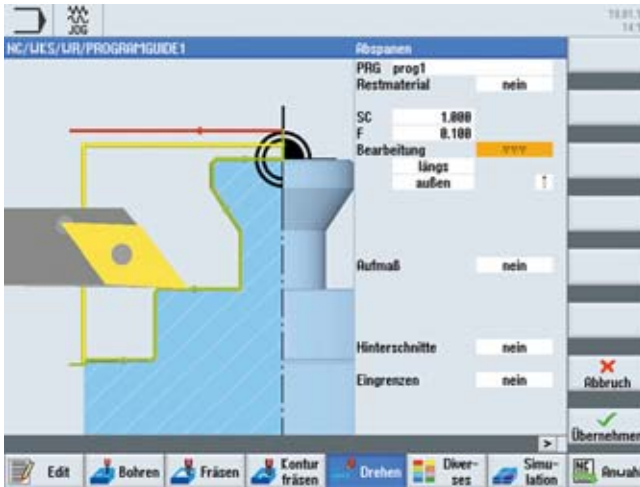
# SINUMERIK Operate – Cost-effective production on multi-tasking machines

1

## Overview

The SINUMERIK 840D sl supports multi-tasking machines for workpiece manufacturing in a single operation. It offers the full scope of functions for machining components on a machining center – even for switchover between different technologies. The SINUMERIK Operate user interface provides integrated turning functions for milling applications, milling functions for turning applications and also supports B-axis kinematics and multitools to achieve even greater cost efficiency in production.

### Simple operation of multi-tasking machines



The SINUMERIK Operate user interface provides integrated turning functions for milling applications and integrated milling functions for turning applications, augmented with innovative measuring cycles in the Animated Element design.

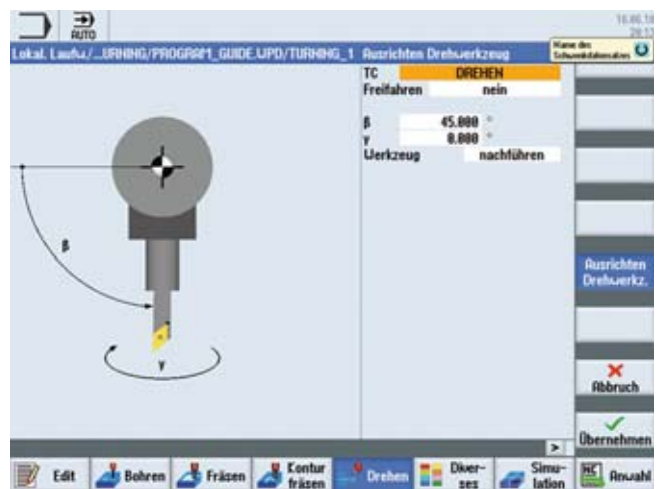
The usability and look and feel of the interface is absolutely identical – even during changeover between different technologies. The tool management system makes it easy to handle all turning tools, milling tools and multitools in a uniform interface. Functions such as the alignment and setting of turning and milling tools as well as turning and milling cycles including contour programming have been added to the programming tools in programGUIDE. A function for simulating multi-tasking programs is also immediately available, offering even greater machining efficiency.

### Efficient tool management



For the efficient management of tool data including all detailed information, SINUMERIK Operate features an expanded tool management system for milling, drilling and turning tools. Tool and magazine data are displayed with all details in a single screen. Furthermore, the user has access to all tool parameters including those which relate to combined technologies. All tool types including turning tools are clearly displayed as icons.

Even complex tools such as multitools which make tool changes superfluous and boost manufacturing productivity are supported by SINUMERIK so that they can be used in multi-tasking machines.



Aligning the turning-milling tool and swiveling the coordinate system for turning or milling.

# Introduction

## SINUMERIK Ctrl-Energy – Improved energy efficiency

1

### Overview

As technology leader in the field of CNC engineering, Siemens can offer functions which are not only technologically advanced, but which are also designed to boost the energy efficiency of the machine. The SINUMERIK Ctrl-Energy portfolio includes an extensive range of energy-efficient systems, solutions and services.

#### Ctrl-E Analysis

Using the Ctrl-E Analysis function, SINUMERIK CNCs acquire not only the energy consumption of the drive system, but also the energy consumption of the entire machine. This makes it possible for the machine user to analyze the energy consumption per workpiece and to subsequently devise an optimized machining strategy. With the Ctrl+E shortcut, the machine operator can visualize energy consumption at the touch of a button.

#### Dynamic energy management

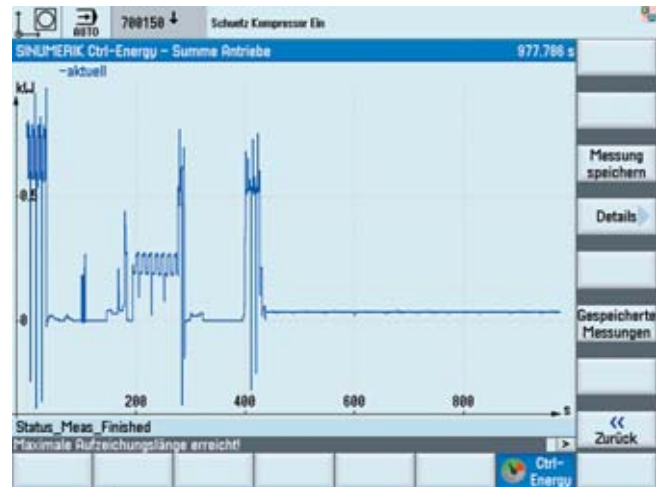
SINAMICS S120 drive systems are designed to allow dynamic energy management in the DC link and are capable of highly efficient regenerative feedback. This means that energy produced during braking is not converted to heat by braking resistors, but stored first in the DC link so that it can be recovered to the grid. Moreover, drive axes can be optionally utilized as kinetic energy stores with the result that all energy stays within the drive system with virtually no losses.

#### Ctrl-E Profiles

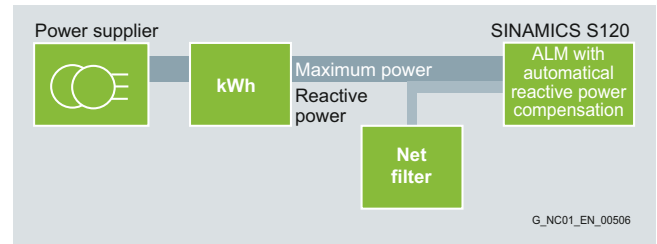
Ctrl-E Profiles gives the machine manufacturer a configuring platform for controlling the energy-saving modes of the machine. This means that specific energy consumers can be shut down when the machine is idle. With the Ctrl+E shortcut, the operator can quickly and easily influence the energy-saving modes.

#### Flux reduction and reactive power compensation

SINAMICS S120 drive systems allow automatic flux reduction during partial-load operation of asynchronous spindles, thereby resulting in a reduction of unnecessary heat losses. Intelligent Active Line infeed/regenerative feedback modules can be used to fully compensate the machine's reactive power, so making it unnecessary to install costly, high-loss reactive power compensation equipment.



Visualization of energy consumption



With integrated reactive power compensation

# SINUMERIK CNC



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SinuCom

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The main functions of the SINUMERIK 840D sl are listed in the function overview.

You can use this list to gain quick and selective access to individual functions.

The designation E in the name of the SINUMERIK 840DE sl control indicates that it is the export version, i.e. the control can be exported with the functions specified in the table.

The information in the overview of functions of SINUMERIK controls is based on the following software versions:

| Control system    | Software version |
|-------------------|------------------|
| SINUMERIK 840D sl | 4.4 SP2          |



# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

2

### Overview



SINUMERIK 840D sl offers modularity, openness, flexibility and uniform structures for operation, programming, and visualization. It provides a system platform with trend-setting functions for almost all technologies.

Integrated into the SINAMICS S120 drive system and complemented by the SIMATIC S7-300 automation system, the SINUMERIK 840D sl forms a complete digital system that is ideally suited for the mid to upper performance range.

SINUMERIK 840D sl is characterized by:

- A high degree of flexibility
- Excellent dynamic response and precision
- Optimum integration into networks

### Benefits

- Outstanding performance and flexibility for multi-axis systems of average to high complexity thanks to scalable hardware and software
- Universal openness of the user interface, the PLC and the NC kernel to allow integration of your specialist know-how
- Integrated safety functions for man and machine: SINUMERIK Safety Integrated
- Comprehensive range of products for integrating machine tools into communication, engineering and production processes: SINUMERIK Integrate

### Application

The SINUMERIK 840D sl can be deployed around the world for the following technologies:

- Turning
- Drilling
- Milling
- Grinding
- Laser
- Nibbling
- Punching
- Tool and mold making
- High-speed cutting applications
- Woodworking and glass processing
- Handling
- Transfer lines
- Rotary indexing machines
- Mass production
- Jobshop production

The SINUMERIK 840DE sl is available as an export version for use in countries where approval is required.

### Design

SINUMERIK 840D sl combines CNC, HMI, PLC, closed-loop control and communication tasks on one SINUMERIK NCU (NCU 710.3 PN, NCU 720.3 PN, NCU 730.3 PN).

For operation, programming and visualization, the corresponding HMI software is already integrated into the CNC software for the NCU and therefore executes on the high-performance NCU multi-processor module. For enhanced operating performance, the SINUMERIK PCU 50.5 industrial PC can be used.

Up to 4 distributed OPs can be operated on one NCU/PCU. The operator panel can be installed as a Thin Client at a distance of up to 100 m (328 ft).

The high-performance NCU multi-processor module can be installed to the left of the Line Module of the SINAMICS S120 drive system. If necessary, the NCU can be installed separately at a distance of up to 100 m (328 ft). MOTION-CONNECT DRIVE-CLiQ cables from Siemens are used for the connections.

SINUMERIK 840D sl offers integrated PROFINET functionality and supports PROFINET CBA and PROFINET IO.

### Matched modular system

The SINUMERIK 840D sl CNC is modular in design, offering outstanding flexibility and openness for any machine application. Entirely in line with the motto "Mix and Match", the components can be perfectly matched to each other – tailored precisely to the requirements of the machine builder and the subsequent operating environment of the machine.



### Function

#### Performance and flexibility

The scalability of the hardware and software – both in the CNC and the operating area – provides exceptional conditions for using SINUMERIK 840D sl in many sectors. The possibilities range from simple positioning tasks up to complex multi-axis systems. We offer different types of NCU for your machining tasks.

A total of 8 axes is provided by SINUMERIK 840D sl with NCU 710.3 PN, while the number of axes can be increased to a maximum of 31 in combination with the NCU 720.3 PN/NCU 730.3 PN. A total of 3 x 31 axes is possible with the CBE30-2 Link Module.

Siemens has bundled its entire milling expertise into the SINUMERIK MDynamics technology packages which allow users to attain outstanding milling results in terms of perfect surface quality, precision, quality and speed:

- Powerful CNC hardware and intelligent CNC functions
- Simple operation
- Unique CAD/CAM/CNC process chain
- Technological expertise in all sectors

Use of an NCU 720.3 PN or NCU 730.3 PN is recommended where excellent dynamic response and accuracy are required for mold making applications or in the High-Speed-Cutting (HSC) sector.

#### PROFINET functionality

PROFINET is the leading Industrial Ethernet Standard. PROFINET is based on tried and tested IT standards and fully supports TCP/IP – for company-wide data transfer across all levels. It also offers integrated diagnostics and fail-safe communication to ensure maximum plant availability, modular machine concepts for outstanding flexibility as well as very fast transfer rates and wireless LAN applications for significantly enhanced performance.

PROFINET IO is a communication concept for the implementation of modular, distributed applications. PROFINET IO is based on Industrial Ethernet and allows distributed field and I/O equipment to be connected to the NCU. 128 PROFINET IO devices can be operated as IO controllers.

The integrated PROFINET CBA (Component Based Automation) functionality for machine-to-machine communication allows users to technologically modularize machines and systems on a process-specific basis and benefit accordingly: Systems are easier to standardize and easier to reuse or extend. Response to customer demands is faster and more flexible and startup is simplified and speeded up by pretesting at component level.

### Function (continued)

#### System-wide openness

Thanks to openness across the HMI, CNC and PLC, users can apply their specific expertise such that they achieve exactly the individual control solution desired. SINUMERIK 840D sl offers to the supplier openness right down to the NCK level. This open architecture and the high computing performance of SINUMERIK 840D sl mean that CNC functions can be adapted to many different innovative machine kinematics flexibly, rapidly and cost-effectively. Additional technology-specific functions can be subsequently loaded as compile cycles.

#### Integrated safety functions

Integrated safety functions SINUMERIK Safety Integrated are available with SINUMERIK 840D sl. The safety functions comply with the requirements of Category 3 as well as Performance Level PL d according to DIN EN ISO 13849-1 and Safety Integrity Level SIL 2 according to DIN EN 61508. As a result, highly effective protection for personnel and machinery can be implemented simply, cost-effectively and practically.

### Integration

The following components can be connected to SINUMERIK 840D sl:

- SINUMERIK operator panel front with TCU, PCU 50.5, machine control panel, machine Push Button Panel
- SIMATIC CE panel, SIMATIC Thin Client Panels
- SINUMERIK handheld units
- Distributed PLC I/O via PROFIBUS DP or PROFINET IO
- SINUMERIK I/O module PP 72/48D PN
- SINUMERIK Analog Drive Interface for 4 axes ADI 4
- SINAMICS S120/SINAMICS S120 Combi drive system
- SIMOTICS feed and main spindle motors
- Probe systems  
(The use of high-precision probes such as those from Renishaw's Rengage range is recommended.)



### Overview



#### NCU 710.3 PN

The NCU 710.3 PN represents the first configuration level of the SINUMERIK 840D sl. Up to 8 axes are available in up to 4 machining channels which can be executed in up to 4 mode groups. Up to 8 axes/spindles are supported per channel. Interpolation is possible for a maximum of 8 axes with the CNC software for NCU (multi-axis interpolation option).

The basic version of the CNC user memory is 3 MB, and can be optionally expanded up to 9 MB.

#### NCU 720.3 PN

The NCU 720.3 PN represents the medium configuration level of the SINUMERIK 840D sl. Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 20 axes/spindles are supported per channel. Interpolation is possible for a maximum of 20 axes with the CNC software for NCU (multi-axis interpolation option).

The basic version of the CNC user memory is 3 MB, and can be optionally expanded up to 15 MB.

#### NCU 730.3 PN

The NCU 730.3 PN is the flagship of the SINUMERIK 840D sl, representing the highest configuration level within the SINUMERIK 840D sl Type 1B.

Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 20 axes/spindles are supported per channel. Interpolation is possible for a maximum of 20 axes with the CNC software for NCU (multi-axis interpolation option).

The basic version of the CNC user memory is 3 MB, and can be optionally expanded up to 15 MB.

# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

**NCU 7x0.3 PN**

### Technical specifications

|                                                             |                                                                                   |                                                                                   |                                                                                   |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK 840D sl;<br>NCU 710.3 PN<br>with PLC 317-3 PN/DP<br>6FC5371-0AA30-0AA1  | SINUMERIK 840D sl;<br>NCU 720.3 PN<br>with PLC 317-3 PN/DP<br>6FC5372-0AA30-0AA1  | SINUMERIK 840D sl;<br>NCU 730.3 PN<br>with PLC 317-3 PN/DP<br>6FC5373-0AA30-0AA1  |
| <b>RAM</b>                                                  | 1 GB DRAM;<br>1 MB NVSRAM                                                         | 1 GB DRAM;<br>1 MB NVSRAM                                                         | 1 GB DRAM;<br>1 MB NVSRAM                                                         |
| <b>SIMATIC S7 – integrated</b>                              | PLC 317-3 PN/DP                                                                   | PLC 317-3 PN/DP                                                                   | PLC 317-3 PN/DP                                                                   |
| <b>Input voltage</b>                                        | 24 V DC                                                                           | 24 V DC                                                                           | 24 V DC                                                                           |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | IP20                                                                              | IP20                                                                              | IP20                                                                              |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K3 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F) | Class 3K3 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F) | Class 3K3 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F) |
| <b>Relative atmospheric humidity</b>                        |                                                                                   |                                                                                   |                                                                                   |
| • Storage                                                   | 10 ... 95 %                                                                       | 10 ... 95 %                                                                       | 10 ... 95 %                                                                       |
| • Transport                                                 | 10 ... 95 %                                                                       | 10 ... 95 %                                                                       | 10 ... 95 %                                                                       |
| • Operation                                                 | ≤ 85 % over max. 2 months                                                         | ≤ 85 % over max. 2 months                                                         | ≤ 85 % over max. 2 months                                                         |
| <b>Ambient temperature</b>                                  |                                                                                   |                                                                                   |                                                                                   |
| • Storage                                                   | 25 ... +55 °C (77 ... +131 °F)                                                    | 25 ... +55 °C (77 ... +131 °F)                                                    | 25 ... +55 °C (77 ... +131 °F)                                                    |
| • Transport                                                 | 40 ... +70 °C (104 ... +158 °F)                                                   | 40 ... +70 °C (104 ... +158 °F)                                                   | 40 ... +70 °C (104 ... +158 °F)                                                   |
| • Operation                                                 | 0 ... 55 °C (32 ... 131 °F)                                                       | 0 ... 55 °C (32 ... 131 °F)                                                       | 0 ... 55 °C (32 ... 131 °F)                                                       |
| <b>Dimensions</b>                                           |                                                                                   |                                                                                   |                                                                                   |
| • Width                                                     | 50 mm (1.97 in)                                                                   | 50 mm (1.97 in)                                                                   | 50 mm (1.97 in)                                                                   |
| • Height                                                    | 418 mm (16.46 in)                                                                 | 418 mm (16.46 in)                                                                 | 418 mm (16.46 in)                                                                 |
| • Depth                                                     | 272 mm (10.7 in)                                                                  | 272 mm (10.7 in)                                                                  | 272 mm (10.7 in)                                                                  |
| <b>Weight, approx.</b>                                      | 3.8 kg (8.38 lb)                                                                  | 3.8 kg (8.38 lb)                                                                  | 4.4 kg (9.7 lb)                                                                   |
| <b>Approvals, according to</b>                              | CE, cULus                                                                         | CE, cULus                                                                         | CE, cULus                                                                         |

### Selection and ordering data

| Description                                                                                                            | Order No.                                              |
|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Hardware</b>                                                                                                        |                                                        |
| <b>NCU 710.3 PN</b><br>With PLC 317-3 PN/DP                                                                            | <b>6FC5371-0AA30-0AA1</b>                              |
| <b>NCU 720.3 PN</b><br>With PLC 317-3 PN/DP                                                                            | <b>6FC5372-0AA30-0AA1</b>                              |
| <b>NCU 730.3 PN</b><br>With PLC 317-3 PN/DP                                                                            | <b>6FC5373-0AA30-0AA1</b>                              |
| <b>Seal for external heat dissipation</b><br>(1 pack = 10 units)<br>For NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN     | <b>6FC5348-0AA07-0AA0</b>                              |
| <b>Numeric Control Extension NX10.3</b><br>Extension of drive control<br>for SINUMERIK 840D sl<br>up to 3 axes         | <b>6SL3040-1NC00-0AA0</b>                              |
| <b>Numeric Control Extension NX15.3</b><br>Extension of drive control<br>for SINUMERIK 840D sl<br>up to 6 axes         | <b>6SL3040-1NB00-0AA0</b>                              |
| <b>CNC user memory</b><br>Expanded by 2 MB each                                                                        | <b>6FC5800-0AD00-0YB0</b>                              |
| <b>PLC user memory</b><br>Expanded by 128 KB each                                                                      | <b>6FC5800-0AD10-0YB0</b>                              |
| <b>Software</b>                                                                                                        |                                                        |
| <b>HMI user memory</b><br>Additional on CF card of NCU,<br>software option<br>• Single License<br>without data carrier | <b>6FC5800-0AP12-0YB0</b>                              |
| <b>Accessories</b>                                                                                                     |                                                        |
| <b>CompactFlash Card</b><br>Blank<br>• 8 GB                                                                            | <b>6FC5313-6AG00-0AA0</b>                              |
| <b>Spacers</b><br>• For NCU 710.3 PN/NCU 720.3 PN<br>• For NCU 730.3 PN                                                | <b>6SL3064-1BB00-0AA0</b><br><b>6FC5348-0AA06-0AA0</b> |
| <b>Battery</b><br>For NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN                                                       | <b>6FC5247-0AA18-0AA0</b>                              |
| <b>Dual fan/battery module</b>                                                                                         | <b>6FC5348-0AA02-0AA0</b>                              |
| <b>Blanking cover</b><br>For NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN                                                | <b>6SL3064-3BB00-0AA0</b>                              |
| <b>Front cover</b><br>For NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN                                                   | <b>6FC5348-0AA30-0AA0</b>                              |

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Order No.                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Software</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                |
| <b>CNC software 31-3 with SINUMERIK Operate for NCU on CF card<sup>2)</sup></b><br>Languages:<br>Chinese Simplified, English,<br>French, German, Italian, Spanish<br><u>SINUMERIK 840DE sl (export):</u><br>• Specific software version<br>with Single License <sup>1)</sup><br>• Specific software version<br>without Single License <sup>1)</sup><br>• Single License<br>without data carrier<br><u>SINUMERIK 840D sl:</u><br>• Specific software version<br>with Single License <sup>1)</sup><br>• Specific software version<br>without Single License <sup>1)</sup><br>• Single License<br>without data carrier | <b>6FC5851-1YG ■ ■ - ■ YA0</b><br><b>6FC5851-1YG ■ ■ - ■ YA8</b><br><b>6FC5851-1YF00-0YB0</b><br><b>6FC5851-1XG ■ ■ - ■ YA0</b><br><b>6FC5851-1XG ■ ■ - ■ YA8</b><br><b>6FC5851-1XF00-0YB0</b> |
| <b>CNC software 31-3 with SINUMERIK Operate on DVD-ROM<sup>2)</sup></b><br>Languages:<br>Chinese Simplified, English,<br>French, German, Italian, Spanish<br><u>SINUMERIK 840DE sl (export):</u><br>• Specific software version<br>without Single License <sup>1)</sup><br>• Single License<br>without data carrier<br><u>SINUMERIK 840D sl:</u><br>• Specific software version<br>without Single License <sup>1)</sup><br>• Single License<br>without data carrier                                                                                                                                                 | <b>6FC5851-1YC ■ ■ - ■ YA8</b><br><b>6FC5851-1YF00-0YB0</b><br><b>6FC5851-1XC ■ ■ - ■ YA8</b><br><b>6FC5851-1XF00-0YB0</b>                                                                     |
| <b>Additional languages for the operating software SINUMERIK Operate<sup>2)</sup></b><br>On DVD-ROM<br>Languages:<br>Chinese Traditional, Czech,<br>Danish, Dutch, Finnish, Hungarian,<br>Japanese, Korean, Polish,<br>Portuguese/Brazilian, Russian,<br>Swedish, Turkish<br>• Specific software version<br>without Single License <sup>1)</sup>                                                                                                                                                                                                                                                                    | <b>6FC5860-1YC ■ ■ - ■ YA8</b>                                                                                                                                                                 |
| <b>Additional languages</b><br>Use of additional languages,<br>software option<br>• Single License<br>without data carrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>6FC5800-0AN00-0YB0</b>                                                                                                                                                                      |
| <b>SINUMERIK 840D sl Toolbox and Protector</b><br>Languages: English, German                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Supplied on the DVD-ROM<br>containing the CNC software<br>for NCU.                                                                                                                             |

Software options shown with an order code can be ordered in combination with the CNC software for NCU.

The possible software options are listed under Functions on page 2/22ff.

<sup>1)</sup> Example of specific software version of the CNC-SW 4.4 SP2:  
6FC5851-1YG40-2YA0

<sup>2)</sup> For available software releases, go to Industry Mall --> Configurator.



# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

### Ordering examples

#### Overview

##### Ordering as a bundle

Order using Order No. with order codes  
License key included in delivery

| Quantity | Order item                                     | Note                                                                                                                                                                                                                                                                                                                                                              |
|----------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | Item 1:<br>6FC5851-1YG40-1YA0-Z<br>M01+A03+C11 | SINUMERIK 840DE sl<br>CNC software 31-3 with<br>SINUMERIK Operate<br>for NCU on CF card<br>6 languages (Chinese Simplified,<br>German, English, French, Italian,<br>Spanish)<br>Export<br>Specific software version<br>4.4 SP1<br>Single License<br>Travel to fixed stop with<br>Force Control<br>3 x additional axis/spindle<br>1 x additional machining channel |

##### Explanation for Item 1

|   |                    |                                                                                                                                                                                                                                                  |
|---|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 6FC5851-1YG40-1YA0 | SINUMERIK 840DE sl<br>CNC software 31-3 with<br>SINUMERIK Operate for NCU<br>on CF card<br>6 languages (Chinese Simplified,<br>English, French, German, Italian,<br>Spanish)<br>Export<br>Specific software version<br>4.4 SP1<br>Single License |
|   | -Z                 | Followed by order codes:                                                                                                                                                                                                                         |
| 1 | M01                | Travel to fixed stop with<br>Force Control                                                                                                                                                                                                       |
| 3 | A03                | 3 x additional axis/spindle                                                                                                                                                                                                                      |
| 1 | C11                | 1 x additional machining channel                                                                                                                                                                                                                 |

##### Ordering individually

Ordering via complete order numbers.  
License key obtained over Internet

| Quantity | Order item                    | Note                                                                                                                                                                                                                                             |
|----------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | Item 1:<br>6FC5851-1YG40-1YA0 | SINUMERIK 840DE sl<br>CNC software 31-3 with<br>SINUMERIK Operate<br>for NCU on CF card<br>6 languages (Chinese Simplified,<br>English, French, German, Italian,<br>Spanish)<br>Export<br>Specific software version<br>4.4 SP1<br>Single License |
| 1        | Item 2:<br>6FC5800-0AM01-0YB0 | Travel to fixed stop with<br>Force Control                                                                                                                                                                                                       |
| 3        | Item 3:<br>6FC5800-0AA00-0YB0 | 3 x additional axis/spindle                                                                                                                                                                                                                      |
| 1        | Item 4:<br>6FC5800-0AC10-0YB0 | 1 x additional machining channel                                                                                                                                                                                                                 |

# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

### Numeric Control Extensions NX10.3/NX15.3

#### Overview



The NX10.3/NX15.3 Numeric Control Extensions are used with SINUMERIK 840D sl for applications with large numbers of axes. NX10.3/NX15.3 allows the drive-end computing performance for the SINAMICS drives within the SINUMERIK 840D sl to be increased.

The modules have the same design as the SINAMICS S120 components. With a width of only 25 mm (1 in), the modules are also ideal for installation in compact machines.

#### Function

The drive control is expanded modularly in steps of 3 or 6 additional servo axes by means of Numeric Control Extensions. Each NX10.3/NX15.3 component can control up to 3 additional servo axes and each NX15.3 component can control up to 6 additional servo axes.

The SINUMERIK 840D sl control handles coordinate transformation, motion control and PLC control for up to 31 axes, whereby the drive control for up to 6 servo axes is already integrated into the SINUMERIK 840D sl.

Data management for the NX10.3/NX15.3 components is located exclusively on the SINUMERIK 840D sl, making it much easier to replace components.

#### Integration

The following can be operated in an axis grouping with SINUMERIK 840D sl:

- Up to 2 NX10.3/NX15.3 components on the NCU 710.3 PN
- Up to 5 NX10.3/NX15.3 components on the NCU 720.3 PN/NCU 730.3 PN

The NX10.3/NX15.3 components are connected to the SINUMERIK 840D sl via DRIVE-CLiQ cables. This ensures that drive control remains high performant and clock synchronized. The communications interfaces on the SINUMERIK 840D sl remain available for other connections.

#### Technical specifications

| Product name                                       | Numeric Control Extension NX10.3<br>6SL3040-1NC00-0AA0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Numeric Control Extension NX15.3<br>6SL3040-1NB00-0AA0 |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Number of axes                                     | Up to 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Up to 6                                                |
| Rated voltage                                      | 24 V DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                        |
| • Permissible range                                | 20.4 ... 28.8 V DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                        |
| Current consumption at 24 V DC, typ. <sup>1)</sup> | 800 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                        |
| Starting current, typ.                             | 1.6 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                        |
| Digital inputs                                     | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                        |
| Digital inputs/outputs                             | 4 (parameterizable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                        |
| Degree of protection to EN 60529 (IEC 60529)       | IP20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                        |
| Humidity class                                     | <ul style="list-style-type: none"> <li>• Long-term storage in transport packaging<br/>Class 1K4 according to DIN EN 60721-3-1<br/>Temperature -25 ... +55 °C (-13 ... +131 °F)<br/>Relative/absolute humidity 10 ... 100 %/≤ 26 g/m<sup>3</sup></li> <li>• Transport<br/>Class 2K4 according to DIN EN 60721-3-2<br/>Temperature -40 ... +70 °C (-40 ... +158 °F)<br/>Relative/absolute humidity 5 ... 95 %/≤ 60 g/m<sup>3</sup></li> <li>• Operation<br/>Class 3K3 according to DIN EN 60721-3-3<br/>Temperature 0 ... 55 °C (32 ... 131 °F)<br/>Relative/absolute humidity 5 ... 90 %/≤ 25 g/m<sup>3</sup><br/>Oil vapor, salt vapor, icing, condensation, water drops, spray, splash and jets are not permitted.</li> </ul> |                                                        |
| Atmospheric pressure                               | 700 ... 1060 hPa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                        |
| Ambient temperature                                | <ul style="list-style-type: none"> <li>• Storage<br/>-25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport<br/>-40 ... +70 °C (-40 ... +158 °F)</li> <li>• Operation<br/>0 ... 55 °C (32 ... 131 °F)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                        |
| Dimensions                                         | <ul style="list-style-type: none"> <li>• Width<br/>25 mm (1 in)</li> <li>• Height<br/>414 mm (16.30 in)</li> <li>• Depth<br/>272 mm (10.7 in)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                        |
| Weight, approx.                                    | 2.58 kg (5.69 lb)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                        |
| Approvals, according to                            | cULus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                        |

#### Selection and ordering data

| Description                                                                                              | Order No.                 |
|----------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Numeric Control Extension NX10.3</b><br>Extension of drive control for SINUMERIK 840D sl up to 3 axes | <b>6SL3040-1NC00-0AA0</b> |
| <b>Numeric Control Extension NX15.3</b><br>Extension of drive control for SINUMERIK 840D sl up to 6 axes | <b>6SL3040-1NB00-0AA0</b> |

<sup>1)</sup> Ignoring digital inputs and DRIVE-CLiQ supply.

# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

### SINUMERIK COM01.3 module

#### Overview



With the SINUMERIK COM01.3 module an RS232C serial interface is available for the NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN. The COM interface has been designed in accordance with the ANSI/EIA/TIA-232-F-1997 standard.

#### Function

The NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN can be connected to a master computer, a PC/PG or a modem via the COM interface. A DNC link via the COM interface is also possible in addition to data input and output.

#### Integration

The SINUMERIK COM01.3 module can be used for the SINUMERIK 840D sl:

- NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN with CNC software version 4.4 SP1 or higher

The COM01.3 module is inserted in the option slot of the NCUs.

#### Technical specifications

|                                                     |                                                                                |
|-----------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Product name</b>                                 | SINUMERIK COM01.3 module<br>6FC5312-0FA01-1AA0                                 |
| <b>Input voltage</b>                                | Via NCU 710.3 PN/<br>NCU 720.3 PN/NCU 730.3 PN                                 |
| <b>Power consumption, max.</b>                      | 2 W                                                                            |
| <b>Degree of protection to EN 60529 (IEC 60529)</b> | IP20                                                                           |
| <b>Humidity class based on DIN EN 60721-3-3</b>     | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F) |
| <b>Ambient temperature</b>                          |                                                                                |
| • Storage                                           | -40 ... +70 °C (-40 ... +158 °F)                                               |
| • Transport                                         | -40 ... +70 °C (-40 ... +158 °F)                                               |
| • Operation                                         | 0 ... 55 °C (32 ... 131 °F)                                                    |
| <b>Dimensions</b>                                   |                                                                                |
| • Width                                             | 22.5 mm (0.89 in)                                                              |
| • Height                                            | 95 mm (3.74 in)                                                                |
| • Depth                                             | 130 mm (5.12 in)                                                               |
| <b>Weight, approx.</b>                              | 65 g (0.14 lb)                                                                 |

#### Selection and ordering data

| Description                                                                                                                             | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK COM01.3 module</b><br>Serial RS232C interface<br>for SINUMERIK 840D sl with<br>NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN. | <b>6FC5312-0FA01-1AA0</b> |

# SINUMERIK CNC

## SINUMERIK 840D sl Type 1B

### CBE30-2 communication module

2

#### Overview



The CBE30-2 communication module for NCU-Link can be used to set up NCU link communication between a number of NCU 710.3 PN/ NCU 720.3 PN/NCU 730.3 PN (Control Units) on the basis of the generally approved standard configuration.

#### Benefits

- Using the CBE30-2 communication module, it is possible to implement machines with more than 31 axes via NCU-Link
- Direct linking in the interpolation cycle means that NCUs can exchange data quickly
- Subordination of a physical axis to several different NCUs
- Cross-NCU interpolation
- An increase in the number of usable axes for an NCU grouping
- An increase in the number of channels for an NCU grouping

#### Design

- 100 Mbit/s full-duplex/autocrossing
- Integrated 4-port switch with four RJ45 sockets based on PROFINET
- Hardwiring for NCU-Link via port 1 (in) and port 2 (out)

#### Function

To support isochronous Ethernet communication for linking up to three NCUs (NCU-Link).

#### Technical specifications

|                                       |                                                    |
|---------------------------------------|----------------------------------------------------|
| <b>Product name</b>                   | CBE30-2 communication module<br>6FC5312-0FA00-2AA0 |
| <b>Current requirement at 24 V DC</b> | 0.25 A                                             |
| <b>Ambient temperature</b>            |                                                    |
| • Storage                             | -40 ... +70 °C (-40 ... +158 °F)                   |
| • Transport                           | -40 ... +70 °C (-40 ... +158 °F)                   |
| • Operation                           | 0 ... 55 °C (32 ... 131 °F)                        |
| <b>Dimensions</b>                     |                                                    |
| • Width                               | 25 mm (1 in)                                       |
| • Height                              | 95 mm (3.74 in)                                    |
| • Depth                               | 143 mm (5.63 in)                                   |
| <b>Weight, approx.</b>                | 0.1 kg (0.22 lb)                                   |
| <b>Approvals, according to</b>        | cULus                                              |

#### Selection and ordering data

| Description                                                                                                                                                                                                                                  | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>CBE30-2 communication module</b><br>SINUMERIK/<br>SIMOTION CBE30-2<br>communication module for<br>connecting<br>SIMOTION D4x5-2 DP/PN to<br>PROFINET IO and for<br>SINUMERIK NCU 710.3 PN/<br>NCU 720.3 PN/NCU 730.3 PN as<br>an NCU-Link | <b>6FC5312-0FA00-2AA0</b> |

#### More information

For more information about FastConnect RJ45 connectors and Industrial Ethernet cables, please refer to Catalog IK PI or visit the Siemens Industry Mall:  
[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

# SINUMERIK CNC

## SINUMERIK I/O

### SINUMERIK Analog Drive Interface for 4 axes ADI 4

#### Overview



The SINUMERIK ADI 4 Analog Drive Interface module for 4 axes can be used to operate up to 4 drives with analog setpoint interface.

#### Benefits

- Connection via PROFIBUS DP
- Motion control functionality (isochronous)

#### Design

- 4 inputs for incremental encoders (TTL signals) or optionally 4 inputs for absolute encoders (SSI interface)
- 4 analog outputs  $\pm 10$  V for the setpoint
- 4 relay contacts for drive enable of axes 1 to 4
- 10 digital outputs (4 general, 6 drive-specific)
- 10 digital drive-specific inputs
- Onboard status display via 4 diagnostics LEDs

To supply the module and digital outputs with power, an external voltage source (+24 V DC) is needed.

#### Integration

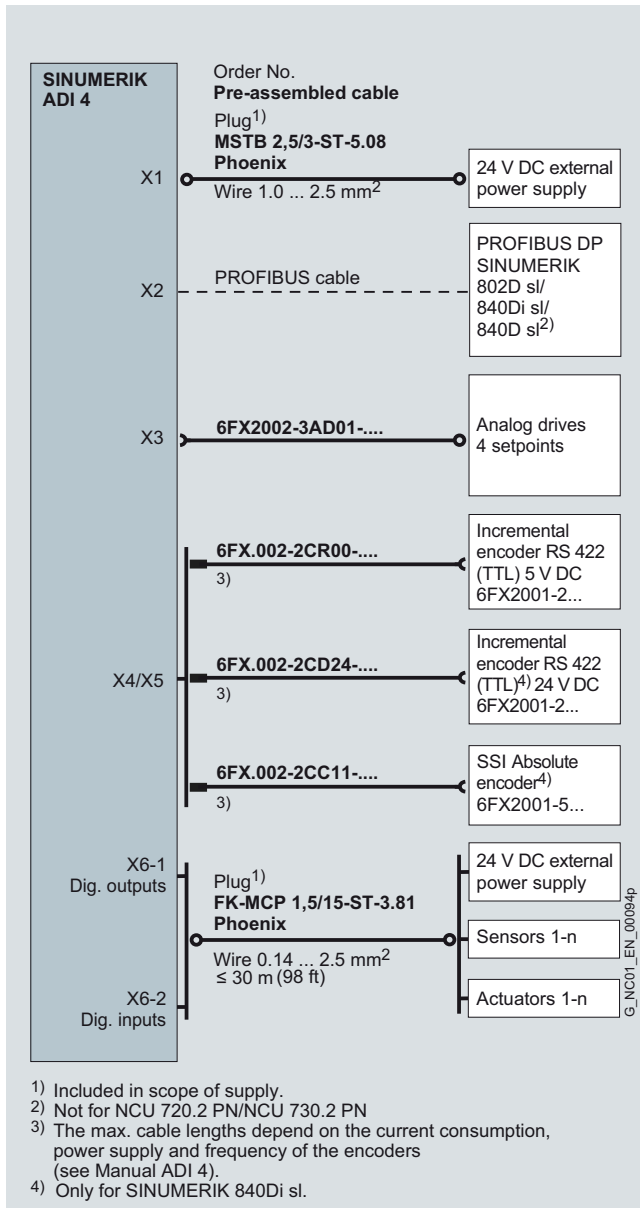
The ADI 4 Analog Drive Interface can be used for the SINUMERIK 840D sl control

Several ADI 4 Drive Interfaces can be connected to the SINUMERIK 840D sl, permitting analog control of all its axes. Mixed operation of digital drives and ADI 4 modules is possible, the axes can interpolate with one another.

##### Encoder connection:

- TTL incremental encoder with differential transfer
  - Track A and inverted signal A
  - Track B and inverted signal B
  - Zero signal and inverted zero signal
  - Output frequency max. 1.5 MHz
  - Phase shift of Track A to Track B:  $90^\circ \pm 30^\circ$
  - Power consumption max. 300 mA
- Absolute encoder with SSI signal
  - True and inverted output signal
  - Shift clock as true and inverted signal
  - Transmission frequency max. 750 kBaud
  - Power consumption max. 300 mA
  - Only multi-turn encoders are approved for this purpose
- Linear encoder with distance-coded zero marks/reference marks
  - LS 476 C
  - LS 186 C with external pulse-shaper electronics EXE
- Encoder with sin/cos signals can be connected via external pulse-shaper electronics EXE.

#### Integration (continued)



Connection overview for ADI 4

More information about cables can be found under MOTION-CONNECT connection systems.

#### Technical specifications

|                                                     |                                                                                                                                                                                                 |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                 | SINUMERIK Analog Drive Interface for 4 Axes ADI 4<br>6FC5211-0BA01-0AA4                                                                                                                         |
| <b>Input voltage</b>                                | 24 V DC                                                                                                                                                                                         |
| <b>Power consumption, max.</b>                      | 30.2 W                                                                                                                                                                                          |
| <b>Degree of protection to EN 60529 (IEC 60529)</b> | IP20                                                                                                                                                                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>     | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F)                                                                                                                  |
| <b>Relative atmospheric humidity</b>                | <ul style="list-style-type: none"> <li>Storage: 5 ... 95 % at 25 °C (77 °F)</li> <li>Transport: 5 ... 95 % at 25 °C (77 °F)</li> <li>Operation: 5 ... 95 % at 25 °C (77 °F)</li> </ul>          |
| <b>Ambient temperature</b>                          | <ul style="list-style-type: none"> <li>Storage: -20 ... +55 °C (-4 ... +131 °F)</li> <li>Transport: -40 ... +70 °C (-40 ... +158 °F)</li> <li>Operation: 0 ... 55 °C (32 ... 131 °F)</li> </ul> |
| <b>Dimensions</b>                                   | <ul style="list-style-type: none"> <li>Width: 48.5 mm (1.91 in)</li> <li>Height: 325 mm (12.8 in)</li> <li>Depth: 154.4 mm (6.08 in)</li> </ul>                                                 |
| <b>Weight, approx.</b>                              | 1.5 kg (3.31 lb)                                                                                                                                                                                |
| <b>Approvals, according to</b>                      | CE, cULus                                                                                                                                                                                       |

#### Selection and ordering data

| Description                                                                     | Order No.                 |
|---------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Analog Drive Interface for 4 axes ADI 4</b>                        | <b>6FC5211-0BA01-0AA4</b> |
| Interface module for operating up to 4 drives with an analog setpoint interface |                           |



# SINUMERIK CNC

## SINUMERIK I/O

### SINUMERIK PP 72/48D PN I/O module

#### Overview



The PP 72/48D PN I/O module is available in a digital variant with 72 inputs and 48 outputs and in a digital/analog variant PP 72/48D 2/2A PN with an additional 2 analog inputs and 2 analog outputs.

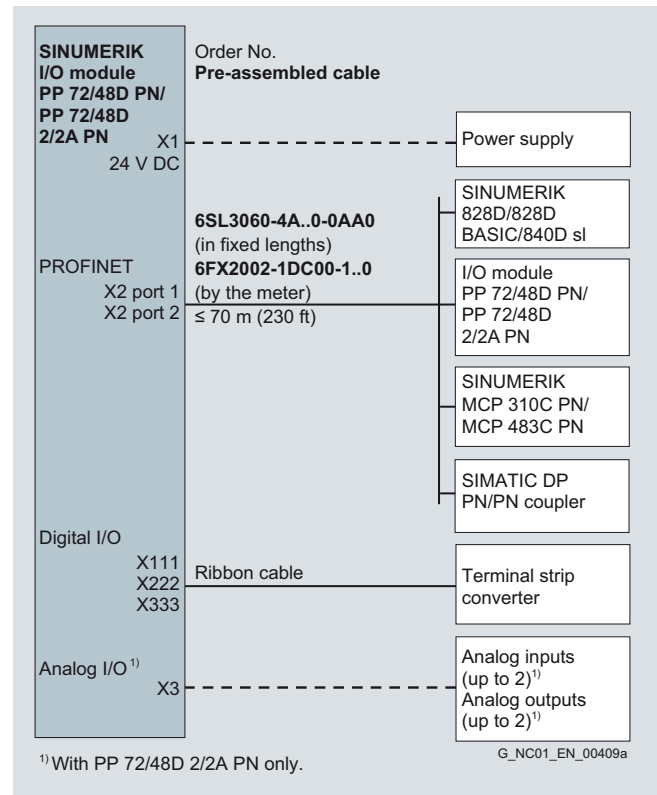
The I/O modules are connected to the CNC via a PROFINET-based I/O interface. The digital inputs and outputs are connected by means of three 50-pin ribbon cables. Terminal strip converters can be used or the direct connection of distribution boards, for example, is possible.

#### Benefits

- Simple connection via a PROFINET-based I/O interface
- Mounting plate for simple module installation in the control cabinet
- Automatic module detection by the CNC, no complex configuring required
- Simple connection of terminal strip converters to plug connectors
- Integrated 24 V DC power supply with electrical isolation between the inputs and outputs and PROFINET

#### Integration

The PP 72/48D PN and PP 72/48D 2/2A PN I/O modules can be used for the SINUMERIK 840D sl CNC.



#### Technical specifications

|                                                     |                                                         |                                                                                      |
|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Product name</b>                                 | SINUMERIK PP 72/48D PN I/O module<br>6FC5311-0AA00-0AA0 | SINUMERIK PP 72/48D 2/2A PN I/O module<br>6FC5311-0AA00-1AA0                         |
| <b>Input voltage</b>                                | DC 24 V + 20 %/- 15 %                                   | DC 24 V + 20 %/- 15 %                                                                |
| <b>Power consumption, max.</b>                      | 17 W                                                    | 19 W                                                                                 |
| <b>Digital I/Os</b>                                 | 72/48                                                   | 72/48                                                                                |
| • Connection system                                 | Connector acc. to MIL-C-83-503/DIN 41-651               | Connector acc. to MIL-C-83-503/DIN 41-651                                            |
| • Simultaneity factor of outputs                    | 100 % at $I_{out} = 250$ mA per output                  | 100 % at $I_{out} = 250$ mA per output                                               |
| <b>Analog inputs</b>                                | –                                                       | 2                                                                                    |
| • Connection system                                 | –                                                       | PHOENIX MINI COMBICON, spring cage connector, core cross-section 0.5 mm <sup>2</sup> |
| • Type of analog inputs                             | –                                                       | ± 10 V, 0 ... 10 V, ± 20 mA, 4 ... 20 mA, PT100                                      |
| • Resolution                                        | –                                                       | 16 bit including sign                                                                |
| <b>Analog outputs</b>                               | –                                                       | 2                                                                                    |
| • Connection system                                 | –                                                       | PHOENIX MINI COMBICON, spring cage connector, core cross-section 0.5 mm <sup>2</sup> |
| • Type of analog outputs                            | –                                                       | ± 10 V, ± 20 mA (max. 600 Ω)                                                         |
| • Resolution                                        | –                                                       | 16 bit, including sign                                                               |
| <b>Degree of protection to EN 60529 (IEC 60529)</b> | IP00                                                    | IP00                                                                                 |
| <b>Relative atmospheric humidity</b>                |                                                         |                                                                                      |
| • Storage                                           | 5 ... 95 % at 25 °C (77 °F)                             | 5 ... 95 % at 25 °C (77 °F)                                                          |
| • Transport                                         | 5 ... 95 % at 25 °C (77 °F)                             | 5 ... 95 % at 25 °C (77 °F)                                                          |
| • Operation                                         | 10 ... 80 % at 25 °C (77 °F)                            | 10 ... 80 % at 25 °C (77 °F)                                                         |
| <b>Ambient temperature</b>                          |                                                         |                                                                                      |
| • Storage                                           | -40 ... +70 °C (-40 ... +158 °F)                        | -40 ... +70 °C (-40 ... +158 °F)                                                     |
| • Transport                                         | -40 ... +70 °C (-40 ... +158 °F)                        | -40 ... +70 °C (-40 ... +158 °F)                                                     |
| • Operation                                         | 0 ... 55 °C (32 ... 131 °F)                             | 0 ... 55 °C (32 ... 131 °F)                                                          |
| <b>Dimensions</b>                                   |                                                         |                                                                                      |
| • Width                                             | 300 mm (11.81 in)                                       | 300 mm (11.81 in)                                                                    |
| • Height                                            | 150 mm (5.91 in)                                        | 150 mm (5.91 in)                                                                     |
| • Depth                                             | 35 mm (1.38 in)                                         | 35 mm (1.38 in)                                                                      |
| <b>Weight, approx.</b>                              | 0.9 kg (1.98 lb)                                        | 0.9 kg (1.98 lb)                                                                     |

#### Selection and ordering data

| Description                                                                                                                             | Order No.                 | Description                                                                                                             | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK PP 72/48D PN I/O module</b><br>72 digital inputs and<br>48 digital outputs                                                 | <b>6FC5311-0AA00-0AA0</b> | <b>Accessories</b>                                                                                                      |                           |
| <b>SINUMERIK PP 72/48D 2/2A PN I/O module</b><br>72 digital inputs and<br>48 digital outputs<br>2 analog inputs and<br>2 analog outputs | <b>6FC5311-0AA00-1AA0</b> | <b>Terminal strip converter</b><br>50-pin                                                                               | <b>6EP5406-5AA00</b>      |
|                                                                                                                                         |                           | <b>Cable set</b><br>Ribbon cable 50-pin,<br>length 6 m (236.22 in),<br>8 insulation displacement<br>connectors 50-pin   | <b>6EP5306-5BG00</b>      |
|                                                                                                                                         |                           | <b>DRIVE-CLiQ signal cable, pre-assembled</b><br>For PROFINET connection<br>Connector with degree of<br>protection IP20 |                           |
|                                                                                                                                         |                           | • In exact meter lengths <sup>1)</sup>                                                                                  | <b>6FX2002-1DC00-1..0</b> |
|                                                                                                                                         |                           | • In fixed lengths <sup>1)</sup>                                                                                        | <b>6SL3060-4A..0-0AA0</b> |

<sup>1)</sup> For length code, see MOTION-CONNECT connection systems.

# SINUMERIK CNC

## SIMATIC I/O

### SIMATIC ET 200 distributed I/O

#### Overview

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#### **SIMATIC ET 200 – offers the right solution for every application**

SIMATIC ET 200 offers a broad range of distributed I/O systems – for solutions in the control cabinet or without a control cabinet directly at the machine and for applications in hazardous areas. Thanks to their modular design, ET 200 systems are easy to scale and expand in small steps. Ready integrated add-on modules reduce costs while at the same time offering extremely diverse application potential. A huge range of different combinations can be selected: Digital and analog inputs/outputs, intelligent modules with CPU functionality, safety systems, motor starters, pneumatic systems, frequency converters and a variety of technology modules (e.g. for counting and positioning tasks).

The communication via PROFIBUS and PROFINET, the uniform engineering, the user-friendly diagnostic tools and the optimum interfacing with SIMATIC controllers and HMI equipment are all proof of the unique consistency of the Totally Integrated Automation.

#### **PROFIBUS**

PROFIBUS is the international standard (IEC 61158/61784) for the field level. It is the only fieldbus to allow communication both in manufacturing applications and in process-oriented applications.

PROFIBUS is used to connect field devices such as distributed I/O devices or drives, to automation systems such as SIMATIC S7, SIMOTION, SINUMERIK or PCs.

PROFIBUS is standardized in accordance with IEC 61158 and is a powerful, open and rugged fieldbus system with short response times. PROFIBUS is available in different forms for various applications.

#### **PROFIBUS DP (distributed I/O)**

PROFIBUS DP is used for connecting distributed field devices, e.g. SIMATIC ET 200 or drives with extremely fast response times. PROFIBUS DP is used when sensors/actuators are distributed at the machine or in the plant (e.g. field level).

#### **PROFINET**

PROFINET is the open, cross-vendor Industrial Ethernet standard (IEC 61158/61784) for automation.

Based on Industrial Ethernet, PROFINET enables direct communication between field devices (IO devices) and controllers (IO controllers), up to and including the solution of isochronous drive controls for motion control applications.

As PROFINET is based on Standard Ethernet according to IEEE 802.3, any devices from the field level to the management level can be connected.

In this way, PROFINET enables system-wide communication, supports plant-wide engineering and applies IT standards, such as Webserver or FTP, right down to field level. Tried and tested fieldbus systems, such as PROFIBUS or AS-Interface, can be easily integrated without any modification to the existing devices.

#### **More information**

Further information is provided:

- In Catalog ST 70
- In the Siemens Industry Mall: [www.siemens.com/industrymall](http://www.siemens.com/industrymall)
- On the Internet at: [www.siemens.com/simatic](http://www.siemens.com/simatic)

# SINUMERIK CNC

## Supplementary components

### SITOP power supply Stabilized power supply units

#### Overview

##### Stabilized power supply units



The 24 V power supply from the SITOP range are optimized for industrial use and operate on the switched-mode principle. Due to the precisely regulated output voltage, the devices are even suitable for the connection of sensitive sensors. Different versions are available depending on the output current and field of application. In some cases, functional expansion is possible with add-on modules. For example, for back-up in the event of long supply system outages, DC UPS modules 6 A, 15 A and 40 A are available with external back-up by rechargeable batteries and maintenance-free SITOP UPS500 with capacitor technology. 48 V power supplies have been added to the SITOP product range.

The SITOP PSU400M power supply unit with 600 V DC input is suitable for use on frequency converters as an efficient DC/DC converter.

It converts the DC link voltage to a stabilized 24 V DC thus allowing, for example, specific emergency retraction movements to be performed in the event of a mains failure. This is possible because the control system and the drive electronics continue to receive a power supply for as long as there is sufficient energy stored in the DC link.

The wide DC input range (200 V to 900 V DC) and the high efficiency level of up to 96 % ensure efficient use of the DC link energy. The compact, rail-mounted device is versatile in its application thanks to its high overload capability with 50 % extra power for 5 s/min, its comprehensive range of functions and its rugged construction. The selectable ON delay which ensures that the converter's DC link is not loaded immediately during starting is one of the features that makes it ideal for operation on SINAMICS frequency converters.

#### Benefits

- High level of efficiency  
The efficiency of up to 96 % keeps the current consumption low and the control cabinet cool.
- Easy installation  
The low weight and mounting accessories support fast and therefore low-cost installation.
- Low space requirements  
The high power ratio means that the devices only require minimal space in the control cabinet and in the machines.
- Accurate output voltage  
The output voltage of 24 V DC remains accurate even under conditions of extreme voltage variation. The loads are protected from overvoltage spikes which lengthens the lifetime and reduces downtimes.
- Low residual ripple  
The low residual ripple of < 0.4 % supports voltage-sensitive loads.
- Integrated short-circuit protection  
No additional protection of the cables in the 24 V DC circuit is required.
- Safety isolation  
The UA output is electrically isolated from the input (output voltage SELV acc. to EN 60950). Dangerous voltages cannot arise due to electrical isolation at the output.
- Meets the requirements of national and international standards, e.g.:
- CE marking in accordance with 89/336 EEC und 73/23 EEC
- UL/cUL (CSA) approval
- FM approval (Factory Mutual)
- Marine approval
- No release of silicon

#### More information

Further information is provided:

- In Catalog KT 10.1
- In the Siemens Industry Mall:  
[www.siemens.com/industrymall](http://www.siemens.com/industrymall)
- On the Internet at: [www.siemens.com/sitop](http://www.siemens.com/sitop)

# SINUMERIK CNC

## SINUMERIK Safety Integrated

2

### Overview



SINUMERIK Safety Integrated provides integrated safety functions that support the implementation of highly effective personnel and machine protection. The safety functions comply with the requirements of Category 3 as well as Performance Level PL d according to DIN EN ISO 13849-1 and Safety Integrity Level SIL 2 according to DIN EN 61508. Consequently, important functional safety requirements can be implemented easily and economically. The range of functions includes, for example:

- Functions for safety monitoring of velocity and standstill
- Functions for establishing safe boundaries in work spaces and protected spaces, and for range recognition
- Direct connection of all safety-related signals and their internal logical linkage

### Benefits

- High level of safety:  
Complete implementation of the safety functions in Category 3/SIL 2/PL d
- High level of flexibility:  
Supports the implementation of practically sound safety and operating concepts
- Extremely cost-effective:  
Reduced hardware and installation costs
- Enhanced availability:  
Absence of interference-susceptible electromechanical switching elements

### Function

The safety functions are available in all modes and can communicate with the process using safety-related input/output signals.

They can be implemented for each individual axis and spindle:

#### **Safety Integrated (system-integrated, option)**

- Safe shutdown  
Ensures safe transition of the drive from motion to rest when a monitoring device or a sensor (e.g. a light barrier) is triggered.
- Safe braking ramp (SBR)  
Monitoring of the speed curve. The speed must be reduced after a stop request has been issued
- Safe operating stop (SBH)  
Monitors drives for standstill. The drives remain fully functional in position control
- Safe standstill (SH)  
Suppression of drive pulses, providing safe electronic interruption of the power supply
- Safely limited speed (SLS)  
Monitoring of configurable speed limits
- Safety-related output  $n < n_x$   
Safe speed recognition of a drive
- Safe software limit switch (SE)  
Variable travel limitations
- Safe software cams (SN)  
Range recognition
- Safety-related input/output signals (SGE/SGA)  
Interface with process
- Safe programmable logic (SPL)  
Direct connection of all safety-related signals and their internal logical linkage
- Safe brake management (SBM)  
- 2-channel braking signal (integrated in the Motor Module) (SBC)  
- Cyclic brake test (SBT)
- Safety-related communication via standard bus  
- Connection of distributed I/O for process and safety signals via PROFIBUS/PROFINET using the PROFIsafe protocol  
- Safety-related CPU – CPU communication via PROFIBUS or PROFINET
- Integrated acceptance test  
Partially automated acceptance test for all safety-relevant functions. Simple operation of the test process, automatic configuration of Trace functions and automatic generation of an acceptance record

#### **Safety Integrated (drive-based, basic version)**

- Safe Torque Off (STO)  
Suppression of drive pulses, providing safe electronic interruption of the power supply
- Safe Brake Control (SBC)  
Safe (two-channel) control of a holding brake (integrated in the Motor Module)
- Safe Stop 1 (SS1)  
Safe stopping of the drive followed by STO

### Integration

Preconditions:

- SINUMERIK 840D sl
- SINAMICS S120 booksize format
- The encoder systems used must meet the requirements of SINUMERIK Safety Integrated.
- The measuring circuit cables must comply with the SINAMICS S120 specification.
- Sensor/actuator integration with PROFIsafe I/Os
- Fail-safe modules
  - SIMATIC ET 200M
  - SIMATIC ET 200S
  - SIMATIC ET 200eco
  - SIMATIC ET 200pro
  - DP/AS-i F-Link
- SIMATIC S7 F Configuration Pack available as a download at: <http://support.automation.siemens.com/WW/view/de/15208817?Datakey=25536344>
- For the integrated acceptance test
  - SinuCom NC software tool (can run on PC/PG)

### Selection and ordering data

| Description                                                                                                                     | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Safety Integrated for SINUMERIK 840D sl</b>                                                                        |                           |
| • SINUMERIK SI Basic (incl. 1 axis/spindle; up to 4 inputs and up to 4 outputs can be used for safe programmable logic)         | <b>6FC5800-0AM63-0YB0</b> |
| • SINUMERIK SI Comfort (including 1 axis/spindle; up to 64 inputs and up to 64 outputs can be used for safe programmable logic) | <b>6FC5800-0AM64-0YB0</b> |
| • SINUMERIK SI axis/spindle package (extra for each additional axis/spindle)                                                    | <b>6FC5800-0AC70-0YB0</b> |
| • SINUMERIK SI axis/spindle package (further additional 15 axes/spindles)                                                       | <b>6FC5800-0AC60-0YB0</b> |

Only one SI Basic and one SI Comfort option can be ordered for each SINUMERIK 840D sl NCU. If a machine with Safety Integrated requires up to 4 safe inputs and 4 safe outputs, the SI Basic option can be ordered. If 5 or more safe inputs/outputs are required, the SI Comfort option should be ordered.

#### Ordering example 1:

The machine has 2 axes and 1 spindle, which are to be monitored by Safety Integrated. 4 safe inputs and 3 safe outputs are required. The following options must be ordered:

| Quantity | Order item         | Note            |
|----------|--------------------|-----------------|
| 1        | 6FC5800-0AM63-0YB0 | SI Basic        |
| 2        | 6FC5800-0AC70-0YB0 | SI axis/spindle |

#### Ordering example 2:

The machine has 5 axes and one spindle, which are to be monitored by Safety Integrated. 9 safe inputs and 5 safe outputs are required. The following options must be ordered:

| Quantity | Order item         | Note            |
|----------|--------------------|-----------------|
| 1        | 6FC5800-0AM64-0YB0 | SI Comfort      |
| 5        | 6FC5800-0AC70-0YB0 | SI axis/spindle |

### More information

The Safety Integrated functions of the SINUMERIK are generally certified by independent institutes. An up-to-date list of certified components is available on request from your local Siemens office. If you have any questions relating to certifications that have not been completed, please ask your Siemens contact.

#### Encoder systems

If you require information about the use of suitable encoder systems with SINUMERIK Safety Integrated, please contact your local Siemens office.



# SINUMERIK CNC

## Tools

### SIMATIC STEP 7 for SINUMERIK

#### Overview

The SIMATIC STEP 7 software for service functions can be used to read status and service displays of the CPU via the PLC program without the need for an additional programming device, and to integrate new modules.

The software is designed for service functions. The conditions of the SINUMERIK supply contract apply.

Existing service packs for SIMATIC STEP 7 are released separately for STEP 7 on SINUMERIK PCU.

#### Integration

SIMATIC STEP 7 V5.5 SP1 can be used on the SINUMERIK PCU 50.5.

Preconditions:

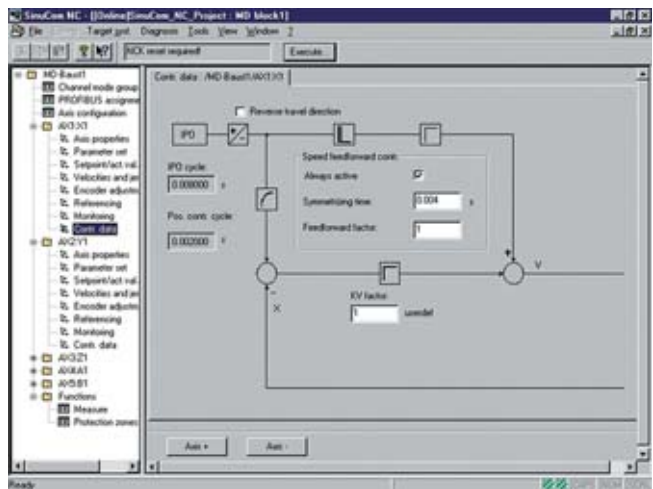
- Mouse and PC keyboard
- SINUMERIK PCU 50.5 with PCU-Basesoftware, version 1.2 or higher

#### Selection and ordering data

| Description                                                           | Order No.                 |
|-----------------------------------------------------------------------|---------------------------|
| <b>SIMATIC STEP 7 for SINUMERIK</b>                                   |                           |
| • Single License, without data carrier                                | <b>6FC5252-0AY00-0AG1</b> |
| • Single License with CD-ROM, current software version                | <b>6FC5252-0AY00-0AG0</b> |
| • Single License with CD-ROM, specific software version <sup>1)</sup> | <b>6FC5252-AY01-AG0</b>   |

### SinuCom

#### Overview



The SinuCom program package consists of:

- SinuCom NC
  - SinuCom NCTrace
  - SinuCom NC SI
- SinuCom FFS
- SinuCom CFS
- SinuCom ARC
- Commissioning software for SINAMICS S120/ SIMODRIVE 611 digital

The SinuCom program package supports simple and effective commissioning of control systems. The programs provide comprehensive support to commissioning and service personnel of machine manufacturers for the following:

- Commissioning of the machine including utilization of the trace functionality, for the Safety Integrated acceptance test
- Creation of CF Card images
- Administration of data for series start-up
- Transmission of CNC user data
- Know-how protection – guard technological knowledge against unauthorized access

#### Function

##### SinuCom NC

The SinuCom NC program facilitates commissioning of control systems by providing:

- Dialog-based parameterization of machine data
- Administration of data for series start-up
- Integrated online help for functions, machine data and alarms
- Functional description in German and English as PDF (part of the online Help)

##### SinuCom Trace

The SinuCom NC Trace function permits the dynamic recording of CNC, PLC and HMI variables and of drive signals that are available via the CNC. These variables can be displayed, printed out or stored in a file, similar to using an oscilloscope or logic analyzer. The SinuCom NC Trace function helps with:

- Fault detection and fault correction
- Machine performance analysis, benchmarking and tuning
- Process performance analysis, benchmarking and tuning

<sup>1)</sup> Example of specific software version, e.g., 5.5: 6FC5252-5....-5...

### Function (continued)

#### Preconditions:

- HMI-Advanced, version 6.3.15 or higher (variables of the CNC, PLC, HMI and drive)
- HMI-Advanced, software version 7.1 or higher
- Mouse

#### SinuCom NC SI

The SinuCom NC SI function supports the machine manufacturer in automating the Safety Integrated acceptance test, and optimizes the process:

- Verification of machines according to the EC Machinery Directive
- Testing of safety functions (partly automated) during the machine acceptance
- Logging of measured data and test results incl. trace functions records
- Testing of single/special-purpose machines, machine components (as a partial test) and series machines as a series commissioning process
- Faster commissioning because, in the new acceptance mode, power-on alarms during the acceptance test are acknowledged by RESET
- Simple operator control using prompted sequences
- Automatic configuration of the trace functions
- Unambiguous quality verification for equipment manufacturers and final customers, and for dealings with government agencies

#### Preconditions:

- HMI-Advanced, software version 6.3.15 or higher
- HMI-Advanced, software version 7.1 or higher
- Mouse

#### SinuCom CFS

The SinuCom CFS program can be used to generate an image in Ext3 format for the CF card of the NCU of the SINUMERIK 840D sl. It contains:

- Preparing the image for programming the CF card
- Integrated help

#### Preconditions:

- SINUMERIK 840D sl

When copying the software, make sure that you comply with the I DT software marketing guidelines.

#### SinuCom ARC

The SinuCom ARC program simplifies the processing of series startup data:

- Reading, deleting, inserting and changing of data for series startup
- Integrated help

#### Commissioning software for SINAMICS S120/SIMODRIVE 611 digital

The commissioning software for PC/PG permits optimized commissioning of drives with SINAMICS S120/SIMODRIVE 611 digital if no HMI-Advanced operating software is available.

### Integration

| Product name                 | SINUMERIK |         |      | Windows |                   |
|------------------------------|-----------|---------|------|---------|-------------------|
|                              | 840D      | 840D sl | 828D | XP      | 7 (32-bit 64-bit) |
| Commissioning tool S120/611D | ○         | ○       | ○    | ○       | ○                 |
| SinuCom NC                   | ○         | ○       | -    | ○       | ○                 |
| SinuCom NC Trace             | ○         | ○       | -    | ○       | ○                 |
| SinuCom NC SI                | ○         | -       | -    | ○       | ○                 |
| SinuCom FFS                  | ○         | -       | -    | ○       | ○                 |
| SinuCom CFS                  | -         | ○       | -    | ○       | ○                 |
| SinuCom ARC                  | ○         | ○       | -    | ○       | ○                 |

○ = possible

### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                                                          | Order No.                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>SinuCom Commissioning / service tools</b> <ul style="list-style-type: none"> <li>• SinuCom NC, including               <ul style="list-style-type: none"> <li>- SinuCom NC Trace</li> <li>- SinuCom NC SI</li> </ul> </li> <li>• SinuCom FFS</li> <li>• SinuCom CFS</li> <li>• SinuCom ARC</li> </ul> Languages:<br>English, French, German, Italian, Spanish<br>Documentation:<br>English/German |                            |
| • Single License, without data carrier                                                                                                                                                                                                                                                                                                                                                               | <b>6FC5250-0AY00-0AG1</b>  |
| • Single License on DVD-ROM, current software version                                                                                                                                                                                                                                                                                                                                                | <b>6FC5250-0AY00-0AG0</b>  |
| • Single License on DVD-ROM specific software version <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                  | <b>6FC5250-7AY00-■ AG0</b> |
| • Software Update Service                                                                                                                                                                                                                                                                                                                                                                            | <b>6FC5250-0AY00-0AG2</b>  |
| • Update on order on DVD-ROM, specific software version <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                | <b>6FC5250-7AY00-■ AG3</b> |

<sup>1)</sup> Example of specific software version, e.g. 7.6:  
6FC5250-7AY00-6...

# SINUMERIK CNC

## Functions

### Control structure and configuration

#### Overview table

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.<br><br>Type<br>(for complete<br>Order No., see notes) | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               |                                                                 |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                                 |            |           |         |
| <b>Control structure and configuration</b>                                                                                                                         |                                                               |                                                                 |            |           |         |
| SINUMERIK 840D sl BASIC:                                                                                                                                           |                                                               |                                                                 |            |           |         |
| • NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                                 |            | ○         | ○       |
| SINUMERIK 840D sl:                                                                                                                                                 |                                                               |                                                                 |            |           |         |
| • NCU 710.3 PN with PLC 317-3PN/DP                                                                                                                                 |                                                               | 6FC5371-0AA30-0AA1                                              |            | ○         | ○       |
| • NCU 720.3 PN with PLC 317-3PN/DP                                                                                                                                 |                                                               | 6FC5372-0AA30-0AA1                                              |            | ○         | ○       |
| • NCU 730.3 PN with PLC 317-3PN/DP                                                                                                                                 |                                                               | 6FC5373-0AA30-0AA1                                              |            | ○         | ○       |
| • Seal for external cooling of NCUs                                                                                                                                |                                                               | 6FC5348-0AA07-0AA0                                              |            | ○         | ○       |
| • Numeric Control Extension NX10.3                                                                                                                                 |                                                               | 6SL3040-1NC00-0AA0                                              |            | ○         | ○       |
| • Numeric Control Extension NX15.3                                                                                                                                 |                                                               | 6SL3040-1NB00-0AA0                                              |            | ○         | ○       |
| • Maximum configuration NX:                                                                                                                                        |                                                               |                                                                 |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                                 |            | –         | –       |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 3         | 3       |
| - NCU 720.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 5         | 5       |
| - NCU 730.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 5         | 5       |
| • Maximum configuration NCU + NX + CU3x0-2                                                                                                                         |                                                               |                                                                 |            |           |         |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 9         | 9       |
| - NCU 720.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 13        | 13      |
| - NCU 730.3 PN                                                                                                                                                     |                                                               |                                                                 |            | 15        | 15      |
| • Maximum configuration CU3x0-2                                                                                                                                    |                                                               |                                                                 |            |           |         |
| - NCU 710.3 PN                                                                                                                                                     | x = no. of NX.                                                |                                                                 |            | 8-x       | 8-x     |
| - NCU 720.3 PN                                                                                                                                                     | x = no. of NX.                                                |                                                                 |            | 12-x      | 12-x    |
| - NCU 730.3 PN                                                                                                                                                     | x = no. of NX.                                                |                                                                 |            | 14-x      | 14-x    |
| • COM01.3 module                                                                                                                                                   | As an alternative to CBE30-2.                                 | 6FC5312-0FA01-1AA0                                              |            | ○         | ○       |
| • CBE30-2 PROFINET module                                                                                                                                          | As an alternative to COM01.3.                                 | 6FC5312-0FA00-2AA0                                              |            | ○         | ○       |
| Software for<br>SINUMERIK NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN:                                                                                                  |                                                               |                                                                 |            |           |         |
| • CNC software 31-3 with SINUMERIK Operate,<br>export version, on CF card, with license                                                                            |                                                               | 6FC5851-1YG...-YA0                                              |            | ○         | –       |
| • CNC software 31-3 with SINUMERIK Operate,<br>on CF card, with license                                                                                            |                                                               | 6FC5851-1XG...-YA0                                              |            | –         | ○       |
| • CNC software 31-3 with SINUMERIK Operate,<br>export version, on CF card, without license                                                                         |                                                               | 6FC5851-1YG...-YA8                                              |            | ○         | –       |
| • CNC software 31-3 with SINUMERIK Operate,<br>on CF card, without license                                                                                         |                                                               | 6FC5851-1XG...-YA8                                              |            | –         | ○       |
| • CNC software 31-3 with SINUMERIK Operate,<br>export version, on DVD, without license                                                                             |                                                               | 6FC5851-1YC...-YA8                                              |            | ○         | –       |
| • CNC software 31-3 with SINUMERIK Operate,<br>on DVD, without license                                                                                             |                                                               | 6FC5851-1XC...-YA8                                              |            | –         | ○       |
| • CNC software 31-3 with SINUMERIK Operate,<br>export version, license                                                                                             |                                                               | 6FC5851-1YF00-0YB0                                              |            | ○         | –       |
| • CNC software 31-3 with SINUMERIK Operate, license                                                                                                                |                                                               | 6FC5851-1XF00-0YB0                                              |            | –         | ○       |
| • CNC software 31-3 with SINUMERIK Operate,<br>export version, software update service, without license                                                            |                                                               | 6FC5851-1YP00-0YL8                                              |            | ○         | –       |
| • CNC software 31-3 with SINUMERIK Operate,<br>software update service, without license                                                                            |                                                               | 6FC5851-1XP00-0YL8                                              |            | –         | ○       |

### Control structure and configuration

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| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                |            |           |         |
| <b>Control structure and configuration (continued)</b>                                                                                                             |                                                               |                                                |            |           |         |
| Channels/mode groups:                                                                                                                                              |                                                               |                                                |            | 1         | 1       |
| • Maximum configuration                                                                                                                                            |                                                               |                                                |            |           |         |
| - CNC software 31-3                                                                                                                                                |                                                               |                                                |            | 10        | 10      |
| - NCU 710.3 PN/NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                  |                                                               |                                                |            | 4         | 4       |
| - NCU 720.3 PN/NCU 730.3 PN                                                                                                                                        |                                                               |                                                |            | 10        | 10      |
| • Mode group, each additional                                                                                                                                      |                                                               | 6FC5800-0AC00-0YB0                             | C01...C09  | ○         | ○       |
| • Machining channel, each additional                                                                                                                               |                                                               | 6FC5800-0AC10-0YB0                             | C11...C19  | ○         | ○       |
| CNC user memory (buffered) for programs and OEM cycles in MB                                                                                                       |                                                               |                                                |            | 3         | 3       |
| CNC user memory, maximum configuration:                                                                                                                            |                                                               |                                                |            |           |         |
| • NCU 710.3 PN                                                                                                                                                     |                                                               |                                                |            | 9         | 9       |
| • NCU 720.3 PN/NCU 730.3 PN                                                                                                                                        |                                                               |                                                |            | 15        | 15      |
| CNC user memory, expansion by increments of 2 MB                                                                                                                   |                                                               | 6FC5800-0AD00-0YB0                             | D01...D06  | ○         | ○       |
| HMI user memory, additional 2 GB on CF card of NCU                                                                                                                 | Not in combination with PCU.                                  | 6FC5800-0AP12-0YB0                             | P12        | ○         | ○       |
| Axes/spindles or positioning axes/auxiliary spindle                                                                                                                |                                                               |                                                |            | ●         | ●       |
| CNC software 31-3:                                                                                                                                                 |                                                               |                                                |            | 3         | 3       |
| • Maximum configuration of axes:                                                                                                                                   |                                                               |                                                |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                |            | 6         | 6       |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                |            | 8         | 8       |
| - NCU 720.3 PN/NCU 730.3 PN                                                                                                                                        |                                                               |                                                |            | 31        | 31      |
| • Maximum configuration of spindles:                                                                                                                               |                                                               |                                                |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                |            | 3         | 3       |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                |            | 8         | 8       |
| - NCU 720.3 PN/NCU 730.3 PN                                                                                                                                        |                                                               |                                                |            | 31        | 31      |
| • Configuration per channel axes incl. spindles:                                                                                                                   |                                                               |                                                |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                |            | 6         | 6       |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                |            | 8         | 8       |
| - NCU 720.3 PN/NCU 730.3 PN                                                                                                                                        |                                                               |                                                |            | 20        | 20      |
| Axis/spindle, each additional                                                                                                                                      |                                                               | 6FC5800-0AA00-0YB0                             | A01...A28  | ○         | ○       |
| Positioning axis/auxiliary spindle, each additional                                                                                                                |                                                               | 6FC5800-0AB00-0YB0                             | B01...B28  | ○         | ○       |
| Multi-axis package (expansion to 31 axes/spindles and 10 channels)                                                                                                 |                                                               | 6FC5800-0AM10-0YB0                             | M10        | ○         | ○       |
| PLC-controlled axis                                                                                                                                                |                                                               |                                                |            | ●         | ●       |
| PLC positioning axis via PROFIBUS DP:                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| • Maximum configuration axes/spindles, numerically and PLC-controlled:                                                                                             |                                                               |                                                |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               |                                                               |                                                |            | 15        | 15      |
| - NCU 710.3 PN                                                                                                                                                     |                                                               |                                                |            | 15        | 15      |
| - NCU 720.3 PN                                                                                                                                                     |                                                               |                                                |            | 40        | 40      |
| - NCU 730.3 PN                                                                                                                                                     |                                                               |                                                |            | 50        | 50      |

# SINUMERIK CNC

## Functions

### Control structure and configuration Drives

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| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line) | Order No.                                                                                                                        | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                         | Type<br>(for complete Order No., see notes)                                                                                      |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                         |                                                                                                                                  |            |           |         |
| <b>Control structure and configuration (continued)</b>                                                                                                             |                                                         |                                                                                                                                  |            |           |         |
| • Maximum configuration axes/spindles PLC-controlled                                                                                                               | No CNC option axis/spindle required.                    |                                                                                                                                  |            |           |         |
| - NCU 710.3 PN + SINAMICS S120 Combi                                                                                                                               | Max. 15 minus numerically controlled axes/spindles.     |                                                                                                                                  |            | 9...15    | 9...15  |
| - NCU 710.3 PN                                                                                                                                                     | Max. 15 minus numerically controlled axes/spindles.     |                                                                                                                                  |            | 7...15    | 7...15  |
| - NCU 720.3 PN                                                                                                                                                     | Max. 40 minus numerically controlled axes/spindles.     |                                                                                                                                  |            | 9...40    | 9...40  |
| - NCU 730.3 PN                                                                                                                                                     | Max. 50 minus numerically controlled axes/spindles.     |                                                                                                                                  |            | 19...50   | 19...50 |
| <b>Drives</b>                                                                                                                                                      |                                                         |                                                                                                                                  |            |           |         |
| SINAMICS S120 Combi Power Modules                                                                                                                                  | See SINAMICS S120.                                      | 6SL3111-3VE21-6FA0<br>6SL3111-3VE21-6EA0<br>6SL3111-3VE22-0HA0<br>6SL3111-4VE21-6FA0<br>6SL3111-4VE21-6EA0<br>6SL3111-4VE22-0HA0 |            | ○         | ○       |
| SINAMICS S120 in booksize compact format Motor Modules as expansion for SINAMICS S120 Combi                                                                        | See SINAMICS S120.                                      | 6SL34...-.....-....                                                                                                              |            | ○         | ○       |
| SINAMICS S120 booksize format, Motor Modules via DRIVE-CLiQ                                                                                                        |                                                         |                                                                                                                                  |            | ●         | ●       |
| SINAMICS S120 CU320-2 DP Control Unit (without CompactFlash card)                                                                                                  |                                                         | 6SL3040-1MA00-0AA0                                                                                                               |            | ○         | ○       |
| SINAMICS S120 CU320-2 PN Control Unit (without CompactFlash card)                                                                                                  | For positioning tasks via PLC.                          | 6SL3040-1MA01-0AA0                                                                                                               |            | ○         | ○       |
| CompactFlash card with current SINAMICS FW release:                                                                                                                |                                                         |                                                                                                                                  |            |           |         |
| • License for basic performance                                                                                                                                    |                                                         | 6SL3054-0EE00-1BA0                                                                                                               |            | ○         | ○       |
| • License incl. FW option Performance expansion                                                                                                                    |                                                         | 6SL3054-0EE01-1BA0                                                                                                               |            | ○         | ○       |
| SINAMICS S120 CU310-2 DP Control Unit                                                                                                                              |                                                         | 6SL3040-1LA00-0AA0                                                                                                               |            | ○         | ○       |
| SINAMICS S120 CU310-2 PN Control Unit                                                                                                                              |                                                         | 6SL3040-1LA01-0AA0                                                                                                               |            | ○         | ○       |
| SINAMICS S120 Control Unit Adapter CUA31                                                                                                                           |                                                         | 6SL3040-0PA00-0AA1                                                                                                               |            | ○         | ○       |
| SINAMICS S120 CUA32 Control Unit Adapter                                                                                                                           |                                                         | 6SL3040-0PA01-0AA0                                                                                                               |            | –         | –       |
| SINAMICS S120 Sensor Module Cabinet:                                                                                                                               |                                                         |                                                                                                                                  |            |           |         |
| • SINAMICS S120 SMC10                                                                                                                                              | No SINUMERIK Safety Integrated.                         | 6SL3055-0AA00-5AA3                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 SMC20                                                                                                                                              |                                                         | 6SL3055-0AA00-5BA3                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 SMC30                                                                                                                                              | No SINUMERIK Safety Integrated.                         | 6SL3055-0AA00-5CA2                                                                                                               |            | ○         | ○       |
| SINAMICS S120 SME Sensor Module Externally Mounted:                                                                                                                |                                                         |                                                                                                                                  |            |           |         |
| • SINAMICS S120 SME20                                                                                                                                              |                                                         | 6SL3055-0AA00-5EA3                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 SME25                                                                                                                                              |                                                         | 6SL3055-0AA00-5HA3                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 SME120                                                                                                                                             |                                                         | 6SL3055-0AA00-5JA3                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 SME125                                                                                                                                             |                                                         | 6SL3055-0AA00-5KA3                                                                                                               |            | ○         | ○       |

| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>– Not possible | Instructions<br>(footnotes are applicable line by line) | Order No.                                                                                                                                                                                                                                                                                                        | Order code | SINUMERIK |         |
|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                               |                                                         | Type<br>(for complete Order No., see notes)                                                                                                                                                                                                                                                                      |            | 840DE sl  | 840D sl |
| Drives (continued)                                                                                            |                                                         |                                                                                                                                                                                                                                                                                                                  |            |           |         |
| SINAMICS S120 TB/TM terminal modules:                                                                         |                                                         |                                                                                                                                                                                                                                                                                                                  |            |           |         |
| • SINAMICS S120 TB30                                                                                          |                                                         | 6SL3055-0AA00-2TA0                                                                                                                                                                                                                                                                                               |            | –         | –       |
| • SINAMICS S120 TM31                                                                                          |                                                         | 6SL3055-0AA00-3AA1                                                                                                                                                                                                                                                                                               |            | –         | –       |
| • SINAMICS S120 TM41                                                                                          |                                                         | 6SL3055-0AA00-3PA1                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 TM15                                                                                          |                                                         | 6SL3055-0AA00-3FA0                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 TM17                                                                                          | Requirement:<br>Option N51.                             | 6SL3055-0AA00-3HA0                                                                                                                                                                                                                                                                                               |            | –         | ○       |
| • SINAMICS S120 TM120                                                                                         |                                                         | 6SL3055-0AA00-3KA0                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| SINAMICS S120 expansion modules:                                                                              |                                                         |                                                                                                                                                                                                                                                                                                                  |            |           |         |
| • SINAMICS S120 VSM                                                                                           |                                                         | 6SL3053-0AA00-3AA0                                                                                                                                                                                                                                                                                               |            | –         | –       |
| • SINAMICS S120 DMC20                                                                                         |                                                         | 6SL3055-0AA00-6AA0                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| • SINAMICS S120 DME20                                                                                         |                                                         | 6SL3055-0AA00-6AB0                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Motor Modules;<br>internal air cooling                                     | See SINAMICS S120.                                      | 6SL3120-1TE13-0A..<br>6SL3120-1TE15-0A..<br>6SL3120-1TE21-0A..<br>6SL3120-1TE21-8A..<br>6SL3120-1TE23-0A..<br>6SL3120-1TE24-5A..<br>6SL3120-1TE26-0A..<br>6SL3120-1TE28-5A..<br>6SL3120-1TE31-3A..<br>6SL3120-1TE32-0A..<br>6SL3120-2TE13-0A..<br>6SL3120-2TE15-0A..<br>6SL3120-2TE21-0A..<br>6SL3120-2TE21-8A.. |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Motor Modules;<br>external air cooling                                     |                                                         | 6SL3121-1TE13-0A..<br>6SL3121-1TE15-0A..<br>6SL3121-1TE21-0A..<br>6SL3121-1TE21-8A..<br>6SL3121-1TE23-0A..<br>6SL3121-1TE24-5A..<br>6SL3121-1TE26-0A..<br>6SL3121-1TE28-5A..<br>6SL3121-1TE31-3A..<br>6SL3121-1TE32-0A..<br>6SL3121-2TE13-0A..<br>6SL3121-2TE15-0A..<br>6SL3121-2TE21-0A..<br>6SL3121-2TE21-8A.. |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Motor Modules;<br>cold plate cooling                                       |                                                         | 6SL3126-1TE13-0A..<br>6SL3126-1TE15-0A..<br>6SL3126-1TE21-0A..<br>6SL3126-1TE21-8A..<br>6SL3126-1TE23-0A..<br>6SL3126-1TE24-5A..<br>6SL3126-1TE26-0A..<br>6SL3126-1TE28-5A..<br>6SL3126-1TE31-3A..<br>6SL3126-1TE32-0A..<br>6SL3126-2TE13-0A..<br>6SL3126-2TE15-0A..<br>6SL3126-2TE21-0A..<br>6SL3126-2TE21-8A.. |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Motor Modules;<br>liquid cooling                                           |                                                         | 6SL3125-1TE32-0A..                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Active Line Modules;<br>internal air cooling                               |                                                         | 6SL3130-7TE21-6A..<br>6SL3130-7TE23-6A..<br>6SL3130-7TE25-5A..<br>6SL3130-7TE28-0A..<br>6SL3130-7TE31-2A..                                                                                                                                                                                                       |            | ○         | ○       |



| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                                                                                                        | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes)                                                                                   |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                                                                                                  |            |           |         |
| <b>Drives (continued)</b>                                                                                                                                          |                                                               |                                                                                                                                  |            |           |         |
| SINAMICS S120 expansion modules (continued):                                                                                                                       |                                                               |                                                                                                                                  |            |           |         |
| • SINAMICS S120<br>booksize format Active Line Modules;<br>external air cooling                                                                                    |                                                               | 6SL3131-7TE21-6A..<br>6SL3131-7TE23-6A..<br>6SL3131-7TE25-5A..<br>6SL3131-7TE28-0A..<br>6SL3131-7TE31-2A..                       |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Active Line Modules;<br>cold plate cooling                                                                                      |                                                               | 6SL3136-7TE21-6A..<br>6SL3136-7TE23-6A..<br>6SL3136-7TE25-5A..<br>6SL3136-7TE28-0A..<br>6SL3136-7TE31-2A..                       |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Active Line Modules;<br>liquid cooling                                                                                          |                                                               | 6SL3135-7TE31-2A..                                                                                                               |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Active Interface Modules                                                                                                        | See SINAMICS S120.                                            | 6SL3100-0BE21-6A..<br>6SL3100-0BE23-6A..<br>6SL3100-0BE25-5A..<br>6SL3100-0BE28-0A..<br>6SL3100-0BE31-2A..                       |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Smart Line Modules;<br>internal air cooling                                                                                     |                                                               | 6SL3130-6AE15-0A..<br>6SL3130-6AE21-0A..<br>6SL3130-6TE21-6A..<br>6SL3130-6TE23-6A..<br>6SL3130-6TE25-5A..                       |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Smart Line Modules;<br>external air cooling                                                                                     |                                                               | 6SL3131-6AE15-0A..<br>6SL3131-6AE21-0A..<br>6SL3131-6TE21-6A..<br>6SL3131-6TE23-6A..<br>6SL3131-6TE25-5A..                       |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Smart Line Modules;<br>cold plate cooling                                                                                       |                                                               | 6SL3136-6AE15-0A..<br>6SL3136-6AE21-0A..                                                                                         |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Basic Line Modules;<br>internal air cooling                                                                                     |                                                               | 6SL3130-1TE22-0A..<br>6SL3130-1TE24-0A..<br>6SL3130-1TE31-0A..                                                                   |            | ○         | ○       |
| • SINAMICS S120<br>booksize format Basic Line Modules;<br>cold plate cooling                                                                                       |                                                               | 6SL3136-1TE22-0A..<br>6SL3136-1TE24-0A..<br>6SL3136-1TE31-0A..                                                                   |            | ○         | ○       |
| • SINAMICS S120<br>chassis format Motor Modules;<br>internal air cooling<br>(rated pulse frequency 2 kHz)                                                          |                                                               | 6SL3320-1TE32-1AA3<br>6SL3320-1TE32-6AA3<br>6SL3320-1TE33-1AA3<br>6SL3320-1TE33-8AA3<br>6SL3320-1TE35-0AA3                       |            | ○         | ○       |
| • SINAMICS S120<br>chassis format Motor Modules;<br>internal air cooling<br>(rated pulse frequency 1.25 kHz)                                                       |                                                               | 6SL3320-1TE36-1AA.<br>6SL3320-1TE37-5AA.<br>6SL3320-1TE38-4AA.<br>6SL3320-1TE41-0AA.<br>6SL3320-1TE41-2AA.<br>6SL3320-1TE41-4AA. |            | –         | –       |
| • SINAMICS S120<br>chassis format Active Line Modules;<br>internal air cooling (up to 300 kW)                                                                      |                                                               | 6SL3330-7TE32-1AA.<br>6SL3330-7TE32-6AA.<br>6SL3330-7TE33-8AA.<br>6SL3330-7TE35-0AA.                                             |            | ○         | ○       |
| • SINAMICS S120<br>chassis format Active Line Modules;<br>internal air cooling (from 500 kW)                                                                       |                                                               | 6SL3330-7TE36-1AA.<br>6SL3330-7TE38-4AA.<br>6SL3330-7TE41-0AA.<br>6SL3330-7TE41-4AA.                                             |            | –         | –       |
| • SINAMICS S120<br>chassis format Active Interface Modules                                                                                                         |                                                               | 6SL3300-7TE32-6A..<br>6SL3300-7TE33-8A..<br>6SL3300-7TE35-0A..                                                                   |            | ○         | ○       |
| • SINAMICS S120<br>blocksize format Power Modules 230 V 1 AC;<br>internal air cooling                                                                              | No SINUMERIK<br>Safety Integrated.                            | 6SL3210-1SB11-0...<br>6SL3210-1SB12-3...<br>6SL3210-1SB14-0...                                                                   |            | ○         | ○       |

| Description                                                                                                                                                                                                            | Instructions<br>(footnotes are applicable line by line) | Order No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Order code | SINUMERIK |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                                                                        |                                                         | Type<br>(for complete Order No., see notes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul>                                                     |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <b>Drives (continued)</b>                                                                                                                                                                                              |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| SINAMICS S120 expansion modules (continued):                                                                                                                                                                           |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <ul style="list-style-type: none"> <li>SINAMICS S120 blocksize format Power Modules 400 V 3 AC; internal air cooling</li> </ul>                                                                                        | No SINUMERIK Safety Integrated.                         | <b>6SL3210-1SE11-3UA0</b><br><b>6SL3210-1SE11-7UA0</b><br><b>6SL3210-1SE12-2UA0</b><br><b>6SL3210-1SE13-1UA0</b><br><b>6SL3210-1SE14-1UA0</b><br><br><b>6SL3210-1SE16-0...</b><br><b>6SL3210-1SE17-7...</b><br><b>6SL3210-1SE21-0...</b><br><b>6SL3210-1SE21-8...</b><br><b>6SL3210-1SE22-5...</b><br><b>6SL3210-1SE23-2...</b><br><b>6SL3210-1SE23-8...</b><br><b>6SL3210-1SE24-5...</b><br><b>6SL3210-1SE26-0...</b><br><b>6SL3210-1SE27-5...</b><br><b>6SL3210-1SE31-0...</b><br><b>6SL3210-1SE31-1...</b><br><b>6SL3210-1SE31-5...</b><br><b>6SL3210-1SE31-8...</b> |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>SINAMICS S120 chassis format Power Modules 400 V 3 AC; internal air cooling</li> </ul>                                                                                          | See SINAMICS S120.                                      | <b>6SL3310-1TE32-1AA.</b><br><b>6SL3310-1TE32-6AA.</b><br><b>6SL3310-1TE33-1AA.</b><br><b>6SL3310-1TE33-8AA.</b><br><b>6SL3310-1TE35-0AA.</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |            | –         | –       |
| SINUMERIK Analog Drive Interface:                                                                                                                                                                                      |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <ul style="list-style-type: none"> <li>Analog Drive Interface for 4 axes ADI 4</li> </ul>                                                                                                                              | No PROFIBUS certification.                              | <b>6FC5211-0BA01-0AA4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | ○         | ○       |
| External drive:                                                                                                                                                                                                        |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <ul style="list-style-type: none"> <li>Hydraulic axis (distributed) can be connected as interpolating NC axis. Distributed axes can be operated in isochronous mode with PROFIdrive V4.1 on PROFIBUS DP-V2.</li> </ul> | No SINUMERIK Safety Integrated.                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ○         | ○       |
| Synchronous motors<br>1FT7/1FK7/1FE1/2SP1/1FW6/1FN3/1FN6                                                                                                                                                               | See Motors.                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ○         | ○       |
| Induction motors<br>1PH8/1PH7/1PH2                                                                                                                                                                                     | See Motors.                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ○         | ○       |
| SINAMICS S120 DRIVE-CLiQ on motor:                                                                                                                                                                                     |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <ul style="list-style-type: none"> <li>Resolver</li> </ul>                                                                                                                                                             |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>sin/cos 1 V<sub>pp</sub> and EnDat 2.1</li> </ul>                                                                                                                               |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ○         | ○       |
| Connectable measuring systems:                                                                                                                                                                                         |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |           |         |
| <ul style="list-style-type: none"> <li>Max. number</li> </ul>                                                                                                                                                          | Two measuring systems per axis.                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Absolute/incremental encoder installed in 1FT7/1FK7/1PH7/1PH8</li> </ul>                                                                                                        | Integrated in motor via SINAMICS Sensor Modules.        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Resolver installed in 1FK7</li> </ul>                                                                                                                                           | Integrated in motor via SINAMICS Sensor Modules.        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Incremental rotary measuring systems with RS422 (TTL)</li> </ul>                                                                                                                | Via SINAMICS SMC30 Sensor Modules.                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Linear scale LMS with sin/cos 1 V<sub>pp</sub></li> </ul>                                                                                                                       | Via SINAMICS SMC20/SME20 Sensor Modules.                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Rotary measuring systems with sin/cos 1 V<sub>pp</sub></li> </ul>                                                                                                               |                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |
| <ul style="list-style-type: none"> <li>Linear scale LMS with distance-coded reference marks</li> </ul>                                                                                                                 | Via SINAMICS SMC20/SME20 Sensor Modules.                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | ●         | ●       |

# SINUMERIK CNC

## Functions

### Drives Drive functions

2

| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>– Not possible | Instructions<br>(footnotes are applicable line by line)              | Order No.                                   | Order code | SINUMERIK |         |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                               |                                                                      | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| Drives (continued)                                                                                            |                                                                      |                                             |            |           |         |
| Connectable measuring systems (continued):                                                                    |                                                                      |                                             |            |           |         |
| • Rotary measuring systems with distance-coded reference marks                                                | Via SINAMICS SMC20/SME20 Sensor Modules.                             |                                             |            | ●         | ●       |
| • Linear scale LMS with EnDat 2.1                                                                             | Via SINAMICS SMC20/SME25 Sensor Modules.                             |                                             |            | ●         | ●       |
| • Rotary measuring systems with EnDat 2.1                                                                     | Via SINAMICS SMC20/SME25 Sensor Modules.                             |                                             |            | ●         | ●       |
| • Absolute encoder connection with SSI interface                                                              | Via SINAMICS SMC30 Sensor Modules/for analog axes via ADI 4.         |                                             |            | ●         | ●       |
| • Resolver as external machine encoder                                                                        | Via SINAMICS SMC10 Sensor Modules.                                   |                                             |            | ●         | ●       |
| • Absolute encoder connection with DRIVE-CLiQ interface                                                       | Via SINAMICS.                                                        |                                             |            | ●         | ●       |
| Drive functions                                                                                               |                                                                      |                                             |            |           |         |
| Control:                                                                                                      |                                                                      |                                             |            | ●         | ●       |
| • Servo control                                                                                               |                                                                      |                                             |            | ●         | ●       |
| • Vector control                                                                                              |                                                                      |                                             |            | –         | –       |
| • V/f control                                                                                                 |                                                                      |                                             |            | ●         | ●       |
| • Combination of servo/V/f control possible on a CU                                                           |                                                                      |                                             |            | –         | –       |
| • Setting the pulse frequency grid in fine steps (3.2 kHz; 4 kHz; 5.33 kHz; 6.4 kHz; 8 kHz)                   | Requires current control cycle of 62.5 µs or 31.25 µs in some cases. |                                             |            | ●         | ●       |
| • Sine-wave filter                                                                                            |                                                                      |                                             |            | –         | –       |
| • Unit switchover (US/Sl/etc.)                                                                                |                                                                      |                                             |            | –         | –       |
| • Direction reversal without changing the setpoint                                                            |                                                                      |                                             |            | –         | –       |
| • Technology controller                                                                                       |                                                                      |                                             |            | –         | –       |
| • kT estimator                                                                                                |                                                                      |                                             |            | –         | –       |
| • kT(iq) characteristic                                                                                       |                                                                      |                                             |            | ●         | ●       |
| • Rotor/pole position identification saturation-based/motion-based                                            |                                                                      |                                             |            | ●         | ●       |
| • Edge modulation                                                                                             |                                                                      |                                             |            | –         | –       |
| • Motor data identification stationary/rotating                                                               |                                                                      |                                             |            | ●         | ●       |
| • Flux reduction for induction motors                                                                         |                                                                      |                                             |            | ●         | ●       |
| Modular machine concept (sub-topologies):                                                                     |                                                                      |                                             |            | –         | –       |
| • Parking axis/encoder                                                                                        |                                                                      |                                             |            | ●         | ●       |
| Brakes:                                                                                                       |                                                                      |                                             |            |           |         |
| • Braking signal, basic/extended                                                                              |                                                                      |                                             |            | ●         | ●       |
| • Armature short-circuit brake, internal/external                                                             |                                                                      |                                             |            | –/●       | –/●     |
| • DC brake                                                                                                    |                                                                      |                                             |            | –         | –       |

| Description<br><div>● Basic version<br/>○ Option<br/>◇ Function is dependent on operating software<br/>– Not possible</div> | Instructions<br>(footnotes are applicable line by line) | Order No.                                   | Order code | SINUMERIK |          |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|------------|-----------|----------|
|                                                                                                                             |                                                         | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl  |
| Drive functions (continued)                                                                                                 |                                                         |                                             |            |           |          |
| Voltage protection for 1PH8, 1FE1, 2SP1 motors:                                                                             |                                                         |                                             |            |           |          |
| • Externally via VPM module                                                                                                 |                                                         |                                             |            | ○         | ○        |
| Motor/winding switchover                                                                                                    |                                                         |                                             |            | ○         | ○        |
| Suspended axis/electronic counterweight                                                                                     |                                                         |                                             |            | ●         | ●        |
| Dynamic energy management<br>(DC link voltage management)                                                                   |                                                         |                                             |            | ●         | ●        |
| Runtime meter                                                                                                               |                                                         |                                             |            | ●         | ●        |
| $I^2t$ monitoring for motors                                                                                                |                                                         |                                             |            | ●         | ●        |
| Automatic restart mechanism (servo/infeed)                                                                                  |                                                         |                                             |            | –         | –        |
| Technology function Friction characteristic                                                                                 |                                                         |                                             |            | –         | –        |
| DCC (Drive Control Chart)                                                                                                   |                                                         |                                             |            | –         | –        |
| Drive Based Open Architecture                                                                                               |                                                         |                                             |            | ○         | ○        |
| Basic positioner                                                                                                            |                                                         |                                             |            | ○         | ○        |
| 2 command data sets                                                                                                         |                                                         |                                             |            | –         | –        |
| Parallel connection of Motor Modules                                                                                        |                                                         |                                             |            | –         | –        |
| 200 V 3 AC possible for booksize/blocksize modules                                                                          |                                                         |                                             |            | ○         | ○        |
| Maximum configuration valid for standard PROFIBUS DP cycle:                                                                 |                                                         |                                             |            |           |          |
| • Axes/spindles for current/speed controller cycle of 125 µs/62.5 µs                                                        |                                                         |                                             |            | 31/11     | 31/11    |
| • Axes/spindles per NCU/NX for current/speed controller cycle of 125 µs/62.5 µs/31.25 µs                                    |                                                         |                                             |            | 6/3/1     | 6/3/1    |
| • Motor measuring systems and direct measuring systems per NCU/NX for current/speed controller cycle of 125 µs              |                                                         |                                             |            | 12        | 12       |
| • SINAMICS S120 chassis format Motor Modules per NCU/NX                                                                     |                                                         |                                             |            | 2         | 2        |
| Current/speed controller cycle:                                                                                             |                                                         |                                             |            |           |          |
| • Minimum for SINAMICS S120 in booksize format                                                                              |                                                         |                                             |            | 31.25 µs  | 31.25 µs |
| • Minimum for SINAMICS S120 in chassis format                                                                               |                                                         |                                             |            | 125 µs    | 125 µs   |
| • Maximum                                                                                                                   |                                                         |                                             |            | 250 µs    | 250 µs   |
| PROFIBUS DP cycle (corresponds to FIPO cycle):                                                                              |                                                         |                                             |            |           |          |
| • Minimum                                                                                                                   |                                                         |                                             |            | 0.5 ms    | 0.5 ms   |
| Maximum number:                                                                                                             |                                                         |                                             |            |           |          |
| • Drive data sets                                                                                                           |                                                         |                                             |            | 32        | 32       |
| • Motor data sets                                                                                                           |                                                         |                                             |            | 8         | 8        |
| • Encoder data sets                                                                                                         |                                                         |                                             |            | 8         | 8        |

# SINUMERIK CNC

## Functions

### Axis functions Spindle functions

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                |            |           |         |
| <b>Axis functions</b>                                                                                                                                              |                                                               |                                                |            |           |         |
| Traversing range $\pm 9$ decades                                                                                                                                   |                                                               |                                                |            | ●         | ●       |
| Rotary axis turning endlessly                                                                                                                                      |                                                               |                                                |            | ●         | ●       |
| Velocity, max. 300 m/s                                                                                                                                             |                                                               |                                                |            | ●         | ●       |
| Acceleration with jerk limitation                                                                                                                                  |                                                               |                                                |            | ●         | ●       |
| Programmable acceleration                                                                                                                                          |                                                               |                                                |            | ●         | ●       |
| Follow-up mode                                                                                                                                                     |                                                               |                                                |            | ●         | ●       |
| Measuring systems 1 and 2 selectable                                                                                                                               |                                                               |                                                |            | ●         | ●       |
| Feedrate interpolation                                                                                                                                             |                                                               |                                                |            | ●         | ●       |
| Separate feedrate for roundings and chamfers                                                                                                                       |                                                               |                                                |            | ●         | ●       |
| Travel to fixed stop                                                                                                                                               |                                                               |                                                |            | ●         | ●       |
| Travel to fixed stop with Force Control                                                                                                                            |                                                               | 6FC5800-0AM01-0YB0                             | M01        | ○         | ○       |
| Setpoint exchange                                                                                                                                                  |                                                               | 6FC5800-0AM05-0YB0                             | M05        | ○         | ○       |
| Tangential control                                                                                                                                                 |                                                               | 6FC5800-0AM06-0YB0                             | M06        | ○         | ○       |
| Position switching signals/cam controller:                                                                                                                         |                                                               | 6FC5800-0AM07-0YB0                             | M07        | ○         | ○       |
| • Max. number of pairs                                                                                                                                             |                                                               |                                                |            | 16        | 16      |
| Advanced Position Control, APC                                                                                                                                     |                                                               | 6FC5800-0AM13-0YB0                             | M13        | ○         | ○       |
| Axis container                                                                                                                                                     | Within<br>31 axes.                                            |                                                |            | ●         | ●       |
| Link axes (axis container distributed among several NCUs):                                                                                                         | Requirement:<br>CBE 30-2 PROFINET<br>module.                  |                                                |            | ●         | ●       |
| • Max. number of NCUs                                                                                                                                              |                                                               |                                                |            | 3         | 3       |
| <b>Spindle functions</b>                                                                                                                                           |                                                               |                                                |            |           |         |
| Digital spindle speed                                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| Spindle speed, max. programmable value range:<br>$10^6 \dots 0.0001$ (display: $\pm 999\,999\,999.9999$ )                                                          |                                                               |                                                |            | ●         | ●       |
| 5 gear stages                                                                                                                                                      |                                                               |                                                |            | ●         | ●       |
| Automatic gear stage selection                                                                                                                                     |                                                               |                                                |            | ●         | ●       |
| Oriented spindle stop                                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| Spindle speed limitation (min./max.)                                                                                                                               |                                                               |                                                |            | ●         | ●       |
| Constant cutting rate                                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| Spindle control via PLC<br>(positioning, oscillation)                                                                                                              |                                                               |                                                |            | ●         | ●       |
| Changeover to axis mode                                                                                                                                            |                                                               |                                                |            | ●         | ●       |
| Axis synchronization on-the-fly                                                                                                                                    |                                                               |                                                |            | ●         | ●       |
| Thread run-in and run-out,<br>programmable                                                                                                                         |                                                               |                                                |            | ●         | ●       |
| Thread cutting with constant or variable pitch                                                                                                                     |                                                               |                                                |            | ●         | ●       |
| Tapping with compensating chuck/rigid tapping                                                                                                                      |                                                               |                                                |            | ●         | ●       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line)             | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                           | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                           |                                                |            |           |         |
| <b>Interpolations</b>                                                                                                                                              |                                                                           |                                                |            |           |         |
| Floating point accuracy (80-bit floating point accuracy)                                                                                                           |                                                                           |                                                |            | ●         | ●       |
| Linear interpolating axes:                                                                                                                                         |                                                                           |                                                |            | 4         | 4       |
| • Maximum                                                                                                                                                          |                                                                           |                                                |            | 4         | 20      |
| Circle via center point and end point                                                                                                                              |                                                                           |                                                |            | ●         | ●       |
| Circle via interpolation point                                                                                                                                     |                                                                           |                                                |            | ●         | ●       |
| Helical interpolation                                                                                                                                              |                                                                           |                                                |            | 2D+2      | 2D+6    |
| Universal interpolator NURBS (non-uniform rational B splines)                                                                                                      |                                                                           |                                                |            | ●         | ●       |
| Continuous-path mode with programmable rounding clearance                                                                                                          |                                                                           |                                                |            | ●         | ●       |
| Multi-axis interpolation (> 4 interpolating axes)                                                                                                                  |                                                                           | 6FC5800-0AM15-0YB0                             | M15        | –         | ○       |
| Motion control: Advanced Surface                                                                                                                                   |                                                                           | 6FC5800-0AS07-0YB0                             | S07        | ○         | ○       |
| 3-axis compressor                                                                                                                                                  |                                                                           |                                                |            | ●         | ●       |
| 5-axis compressor                                                                                                                                                  |                                                                           |                                                |            | ●         | ●       |
| Spline interpolation (A, B and C splines)                                                                                                                          |                                                                           | 6FC5800-0AS16-0YB0                             | S16        | ○         | ○       |
| Polynomial interpolation                                                                                                                                           |                                                                           | 6FC5800-0AM18-0YB0                             | M18        | ○         | ○       |
| Involute interpolation                                                                                                                                             |                                                                           | 6FC5800-0AM21-0YB0                             | M21        | ○         | ○       |
| Continue machining at the contour (Retrace Support)                                                                                                                | Requirement:<br>Loadable compile<br>cycle and cross-<br>mode actions M43. | 6FC5800-0AM24-0YB0                             | M24        | ○         | ○       |
| Crankshaft interpolation CRIP                                                                                                                                      | Requirement:<br>Loadable<br>compile cycle.                                | 6FC5800-0AN04-0YB0                             | N04        | –         | ○       |



# SINUMERIK CNC

## Functions

### Couplings

2

| Description<br><div>● Basic version<br/>○ Option<br/>◇ Function is dependent on operating software<br/>– Not possible</div>                                                                                                                                                                                                                                                                                           | Instructions<br>(footnotes are applicable line by line)                                                                                | Order No.                                   | Order code | SINUMERIK     |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|---------------|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                        | Type<br>(for complete Order No., see notes) |            | 840DE sl      | 840D sl |
| Couplings                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                        |                                             |            |               |         |
| Pair of synchronous axes (gantry axes):<br>• Max. number                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                        | 6FC5800-0AM02-0YB0                          | M02        | ○<br>8        | ○<br>8  |
| Master/slave for drives                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                        | 6FC5800-0AM03-0YB0                          | M03        | ○             | ○       |
| Generic coupling Standard CP Standard:<br>• 4 axis pairs in simultaneous coupled motion                                                                                                                                                                                                                                                                                                                               |                                                                                                                                        |                                             |            | ●             | ●       |
| Generic coupling Static CP Static:<br>• 1 × simple synchronous spindle,<br>(coupling ratio  1 :1, no multi-edge machining)                                                                                                                                                                                                                                                                                            |                                                                                                                                        | 6FC5800-0AM75-0YB0                          | M75        | ○             | ○       |
| Generic coupling Basic CP Basic:<br>• 4 axis pairs in simultaneous coupled motion and<br>• 1 × synchronous spindle/multi-edge turning and/or master value coupling/curve table interpolation and/or axial coupling in the machine coordinate system                                                                                                                                                                   | <sup>1)</sup> With restricted functionality, see export control version.                                                               | 6FC5800-0AM72-0YB0                          | M72        | ○<br>1)       | ○       |
| Generic coupling Comfort CP Comfort:<br>• 4 axis pairs in simultaneous coupled motion and<br>• 4 × synchronous spindle/multi-edge turning and/or master value coupling/curve table interpolation and/or axial coupling in the machine coordinate system<br>• 1 × electronic gear for 3 leading axes (without curve table, without cascading)                                                                          | <sup>1)</sup> With restricted functionality, see export control version.                                                               | 6FC5800-0AM73-0YB0                          | M73        | ○<br>1)       | ○       |
| Generic coupling Expert CP Expert:<br>• 8 axis pairs in simultaneous coupled motion and<br>• 8 × synchronous spindle/multi-edge turning and/or master value coupling/curve table interpolation and/or axial coupling in the machine coordinate system<br>• 8 × electronic gear for 3 leading axes (with curve tables, with cascading)<br>• 5 × electronic gear for 5 leading axes (with curve tables, with cascading) | <sup>1)</sup> With restricted functionality, see export control version.<br><br><sup>2)</sup> Requirement: NCU 720.3 PN/ NCU 730.3 PN. | 6FC5800-0AM74-0YB0                          | M74        | ○<br>1)<br>2) | ○<br>2) |
| Compensation of a forced mechanical coupling AXCO                                                                                                                                                                                                                                                                                                                                                                     | Requirement: Loadable compile cycle.                                                                                                   | 6FC5800-0AM81-0YB0                          | M81        | –             | ○       |
| Transformation: Redundant axes at workpiece RDCC                                                                                                                                                                                                                                                                                                                                                                      | Requirement: Loadable compile cycle.                                                                                                   | 6FC5800-0AN26-0YB0                          | N26        | –             | ○       |

### Transformations Measuring functions/Measuring cycles

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line)                                                         | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                                                                       | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                                                                       |                                                |            |           |         |
| <b>Transformations</b>                                                                                                                                             |                                                                                                                       |                                                |            |           |         |
| Cartesian Point-to-Point (PTP) travel                                                                                                                              |                                                                                                                       |                                                |            | ●         | ●       |
| Concatenated transformations<br>(inclined axis TRAANG after TRAORI/<br>cardanic milling head/TRANSMIT/TRACYL)                                                      |                                                                                                                       |                                                |            | ●         | ●       |
| Generic transformation                                                                                                                                             | Requirement:<br>5-axis machining<br>package or<br>Milling technology<br>package:<br>SINUMERIK<br>MDynamics<br>5 axes. |                                                |            | –         | ●       |
| TRANSMIT/cylinder surface transformation                                                                                                                           |                                                                                                                       | 6FC5800-0AM27-0YB0                             | M27        | ○         | ○       |
| Inclined axis                                                                                                                                                      |                                                                                                                       | 6FC5800-0AM28-0YB0                             | M28        | ○         | ○       |
| Transformation DOUBLETRANSMIT 2TRA                                                                                                                                 | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AM25-0YB0                             | M25        | –         | ○       |
| Transformation Handling RCTRA                                                                                                                                      | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AM31-0YB0                             | M31        | –         | ○       |
| PARACOP 3-axis transformation for parallel kinematics<br>(1st channel)                                                                                             | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AM44-0YB0                             |            | –         | ○       |
| Transformation Pantograph kinematics 2 axes SCIS                                                                                                                   | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AM51-0YB0                             | M51        | –         | ○       |
| Double generic transformation DGEN                                                                                                                                 | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AN34-0YB0                             | N34        | –         | ○       |
| Transformation TRIPOD HYBRID basis, 5 axes THYK                                                                                                                    | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AN36-0YB0                             | N36        | –         | ○       |
| Transformation robotics extended ROBX                                                                                                                              | Requirement:<br>Loadable<br>compile cycle.                                                                            | 6FC5800-0AN54-0YB0                             | N54        | –         | ○       |
| <b>Measuring functions/measuring cycles</b>                                                                                                                        |                                                                                                                       |                                                |            |           |         |
| Measuring stage 1<br>Two probes (switching) with/without deletion of distance-to-go                                                                                |                                                                                                                       |                                                |            | ●         | ●       |
| Measuring stage 2<br>Axial measuring, measuring from synchronized actions,<br>cyclic measurement                                                                   |                                                                                                                       | 6FC5800-0AM32-0YB0                             | M32        | ○         | ○       |
| Measuring cycles for drilling/milling and turning<br>(calibrate workpiece probe, workpiece measurement,<br>tool measurement)                                       |                                                                                                                       | 6FC5800-0AP28-0YB0                             | P28        | ○         | ○       |
| Measure kinematics<br>(determine transformation data of rotary axes)                                                                                               |                                                                                                                       | 6FC5800-0AP18-0YB0                             | P18        | ○         | ○       |

# SINUMERIK CNC

## Functions

### Technologies

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| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Instructions<br>(footnotes are<br>applicable line<br>by line)                         | Order No.                                      | Order code | SINUMERIK               |                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|------------|-------------------------|-------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                       | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl                | 840D sl                 |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul>                                                                                                                                                                                                                                                                                                                        |                                                                                       |                                                |            |                         |                         |
| <b>Technologies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                       |                                                |            |                         |                         |
| Multiple feedrates in one block, e.g. for clamp meters                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                       |                                                |            | ●                       | ●                       |
| Handwheel override                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |                                                |            | ●                       | ●                       |
| Contour handwheel                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       | 6FC5800-0AM08-0YB0                             | M08        | ○                       | ○                       |
| Punching/nibbling                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       | 6FC5800-0AM33-0YB0                             | M33        | ○                       | ○                       |
| Oscillation functions<br>block-related, modal and asynchronous                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       | 6FC5800-0AM34-0YB0                             | M34        | ○                       | ○                       |
| Electronic transfer CP<br>Contains the option: CP Comfort                                                                                                                                                                                                                                                                                                                                                                                                                                 | <sup>1)</sup> With restricted<br>functionality,<br>see export<br>control version.     | 6FC5800-0AM76-0YB0                             | M76        | ○<br>1)                 | ○                       |
| Milling technology package:<br>SINUMERIK MDynamics 3 axes<br>Contains the options: ShopTurn/ShopMill,<br>residual material detection and machining for contour pockets<br>and cutting,<br>3D simulation 1 (finished part), simultaneous recording,<br>Advanced Surface, Spline interpolation, Transmit and peripheral<br>surface transformation, measuring cycles, additional HMI<br>user memory on CF card                                                                               |                                                                                       | 6FC5800-0AS32-0YB0                             | S32        | ○                       | ○                       |
| 5-axis machining package<br><ul style="list-style-type: none"> <li>• Contains the option Multi-axis interpolation<br/>(&gt; 4 interpolating axes)</li> <li>• 5-axis functionality (TRAORI, RTCP)</li> </ul>                                                                                                                                                                                                                                                                               |                                                                                       | 6FC5800-0AM30-0YB0                             | M30        | –                       | ○                       |
| 5-axis machining package,<br>additional function 7th axis                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                       | 6FC5800-0AS01-0YB0                             | S01        | –                       | ○                       |
| Milling technology package:<br>SINUMERIK MDynamics 5 axes<br>Contains the options: 5-axis machining package,<br>ShopTurn/ShopMill, residual material detection and machining<br>for contour pockets and cutting,<br>3D simulation 1 (finished part), simultaneous recording,<br>Advanced Surface, Spline interpolation, Transmit and peripheral<br>surface transformation, measuring cycles, additional<br>HMI user memory on CF card, 3D tool radius compensation,<br>measure kinematics |                                                                                       | 6FC5800-0AS33-0YB0                             | S33        | –                       | ○                       |
| Typical block cycle times (block processing times) in ms<br><ul style="list-style-type: none"> <li>• NCU 710.3 PN</li> <li>• NCU 720.3 PN</li> <li>• NCU 730.3 PN</li> </ul>                                                                                                                                                                                                                                                                                                              | Requirement:<br>With use of the<br>compressor.<br><sup>1)</sup> Under<br>development. |                                                |            | 1.5<br>0.6<br>1)<br>0.4 | 1.5<br>0.6<br>1)<br>0.4 |
| Handling package<br>Contains the options: 3 additional axes,<br>3 additional channels, Handling transformation,<br>synchronized actions stage 2, no tool offsets or spindles<br>possible                                                                                                                                                                                                                                                                                                  | Requirement:<br>Loadable<br>compile cycle.                                            | 6FC5800-0AS31-0YB0                             | S31        | –                       | ○                       |
| SINUMERIK plastics package IME<br>Contains the options:<br><ul style="list-style-type: none"> <li>• Three additional axes</li> <li>• Travel to fixed stop</li> <li>• Pair of synchronous axes (gantry axes)</li> <li>• Master/slave for drives</li> <li>• Position switching signals/cam controller</li> <li>• Polynomial interpolation</li> <li>• Handling transformation</li> <li>• Synchronized actions stage 2 and no tool offsets or spindles<br/>possible</li> </ul>                |                                                                                       | 6FC5800-0AS40-0YB0                             | S40        | –                       | ○                       |
| Velocity adaptation VADA                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Requirement:<br>Loadable<br>compile cycle.                                            | 6FC5800-0AN05-0YB0                             | N05        | –                       | ○                       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line)                                                             | Order No.                                   | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                                                                     | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                                                                     |                                             |            |           |         |
| <b>Technologies (continued)</b>                                                                                                                                    |                                                                                                                     |                                             |            |           |         |
| Extrapolated switching signals (64) XOUT                                                                                                                           | Requirement:<br>Loadable compile cycle.                                                                             | 6FC5800-0AN51-0YB0                          | N51        | –         | ○       |
| Path-related pulse output PRIG                                                                                                                                     | Requirement:<br>Loadable compile cycle.                                                                             | 6FC5800-0AN76-0YB0                          | N76        | –         | ○       |
| CCG compiler as DLL for SINUMERIK PCU 50.5<br>(CCG = Cam Contour Grinding)                                                                                         |                                                                                                                     | 6FC5800-0AP10-0YB0                          | P10        | ○         | ○       |
| <b>Motion-synchronous actions</b>                                                                                                                                  |                                                                                                                     |                                             |            |           |         |
| CNC inputs/outputs, high-speed:                                                                                                                                    |                                                                                                                     |                                             |            |           |         |
| • Digital inputs on-board                                                                                                                                          |                                                                                                                     |                                             |            | 4         | 4       |
| • Digital inputs or outputs on-board                                                                                                                               |                                                                                                                     |                                             |            | 4         | 4       |
| • Expansion via SIMATIC S7 I/O<br>32 digital inputs/32 digital outputs<br>4 analog inputs/4 analog outputs                                                         |                                                                                                                     |                                             |            | ○         | ○       |
| Synchronized actions (max. 24) and high-speed auxiliary function output incl. 3 synchronous functions (max. 159 elements for synchronized actions)                 | <sup>1)</sup> With restricted functionality, see export control version.                                            |                                             |            | ●<br>1)   | ●       |
| Synchronized actions stage 2                                                                                                                                       | <sup>1)</sup> With restricted functionality, see export control version.                                            | 6FC5800-0AM36-0YB0                          | M36        | ○<br>1)   | ○       |
| Positioning axes and spindles via synchronized actions (command axes)                                                                                              |                                                                                                                     |                                             |            | ●         | ●       |
| Analog value control in the interpolation cycle<br>(Requirement: analog input)                                                                                     |                                                                                                                     |                                             |            | ●         | ●       |
| Analog output, path velocity-dependent (laser power control)                                                                                                       |                                                                                                                     | 6FC5800-0AM37-0YB0                          | M37        | ○         | ○       |
| Laser switching signal, high-speed HSLC                                                                                                                            | Requirement:<br>Loadable compile cycle.                                                                             | 6FC5800-0AM38-0YB0                          | M38        | ○         | ○       |
| Clearance control:                                                                                                                                                 |                                                                                                                     |                                             |            |           |         |
| • 1D in interpolation cycle via synchronized actions                                                                                                               |                                                                                                                     |                                             |            | ●         | ●       |
| • Clearance control 1D/3D in position control cycle including in the IPO cycle                                                                                     | Requirement:<br>Loadable compile cycle.<br><sup>1)</sup> With restricted functionality, see export control version. | 6FC5800-0AM40-0YB0                          | M40        | ○<br>1)   | ○       |
| • Clearance control 1D/3D in position control cycle, free direction                                                                                                | Requirement:<br>Loadable compile cycle and M40.                                                                     | 6FC5800-0AM65-0YB0                          | M65        | ○         | ○       |
| Evaluation of internal drive variables<br>(precondition for Adaptive Control)                                                                                      |                                                                                                                     | 6FC5800-0AM41-0YB0                          | M41        | ○         | ○       |
| Continuous dressing (parallel dressing, online modification of the tool offset)                                                                                    |                                                                                                                     |                                             |            | ●         | ●       |
| Asynchronous subprograms ASUP                                                                                                                                      | High-speed CNC inputs/outputs.                                                                                      |                                             |            | ●         | ●       |
| Interrupt routines with fast retraction from the contour                                                                                                           |                                                                                                                     | 6FC5800-0AM42-0YB0                          | M42        | ○         | ○       |
| Cross-mode actions (ASUPs and synchronized actions in all operating modes)                                                                                         |                                                                                                                     | 6FC5800-0AM43-0YB0                          | M43        | ○         | ○       |

# SINUMERIK CNC

## Functions

### Open Architecture

2

| Description                                                                                                                                                                                            | Instructions<br>(footnotes are applicable line by line)                            | Order No.                                                                                                       | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                                                        |                                                                                    | Type<br>(for complete Order No., see notes)                                                                     |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul>                                     |                                                                                    |                                                                                                                 |            |           |         |
| <b>Open Architecture</b>                                                                                                                                                                               |                                                                                    |                                                                                                                 |            |           |         |
| Program screens, operating areas and user interfaces<br>SINUMERIK Integrate Create MyHMI:                                                                                                              | See<br>SINUMERIK<br>Integrate.                                                     |                                                                                                                 |            |           |         |
| Create MyHMI /3GL (programming package)<br>Software for PC                                                                                                                                             | OEM contract<br>required.                                                          | <b>6FC5861-1YC00-0YA0</b><br><b>6FC5861-1YC...YA0</b><br><b>6FC5861-1YP00-0YB0</b><br><b>6FC5861-1YP00-0YL8</b> |            | ○         | ○       |
| Run MyHMI /3GL                                                                                                                                                                                         |                                                                                    | <b>6FC5800-0AP60-0YB0</b>                                                                                       | <b>P60</b> | ○         | ○       |
| Run MyHMI /3GL (.net)                                                                                                                                                                                  |                                                                                    | <b>6FC5800-0AP66-0YB0</b>                                                                                       | <b>P66</b> | ○         | ○       |
| Use SIMATIC OP 177B, TP 177B, OP 277, TP 277, MP 277,<br>MP 377, OP 170B, TP 170B, OP 270/TP 270 with 6"/10" display<br>and MP 170/MP 270B/MP 370 with keys/touch<br>SINUMERIK Integrate Create MyHMI: | See<br>SINUMERIK<br>Integrate.                                                     |                                                                                                                 |            |           |         |
| Run MyHMI /SIMATIC OP<br>for SIMATIC Basic /Comfort Panels                                                                                                                                             |                                                                                    | <b>6FC5800-0AP03-0YB0</b>                                                                                       | <b>P03</b> | ○         | ○       |
| Integrate screens with variable<br>layout in SINUMERIK Operate with<br>SINUMERIK Integrate Create MyHMI /PRO                                                                                           | See<br>SINUMERIK<br>Integrate.                                                     | <b>6FC5867-3YC00-0YA8</b><br><b>6FC5867-3YC2...YA8</b>                                                          |            | ○         | ○       |
| SINUMERIK Integrate Run MyHMI /PRO for<br>SINUMERIK PCU 50.5/<br>NCU 710.3 PN/NCU 720.3 PN/<br>NCU 730.3 PN for machine operation                                                                      |                                                                                    | <b>6FC5800-0AP47-0YB0</b>                                                                                       | <b>P47</b> | ○         | ○       |
| Integrate screens in SINUMERIK Operate with<br>SINUMERIK Integrate Run MyScreens                                                                                                                       | See<br>SINUMERIK<br>Integrate.                                                     | <b>6FC5800-0AP64-0YB0</b>                                                                                       | <b>P64</b> | ○         | ○       |
| • Free screens                                                                                                                                                                                         |                                                                                    |                                                                                                                 |            | 5         | 5       |
| Integrate OEM specific solutions in the NC kernel<br>with SINUMERIK Integrate Create MyCC:                                                                                                             | See<br>SINUMERIK<br>Integrate.                                                     |                                                                                                                 |            |           |         |
| • Create MyCC for openness in the NC kernel                                                                                                                                                            | OEM contract<br>required.                                                          | On request                                                                                                      |            | –         | ○       |
| • Create MyCCI for openness in the NC kernel based on<br>Customized Interface                                                                                                                          | COA contract<br>required.                                                          | <b>6FC5863-1YP00-0YB8</b>                                                                                       |            | ○         | ○       |
| • Create MyCCI /Interpreter for openness in the NC kernel<br>based on Interpreter Interface                                                                                                            | COA contract<br>required.                                                          | <b>6FC5863-0YP00-0YB8</b>                                                                                       |            | ○         | ○       |
| • Run MyCC                                                                                                                                                                                             | Requirement:<br>Create MyCC.                                                       | <b>6FC5800-0AM04-0YB0</b>                                                                                       | <b>M04</b> | –         | ○       |
| • Run MyCCI /IMD                                                                                                                                                                                       | Requirement:<br>Create MyCC or<br>Create MyCCI or<br>Create MyCCI<br>/Interpreter. | <b>6FC5800-0AN13-0YB0</b>                                                                                       | <b>N13</b> | ○         | ○       |
| • Run MyCCI /VCI                                                                                                                                                                                       | Requirement:<br>Create MyCC or<br>Create MyCCI or<br>Create MyCCI<br>/Interpreter. | <b>6FC5800-0AN74-0YB0</b>                                                                                       | <b>N74</b> | ○         | ○       |
| • Run MyCCI /COOC                                                                                                                                                                                      | Requirement:<br>Create MyCC or<br>Create MyCCI or<br>Create MyCCI<br>/Interpreter. | <b>6FC5800-0AM67-0YB0</b>                                                                                       | <b>M67</b> | ○         | ○       |

| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>— Not possible                                      | Instructions<br>(footnotes are applicable line by line) | Order No.                                   | Order code | SINUMERIK |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                                                    |                                                         | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| CNC programming language                                                                                                                           |                                                         |                                             |            |           |         |
| Programming language<br>(DIN 66025 and high-level language expansion)                                                                              |                                                         |                                             |            | ●         | ●       |
| Main program call from main program and subprogram                                                                                                 |                                                         |                                             |            | ●         | ●       |
| Subprogram levels/interrupt routines, max.                                                                                                         |                                                         |                                             |            | 16/2      | 16/2    |
| Number of subprogram passes ≤ 9999                                                                                                                 |                                                         |                                             |            | ●         | ●       |
| Number of levels for skip blocks (/0 to /...)                                                                                                      |                                                         |                                             |            | 8         | 8       |
| Polar coordinates                                                                                                                                  |                                                         |                                             |            | ●         | ●       |
| 1/2/3-point contours                                                                                                                               |                                                         |                                             |            | ●         | ●       |
| Dimensions metric/inch,<br>changeover manually or via program                                                                                      |                                                         |                                             |            | ●         | ●       |
| Inverse-time feedrate                                                                                                                              |                                                         |                                             |            | ●         | ●       |
| Auxiliary function output:                                                                                                                         |                                                         |                                             |            |           |         |
| • Via M word, max. programmable value range:<br>INT 2 <sup>31</sup> -1                                                                             |                                                         |                                             |            | ●         | ●       |
| • Via H word, max. programmable value range:<br>REAL ± 3.4028 ex 38<br>(display: ± 999 999 999.9999)<br>INT -2 <sup>31</sup> to 2 <sup>31</sup> -1 |                                                         |                                             |            | ●         | ●       |
| CNC high-level language with:                                                                                                                      |                                                         |                                             |            |           |         |
| • User variables, configurable                                                                                                                     |                                                         |                                             |            | ●         | ●       |
| • Predefined user variables (arithmetic parameters)                                                                                                |                                                         |                                             |            | ●         | ●       |
| • Predefined user variables (arithmetic parameters),<br>configurable                                                                               |                                                         |                                             |            | ●         | ●       |
| • Read/write system variables                                                                                                                      |                                                         |                                             |            | ●         | ●       |
| • Indirect programming                                                                                                                             |                                                         |                                             |            | ●         | ●       |
| • Program jumps and branches                                                                                                                       |                                                         |                                             |            | ●         | ●       |
| • Program coordination with WAIT, START, INIT                                                                                                      |                                                         |                                             |            | ●         | ●       |
| • Arithmetic and trigonometric functions                                                                                                           |                                                         |                                             |            | ●         | ●       |
| • Comparison operations and logic combinations                                                                                                     |                                                         |                                             |            | ●         | ●       |
| • Macro techniques                                                                                                                                 |                                                         |                                             |            | ●         | ●       |
| • Control structures IF-ELSE-ENDIF                                                                                                                 |                                                         |                                             |            | ●         | ●       |
| • Control structures WHILE, FOR, REPEAT, LOOP                                                                                                      |                                                         |                                             |            | ●         | ●       |
| • Commands to HMI                                                                                                                                  |                                                         |                                             |            | ●         | ●       |
| • STRING functions                                                                                                                                 |                                                         |                                             |            | ●         | ●       |
| Program functions:                                                                                                                                 |                                                         |                                             |            |           |         |
| • Preprocessing buffer, dynamic (FIFO)                                                                                                             |                                                         |                                             |            | ●         | ●       |
| • Look Ahead                                                                                                                                       |                                                         |                                             |            | ●         | ●       |
| • Frame concept                                                                                                                                    |                                                         |                                             |            | ●         | ●       |
| • Inclined-surface machining with frames                                                                                                           |                                                         |                                             |            | ●         | ●       |
| • Axis/spindle interchange                                                                                                                         |                                                         |                                             |            | ●         | ●       |
| • Geometry axes, switchable online in the CNC program                                                                                              |                                                         |                                             |            | ●         | ●       |
| • Program preprocessing                                                                                                                            |                                                         |                                             |            | ●         | ●       |

# SINUMERIK CNC

## Functions

### CNC programming language

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.<br><br>Type<br>(for complete<br>Order No., see notes) | Order code | SINUMERIK       |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|------------|-----------------|-----------------|
|                                                                                                                                                                    |                                                               |                                                                 |            | 840DE sl        | 840D sl         |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                                 |            |                 |                 |
| <b>CNC programming language (continued)</b>                                                                                                                        |                                                               |                                                                 |            |                 |                 |
| Online ISO dialect interpreter                                                                                                                                     |                                                               |                                                                 |            | ●               | ●               |
| Program/workpiece management:                                                                                                                                      |                                                               |                                                                 |            |                 |                 |
| • Part programs on NCU, max. number                                                                                                                                | In total max.<br>512 files per directory.                     |                                                                 |            | 1000            | 1000            |
| • Workpieces on NCU, max. number                                                                                                                                   | In total max.<br>256 directories.                             |                                                                 |            | 250             | 250             |
| • Workpieces on SSD of PCU,<br>max. number                                                                                                                         | In total max.<br>100000 user files.                           |                                                                 |            | 10 <sup>5</sup> | 10 <sup>5</sup> |
| • In additional HMI user memory<br>on CF card of the NCU                                                                                                           | In total max.<br>100000 user files<br>and directories.        |                                                                 |            | ○               | ○               |
| • On additional plug-in CF card in SINUMERIK PCU 50.5                                                                                                              |                                                               |                                                                 |            | ○               | ○               |
| • On integrated hard disk in SINUMERIK PCU 50.5                                                                                                                    |                                                               |                                                                 |            | ○               | ○               |
| • On USB storage medium,<br>e.g. diskette drive, memory stick                                                                                                      |                                                               |                                                                 |            | ○               | ○               |
| • On network drive                                                                                                                                                 |                                                               |                                                                 |            | ●               | ●               |
| • Templates for workpieces and programs                                                                                                                            |                                                               |                                                                 |            | ●               | ●               |
| • Job lists                                                                                                                                                        |                                                               |                                                                 |            | ●               | ●               |
| Number of basic frames, max.                                                                                                                                       |                                                               |                                                                 |            | 16              | 16              |
| Number of settable offsets, max.                                                                                                                                   |                                                               |                                                                 |            | 100             | 100             |
| Work offsets, programmable (frames)                                                                                                                                |                                                               |                                                                 |            | ●               | ●               |
| Scratching, determining zero work offset                                                                                                                           |                                                               |                                                                 |            | ●               | ●               |
| Zero work offsets, external (PLC)                                                                                                                                  |                                                               |                                                                 |            | ●               | ●               |
| Global and local user data                                                                                                                                         |                                                               |                                                                 |            | ●               | ●               |
| Global program user data                                                                                                                                           |                                                               |                                                                 |            | ●               | ●               |
| Display system variables<br>(also via online configurable display) and log them                                                                                    |                                                               |                                                                 |            | ◇               | ◇               |



| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line) | Order No.                                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                         | Type<br>(for complete Order No., see notes)                    |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                         |                                                                |            |           |         |
| <b>Programming support</b>                                                                                                                                         |                                                         |                                                                |            |           |         |
| Program editor:                                                                                                                                                    |                                                         |                                                                |            |           |         |
| • Text editor with editing functions: Selecting, copying, deleting                                                                                                 |                                                         |                                                                |            | ●         | ●       |
| • Dual editor                                                                                                                                                      |                                                         |                                                                |            | ●         | ●       |
| • Multi-editor, maximum 4                                                                                                                                          | Requirement:<br>SINUMERIK<br>OP 019.                    |                                                                |            | ●         | ●       |
| • Write protection for lines                                                                                                                                       |                                                         |                                                                |            | ●         | ●       |
| • Suppression of lines in the display                                                                                                                              |                                                         |                                                                |            | ●         | ●       |
| ShopTurn/ShopMill:                                                                                                                                                 |                                                         |                                                                |            |           |         |
| • Machining step programming and multiple clamping of identical workpieces                                                                                         |                                                         | 6FC5800-0AP17-0YB0                                             | P17        | ◇         | ◇       |
| Multiple clamping of various workpieces                                                                                                                            | Requirement:<br>Option P17.                             | 6FC5800-0AP14-0YB0                                             | P14        | ◇         | ◇       |
| programSYNC (machining step programming)                                                                                                                           |                                                         | 6FC5800-0AP05-0YB0                                             | P05        | ◇         | ◇       |
| Programming support for geometry entries:                                                                                                                          |                                                         |                                                                |            |           |         |
| • programGUIDE<br>(programming support for cycles,<br>dynamic programming graphics, animated elements)                                                             |                                                         |                                                                |            | ●         | ●       |
| Technology cycles:                                                                                                                                                 |                                                         |                                                                |            |           |         |
| • Drilling                                                                                                                                                         |                                                         |                                                                |            | ●         | ●       |
| • Milling                                                                                                                                                          |                                                         |                                                                |            | ●         | ●       |
| • Turning                                                                                                                                                          |                                                         |                                                                |            | ●         | ●       |
| Pocket milling<br>with free contour definition and islands                                                                                                         |                                                         |                                                                |            | ●         | ●       |
| Residual material detection and machining for contour pockets<br>and stock removal                                                                                 |                                                         | 6FC5800-0AP13-0YB0                                             | P13        | ○         | ○       |
| Programming support for cycles:                                                                                                                                    |                                                         |                                                                |            |           |         |
| • Dynamic programming graphic during programming                                                                                                                   |                                                         |                                                                |            | ●         | ●       |
| • Programming support is expandable<br>(e.g. customer cycles)                                                                                                      | SINUMERIK<br>Integrate<br>Run MyScreens.                |                                                                |            | ●         | ●       |
| Access protection for cycles<br>SINUMERIK Integrate Lock MyCycles:                                                                                                 | See<br>SINUMERIK<br>Integrate.                          |                                                                |            |           |         |
| • Lock MyCycles (cycle protection (OEM))                                                                                                                           |                                                         | 6FC5800-0AP54-0YB0                                             | P54        | ○         | ○       |
| CAD Reader for PC                                                                                                                                                  |                                                         | 6FC5260-0AY00-0AG0<br>6FC5260-6AY00-2AG0<br>6FC5260-0AY00-0AG2 |            | ○         | ○       |

# SINUMERIK CNC

## Functions

### Simulation

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                |            |           |         |
| <b>Simulation</b>                                                                                                                                                  |                                                               |                                                |            |           |         |
| Up to n channels can be simulated                                                                                                                                  | Requirement:<br>programSYNC                                   |                                                |            | 4         | 4       |
| Simulation of program X,<br>while program Y is being executed                                                                                                      | With NCU 720.3/<br>NCU 730.3                                  |                                                |            | ●         | ●       |
| Quickview for mold-making programs                                                                                                                                 |                                                               |                                                |            | ●         | ●       |
| Turning/drilling/milling:                                                                                                                                          |                                                               |                                                |            |           |         |
| • Turning                                                                                                                                                          |                                                               |                                                |            | ●         | ●       |
| • Counterspindle                                                                                                                                                   |                                                               |                                                |            | ●         | ●       |
| • Turn-milling                                                                                                                                                     |                                                               |                                                |            | ●         | ●       |
| • Mill-turning with supported kinematics                                                                                                                           | Application-specific<br>by machine<br>manufacturer.           |                                                |            | ●         | ●       |
| • Milling up to 5-axis machining with TRAORI                                                                                                                       |                                                               |                                                |            | ●         | ●       |
| • Simultaneous recording<br>(real-time simulation of current machining)                                                                                            |                                                               | 6FC5800-0AP22-0YB0                             | P22        | ○         | ○       |
| • 2D simulation (finished part)                                                                                                                                    |                                                               |                                                |            | ●         | ●       |
| • 3D simulation 1 (finished part)                                                                                                                                  |                                                               | 6FC5800-0AP25-0YB0                             | P25        | ○         | ○       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line)           | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                         | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                         |                                                |            |           |         |
| <b>Operating modes</b>                                                                                                                                             |                                                                         |                                                |            |           |         |
| JOG:                                                                                                                                                               |                                                                         |                                                |            | ●         | ●       |
| • Handwheel selection                                                                                                                                              |                                                                         |                                                |            | ●         | ●       |
| • Inch/metric changeover                                                                                                                                           |                                                                         |                                                |            | ●         | ●       |
| • Manual measurement of zero work offset                                                                                                                           |                                                                         |                                                |            | ●         | ●       |
| • Manual measurement of tool offset                                                                                                                                |                                                                         |                                                |            | ●         | ●       |
| • Automatic tool/workpiece measurement                                                                                                                             |                                                                         |                                                |            | ●         | ●       |
| • Reference point approach<br>automatic/via CNC program                                                                                                            |                                                                         |                                                |            | ●         | ●       |
| MDI:                                                                                                                                                               |                                                                         |                                                |            | ●         | ●       |
| • Input in text editor                                                                                                                                             |                                                                         |                                                |            | ●         | ●       |
| • Save MDI program                                                                                                                                                 |                                                                         |                                                |            | ●         | ●       |
| Teach-in:                                                                                                                                                          |                                                                         |                                                |            | ●         | ●       |
| • Teach positions in MDI buffer                                                                                                                                    |                                                                         |                                                |            | ●         | ●       |
| • Teach-in function Handling                                                                                                                                       |                                                                         |                                                |            | ●         | ●       |
| Automatic:                                                                                                                                                         |                                                                         |                                                |            | ●         | ●       |
| • Execution from storage medium at rear USB interface of<br>TCU/PCU<br>e.g. card reader, memory stick                                                              |                                                                         |                                                |            | ●         | ●       |
| • Execution from HMI memory on CF card of NCU                                                                                                                      | Requirement:<br>Additional HMI user<br>memory on CF card of<br>the NCU. | 6FC5800-0AP12-0YB0                             | P12        | ○         | ○       |
| • Execution from network drive                                                                                                                                     |                                                                         |                                                |            | ●         | ●       |
| • Execution from hard disk                                                                                                                                         | On PCU 50.5.                                                            |                                                |            | ●         | ●       |
| • Program control                                                                                                                                                  |                                                                         |                                                |            | ●         | ●       |
| • Program editing                                                                                                                                                  |                                                                         |                                                |            | ●         | ●       |
| • Overstore                                                                                                                                                        |                                                                         |                                                |            |           |         |
| • DRF offset                                                                                                                                                       |                                                                         |                                                |            | ●         | ●       |
| • Block search with/without calculation                                                                                                                            |                                                                         |                                                |            | ●         | ●       |
| Repos (repositioning on the contour):                                                                                                                              |                                                                         |                                                |            | ●         | ●       |
| • With operator command/semi-automatically                                                                                                                         |                                                                         |                                                |            | ●         | ●       |
| • Program-controlled                                                                                                                                               |                                                                         |                                                |            | ●         | ●       |

# SINUMERIK CNC

## Functions

### Tools

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line)                 | Order No.                                   | Order code | SINUMERIK    |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------|------------|--------------|--------------|
|                                                                                                                                                                    |                                                                         | Type<br>(for complete Order No., see notes) |            | 840DE sl     | 840D sl      |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                         |                                             |            |              |              |
| <b>Tools</b>                                                                                                                                                       |                                                                         |                                             |            |              |              |
| Tool types:                                                                                                                                                        |                                                                         |                                             |            |              |              |
| • Turning                                                                                                                                                          |                                                                         |                                             |            | ●            | ●            |
| • Drilling/milling                                                                                                                                                 |                                                                         |                                             |            | ●            | ●            |
| • Grinding                                                                                                                                                         |                                                                         |                                             |            | ●            | ●            |
| • Nibbling                                                                                                                                                         | Not in SINUMERIK Operate.                                               |                                             |            | –            | –            |
| • Groove sawing                                                                                                                                                    |                                                                         |                                             |            | ●            | ●            |
| Tool radius compensations in plane:                                                                                                                                |                                                                         |                                             |            |              |              |
| • With approach and retract strategies                                                                                                                             |                                                                         |                                             |            | ●            | ●            |
| • With transition circle/transition ellipse at outside corners                                                                                                     |                                                                         |                                             |            | ●            | ●            |
| Configurable intermediate blocks with tool radius compensation active                                                                                              |                                                                         |                                             |            | ●            | ●            |
| 3D tool radius compensation                                                                                                                                        |                                                                         | 6FC5800-0AM48-0YB0                          | M48        | ○            | ○            |
| Tool change via T number                                                                                                                                           |                                                                         |                                             |            | ●            | ●            |
| Tool carrier with orientation capability                                                                                                                           |                                                                         |                                             |            | ●            | ●            |
| Look-ahead detection of contour violations                                                                                                                         |                                                                         |                                             |            | ●            | ●            |
| Grinding wheel peripheral speed programmable                                                                                                                       |                                                                         |                                             |            | ●            | ●            |
| Tool orientation interpolation                                                                                                                                     | Requirement:<br>SINUMERIK MDynamics 5 axes or 5 axis machining package. |                                             |            | –            | ●            |
| Online tool length compensation                                                                                                                                    |                                                                         |                                             |            | ●            | ●            |
| Operation <u>without</u> magazine management:                                                                                                                      |                                                                         |                                             |            | ●            | ●            |
| • Tool offset selection via D number without T assignment (flat D number)                                                                                          |                                                                         |                                             |            | –            | –            |
| • Editing of tool data                                                                                                                                             |                                                                         |                                             |            | ●            | ●            |
| • Tool offset selection via T and D numbers                                                                                                                        |                                                                         |                                             |            | ●            | ●            |
| • Number of tools/cutting edges in tool list                                                                                                                       |                                                                         |                                             |            | 600/<br>1500 | 600/<br>1500 |

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line) | Order No.                                   | Order code | SINUMERIK    |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|------------|--------------|--------------|
|                                                                                                                                                                    |                                                         | Type<br>(for complete Order No., see notes) |            | 840DE sl     | 840D sl      |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                         |                                             |            |              |              |
| <b>Tools (continued)</b>                                                                                                                                           |                                                         |                                             |            |              |              |
| Operation <u>with</u> tool management up to 3 magazines (corresponding to one real magazine):                                                                      |                                                         |                                             |            | ●            | ●            |
| • Operation <u>with</u> tool management with more than three magazines                                                                                             |                                                         | 6FC5800-0AM88-0YB0                          | M88        | ○            | ○            |
| • System displays in standard software                                                                                                                             |                                                         |                                             |            | ●            | ●            |
| • User-friendly commissioning via system displays                                                                                                                  |                                                         |                                             |            | ●            | ●            |
| • Tool list                                                                                                                                                        |                                                         |                                             |            | ●            | ●            |
| • Configurable tool lists                                                                                                                                          | One configured list is possible.                        |                                             |            | ●            | ●            |
| • Number of tools/cutting edges in tool list                                                                                                                       |                                                         |                                             |            | 600/<br>1500 | 600/<br>1500 |
| • Tool offset selection via T and D numbers                                                                                                                        |                                                         |                                             |            | ●            | ●            |
| • Editing of tool data                                                                                                                                             |                                                         |                                             |            | ●            | ●            |
| • Editing of OA data                                                                                                                                               |                                                         |                                             |            | ●            | ●            |
| • Magazine list                                                                                                                                                    |                                                         |                                             |            | ●            | ●            |
| • Configurable magazine list                                                                                                                                       |                                                         |                                             |            | ●            | ●            |
| • Max. number of magazines                                                                                                                                         |                                                         |                                             |            | 32           | 32           |
| • Magazine data                                                                                                                                                    |                                                         |                                             |            | ●            | ●            |
| • Empty location search and place positioning                                                                                                                      |                                                         |                                             |            | ●            | ●            |
| • Easy empty location search using softkeys                                                                                                                        |                                                         |                                             |            | ●            | ●            |
| • Loading and unloading of tools                                                                                                                                   |                                                         |                                             |            | ●            | ●            |
| • More than one loading and unloading points per magazine                                                                                                          |                                                         |                                             |            | ●            | ●            |
| • Tool life monitoring and workpiece count                                                                                                                         |                                                         |                                             |            | ●            | ●            |
| • Monitoring for max. tool speed/acceleration                                                                                                                      |                                                         | 6FC5800-0AS08-0YB0                          | S08        | ○            | ○            |
| Tool management functions for individual machines and networked machines SINUMERIK Integrate Manage MyTools (TDI):                                                 | See SINUMERIK Integrate.                                |                                             |            |              |              |
| • Manage MyTools<br>Software for PC/Server                                                                                                                         |                                                         | 6FC6000-2XC02-4AA8<br>6FC6000-2XC0.-AA8     |            |              |              |
| • Manage MyTools<br>License for NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN                                                                                             |                                                         | 6FC5800-0AP37-0YB0                          | P37        | ○            | ○            |
| • Manage MyTools (Node)<br>Node license for other ports                                                                                                            |                                                         | 6FC6000-2NF00-0YB0                          |            |              |              |
| Tool identification for loading/unloading tools by means of code carrier SINUMERIK Integrate Access MyTool ID:                                                     | See SINUMERIK Integrate.                                |                                             |            |              |              |
| • Access MyTool ID<br>(TDI Ident Connection)                                                                                                                       |                                                         | 6FC5800-0AP52-0YB0                          | P52        | ○            | ○            |

# SINUMERIK CNC

## Functions

### Communication/data management

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line)         | Order No.                                              | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                 | Type<br>(for complete Order No., see notes)            |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                 |                                                        |            |           |         |
| <b>Communication/data management</b>                                                                                                                               |                                                                 |                                                        |            |           |         |
| HMI user memory, additional on CF card of NCU                                                                                                                      | See CNC.<br>1) Not in combination with PCU 50.5.                | <b>6FC5800-0AP12-0YB0</b>                              | <b>P12</b> | ○<br>1)   | ○<br>1) |
| Data on storage medium on rear USB interface of TCU/PCU, e.g. card reader, memory stick                                                                            | 1) Two plant HMIs can be accessed per plant network.            |                                                        |            | ●<br>1)   | ●<br>1) |
| Data on storage medium on front USB interface of operator panel, e.g. memory stick                                                                                 | 1) Two plant HMIs can be accessed per plant network.            |                                                        |            | ●<br>1)   | ●<br>1) |
| Manage additional drives:                                                                                                                                          |                                                                 |                                                        |            |           |         |
| • Via Ethernet, max. 4                                                                                                                                             |                                                                 |                                                        |            | ●         | ●       |
| • Via USB                                                                                                                                                          |                                                                 |                                                        |            | ●         | ●       |
| • Via CF card of the PCU                                                                                                                                           |                                                                 |                                                        |            | ●         | ●       |
| COM (RS232C/V.24) serial interface                                                                                                                                 | Requirement:<br>COM01 RS232C (V.24) module for NCU or PCU 50.5. |                                                        |            | ●         | ●       |
| I/O interfacing via PROFIBUS DP                                                                                                                                    |                                                                 |                                                        |            | ●         | ●       |
| Axis data output via PROFIBUS ADAS                                                                                                                                 | Requirement:<br>Loadable compile cycle.                         | <b>6FC5800-0AN07-0YB0</b>                              | <b>N07</b> | ○         | ○       |
| Reading of actual positions correlated with output signal COPA                                                                                                     | Requirement:<br>Loadable compile cycle.                         | <b>6FC5800-0AN61-0YB0</b>                              | <b>N61</b> | ○         | ○       |
| Data backup for NCU CF card (Backup/Restore) on memory stick or via network                                                                                        |                                                                 |                                                        |            | ●         | ●       |
| Data backup on hard disk of SINUMERIK PCU 50.5                                                                                                                     |                                                                 |                                                        |            | ●         | ●       |
| Data backup with Ghost (Backup/Restore) on hard disk of SINUMERIK PCU 50.5/network                                                                                 |                                                                 |                                                        |            | ●         | ●       |
| CNC program transfer<br>SINUMERIK Integrate<br>Manage MyPrograms (MCIS DNC):                                                                                       | See SINUMERIK Integrate.                                        |                                                        |            |           |         |
| • Manage MyPrograms<br>Software for PC/Server                                                                                                                      |                                                                 | <b>6FC6000-0XC02-4AA8</b><br><b>6FC6000-0XC0.-.AA8</b> |            |           |         |
| • Manage MyPrograms<br>License for NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN                                                                                          |                                                                 | <b>6FC5800-0AP41-0YB0</b>                              | <b>P41</b> | ○         | ○       |
| • Manage MyPrograms<br>Node license for other ports                                                                                                                |                                                                 | <b>6FC6000-0NF00-0YB0</b>                              |            |           |         |

| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>– Not possible                                        | Instructions<br>(footnotes are applicable line by line) | Order No.                                   | Order code | SINUMERIK |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                                                      |                                                         | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| Operation                                                                                                                                            |                                                         |                                             |            |           |         |
| Operator panel fronts:                                                                                                                               |                                                         |                                             |            |           |         |
| • SINUMERIK OP 010, 10.4", color                                                                                                                     |                                                         | 6FC5203-0AF00-0AA1                          |            | ○         | ○       |
| • SINUMERIK OP 010C, 10.4", color                                                                                                                    |                                                         | 6FC5203-0AF01-0AA0                          |            | ○         | ○       |
| • SINUMERIK OP 010S, 10.4", color                                                                                                                    |                                                         | 6FC5203-0AF04-0AA0                          |            | ○         | ○       |
| • SINUMERIK OP 012, 12.1", color                                                                                                                     |                                                         | 6FC5203-0AF02-0AA1                          |            | ○         | ○       |
| • SINUMERIK OP 015, 15", color                                                                                                                       |                                                         | 6FC5203-0AF03-0AA0                          |            | ○         | ○       |
| • SINUMERIK OP 015A, 15", color                                                                                                                      |                                                         | 6FC5203-0AF05-0AB0                          |            | ○         | ○       |
| • SINUMERIK TP 015A, 15", color, touch                                                                                                               |                                                         | 6FC5203-0AF08-0AB2                          |            | ○         | ○       |
| • SINUMERIK OP 019, 19", color                                                                                                                       | Requirement:<br>PCU 50.5.                               | 6FC5303-0AF13-0AA0                          |            | ○         | ○       |
| Thin Client Unit for operator panel fronts:                                                                                                          |                                                         |                                             |            |           |         |
| • SINUMERIK TCU                                                                                                                                      | Not in combination<br>with SINUMERIK<br>OP 019.         | 6FC5312-0DA00-0AA1                          |            | ○         | ○       |
| Operator panel fronts with integrated TCU:                                                                                                           |                                                         |                                             |            |           |         |
| • SINUMERIK OP 08T, 8", color                                                                                                                        |                                                         | 6FC5203-0AF04-1BA0                          |            | ○         | ○       |
| • SINUMERIK OP 015AT, 15", color                                                                                                                     |                                                         | 6FC5203-0AF05-1AB0                          |            | ○         | ○       |
| • SINUMERIK TP 015AT, 15", color, touch                                                                                                              |                                                         | 6FC5203-0AF08-1AB2                          |            | ○         | ○       |
| Additional components for Thin Client:                                                                                                               |                                                         |                                             |            |           |         |
| • Switch SCALANCE XB005 unmanaged                                                                                                                    |                                                         | 6GK5005-0BA00-1AB2                          |            | ○         | ○       |
| • Switch SCALANCE X005 unmanaged                                                                                                                     |                                                         | 6GK5005-0BA00-1AA3                          |            | ○         | ○       |
| • Switch SCALANCE X108 unmanaged                                                                                                                     |                                                         | 6GK5108-0BA00-2AA3                          |            | ○         | ○       |
| • Switch SCALANCE X208 managed                                                                                                                       |                                                         | 6GK5208-0BA10-2AA3                          |            | ○         | ○       |
| • Switch SCALANCE X208 PRO managed                                                                                                                   |                                                         | 6GK5208-0HA00-2AA6                          |            | ○         | ○       |
| Accessories for operator panels:                                                                                                                     |                                                         |                                             |            |           |         |
| • USB interface for mounting in control cabinet<br>(with connection between cabinet mounting component and the USB connector, length 1 m (39.37 in)) |                                                         | 6FC5347-0AF01-1AA0                          |            | ○         | ○       |
| Industrial PC for operator panel fronts:                                                                                                             |                                                         |                                             |            |           |         |
| • SINUMERIK PCU 50.5-C<br>P4505; 1.86 GHZ/1024 MB,<br>Windows XP ProEmbSys                                                                           |                                                         | 6FC5210-0DF52-2AA0                          |            | ○         | ○       |
| • SINUMERIK PCU 50.5-P<br>i5-520E; 2.4 GHZ/2048 MB,<br>Windows XP ProEmbSys                                                                          |                                                         | 6FC5210-0DF53-2AA0                          |            | ○         | ○       |
| • Memory expansion 1024 MB for SINUMERIK PCU 50.5                                                                                                    |                                                         | 6ES7648-2AJ40-1KA0                          |            | ○         | ○       |
| • Memory expansion 2048 MB for SINUMERIK PCU 50.5                                                                                                    |                                                         | 6ES7648-2AJ50-1KA0                          |            | ○         | ○       |



# SINUMERIK CNC

## Functions

### Operation

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| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>– Not possible         | Instructions<br>(footnotes are applicable line by line)   | Order No.                                   | Order code | SINUMERIK |         |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                       |                                                           | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| Operation (continued)                                                                                                 |                                                           |                                             |            |           |         |
| Software for:                                                                                                         | See SINUMERIK Operate.                                    |                                             |            |           |         |
| • SINUMERIK PCU 50.5 for machine operation with SINUMERIK Operate                                                     |                                                           | 6FC5860-1YF00-0YA0                          |            | ○         | ○       |
|                                                                                                                       |                                                           | 6FC5860-1YF2-.-YA0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-1YC00-0YA0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-1YC2-.-YA0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-1YC2-.-YA8                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-1YF00-0YB0                          |            |           |         |
| • PC for machine operation with SINUMERIK Operate                                                                     |                                                           | 6FC5860-1YP00-0YL8                          |            | ○         | ○       |
|                                                                                                                       |                                                           | 6FC5860-2YC00-0YA0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-2YC20-.YA0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-2YC20-.YA8                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-2YF00-0YB0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5860-2YP00-0YL8                          |            |           |         |
| Assembly materials for PCU and TCU:                                                                                   |                                                           |                                             |            |           |         |
| • Mounting bracket for PCU or TCU behind operator panel front                                                         |                                                           | 6FC5248-0AF20-2AA0                          |            | ○         | ○       |
| • Upright mounting bracket for PCU 50.5 in control cabinet                                                            |                                                           | 6FC5248-0AF20-1AA1                          |            | ○         | ○       |
| • Flat mounting bracket for PCU in control cabinet                                                                    |                                                           | 6FC5248-0AF20-0AA0                          |            | ○         | ○       |
| Connection for:                                                                                                       |                                                           |                                             |            |           |         |
| • SIMATIC Thin Client Touch 10" and 15" operator panels via Industrial Ethernet                                       |                                                           |                                             |            | ●         | ●       |
| • Standard monitor (DVI), VGA via external adapter for PCU 50.3                                                       |                                                           |                                             |            | ●         | ●       |
| • SIMATIC OP 177B/TP 177B, OP 277/TP 277 and MP 277/MP377                                                             | Requirement:<br>WinCC flexible and Run MyHMI /SIMATIC OP. |                                             |            | ●         | ●       |
| • SIMATIC OP 170B/TP 170B and OP 270/TP 270 with 6"/10" display and MP 170/MP 270B/MP 370 with keys/touch             | Requirement:<br>WinCC flexible and Run MyHMI /SIMATIC OP. |                                             |            | ●         | ●       |
| Software for:                                                                                                         |                                                           |                                             |            |           |         |
| • SIMATIC OP 177B/TP 177B/MP 277 operator panel for machine operation with HMI Lite CE                                |                                                           | 6FC5263-0PY11-0AG0                          |            | ○         | ○       |
|                                                                                                                       |                                                           | 6FC5263-.PY11-.AG0                          |            |           |         |
|                                                                                                                       |                                                           | 6FC5263-0PY11-0AG1                          |            |           |         |
| Control unit management:                                                                                              |                                                           |                                             |            |           |         |
| • Identical display on all OPs with TCU                                                                               |                                                           |                                             |            | ●         | ●       |
| - Simultaneous operation interlock                                                                                    |                                                           |                                             |            | ●         | ●       |
| - Activate/deactivate MCP/MPP                                                                                         |                                                           |                                             |            | ●         | ●       |
| - Different resolutions (e.g. SINUMERIK OP 010/SINUMERIK OP 012)                                                      |                                                           |                                             |            | ●         | ●       |
| - Up to 2 operator panel fronts each with one TCU on an NCU 710.3 PN                                                  |                                                           |                                             |            | ●         | ●       |
| - Up to 4 operator panel fronts each with one TCU on an NCU 720.3 PN/NCU 730.3 PN                                     |                                                           |                                             |            | ●         | ●       |
| - Up to 4 operator panel fronts each with one TCU on a PCU plus 1 additional operator panel front directly on the PCU |                                                           |                                             |            | ●         | ●       |
| - From 2/4 operator panel fronts as many operator panel fronts as required due to intelligent suppression             |                                                           |                                             |            | ●         | ●       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line)     | Order No.<br><br>Type<br>(for complete<br>Order No., see notes) | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                   |                                                                 |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                   |                                                                 |            |           |         |
| <b>Operation (continued)</b>                                                                                                                                       |                                                                   |                                                                 |            |           |         |
| One or several TCUs which can be switched over via several NCUs and PCUs                                                                                           |                                                                   |                                                                 |            | ●         | ●       |
| One HMI switchable via several NCUs                                                                                                                                |                                                                   |                                                                 |            | ●         | ●       |
| One integrated HMI and one SINUMERIK Operate simultaneously on one NCU                                                                                             | For loading/unloading tools only.                                 |                                                                 |            | ●         | ●       |
| Operator control without SINUMERIK operator panel                                                                                                                  |                                                                   | 6FC5800-0AP00-0YB0                                              | P00        | ○         | ○       |
| Operation via a VNC viewer:                                                                                                                                        |                                                                   |                                                                 |            | ●         | ●       |
| • SINUMERIK HT 8 handheld terminal                                                                                                                                 |                                                                   | 6FC5403-0AA20-0AA0                                              |            | ○         | ○       |
| • SINUMERIK HT 8 H handheld terminal (with handwheel):                                                                                                             |                                                                   | 6FC5403-0AA20-1AA0                                              |            | ○         | ○       |
| - Touch pen with holding loop for HT 8/HT 8 H                                                                                                                      |                                                                   | 6FC5348-0AA08-4AA0                                              |            | ○         | ○       |
| - Wall holder for HT 8/HT 8 H                                                                                                                                      |                                                                   | 6AV6574-1AF04-4AA0                                              |            | ○         | ○       |
| • SINUMERIK HT 2 handheld terminal:                                                                                                                                |                                                                   | 6FC5303-0AA00-2AA0                                              |            | ○         | ○       |
| - Magnetic clamp for HT 2                                                                                                                                          |                                                                   | 6FC5348-0AA08-0AA0                                              |            | ○         | ○       |
| - Holder for HT 2                                                                                                                                                  |                                                                   | 6FC5348-0AA08-1AA0                                              |            | ○         | ○       |
| - Slide-in labels inscribable (3 A4 sheets)                                                                                                                        |                                                                   | 6FC5348-0AA08-2AA0                                              |            | ○         | ○       |
| • Connection module Basic PN without emergency stop override, with switch, control cabinet mounting, for SINUMERIK HT 8 and SINUMERIK HT 2                         |                                                                   | 6FC5303-0AA01-1AA0                                              |            | ○         | ○       |
| • PN Basic connection box without emergency stop override, for SINUMERIK HT 8 and SINUMERIK HT 2                                                                   |                                                                   | 6AV6671-5AE01-0AX0                                              |            | ○         | ○       |
| • PN Plus connection box with emergency stop override, for SINUMERIK HT 8 and SINUMERIK HT 2                                                                       |                                                                   | 6AV6671-5AE11-0AX0                                              |            | ○         | ○       |
| • Mini handheld unit with coiled connecting cable                                                                                                                  |                                                                   | 6FX2007-1AD03                                                   |            | ○         | ○       |
| • Mini handheld unit with straight cable                                                                                                                           |                                                                   | 6FX2007-1AD13                                                   |            | ○         | ○       |
| • Connection kit for mini handheld unit                                                                                                                            |                                                                   | 6FX2006-1BG03                                                   |            | ○         | ○       |
| • Handwheel connection module for PROFIBUS                                                                                                                         | Not required for hand-wheel connection via machine control panel. | 6FC5303-0AA02-0AA0                                              |            | ○         | ○       |
| Machine control panels:                                                                                                                                            |                                                                   |                                                                 |            |           |         |
| • SINUMERIK MCP 310C PN                                                                                                                                            |                                                                   | 6FC5303-0AF23-0AA1                                              |            | ○         | ○       |
| • SINUMERIK MCP 310                                                                                                                                                |                                                                   | 6FC5203-0AF23-1AA0                                              |            | ○         | ○       |
| • SINUMERIK MCP 310 PN:                                                                                                                                            |                                                                   | 6FC5303-0AF23-1AA1                                              |            | ○         | ○       |
| - Actuating element 22 mm (0.87 in) latching mushroom pushbutton, red                                                                                              |                                                                   | 3SB3000-1HA20                                                   |            | ○         | ○       |
| - Contact block                                                                                                                                                    |                                                                   | 3SB3400-0A                                                      |            | ○         | ○       |
| - Cable set for additional control devices                                                                                                                         |                                                                   | 6FC5247-0AA35-0AA0                                              |            | ○         | ○       |
| - Spindle/rapid traverse override rotary switch, 1 x 16G, T=24, cap, button, pointer, rapid traverse and spindle dials                                             |                                                                   | 6FC5247-0AF12-1AA0                                              |            | ○         | ○       |
| • SINUMERIK MCP 483C PN:                                                                                                                                           |                                                                   | 6FC5303-0AF22-0AA1                                              |            | ○         | ○       |
| - Cable set for additional control devices                                                                                                                         |                                                                   | 6FC5247-0AA35-0AA0                                              |            | ○         | ○       |
| • SINUMERIK MCP 483:                                                                                                                                               |                                                                   | 6FC5203-0AF22-1AA2                                              |            | ○         | ○       |
| - Cable set for additional control devices                                                                                                                         |                                                                   | 6FC5247-0AA35-0AA0                                              |            | ○         | ○       |
| • SINUMERIK MCP 483 PN                                                                                                                                             |                                                                   | 6FC5303-0AF22-1AA1                                              |            | ○         | ○       |

# SINUMERIK CNC

## Functions

### Operation

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line)    | Order No.<br><br>Type<br>(for complete<br>Order No., see notes) | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                  |                                                                 |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                  |                                                                 |            |           |         |
| <b>Operation (continued)</b>                                                                                                                                       |                                                                  |                                                                 |            |           |         |
| Machine Push Button Panel with machine control panel functions                                                                                                     |                                                                  |                                                                 |            | ○         | ○       |
| • MPP 310 IEH with connection for SINUMERIK HT 8                                                                                                                   |                                                                  | 6FC5303-1AF20-8AA1                                              |            | ○         | ○       |
| • MPP 483                                                                                                                                                          |                                                                  | 6FC5303-1AF00-0AA1                                              |            | ○         | ○       |
| • MPP 483H for handheld unit                                                                                                                                       |                                                                  | 6FC5303-1AF00-1AA1                                              |            | ○         | ○       |
| • MPP 483A without override                                                                                                                                        |                                                                  | 6FC5303-1AF01-0AA1                                              |            | ○         | ○       |
| • MPP 483 HTC with connection for SINUMERIK HT 8                                                                                                                   |                                                                  | 6FC5303-1AF00-8AA1                                              |            | ○         | ○       |
| • MPP 483 IE                                                                                                                                                       |                                                                  | 6FC5303-1AF10-0AA0                                              |            | ○         | ○       |
| • MPP 483 IEH with connection for SINUMERIK HT 8                                                                                                                   |                                                                  | 6FC5303-1AF10-8AA0                                              |            | ○         | ○       |
| Software option for Electronic Key System EKS                                                                                                                      |                                                                  | 6FC5800-0AP53-0YB0                                              | P53        | ○         | ○       |
| Direct key module                                                                                                                                                  |                                                                  | 6FC5247-0AF11-0AA0                                              |            | ○         | ○       |
| • Direct key module mounting kit                                                                                                                                   |                                                                  | 6FC5247-0AF30-0AA0                                              |            | ○         | ○       |
| Electronic handwheels:                                                                                                                                             | Third handwheel can be operated as a contour handwheel.          |                                                                 |            | 2/3       | 2/3     |
| • With 120 mm × 120 mm (4.72 × 4.72 in) front panel, 5 V DC                                                                                                        |                                                                  | 6FC9320-5DB01                                                   |            | ○         | ○       |
| • With 76.2 mm × 76.2 mm (3 × 3 in) front panel, 5 V DC                                                                                                            |                                                                  | 6FC9320-5DC01                                                   |            | ○         | ○       |
| • With 76.2 mm × 76.2 mm (3 × 3 in) front panel, 24 V DC, HTL                                                                                                      |                                                                  | 6FC9320-5DH01                                                   |            | ○         | ○       |
| • Without front panel, without setting wheel, 5 V DC                                                                                                               |                                                                  | 6FC9320-5DF01                                                   |            | ○         | ○       |
| • Without front panel, with setting wheel, 5 V DC                                                                                                                  |                                                                  | 6FC9320-5DM00                                                   |            | ○         | ○       |
| • Portable in housing, 2.5 m (98.43 in) coiled cable, 5 V DC                                                                                                       |                                                                  | 6FC9320-5DE02                                                   |            | ○         | ○       |
| • Flange socket for portable handwheel                                                                                                                             |                                                                  | 6FC9341-1AQ                                                     |            | ○         | ○       |
| • Handwheel connection module for PROFIBUS                                                                                                                         | Not required for handwheel connection via machine control panel. | 6FC5303-0AA02-0AA0                                              |            | ○         | ○       |
| Keyboards:                                                                                                                                                         |                                                                  |                                                                 |            |           |         |
| • Full CNC keyboard vertical format                                                                                                                                |                                                                  | 6FC5303-0DT12-1AA0                                              |            | –         | –       |
| • Full CNC keyboard horizontal format                                                                                                                              |                                                                  | 6FC5303-0DM13-1AA0                                              |            | –         | –       |
| • KB 483C                                                                                                                                                          |                                                                  | 6FC5203-0AF20-0AA1                                              |            | ○         | ○       |
| • KB 310C                                                                                                                                                          |                                                                  | 6FC5203-0AF21-0AA1                                              |            | ○         | ○       |
| • KBPC CG US standard PC keyboard                                                                                                                                  |                                                                  | 6FC5203-0AC01-3AA0                                              |            | ○         | ○       |
| - Keyboard tray for standard PC keyboards                                                                                                                          |                                                                  | 6FC5247-0AA40-0AA0                                              |            | ○         | ○       |

| Description                                                                                                                                                               | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                           |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul>        |                                                               |                                                |            |           |         |
| <b>Operation (continued)</b>                                                                                                                                              |                                                               |                                                |            |           |         |
| Memory/storage devices:                                                                                                                                                   |                                                               |                                                |            | ○         | ○       |
| • Card reader for CF/SD memory media,<br>with USB connection                                                                                                              |                                                               | <b>6FC5335-0AA00-0AA0</b>                      |            | ○         | ○       |
| • Industrial USB hub 4                                                                                                                                                    | With SINUMERIK<br>PCU 50.5.                                   | <b>6AV6671-3AH00-0AX0</b>                      |            | ○         | ○       |
| • 1 GB CompactFlash card                                                                                                                                                  | Requirement:<br>Card reader.                                  | <b>6FC5313-5AG00-0AA1</b>                      |            | ○         | ○       |
| • 8 GB CompactFlash card                                                                                                                                                  | Requirement:<br>Card reader.                                  | <b>6FC5313-6AG00-0AA0</b>                      |            | ○         | ○       |
| • SIMATIC USB FlashDrive 8 GB                                                                                                                                             |                                                               | <b>6ES7648-0DC50-0AA0</b>                      |            | ○         | ○       |
| Plain text display of user variables                                                                                                                                      |                                                               |                                                |            | ●         | ●       |
| Multi-channel display                                                                                                                                                     | With OP 019<br>up to 4 channels.                              |                                                |            | ●         | ●       |
| Workpiece-related actual value system                                                                                                                                     |                                                               |                                                |            | ●         | ●       |
| Menu selection via the PLC                                                                                                                                                |                                                               |                                                |            |           |         |
| CNC program messages                                                                                                                                                      |                                                               |                                                |            | ●         | ●       |
| Access protection, 7 levels                                                                                                                                               |                                                               |                                                |            | ●         | ●       |
| Operating software languages:                                                                                                                                             |                                                               |                                                |            |           |         |
| • Language switchover online                                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| • Chinese Simplified, English, French, German, Italian, Spanish                                                                                                           |                                                               |                                                |            | ●         | ●       |
| • Additional languages                                                                                                                                                    | SW versions<br>available on request.                          | <b>6FC5800-0AN00-0YB0</b>                      | <b>N00</b> | ○         | ○       |
| • Maximum configuration for installed languages                                                                                                                           | SINUMERIK PCU 50.5<br>unlimited.                              |                                                |            | 8         | 8       |
| Additional languages for operating software<br>SINUMERIK Operate on DVD, without license                                                                                  |                                                               | <b>6FC5860-0YC...-YA8</b>                      |            | ○         | ○       |
| Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian,<br>Japanese, Korean, Polish, Portuguese/Brazilian, Romanian,<br>Russian, Slovak, Slovene, Swedish, Turkish |                                                               |                                                |            |           |         |
| • Other languages                                                                                                                                                         | On request.                                                   |                                                |            | ○         | ○       |

# SINUMERIK CNC

## Functions

### Monitoring functions

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                |            |           |         |
| <b>Monitoring functions</b>                                                                                                                                        |                                                               |                                                |            |           |         |
| Working area limitation                                                                                                                                            |                                                               |                                                |            | ●         | ●       |
| Limit switch monitoring<br>Software and hardware limit switches                                                                                                    |                                                               |                                                |            | ●         | ●       |
| Position monitoring                                                                                                                                                |                                                               |                                                |            | ●         | ●       |
| Standstill monitoring                                                                                                                                              |                                                               |                                                |            | ●         | ●       |
| Clamping monitoring                                                                                                                                                |                                                               |                                                |            | ●         | ●       |
| 2D/3D protection areas                                                                                                                                             |                                                               |                                                |            | ●         | ●       |
| Contour monitoring                                                                                                                                                 |                                                               |                                                |            | ●         | ●       |
| Contour monitoring with tunnel function                                                                                                                            |                                                               | 6FC5800-0AM52-0YB0                             | M52        | ○         | ○       |
| Path length evaluation                                                                                                                                             |                                                               | 6FC5800-0AM53-0YB0                             | M53        | ○         | ○       |
| Axis limitation from the PLC                                                                                                                                       |                                                               |                                                |            | ●         | ●       |
| Spindle speed limitation                                                                                                                                           |                                                               |                                                |            | ●         | ●       |
| Collision check:                                                                                                                                                   |                                                               |                                                |            |           |         |
| <ul style="list-style-type: none"> <li>• Axis collision protection PROT</li> </ul>                                                                                 | Requirement:<br>Loadable<br>compile cycle.                    | 6FC5800-0AN06-0YB0                             | N06        | –         | ○       |
| Extended stop and retract ESR<br>(numerically controlled and drive-autonomous)                                                                                     |                                                               | 6FC5800-0AM61-0YB0                             | M61        | ○         | ○       |
| PROFIBUS tool and process monitoring                                                                                                                               | Requirement:<br>Loadable<br>compile cycle.                    | 6FC5800-0AM62-0YB0                             | M62        | ○         | ○       |
| Integrated tool monitoring and diagnostics:                                                                                                                        |                                                               |                                                |            |           |         |
| <ul style="list-style-type: none"> <li>• IMD light</li> </ul>                                                                                                      | Requirement:<br>Loadable<br>compile cycle.                    | 6FC5800-0AN12-0YB0                             | N12        | ○         | ○       |
| <ul style="list-style-type: none"> <li>• IMD base</li> </ul>                                                                                                       | Requirement:<br>Loadable<br>compile cycle.                    | 6FC5800-0AN13-0YB0                             | N13        | ○         | ○       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line)                  | Order No.                                   | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                          | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                          |                                             |            |           |         |
| <b>Compensation</b>                                                                                                                                                |                                                                          |                                             |            |           |         |
| Backlash compensation                                                                                                                                              |                                                                          |                                             |            | ●         | ●       |
| Lead screw error compensation                                                                                                                                      |                                                                          |                                             |            | ●         | ●       |
| Measuring system error compensation                                                                                                                                |                                                                          |                                             |            | ●         | ●       |
| Feedforward control, velocity-dependent                                                                                                                            |                                                                          |                                             |            | ●         | ●       |
| Feedforward control, acceleration-dependent                                                                                                                        |                                                                          |                                             |            | ●         | ●       |
| Electronic weight counterbalance                                                                                                                                   | Function of SINAMICS S120.                                               |                                             |            | ●         | ●       |
| Temperature compensation                                                                                                                                           |                                                                          |                                             |            | ●         | ●       |
| Quadrant error compensation                                                                                                                                        |                                                                          |                                             |            | ●         | ●       |
| Circularity test                                                                                                                                                   |                                                                          |                                             |            | ●         | ●       |
| Bidirectional lead screw error compensation                                                                                                                        | <sup>1)</sup> With restricted functionality, see export control version. | 6FC5800-0AM54-0YB0                          | M54        | ○<br>1)   | ○       |
| Sag compensation, multi-dimensional                                                                                                                                | <sup>1)</sup> With restricted functionality, see export control version. | 6FC5800-0AM55-0YB0                          | M55        | ○<br>1)   | ○       |
| Volumetric space error compensation:                                                                                                                               |                                                                          |                                             |            |           |         |
| • Spatial compensation VCS A3                                                                                                                                      | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN15-0YB0                          | N15        | –         | ○       |
| • Spatial compensation VCS A5                                                                                                                                      | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN16-0YB0                          | N16        | –         | ○       |
| • Spatial compensation VCS A5 plus                                                                                                                                 | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN17-0YB0                          | N17        | –         | ○       |
| • Spatial compensation VCS Rotary                                                                                                                                  | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN31-0YB0                          | N31        | –         | ○       |
| • Spatial compensation for kinematic transformations (Space Error Compensation SEC)                                                                                | Requirement: Loadable compile cycle.                                     | 6FC5800-0AM57-0YB0                          | M57        | –         | ○       |
| Vibration extinction VIBX                                                                                                                                          | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN11-0YB0                          | N11        | –         | ○       |
| Magnetic cogging torque compensation COCO                                                                                                                          | Requirement: Loadable compile cycle.                                     | 6FC5800-0AN46-0YB0                          | N46        | –         | ○       |

# SINUMERIK CNC

## Functions

### Programmable logic controller (PLC)

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.<br><br>Type<br>(for complete<br>Order No., see notes) | Order code       | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|------------------|-----------|---------|
|                                                                                                                                                                    |                                                               |                                                                 |                  | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                                 |                  |           |         |
| <b>Programmable logic controller (PLC)</b>                                                                                                                         |                                                               |                                                                 |                  |           |         |
| SIMATIC S7-300 PLC 317F-3PN/DP (integrated)                                                                                                                        |                                                               |                                                                 |                  | ●         | ●       |
| Processing time in µs, for bit operations, min.                                                                                                                    |                                                               |                                                                 |                  | 0.025     | 0.025   |
| Processing time in µs, for word operations, min.                                                                                                                   |                                                               |                                                                 |                  | 0.03      | 0.03    |
| PLC user memory, maximum configuration in KB                                                                                                                       |                                                               |                                                                 |                  | 1536      | 1536    |
| Expansion of the PLC user memory by 128 KB in each case                                                                                                            |                                                               | <b>6FC5800-0AD10-0YB0</b>                                       | <b>D11...D18</b> | ○         | ○       |
| SIMATIC STEP 7 programming language:                                                                                                                               |                                                               |                                                                 |                  |           |         |
| • Ladder diagram LAD                                                                                                                                               |                                                               |                                                                 |                  | ○         | ○       |
| • Function block diagram FBD                                                                                                                                       |                                                               |                                                                 |                  | ○         | ○       |
| • Statement list STL                                                                                                                                               |                                                               |                                                                 |                  | ○         | ○       |
| • Structured Control Language SCL<br>(add-on package for STEP 7)                                                                                                   |                                                               |                                                                 |                  | ○         | ○       |
| • Continuous Function Chart CFC<br>(add-on package for STEP 7)                                                                                                     |                                                               |                                                                 |                  | ○         | ○       |
| • GRAPH<br>(add-on package for STEP 7)                                                                                                                             |                                                               |                                                                 |                  | ○         | ○       |
| PLC programming with HiGraph<br>(add-on package for STEP 7)                                                                                                        |                                                               |                                                                 |                  | ○         | ○       |
| Distributed I/O via PROFIBUS DP:                                                                                                                                   | See Catalog<br>ST 70 or Siemens<br>Industry Mall.             |                                                                 |                  |           |         |
| • Via integrated interface,<br>data transfer rates up to 12 Mbit/s                                                                                                 |                                                               |                                                                 |                  | ●         | ●       |
| • Distributed DP slaves, max. number                                                                                                                               | In total on DP1<br>and DP2.                                   |                                                                 |                  | 124       | 124     |
| Distributed I/O via PROFINET:                                                                                                                                      | See Catalog<br>ST 70 or Siemens<br>Industry Mall.             |                                                                 |                  |           |         |
| • Via integrated interface,<br>data transfer rates up to 100 Mbit/s                                                                                                |                                                               |                                                                 |                  | ●         | ●       |
| • Distributed PN slaves, max. number                                                                                                                               |                                                               |                                                                 |                  | 128       | 128     |
| PROFINET CBA                                                                                                                                                       |                                                               |                                                                 |                  | ●         | ●       |
| PROFINET IO controller                                                                                                                                             |                                                               |                                                                 |                  | ●         | ●       |
| PROFINET IO device                                                                                                                                                 |                                                               |                                                                 |                  | ●         | ●       |
| Digital inputs, number in bytes<br>(can be adjusted between 0 and 4049 bytes)                                                                                      | Number =<br>process image<br>inputs.                          |                                                                 |                  | 1024      | 1024    |
| Digital outputs, number in bytes<br>(can be adjusted between 0 and 4049 bytes)                                                                                     | Number =<br>process image<br>outputs.                         |                                                                 |                  | 1024      | 1024    |
| I/O inputs, number in bytes:                                                                                                                                       | Logical address<br>range inputs.                              |                                                                 |                  | 8192      | 8192    |
| • Maximum usable                                                                                                                                                   |                                                               |                                                                 |                  | 5700      | 5700    |
| I/O outputs, number in bytes:                                                                                                                                      | Logical address<br>range inputs.                              |                                                                 |                  | 8192      | 8192    |
| • Maximum usable                                                                                                                                                   |                                                               |                                                                 |                  | 5700      | 5700    |



### Programmable logic controller (PLC) Safety functions

2

| Description<br>● Basic version<br>○ Option<br>◇ Function is dependent on operating software<br>– Not possible          | Instructions<br>(footnotes are applicable line by line)               | Order No.                                   | Order code | SINUMERIK |         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------|------------|-----------|---------|
|                                                                                                                        |                                                                       | Type<br>(for complete Order No., see notes) |            | 840DE sl  | 840D sl |
| Programmable logic controller (PLC) (continued)                                                                        |                                                                       |                                             |            |           |         |
| Bit memories, number in bytes                                                                                          |                                                                       |                                             |            | 4096      | 4096    |
| Timers, number                                                                                                         |                                                                       |                                             |            | 512       | 512     |
| Counters, number                                                                                                       |                                                                       |                                             |            | 512       | 512     |
| FB, FC:                                                                                                                |                                                                       |                                             |            | 2048      | 2048    |
| • Highest number per FB, FC                                                                                            |                                                                       |                                             |            | 7999      | 7999    |
| DB:                                                                                                                    |                                                                       |                                             |            | 2048      | 2048    |
| • Highest number                                                                                                       |                                                                       |                                             |            | 16000     | 16000   |
| Cyclic function block                                                                                                  |                                                                       |                                             |            | ●         | ●       |
| Time-controlled function blocks                                                                                        |                                                                       |                                             |            | ●         | ●       |
| SINUMERIK PP 72/48 I/O module:                                                                                         | No PROFIBUS certification.                                            | 6FC5611-0CA01-0AA0                          |            | ○         | ○       |
| • PP 72/48 I/O module, max. number                                                                                     |                                                                       |                                             |            | 125       | 125     |
| SINUMERIK PP 72/48D PN I/O module                                                                                      | Quantity limited by I/O quantity structure of PLC.                    | 6FC5311-0AA00-0AA0                          |            | ○         | ○       |
| Analog Drive Interface for 4 axes ADI 4                                                                                | No PROFIBUS certification.                                            | 6FC5211-0BA01-0AA3                          |            | ○         | ○       |
| Safety functions                                                                                                       |                                                                       |                                             |            |           |         |
| SINUMERIK Safety Integrated<br>Safety functions for personnel and machine protection:                                  |                                                                       |                                             |            |           |         |
| Safety functions integrated in the system                                                                              | Requirement:<br>Safety Integrated with safe programmable logic (SPL). |                                             |            |           |         |
| • Safe shutdown (stops)                                                                                                |                                                                       |                                             |            | ○         | ○       |
| • SBR (safe braking ramp)                                                                                              |                                                                       |                                             |            | ○         | ○       |
| • SH (safe standstill)                                                                                                 |                                                                       |                                             |            | ○         | ○       |
| • SBH (safe operating stop)                                                                                            |                                                                       |                                             |            | ○         | ○       |
| • SLS (safely reduced speed)                                                                                           |                                                                       |                                             |            | ○         | ○       |
| • SE (safe software limit switches)                                                                                    |                                                                       |                                             |            | ○         | ○       |
| • SN (safe software cams/cam track)                                                                                    |                                                                       |                                             |            | ○         | ○       |
| • SGE/SGA (safety-related input/output signals)                                                                        |                                                                       |                                             |            | ○         | ○       |
| • SPL (safe programmable logic)                                                                                        |                                                                       |                                             |            | ○         | ○       |
| • SBM (safe brake management)                                                                                          |                                                                       |                                             |            | ○         | ○       |
| • Safety-related output $n < n_x$                                                                                      |                                                                       |                                             |            | ○         | ○       |
| • Safety-related communication via standard bus (PROFIsafe with SIMATIC ET 200S, SIMATIC ET 200pro, SIMATIC ET 200eco) | See Catalog ST 70 or Siemens Industry Mall.                           |                                             |            | ○         | ○       |
| • Safe integration of sensors via DP ASi F-Link                                                                        | See Catalog IK PI or Siemens Industry Mall.                           |                                             |            | ○         | ○       |

# SINUMERIK CNC

## Functions

### Safety functions Commissioning

2

| Description                                                                                                                                                        | Instructions<br>(footnotes are<br>applicable line<br>by line) | Order No.                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                               | Type<br>(for complete<br>Order No., see notes) |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                               |                                                |            |           |         |
| <b>Safety functions (continued)</b>                                                                                                                                |                                                               |                                                |            |           |         |
| Safety Integrated with safe programmable logic (SPL)                                                                                                               |                                                               |                                                |            |           |         |
| Safety Integrated SI-Basic<br>incl. 1 axis/spindle 4 inputs/outputs for safe<br>programmable logic                                                                 |                                                               | 6FC5800-0AM63-0YB0                             | M63        | ○         | ○       |
| Safety Integrated SI-Comfort<br>incl. 1 axis/spindle 64 inputs/outputs for safe<br>programmable logic                                                              |                                                               | 6FC5800-0AM64-0YB0                             | M64        | ○         | ○       |
| Safety Integrated SI axis/spindle<br>extra for each additional axis/spindle                                                                                        |                                                               | 6FC5800-0AC70-0YB0                             | C71...C78  | ○         | ○       |
| Safety Integrated SI axis/spindle package<br>additional 15 axes/spindles                                                                                           |                                                               | 6FC5800-0AC60-0YB0                             | C61, C62   | ○         | ○       |
| Safety Integrated acceptance test<br>Executed automatically with SinuCom NC SI                                                                                     | Requirement:<br>SinuCom NC.                                   |                                                |            | ○         | ○       |
| Drive-autonomous safety functions for personnel and<br>machine protection:                                                                                         |                                                               |                                                |            |           |         |
| • SBC (Safe Brake Control)                                                                                                                                         |                                                               |                                                |            | ●         | ●       |
| • STO (Safe Torque Off)                                                                                                                                            |                                                               |                                                |            | ●         | ●       |
| • SS1 (Safe Stop 1)                                                                                                                                                |                                                               |                                                |            | ●         | ●       |
| <b>Commissioning</b>                                                                                                                                               |                                                               |                                                |            |           |         |
| Commissioning functions for drive system are integrated:                                                                                                           |                                                               |                                                |            |           |         |
| Auto Servo Tuning (AST)<br>Fully automatic speed and position controller optimization:                                                                             |                                                               |                                                |            | ●         | ●       |
| • Optimization of single axis incl. gantry axes                                                                                                                    |                                                               |                                                |            | ●         | ●       |
| • Speed controller optimization<br>incl. setting of current setpoint filters                                                                                       |                                                               |                                                |            | ●         | ●       |
| • Position controller optimization<br>incl. setting of speed setpoint filters                                                                                      |                                                               |                                                |            | ●         | ●       |
| • Setting of feedforward control                                                                                                                                   |                                                               |                                                |            | ●         | ●       |
| • Overview of optimization results                                                                                                                                 |                                                               |                                                |            | ●         | ●       |
| • Closed circuit can be manually tuned according to Bode plot                                                                                                      |                                                               |                                                |            | ●         | ●       |
| • Optimization of path interpolation                                                                                                                               |                                                               |                                                |            | ●         | ●       |
| • Assignment of torque feedforward control                                                                                                                         |                                                               |                                                |            | ●         | ●       |
| • Complete (freely parameterizable) user strategy                                                                                                                  |                                                               |                                                |            | ●         | ●       |
| • Forward and backward navigation through optimization<br>menus:<br>Re-optimization of speed controller                                                            |                                                               |                                                |            | ●         | ●       |
| • Report generation:<br>Single axis and path interpolation                                                                                                         |                                                               |                                                |            | ●         | ●       |
| • Optimization project can be loaded<br>and optimized offline on the PC                                                                                            |                                                               |                                                |            | ●         | ●       |

| Description                                                                                                                                                        | Instructions<br>(footnotes are applicable line by line)           | Order No.                                                                                                                                     | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                    |                                                                   | Type<br>(for complete Order No., see notes)                                                                                                   |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul> |                                                                   |                                                                                                                                               |            |           |         |
| <b>Commissioning (continued)</b>                                                                                                                                   |                                                                   |                                                                                                                                               |            |           |         |
| Trace                                                                                                                                                              |                                                                   |                                                                                                                                               |            | ●         | ●       |
| Circularity test                                                                                                                                                   |                                                                   |                                                                                                                                               |            | ●         | ●       |
| SINAMICS S120                                                                                                                                                      | See SinuCom.                                                      |                                                                                                                                               |            | –         | –       |
| Commissioning trace (drive optimization)                                                                                                                           | See SinuCom.                                                      |                                                                                                                                               |            | –         | –       |
| Series start-up via USB interface with storage medium, e.g. memory stick                                                                                           |                                                                   |                                                                                                                                               |            | ●         | ●       |
| Series start-up of network drive                                                                                                                                   |                                                                   |                                                                                                                                               |            | ●         | ●       |
| Series start-up via CF card programming offline or online                                                                                                          | Requirement:<br>Additional HMI user memory on CF card of the NCU. |                                                                                                                                               |            | ●         | ●       |
| Toolbox on DVD of the CNC software                                                                                                                                 |                                                                   |                                                                                                                                               |            | ○         | ○       |
| SinuCom commissioning/service tools for SINUMERIK 840D sl:                                                                                                         |                                                                   |                                                                                                                                               |            |           |         |
| • Software for PC/PG                                                                                                                                               |                                                                   | <b>6FC5250-0AY00-0AG0</b><br><b>6FC5250-7AY00-.AG0</b><br><b>6FC5250-0AY00-0AG1</b><br><b>6FC5250-0AY00-0AG2</b><br><b>6FC5250-7AY00-.AG3</b> |            | ○         | ○       |
| • Commissioning software for SINAMICS S120 (and SIMODRIVE 611 digital)                                                                                             | For commissioning.                                                |                                                                                                                                               |            |           |         |
| • SinuCom NC<br>Dialog-based parameterization of machine data, management of series startup files, integrated online help for functions, machine data and alarms   |                                                                   |                                                                                                                                               |            |           |         |
| • SinuCom NC Trace<br>Dynamic recording of variables and signals – optimization without additional oscilloscope                                                    |                                                                   |                                                                                                                                               |            |           |         |
| • SinuCom CFS<br>Creation of an image for the CF card in Ext3 format                                                                                               |                                                                   |                                                                                                                                               |            |           |         |
| • SinuCom ARC<br>Reading, deletion, insertion and editing of series startup files                                                                                  |                                                                   |                                                                                                                                               |            |           |         |
| SINUMERIK Integrate Create MyConfig for series production and software upgrades                                                                                    |                                                                   | <b>6FC5862-2YC41-0YA0</b>                                                                                                                     |            | ○         | ○       |
| STARTER drive/commissioning software for SINAMICS and MICROMASTER                                                                                                  | For topology and diagnostics.                                     | <b>6SL3072-0AA00-0AG0</b>                                                                                                                     |            | –         | –       |

# SINUMERIK CNC

## Functions

### Diagnostic functions and maintenance

2

| Description                                                                                                                                                                                                  | Instructions<br>(footnotes are applicable line by line)             | Order No.                                                      | Order code | SINUMERIK |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------|------------|-----------|---------|
|                                                                                                                                                                                                              |                                                                     | Type<br>(for complete Order No., see notes)                    |            | 840DE sl  | 840D sl |
| <ul style="list-style-type: none"> <li>● Basic version</li> <li>○ Option</li> <li>◇ Function is dependent on operating software</li> <li>– Not possible</li> </ul>                                           |                                                                     |                                                                |            |           |         |
| <b>Diagnostic functions and maintenance</b>                                                                                                                                                                  |                                                                     |                                                                |            |           |         |
| Alarms and messages                                                                                                                                                                                          |                                                                     |                                                                |            | ●         | ●       |
| Action log can be activated for diagnostic purposes                                                                                                                                                          | Logbook for alarms/keys.                                            |                                                                |            | ●         | ●       |
| Trace incl. drive data                                                                                                                                                                                       |                                                                     |                                                                |            | ●         | ●       |
| Circularity test                                                                                                                                                                                             |                                                                     |                                                                |            | ●         | ●       |
| PLC status                                                                                                                                                                                                   | Generally possible via SIMATIC STEP 7 on PG/PC.                     |                                                                |            | ●         | ●       |
| SIMATIC STEP 7 for SINUMERIK hardware for service functions                                                                                                                                                  | With SINUMERIK PCU 50.5.                                            | 6FC5252-0AY00-0AG0<br>6FC5252-0AY00-0AG1<br>6FC5252-.AY01-.AG0 |            | ○         | ○       |
| Remote diagnostics and file transfer<br>SINUMERIK Integrate Access MyMachine:                                                                                                                                | See SINUMERIK Integrate.                                            |                                                                |            |           |         |
| <ul style="list-style-type: none"> <li>• Access MyMachine /P2P (RCS Commander for PC/PG). Principally permits file transfer between PC/PG and CNCs</li> </ul>                                                | Requirement: Access MyMachine /P2P for image transmission by modem. | 6FC5860-7YC00-0YA0<br>6FC5860-7YC...-YA0                       |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• Access MyMachine /P2P (RCS Host remote diagnostics software)</li> </ul>                                                                                             | License for NCU 710.3 PN/ NCU 720.3 PN/ NCU 730.3 PN.               | 6FC5800-0AP30-0YB0                                             | P30        | ○         | ○       |
| SINUMERIK Integrate Access MyMachine /Ethernet (ePS Remote Access) for diagnostic functions in case of machine failures, Workflow Services, remote control and remote monitoring of machine control systems: | Requirement: Access MyMachine /Ethernet company account, setup fee. | 6FC6001-0EE00-0DS0<br>6FC6001-0EE00-0DS1                       |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• ASP Account (ePS Company Account)</li> </ul>                                                                                                                        |                                                                     | 6FC6001-0EE00-0CA1                                             |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• ASP Machine Setup Fee (ePS Connect Machine)</li> </ul>                                                                                                              |                                                                     | 6FC6001-0EE00-0CE0<br>6FC6001-0EE00-0CE1                       |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• Analyze MyCondition (ePS Condition Monitoring Basic) for state-oriented maintenance</li> </ul>                                                                      | Requirement: Access MyMachine /Ethernet company account, setup fee. | 6FC6001-0EE00-0MB0<br>6FC6001-0EE00-0MB1                       |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• ASP Account (ePS Company Account)</li> </ul>                                                                                                                        |                                                                     | 6FC6001-0EE00-0CA1                                             |            | ○         | ○       |
| <ul style="list-style-type: none"> <li>• ASP Machine Setup Fee (ePS Connect Machine)</li> </ul>                                                                                                              |                                                                     | 6FC6001-0EE00-0CE0<br>6FC6001-0EE00-0CE1                       |            | ○         | ○       |

# SINUMERIK Operate



|             |                                                           |
|-------------|-----------------------------------------------------------|
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| <b>3/25</b> | <b>TCU for operator panels</b>                            |
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| <b>3/27</b> | <b>Handheld units</b>                                     |
| 3/27        | SINUMERIK HT 2                                            |
| 3/29        | SINUMERIK HT 8                                            |
| 3/31        | Mini handheld unit                                        |
| 3/32        | Electronic handwheel                                      |
| 3/34        | Handwheel connection module PROFIBUS                      |
| <b>3/35</b> | <b>Machine control panels</b>                             |
| 3/35        | SINUMERIK MCP 310C PN                                     |
| 3/37        | SINUMERIK MCP 310 PN                                      |
| 3/39        | SINUMERIK MCP 483C PN                                     |
| 3/41        | SINUMERIK MCP 483 PN                                      |
| 3/43        | SINUMERIK MPP 310 IEH                                     |
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| 3/48        | KBPC CG US standard PC keyboard                           |
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| 3/49        | SINUMERIK KB 310C                                         |
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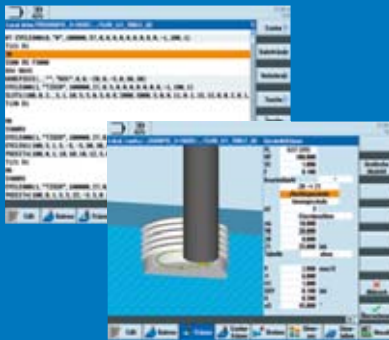
|               |                                                                            |
|---------------|----------------------------------------------------------------------------|
| <b>3/52</b>   | <b>Storage devices</b>                                                     |
| 3/52          | SINUMERIK card reader USB 2.0                                              |
| 3/53          | CompactFlash card                                                          |
| 3/54          | Industrial USB hub 4                                                       |
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| <b>3/58</b>   | <b>Housing systems</b>                                                     |
| 3/58          | Rittal command panel systems                                               |
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| <b>Part 8</b> | <b>CAD CREATOR</b>                                                         |
|               | Dimension drawing and 2D/3D CAD generator                                  |
|               | <a href="http://www.siemens.com/cadcreator">www.siemens.com/cadcreator</a> |

# SINUMERIK Operate

The user interface for efficient machine operation

## Overview

DIN & SINUMERIK  
High-level language &  
programGUIDE



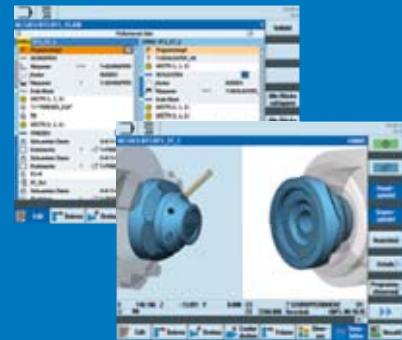
Developed to  
provide maximum flexibility  
and very short  
machining times

ShopMill/ShopTurn  
Machining step  
programming



Developed to  
speed up  
programming

programSYNC



Developed to  
boost the productivity  
of multi-channel  
machines

The SINUMERIK Operate user and programming interface is clearly structured to promote intuitive use and combines all the functions needed to operate and program a CNC machine. It provides a consistent look and feel and offers you the same usability for every technology – even when switching between different technologies, such as multi-tasking machines.

# SINUMERIK Operate

## The user interface for efficient machine operation

### Overview (continued)



#### *Programming has never been so easy*

The SINUMERIK Operate user interface offers many new, high-performance functions. This means that machining step and high-level language programming can be combined under a single system user interface, allowing for very fast, rational and intuitive NC programming and work preparation.

#### *Fast and flexible*

G code programming functions with cycle support have been combined in programGUIDE. ProgramGUIDE ensures maximum flexibility and short machining times and is ideal for applications with medium to large batch sizes. SINUMERIK also supports ISO code programming. The ShopMill and ShopTurn machining step programming systems are tailored to the production of single parts and small batch sizes, in other words, they are ideal for shop floor manufacturing.

#### *Support for manufacturing technologies*

Cost-effective production methods and innovative CNC solutions are required to produce complex workpieces. The SINUMERIK 840D sl CNC supports multi-technology machines for machining workpieces in a single clamping process and offers innovative functions for this purpose – even where the operation requires switchover between different technologies such as mill-turning and turn-milling. The innovative SINUMERIK Operate user interface provides integrated turning functions for milling applications and integrated milling functions for turning applications, augmented with innovative measuring cycles in the Animated Element design. The usability and look and feel of the interface are always identical with every application.





### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Order No.                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>SINUMERIK Operate operating software</b><br>For SINUMERIK PCU 50.5<br>Languages:<br>Chinese Simplified, English,<br>German, French,<br>Italian, Spanish <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> <li>• Single license on DVD-ROM, current software version</li> <li>• Single license on DVD-ROM, specific software version<sup>1)</sup></li> <li>• Without license on DVD-ROM, specific software version<sup>1)</sup></li> <li>• Software Update Service</li> </ul>              | 6FC5860-1YF00-0YB0<br>6FC5860-1YC00-0YA0<br>6FC5860-1YC2 ■ - ■ YA0<br>6FC5860-1YC2 ■ - ■ YA8<br>6FC5860-1YP00-0YL8 |
| <b>SINUMERIK Operate operating software</b><br>For PC with Windows XP or Windows 7<br>Languages:<br>Chinese Simplified, English,<br>German, French,<br>Italian, Spanish <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> <li>• Single license on DVD-ROM, current software version</li> <li>• Single license on DVD-ROM, specific software version<sup>1)</sup></li> <li>• Without license on DVD-ROM, specific software version<sup>1)</sup></li> <li>• Software Update Service</li> </ul> | 6FC5860-2YF00-0YB0<br>6FC5860-2YC00-0YA0<br>6FC5860-2YC2 ■ - ■ YA0<br>6FC5860-2YC2 ■ - ■ YA8<br>6FC5860-2YP00-0YL8 |
| <b>Accessories</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                    |
| <b>Additional languages<sup>2)</sup></b><br>On DVD-ROM<br>Languages:<br>Chinese Traditional, Czech,<br>Danish, Dutch, Finnish,<br>Hungarian,<br>Japanese, Korean,<br>Polish, Portuguese/Brazilian,<br>Romanian, Russian,<br>Slovak, Slovene,<br>Swedish, Turkish<br>Without license. <ul style="list-style-type: none"> <li>• For SINUMERIK 840D sl: CNC SW 2.4 SP1, 2.5 SP1, 2.6</li> <li>• For PCU 50.5: SINUMERIK Operate SW version 2.6</li> </ul>                                                                              | 6FC5860-0YC20-1YA8                                                                                                 |
| <b>Additional languages</b><br>Use of language extensions<br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                                                                                                                                                                                                                                                                                                                                         | 6FC5800-0AN00-0YB0                                                                                                 |

| Description                                                                                                                                                                                                         | Order No.          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Accessories (continued)</b>                                                                                                                                                                                      |                    |
| <b>HMI user memory</b><br>Additionally on CF card of NCU<br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                          | 6FC5800-0AP12-0YB0 |
| <b>Residual material detection and processing for contour pockets and stock removal</b><br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>           | 6FC5800-0AP13-0YB0 |
| <b>ShopMill/ShopTurn</b><br>Machining step programming<br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                            | 6FC5800-0AP17-0YB0 |
| <b>Multiple clamping of different workpieces</b><br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                                  | 6FC5800-0AP14-0YB0 |
| <b>Simultaneous recording of current processing</b><br>Real-time simulation of current processing<br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul> | 6FC5800-0AP22-0YB0 |
| <b>3D simulation 1</b><br>Finished part simulation<br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                                | 6FC5800-0AP25-0YB0 |
| <b>Operator control without SINUMERIK operator panel</b><br>Software option <ul style="list-style-type: none"> <li>• Single license without data storage medium</li> </ul>                                          | 6FC5800-0AP00-0YB0 |

<sup>1)</sup> Example for specific software version 2.7 SP1:  
6FC5860-1YC23-0YA0

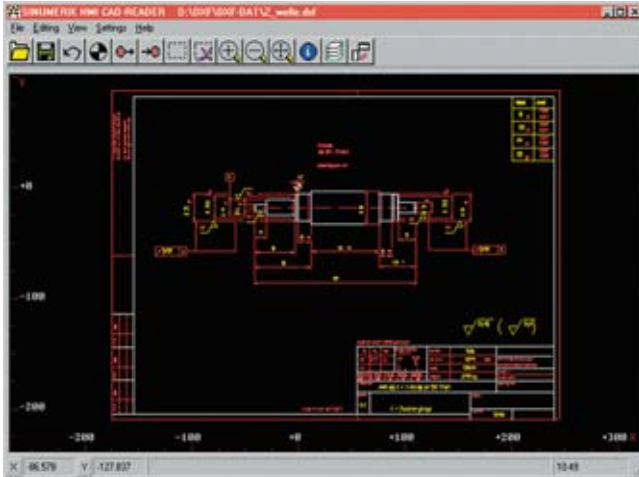
<sup>2)</sup> For other software versions: Order number on request.

# SINUMERIK Operate

## Operation and programming

### CAD Reader

#### Overview



The CAD Reader program converts DXF files into contours or hole drilling templates.

#### Function

- Import of DXF files
- Suppression of image layers
- Automatic contouring
- Any workpiece zero per extracted contour/drilling pattern

SINUMERIK 840D sl with SINUMERIK Operate:

- Generation of contours (straight lines, circles) for SINUMERIK Operate

SINUMERIK 840D sl with SW 1.x:

- Conversion into contours or drilling patterns for ShopMill, ShopTurn, HMI-Advanced or HMI-Embedded
- Display of extracted contours/drilling patterns in the geometric processor/cycle support

#### Integration

The CAD Reader program can be used for:

- SINUMERIK 840D sl

Preconditions:

- Windows 95/98/Me/NT 4.0/2000/XP/7 operating system
- Mouse

#### Selection and ordering data

| Description                                                         | Order No.                 |
|---------------------------------------------------------------------|---------------------------|
| <b>CAD Reader for PC</b>                                            |                           |
| Including documentation                                             |                           |
| Languages:<br>English, German                                       |                           |
| • Single License, without data storage medium                       | <b>6FC5260-0AY00-0AG1</b> |
| • Single license on CD ROM, current software version                | <b>6FC5260-0AY00-0AG0</b> |
| • Single license on CD ROM, specific software version <sup>1)</sup> | <b>6FC5260-■AY00-■AG0</b> |
| • Software Update Service                                           | <b>6FC5260-0AY00-0AG2</b> |
| • Service Pack on order of specific software version <sup>1)</sup>  | <b>6FC5260-■AY00-■AG8</b> |

<sup>1)</sup> Example for specific software version 6.2:  
6FC5260-6AY00-2...

### Overview



TRANSLINE HMI sl is the machine user interface for operator control and monitoring tasks in mass production, for example in transfer lines, processing centers, and assembly lines. TRANSLINE HMI standardizes the operation of machines with diverse tasks and technologies by means of operating screen forms and a parameterizable navigation menu.

The technology-specific operating screen forms are combined into function groups, e.g.:

- Machine functions  
Workpiece counting, cycle times, workpiece overview
- Help texts
- Overviews
- Tool changing functions
- Manual operator functions

Prepared diagnostics functions support rapid localization in the event of a machine fault.

### Function

Diverse target hardware is supported to ensure the best possible price/performance ratio for different applications.

The standard application is easy to adapt or expand and is therefore ideally suited for implementing customized versions for project-specific use.

#### HMI PRO sl

With the configuration software that is executable on PGs/PCs, the screen forms for HMI PRO sl RT can be parameterized, configured, and loaded into the target hardware.

Two diagnostics functions are available for the process error diagnostics integrated into HMI PRO sl RT. Process error diagnostics are used in combination with S7-PDIAG and S7-GRAPH.

Users can freely configure their own operator screen forms using the simple, integrated graphic editor.

#### HMI Lite

HMI Lite contains a sample project that can be expanded with machine-specific or project-specific screen forms by using WinCC flexible. A diagnostics function is available for the optional ProAgent process error diagnostics. It can be used in combination with S7-PDIAG and S7-GRAPH.

HMI Lite can be expanded with interactive screen forms that access SINUMERIK data provided that the SINUMERIK Single License is available for each operator panel.

### Integration

HMI PRO sl RT can run on SINUMERIK 840D sl NCU and SINUMERIK PCU 50.5. HMI Lite is available for the Windows CE-based SIMATIC Panels MP277 (10"), OP/TP 277 (6") and OP/TP 177B.

### Selection and ordering data

| Description                                                                                                                                                                  | Order No.                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>SINUMERIK Integrate Run MyHMI /PRO</b><br>For SINUMERIK 840D sl and SINUMERIK PCU 50.5<br>Runtime software including configuration software<br>Languages: English, German |                            |
| • Single License, without data storage medium                                                                                                                                | <b>6FC5800-0AP47-0YB0</b>  |
| • Without license on CD ROM, current software version                                                                                                                        | <b>6FC5867-3YC00-0YA8</b>  |
| • Without license on CD ROM, specific software version <sup>1)</sup>                                                                                                         | <b>6FC5867-3YC2- - YA8</b> |
| <b>HMI Lite</b><br>Runtime software<br>Languages: English, German, French, Italian, Spanish, Chinese Simplified                                                              |                            |
| • Single License, without data storage medium                                                                                                                                | <b>6FC5263-0PY11-0AG0</b>  |
| • Single License, specific software version <sup>1)</sup>                                                                                                                    | <b>6FC5263- PY11- AG0</b>  |
| • Single License, without data storage medium                                                                                                                                | <b>6FC5263-0PY11-0AG1</b>  |

<sup>1)</sup> Examples for specific software versions:  
 e.g. HMI PRO sl RT 2.7: 6FC5867-3YC22-7YA8  
 or for HMI Lite 5.1: 6FC5263-5PY11-1AG0

# SINUMERIK Operate

## Operator components for CNC controls

### Introduction

#### Overview



SINUMERIK OP 08T



SINUMERIK OP 010



SINUMERIK OP 010S



SINUMERIK OP 010C



SINUMERIK OP 012



SINUMERIK OP 015

SINUMERIK OP 015A  
SINUMERIK OP 015AT  
SINUMERIK TP 015A  
SINUMERIK TP 015AT

SINUMERIK OP 019

SINUMERIK  
PCU 50.5

SINUMERIK TCU

#### SINUMERIK operator panel fronts with PCU/TCU

The SINUMERIK operator panel fronts (OP) and touch operator panels (TP) can be combined with SINUMERIK PCUs (industrial PCs) or SINUMERIK Thin Client Units (TCU) and contain numerous innovations to improve ease of operation.

The USB interface on the panel front provides hot Plug&Play functionality for a standard PC keyboard, mouse and/or USB FlashDrive. The SINUMERIK operator panel fronts are available with displays in a variety of sizes, and with membrane or mechanical keyboards.

With these elements, the SINUMERIK operator panel fronts can be tailored to suit individual user requirements.

#### SINUMERIK PCU

Innovative operator panels can be created with the SINUMERIK PCU and the SINUMERIK operator panel fronts. The SINUMERIK PCU is mounted on the rear of the SINUMERIK operator panel front, or can be positioned at distances up to 100 m (328 ft) from the operator panel in the cabinet.

The powerful SINUMERIK PCU features numerous innovations. The communication interfaces via Ethernet and PROFIBUS DP are already on board.

The complementary proven operator control components, such as handheld units, machine control panels, Push Button Panels, electronic handwheels, keyboards, and card readers can be used with the SINUMERIK PCUs/TCUs.

#### SINUMERIK TCU

The SINUMERIK Thin Client Unit (TCU) allows operator panel fronts and SINUMERIK PCUs/NCUs to be installed separately. For this reason, the user interface is copied to one or several operator panel fronts, each with a SINUMERIK TCU.

#### Operator panels

An operator panel comprises a SINUMERIK PCU (large-scale integrated industrial PC) and a SINUMERIK operator panel front, which is available with various performance levels and display sizes.

The displays comply with the quality standards relating to the pixel error class defined by ISO standard 13406-2, class 2.

#### Benefits

- Intelligent, rugged operator panels that have an impressively slimline, compact design
- Individual design of your user interface, using your expertise by means of openness in human-machine communication
- Distributed design with physical separation of PCU and operator panel front

#### Application

The operator panels are predominantly used for visualization and for the operation of machine tools. They are particularly suitable for milling, turning, grinding and special-purpose machines.

For further information about applications, refer to [SINUMERIK CNC → Functions → Operation](#).



### Overview (continued)



SINUMERIK  
MCP 310C PN



SINUMERIK MCP 483C PN



KBPC CG US  
standard PC keyboard



SINUMERIK  
card reader USB 2.0



SINUMERIK  
MCP 310 PN



SINUMERIK MCP 483 PN



SINUMERIK KB 310C



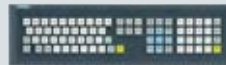
Industrial USB hub



SINUMERIK  
MPP 310 IEH



SINUMERIK MPP 483 IE



SINUMERIK KB 483C



SINUMERIK 3SB3



SINUMERIK expansion panel



DEMME – full CNC keyboard



Electronic handwheel



SINUMERIK HT 8



SINUMERIK HT 2



Handwheel  
connection module



SINUMERIK  
mini handheld unit



Handheld unit type B-MPI

The SINUMERIK handheld units are available with a variety of performance options. Ergonomic handheld units are available which can be used as mobile machine control panels or as an additional main operator panel.

#### Benefits

- Ergonomic machine control thanks to carefully designed housing
- Setup and operation of simple machines with the mini handheld unit, especially as part of JobShop or similar applications
- Setup, operation, teaching and programming of user programs with the multifunctional handheld terminals

#### Machine control panels

Machine control panels, Push Button Panels and handwheels are available for the user-friendly operation of the machine functions of SINUMERIK and PLC-controlled machines.

#### Benefits

- Ergonomic machine control thanks to well-conceived design
- Machine-specific adaptations by means of variable labeling and additional integration of control devices

#### Keyboards

The keyboards enable easy user input of programs and texts.

#### Benefits

- Ergonomic keyboard
- CNC-specific supplements

#### Storage devices

Storage devices are used for archiving user data.

#### Housing systems

Housing systems can be manufactured to precise dimensions and ready to install for numerous combinations of SINUMERIK operator components.

#### Benefits

Optimized configuration options for SINUMERIK CNCs with:

- Operator panel
- Full CNC keyboard
- Machine control panel
- Machine Push Button Panel

# SINUMERIK Operate

## Operator panels

### SINUMERIK OP 08T

#### Overview



The extremely compact SINUMERIK OP 08T operator panel front supports the distributed installation of the operator panel front and control. The SINUMERIK OP 08T operator panel front contains a membrane keyboard with 65 keys (layout as SINUMERIK KB 310C full CNC keyboard), as well as 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Design of compact operator panels through shallow installation depth/reduced size and low power dissipation.
- Vibration-free mounting of the SINUMERIK PCU in the control cabinet
- Efficient operation of larger machines using up to 4 additional, distributed operator panels simultaneously

#### Design

The SINUMERIK OP 08T operator panel front is connected to the PCU/NCU via Ethernet as a Thin Client in its own subnet (via DHCP server to PCU/NCU).

Ports:

- 2 × USB 1.1
- Ethernet 10/100 Mbit/s

#### Function

- Signal transmission between operator panel front and PCU/NCU via Industrial Ethernet
- Easy installation
- Mixed operation with one operator panel front directly on the PCU is possible. Operator inputs on a SINUMERIK OP 08T have equal priority with operator inputs on an operator panel front connected directly to the PCU. The operator panel in passive mode shows a darkened screen.
- The distance to the operator panel fronts is determined by the maximum distance between two network nodes/access points (100 m/328 ft).

#### Integration

The SINUMERIK OP 08T operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

The 2 × 8 vertical softkeys can be used as direct keys with SINUMERIK 840D sl.

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>OP 08T operator panel front<br>6FC5203-0AF04-1BA0                                                                                                                                                                                                                                           |
| <b>Screen</b>                                           | 7.5" TFT, 640 x 480 pixels                                                                                                                                                                                                                                                                               |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 15 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                      |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 330 mm (12.99 in)</li> <li>• Depth 41 mm (1.61 in)</li> </ul>                                                                                                                                                          |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 285 mm (11.22 in)</li> <li>• Height 304 mm (11.97 in)</li> </ul>                                                                                                                                                                                          |
| <b>Weight, approx.</b>                                  | 2.9 kg (6.39 lb)                                                                                                                                                                                                                                                                                         |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                |

#### Selection and ordering data

| Description                                                                                                        | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK OP 08T operator panel front</b><br>19.1 cm/7.5" TFT (640 x 480) with membrane keys and integral TCU   | <b>6FC5203-0AF04-1BA0</b> |
| <b>Accessories</b>                                                                                                 |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets, for SINUMERIK OP 08T                                     | <b>6FC5248-0AF04-1BA0</b> |
| <b>Sealing caps (5 units)</b><br>For the USB port                                                                  | <b>6FC5248-0AF05-0BA0</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in) | <b>6FC5248-0AF14-0AA0</b> |



### Overview



The SINUMERIK OP 010 operator panel front with 10.4" TFT color display with a resolution of 640 × 480 pixels (VGA) features a 62-key membrane keypad with 8 + 4 horizontal and 8 vertical softkeys that has been optimized for programming part programs.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

### Benefits

- Low-cost operator control and monitoring thanks to 10.4" display with optimized keyboard

### Integration

The SINUMERIK OP 010 operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

### Technical specifications

|                                                             |                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 010 operator panel front<br>6FC5203-0AF00-0AA1                                                                                                                                                                                                                                     |
| <b>Screen</b>                                               | 10.4" TFT, 640 x 480 pixels                                                                                                                                                                                                                                                                        |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                                                                                                                                                                                                                                                    |
| <b>Power consumption, max.</b>                              | 16 W                                                                                                                                                                                                                                                                                               |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>Front IP65</li> <li>Rear IP00</li> </ul>                                                                                                                                                                                                                    |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                 |
| <b>Relative atmospheric humidity</b>                        | <ul style="list-style-type: none"> <li>Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                                  | <ul style="list-style-type: none"> <li>Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                           | <ul style="list-style-type: none"> <li>Width 483 mm (19.02 in)</li> <li>Height 310 mm (12.2 in)</li> <li>Depth 30 mm (1.18 in)</li> </ul>                                                                                                                                                          |
| <b>Depth</b>                                                | <ul style="list-style-type: none"> <li>Without PCU 20 mm (0.79 in)</li> <li>With PCU 50.5 108.2 mm (4.26 in)</li> <li>- Clearance 10 mm (0.39 in)</li> </ul>                                                                                                                                       |
| <b>Weight, approx.</b>                                      | 5 kg (11.0 lb)                                                                                                                                                                                                                                                                                     |
| <b>Approvals, according to</b>                              | CE, cULus                                                                                                                                                                                                                                                                                          |

### Selection and ordering data

| Description                                                                                             | Order No.                 |
|---------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 010 operator panel front</b><br>26.4 cm/10.4" TFT (640 x 480)<br>with membrane keys | <b>6FC5203-0AF00-0AA1</b> |
| <b>Accessories</b>                                                                                      |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets,<br>for SINUMERIK OP 010                       | <b>6FC5248-0AF07-0AA0</b> |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                      | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (6 units)                                                                          | <b>6FC5248-0AF06-0AA0</b> |

# SINUMERIK Operate

## Operator panels

### SINUMERIK OP 010S

#### Overview



The slimline SINUMERIK OP 010S operator panel front with 10.4" TFT color display with a resolution of 640 × 480 pixels (VGA) features 8 + 4 horizontal and 8 vertical mechanical softkeys.

The SINUMERIK full CNC keyboard is suitable as the input keyboard.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Space-saving operator control and monitoring
- Ergonomic and reliable operation thanks to the SINUMERIK KB 310C full CNC keyboard

#### Integration

The SINUMERIK OP 010S operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

#### Technical specifications

|                                                             |                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 010S operator panel front<br>6FC5203-0AF04-0AA0                                                                                                                                                                                                                                            |
| <b>Screen</b>                                               | 10.4" TFT, 640 x 480 pixels                                                                                                                                                                                                                                                                                |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                                                                                                                                                                                                                                                            |
| <b>Power consumption, max.</b>                              | 16 W                                                                                                                                                                                                                                                                                                       |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                        |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                         |
| <b>Relative atmospheric humidity</b>                        | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                  |
| <b>Ambient temperature</b>                                  | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                           | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 330 mm (12.99 in)</li> <li>• Depth 45 mm (1.77 in)</li> </ul>                                                                                                                                                            |
| <b>Depth</b>                                                | <ul style="list-style-type: none"> <li>• Without PCU 35 mm (1.38 in)</li> <li>• With PCU 50.5<br/>- Clearance 10 mm (0.39 in)</li> </ul>                                                                                                                                                                   |
| <b>Weight, approx.</b>                                      | 5.5 kg (12.1 lb)                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                              | CE, cULus                                                                                                                                                                                                                                                                                                  |

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 010S operator panel front</b><br>26.4 cm/10.4" TFT (640 x 480) with<br>mechanical keys | <b>6FC5203-0AF04-0AA0</b> |
| <b>Accessories</b>                                                                                         |                           |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                         | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (6 units)                                                                             | <b>6FC5248-0AF06-0AA0</b> |

#### Overview



The SINUMERIK OP 010C operator panel front with 10.4" TFT color display and a resolution of 640 × 480 pixels (VGA) features a 65-key mechanical keypad with 8 + 4 horizontal and 8 vertical softkeys.

The 6 hotkeys are designed with replaceable key covers for machine-specific adaptation. The key covers can be freely inscribed using laser.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Easy, reliable operator control and monitoring thanks to the integral keyboard with mechanical keys
- Fast selection of the main functions using the 6 integral hotkeys

#### Integration

The SINUMERIK OP 010C operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

#### Technical specifications

|                                                             |                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 010C operator panel front<br>6FC5203-0AF01-0AA0                                                                                                                                                                                                                                            |
| <b>Screen</b>                                               | 10.4" TFT, 640 x 480 pixels                                                                                                                                                                                                                                                                                |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                                                                                                                                                                                                                                                            |
| <b>Power consumption, max.</b>                              | 16 W                                                                                                                                                                                                                                                                                                       |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                        |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                         |
| <b>Relative atmospheric humidity</b>                        | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                  |
| <b>Ambient temperature</b>                                  | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                           | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 310 mm (12.2 in)</li> <li>• Depth 30 mm (1.18 in)</li> </ul>                                                                                                                                                            |
| <b>Depth</b>                                                | <ul style="list-style-type: none"> <li>• Without PCU 20 mm (0.79 in)</li> <li>• With PCU 50.5 108.2 mm (4.26 in) <ul style="list-style-type: none"> <li>- Clearance 10 mm (0.39 in)</li> </ul> </li> </ul>                                                                                                 |
| <b>Weight, approx.</b>                                      | 5 kg (11.0 lb)                                                                                                                                                                                                                                                                                             |
| <b>Approvals, according to</b>                              | CE, cULus                                                                                                                                                                                                                                                                                                  |

#### Selection and ordering data

| Description                                                                                                                       | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 010C operator panel front</b><br>26.4 cm/10.4" TFT (640 x 480)<br>with mechanical keys                        | <b>6FC5203-0AF01-0AA0</b> |
| <b>Accessories</b>                                                                                                                |                           |
| <b>Square key cover, for labeling</b><br>1 set comprising: 90 × ergo gray,<br>20 × red, 20 × yellow, 20 × green,<br>20 × mid-gray | <b>6FC5248-0AF12-0AA0</b> |
| <b>Sealing caps (10 units)</b><br>For the USB port                                                                                | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps (6 units)</b>                                                                                                    | <b>6FC5248-0AF06-0AA0</b> |

# SINUMERIK Operate

## Operator panels

### SINUMERIK OP 012

#### Overview



The SINUMERIK OP 012 operator panel front with 12.1" TFT color display and a resolution of 800 × 600 pixels (SVGA) features a 59-key membrane keypad as well as 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys. The integral mouse provides an additional method of machine control. The 2 × 8 vertical softkeys can be used as direct keys in the PLC.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- User-friendly operator control and monitoring thanks to 12.1" display
- Easy operation thanks to integral keyboard and mouse

#### Integration

The SINUMERIK OP 012 operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

If no SINUMERIK Machine Push Button Panel or machine control panel with connection of the direct keys is available, the optional SINUMERIK direct key module provides an additional connection of the 2 × 8 vertical softkeys as direct keys to PROFIBUS DP.

#### Technical specifications

|                                                             |                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 012 operator panel front<br>6FC5203-0AF02-0AA1                                                                                                                                                                                                                                           |
| <b>Screen</b>                                               | 12.1" TFT, 800 x 600 pixels                                                                                                                                                                                                                                                                              |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                                                                                                                                                                                                                                                          |
| <b>Power consumption, max.</b>                              | 21 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                      |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                       |
| <b>Relative atmospheric humidity</b>                        | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                                  | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                           | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 310 mm (12.2 in)</li> <li>• Depth 30 mm (1.18 in)</li> </ul>                                                                                                                                                          |
| <b>Depth</b>                                                | <ul style="list-style-type: none"> <li>• Without PCU 20 mm (0.79 in)</li> <li>• With PCU 50.5 108.2 mm (4.26 in)</li> <li>- Clearance 10 mm (0.39 in)</li> </ul>                                                                                                                                         |
| <b>Weight, approx.</b>                                      | 5 kg (11.0 lb)                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                              | CE, cULus                                                                                                                                                                                                                                                                                                |

#### Selection and ordering data

| Description                                                                                                       | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 012 operator panel front</b><br>30.7 cm/12.1" TFT (800 × 600) with<br>membrane keys and mouse | <b>6FC5203-0AF02-0AA1</b> |
| <b>SINUMERIK direct key module<br/>PROFIBUS DP</b><br>With mounting kit for<br>SINUMERIK OP 012                   | <b>6FC5247-0AF11-0AA0</b> |
| <b>Accessories</b>                                                                                                |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets,<br>for SINUMERIK OP 012                                 | <b>6FC5248-0AF08-0AA0</b> |
| <b>USB mouse</b><br>For operator panel front                                                                      | <b>6FC5247-0AF01-0AA0</b> |
| <b>Sealing caps (10 units)</b><br>For the USB port                                                                | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps (6 units)</b>                                                                                    | <b>6FC5248-0AF06-0AA0</b> |

### Overview



The SINUMERIK OP 015 operator panel front with 15" TFT color display and a resolution of 1024 × 768 pixels (XGA) features 8 + 4 horizontal and 8 vertical membrane softkeys.

The SINUMERIK KB 483C full CNC keyboard is suitable as the input keyboard.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

### Benefits

- Very user-friendly operator control and monitoring thanks to brilliant 15" display
- Ergonomic and reliable operation thanks to the optional SINUMERIK KB 483C full CNC keyboard

### Integration

The SINUMERIK OP 015 operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

### Technical specifications

|                                                             |                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 015 operator panel front<br>6FC5203-0AF03-0AA0                                                                                                                                                                                                                                           |
| <b>Screen</b>                                               | 15" TFT, 1024 x 768 pixels                                                                                                                                                                                                                                                                               |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                                                                                                                                                                                                                                                          |
| <b>Power consumption, max.</b>                              | 24 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                      |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b>         | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                       |
| <b>Relative atmospheric humidity</b>                        | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                                  | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                           | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 310 mm (12.2 in)</li> <li>• Depth 52 mm (2.05 in)</li> </ul>                                                                                                                                                          |
| <b>Depth</b>                                                | <ul style="list-style-type: none"> <li>• Without PCU 42 mm (1.65 in)</li> <li>• With PCU 50.5<br/>- Clearance 130.2 mm (5.13 in)<br/>10 mm (0.39 in)</li> </ul>                                                                                                                                          |
| <b>Weight, approx.</b>                                      | 7 kg (15.4 lb)                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                              | CE, cULus                                                                                                                                                                                                                                                                                                |

### Selection and ordering data

| Description                                                                                          | Order No.                 |
|------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 015 operator panel front</b><br>38 cm/15" TFT (1024 × 768) with<br>membrane keys | <b>6FC5203-0AF03-0AA0</b> |
| <b>Accessories</b>                                                                                   |                           |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                   | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (6 units)                                                                       | <b>6FC5248-0AF06-0AA0</b> |

# SINUMERIK Operate

## Operator panels

### SINUMERIK OP 015A

#### Overview



The SINUMERIK OP 015A operator panel front with 15" TFT color display with a resolution of 1024 × 768 pixels (XGA) features a 62-key membrane keyboard with 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys and an integral mouse. The 2 × 8 vertical softkeys can be used as direct keys in the PLC.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Very user-friendly operator control and monitoring thanks to 15" display
- Easy operation thanks to integral keyboard and mouse

#### Integration

The SINUMERIK OP 015A operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

If no SINUMERIK Machine Push Button Panel or machine control panel with connection of the direct keys is available, the optional SINUMERIK direct key module provides an additional connection of the 2 × 8 vertical softkeys as direct keys to PROFIBUS DP.

#### Technical specifications

|                                                             |                                                                 |
|-------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Product name</b>                                         | SINUMERIK<br>OP 015A operator panel front<br>6FC5203-0AF05-0AB0 |
| <b>Screen</b>                                               | 15" TFT, 1024 x 768 pixels                                      |
| <b>Input voltage</b>                                        | Via PCU, TCU or video link<br>receiver (5 V DC)                 |
| <b>Power consumption, max.</b>                              | 25 W                                                            |
| <b>Degree of protection to<br/>DIN EN 60529 (IEC 60529)</b> |                                                                 |
| • Front                                                     | IP65                                                            |
| • Rear                                                      | IP00                                                            |

#### Technical specifications (continued)

|                                                     |                                                                                    |
|-----------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Product name</b>                                 | SINUMERIK<br>OP 015A operator panel front<br>6FC5203-0AF05-0AB0                    |
| <b>Humidity class based on<br/>DIN EN 60721-3-3</b> | Class 3K5 condensation and<br>icing excluded.<br>Low air temperature 0 °C (32 °F). |
| <b>Relative atmospheric humidity</b>                |                                                                                    |
| • Storage                                           | 5 ... 95 % at 25 °C (77 °F)                                                        |
| • Transport                                         | 5 ... 95 % at 25 °C (77 °F)                                                        |
| • Operation                                         | 5 ... 80 % at 25 °C (77 °F)                                                        |
| <b>Ambient temperature</b>                          |                                                                                    |
| • Storage                                           | -20 ... +60 °C (-4 ... +140 °F)                                                    |
| • Transport                                         | -20 ... +60 °C (-4 ... +140 °F)                                                    |
| • Operation                                         |                                                                                    |
| - Front                                             | 0 ... 45 °C (32 ... 113 °F)                                                        |
| - Rear                                              | 0 ... 55 °C (32 ... 131 °F)                                                        |
| <b>Dimensions</b>                                   |                                                                                    |
| • Width                                             | 483 mm (19.02 in)                                                                  |
| • Height                                            | 355 mm (13.98 in)                                                                  |
| • Depth                                             | 53 mm (2.09 in)                                                                    |
| <b>Depth</b>                                        |                                                                                    |
| • Without PCU                                       | 42 mm (1.65 in)                                                                    |
| • With PCU 50.5                                     | 127 mm (5.00 in)                                                                   |
| - Clearance                                         | 10 mm (0.39 in)                                                                    |
| <b>Weight, approx.</b>                              | 8.4 kg (18.5 lb)                                                                   |
| <b>Approvals, according to</b>                      | CE, cULus                                                                          |

#### Selection and ordering data

| Description                                                                                           | Order No.                 |
|-------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK<br/>OP 015A operator panel front</b><br>38 cm/15" TFT (1024 x 768)<br>with membrane keys | <b>6FC5203-0AF05-0AB0</b> |
| <b>SINUMERIK direct key module<br/>PROFIBUS DP</b><br>With mounting kit for<br>SINUMERIK OP 012       | <b>6FC5247-0AF11-0AA0</b> |
| <b>Direct key module mounting kit</b><br>For SINUMERIK OP 015A/<br>OP 019/TP 015A                     | <b>6FC5247-0AF30-0AA0</b> |

#### Accessories

|                                                                                                                                          |                           |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets for<br>SINUMERIK OP 015A/<br>OP 015AT/TP 015A/TP 015AT<br>for vertical softkeys | <b>6FC5248-0AF24-0AA0</b> |
| <b>USB mouse</b><br>For operator panel front                                                                                             | <b>6FC5247-0AF01-0AA0</b> |
| <b>Sealing caps (10 units)</b><br>For the USB port                                                                                       | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with<br>2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                    | <b>6FC5248-0AF14-0AA0</b> |



### Overview



The SINUMERIK OP 015AT operator panel front with 15" TFT color display and 1024 x 768 pixels (XGA) enables the distributed installation of the operator panel front and the controller. The SINUMERIK OP 015AT operator panel front contains a membrane keyboard with 62 keys as well as 2 x (8+2) horizontal and 2 x 8 vertical softkeys and an integral mouse.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

### Benefits

- Design of flat operator panels through shallow installation depth and low power dissipation
- Vibration-free mounting of the SINUMERIK PCU in the control cabinet
- Efficient operation of larger machines using up to 4 additional, distributed operator panels simultaneously

### Design

The SINUMERIK OP 015AT operator panel front is connected to the PCU/NCU via Ethernet as a Thin Client in its own subnet (via DHCP server to PCU/NCU).

Ports:

- 3 x USB 1.1 (2 x rear, 1 x front)
- Ethernet 10/100 Mbit/s

### Function

- Signal transmission between operator panel front and PCU/NCU via Industrial Ethernet
- Easy installation
- Mixed operation with one operator panel front directly on the PCU is possible. Operator inputs on a SINUMERIK OP 015AT have equal priority with operator inputs on an operator panel front connected directly to the PCU. The operator panel in passive mode shows a darkened screen.
- The distance to the operator panel fronts is determined by the maximum distance between two network nodes/access points (100 m/328 ft).

### Integration

The SINUMERIK OP 015AT operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

The 2 x 8 vertical softkeys can be used as direct keys with SINUMERIK 840D sl.

### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>OP 015AT operator panel front<br>6FC5203-0AF05-1AB0                                                                                                                                                                                                                                         |
| <b>Screen</b>                                           | 15" TFT, 1024 x 768 pixels                                                                                                                                                                                                                                                                               |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 25 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                      |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 355 mm (13.98 in)</li> <li>• Depth 53 mm (2.09 in)</li> </ul>                                                                                                                                                         |
| <b>Weight, approx.</b>                                  | 7.6 kg (16.8 lb)                                                                                                                                                                                                                                                                                         |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                |

### Selection and ordering data

| Description                                                                                                                    | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK OP 015AT operator panel front</b><br>38 cm/15" TFT (1024 x 768) with membrane keys and integral TCU               | <b>6FC5203-0AF05-1AB0</b> |
| <b>Accessories</b>                                                                                                             |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets for SINUMERIK OP 015A/OP 015AT/TP 015A/TP 015AT for vertical softkeys | <b>6FC5248-0AF24-0AA0</b> |
| <b>USB mouse</b><br>For operator panel front                                                                                   | <b>6FC5247-0AF01-0AA0</b> |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                                             | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (9 units)<br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)             | <b>6FC5248-0AF14-0AA0</b> |



# SINUMERIK Operate

## Operator panels

### SINUMERIK OP 019

#### Overview



The SINUMERIK OP 019 operator panel front with 19" TFT color display and 1280 × 1024 pixels has a continuous glass front and capacitive keys with 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys. The 2 × 8 vertical softkeys can be used as direct keys in the PLC.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Clear operator control and monitoring thanks to the 19" display
- High-quality design and high degree of ruggedness
- Innovative capacitive sensor technology for user-friendly operation

#### Integration

The SINUMERIK operator panel front OP 019 can be used for:

- SINUMERIK 840D sl with PCU 50.5

For the USB 2.0 port at the front, there is a USB extension available for installation in control desks.

If no SINUMERIK Machine Push Button Panel or machine control panel with connection of the direct keys is available, or if the direct key commands cannot be transferred over the Thin Client, the optional SINUMERIK direct key module provides an additional connection of the 2 × 8 vertical softkeys as direct keys to the PROFIBUS DP.

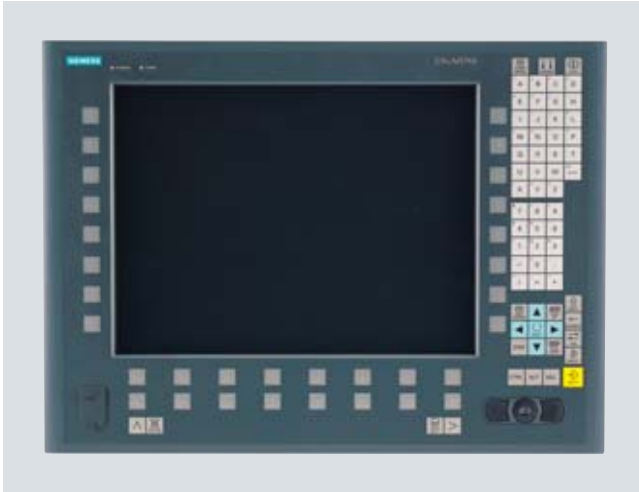
#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>OP 019 operator panel front<br>6FC5303-0AF13-0AA0                                                                                                                                                                                                                                           |
| <b>Screen</b>                                           | 19" TFT, 1280 × 1024 Pixel                                                                                                                                                                                                                                                                               |
| <b>Input voltage</b>                                    | 5 V DC via PCU                                                                                                                                                                                                                                                                                           |
| <b>Power consumption, max.</b>                          | 24 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65/IP66</li> <li>• Rear IP20</li> </ul>                                                                                                                                                                                                                 |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 399 mm (15.71 in)</li> <li>• Depth 58.5 mm (3.37 in)</li> </ul>                                                                                                                                                       |
| <b>Depth</b>                                            | <ul style="list-style-type: none"> <li>• Without PCU 47.5 mm (1.87 in)</li> <li>• With PCU 50.5 <ul style="list-style-type: none"> <li>- Clearance 10 mm (0.39 in)</li> </ul> </li> </ul>                                                                                                                |
| <b>Weight, approx.</b>                                  | 11.5 kg (25.36 lb)                                                                                                                                                                                                                                                                                       |
| <b>Approvals, according to</b>                          | CE, UL                                                                                                                                                                                                                                                                                                   |

#### Selection and ordering data

| Description                                                                                                                            | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK OP 019 operator panel front</b><br>48 cm/19" TFT (1280 × 1024) with capacitive keys                                       | <b>6FC5303-0AF13-0AA0</b> |
| <b>SINUMERIK direct key module PROFIBUS DP</b><br>With mounting kit for SINUMERIK OP 012                                               | <b>6FC5247-0AF11-0AA0</b> |
| <b>Direct key module mounting kit</b><br>For SINUMERIK OP 015A/ OP 019/TP 015A                                                         | <b>6FC5247-0AF30-0AA0</b> |
| <b>Accessories</b>                                                                                                                     |                           |
| <b>USB 1.1/2.0 extension, type A</b><br>For desk mounting<br>degree of protection IP66,<br>D = 22 mm (0.87 in)<br>length 1 m (3.28 ft) | <b>6FC5347-0AF01-1AA0</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with<br>2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                  | <b>6FC5248-0AF14-0AA0</b> |

### Overview



The SINUMERIK TP 015A operator panel front with 15" TFT color display and a resolution of 1024 × 768 pixels (XGA) and touch screen features a 62-key membrane keyboard as well as 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys and an integral mouse. The 2 × 8 vertical softkeys can be used as direct keys in the PLC.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

### Benefits

- Very user-friendly operator control and monitoring thanks to 15" display
- Easy operation thanks to touch screen, integral keyboard and mouse

### Integration

The SINUMERIK TP 015A operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

If no SINUMERIK Machine Push Button Panel or machine control panel with connection of the direct keys is available, or if the direct key commands cannot be transferred over the Thin Client, the optional SINUMERIK direct key module provides an additional connection of the 2 × 8 vertical softkeys as direct keys to the PROFIBUS DP.

### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK TP 015A operator panel front<br>6FC5203-0AF08-0AB2                                                                                                                                                                                                                                       |
| <b>Screen</b>                                           | 15" TFT, 1024 x 768 pixels                                                                                                                                                                                                                                                                         |
| <b>Input voltage</b>                                    | Via PCU, TCU or video link receiver (5 V DC)                                                                                                                                                                                                                                                       |
| <b>Power consumption, max.</b>                          | 25 W                                                                                                                                                                                                                                                                                               |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>Front IP65</li> <li>Rear IP00</li> </ul>                                                                                                                                                                                                                    |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                    |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>Width 483 mm (19.02 in)</li> <li>Height 355 mm (13.98 in)</li> <li>Depth 53 mm (2.09 in)</li> </ul>                                                                                                                                                         |
| <b>Depth</b>                                            | <ul style="list-style-type: none"> <li>Without PCU 42 mm (1.65 in)</li> <li>With PCU 50.5 127 mm (5.00 in)</li> <li>- Clearance 10 mm (0.39 in)</li> </ul>                                                                                                                                         |
| <b>Weight, approx.</b>                                  | 8.4 kg (18.5 lb)                                                                                                                                                                                                                                                                                   |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                          |

### Selection and ordering data

| Description                                                                                                                    | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK TP 015A operator panel front</b><br>38 cm/15" TFT (1024 x 768) with membrane keys and touch screen                | <b>6FC5203-0AF08-0AB2</b> |
| <b>SINUMERIK direct key module PROFIBUS DP</b><br>With mounting kit for SINUMERIK OP 012                                       | <b>6FC5247-0AF11-0AA0</b> |
| <b>Direct key module mounting kit</b><br>For SINUMERIK OP 015A/OP 019/TP 015A                                                  | <b>6FC5247-0AF30-0AA0</b> |
| <b>Accessories</b>                                                                                                             |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets for SINUMERIK OP 015A/OP 015AT/TP 015A/TP 015AT for vertical softkeys | <b>6FC5248-0AF24-0AA0</b> |
| <b>USB mouse</b><br>For operator panel front                                                                                   | <b>6FC5247-0AF01-0AA0</b> |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                                             | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (9 units)<br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)             | <b>6FC5248-0AF14-0AA0</b> |

# SINUMERIK Operate

## Operator panels

### SINUMERIK TP 015AT

#### Overview



The SINUMERIK TP 015AT operator panel front with 15" TFT color display, 1024 × 768 pixels (XGA) and touch screen supports the distributed installation of the operator panel front and control. The SINUMERIK TP 015AT operator panel front contains a membrane keyboard with 62 keys as well as 2 × (8 + 2) horizontal and 2 × 8 vertical softkeys and an integral mouse.

The operator panel front is mounted from the rear using special clamping elements included in the scope of supply.

#### Benefits

- Flat operator panel through shallow installation depth
- Low power dissipation
- Easy installation
- Vibration-free mounting in the control cabinet
- Efficient operation of larger machines using up to 4 additional, distributed operator panels simultaneously

#### Design

The SINUMERIK TP 015AT operator panel front is connected to the PCU/NCU via Ethernet as a Thin Client in its own subnet (via DHCP server to PCU/NCU).

Ports:

- 3 × USB 1.1 (2 × rear, 1 × front)
- Ethernet 10/100 Mbit/s

#### Function

- Signal transmission between operator panel front and PCU/NCU via Industrial Ethernet
- Mixed operation with one operator panel front directly on the PCU is possible. Operator inputs on a SINUMERIK TP 015AT have equal priority with operator inputs on an operator panel front connected directly to the PCU. The operator panel in passive mode shows a darkened screen.
- The distance to the operator panel fronts is determined by the maximum distance between two network nodes/access points (100 m/328 ft).

#### Integration

The SINUMERIK TP 015AT operator panel front can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

The 2 × 8 vertical softkeys can be used as direct keys with SINUMERIK 840D sl.

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK TP 015AT operator panel front<br>6FC5203-0AF08-1AB2                                                                                                                                                                                                                                            |
| <b>Screen</b>                                           | 15" TFT, 1024 x 768 pixels                                                                                                                                                                                                                                                                               |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 25 W                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                      |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 355 mm (13.98 in)</li> <li>• Depth 53 mm (2.09 in)</li> </ul>                                                                                                                                                         |
| <b>Weight, approx.</b>                                  | 7.6 kg (16.8 lb)                                                                                                                                                                                                                                                                                         |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                |

#### Selection and ordering data

| Description                                                                                                                    | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK TP 015AT operator panel front</b><br>38 cm/15" TFT (1024 × 768) with membrane keys, touch screen and integral TCU | <b>6FC5203-0AF08-1AB2</b> |
| <b>Accessories</b>                                                                                                             |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets, for SINUMERIK OP 015A/ OP 015AT/TP 015A/TP 015AT                     | <b>6FC5248-0AF24-0AA0</b> |
| <b>USB mouse</b><br>For operator panel front                                                                                   | <b>6FC5247-0AF01-0AA0</b> |
| <b>Sealing caps</b> (10 units)<br>For the USB port                                                                             | <b>6FC5248-0AF05-0AA0</b> |
| <b>Set of clamps</b> (9 units)<br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)             | <b>6FC5248-0AF14-0AA0</b> |

#### Overview



The SINUMERIK direct key module makes it possible to perform machine operations with the two rows of keys (on the left and the right of the screen) from the SINUMERIK OP 012/OP 015A/OP 019/TP 015A operator panel fronts.

#### Design

The SINUMERIK direct key module is fitted alongside the SINUMERIK PCU 50 on the SINUMERIK operator panel fronts OP 012/OP 015A/OP 019/TP 015A. Cables and assembly material for installing the SINUMERIK PCU 50 with SINUMERIK OP 012 are included in the scope of delivery.

There is an extra installation kit for combining SINUMERIK PCU 50 with SINUMERIK OP 015A/OP 019 and TP 015A which must be additionally ordered when required.

#### Integration

The SINUMERIK direct key module is suitable for connection to:

- SINUMERIK PCU 50.5 with the SINUMERIK operator panel fronts OP 012/OP 015A/OP 019/TP 015A

The SINUMERIK direct key module is connected to PROFIBUS DP of the SINUMERIK operator panel front using a ribbon cable and PROFIBUS connectors.

#### Technical specifications

|                                                         |                                                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>direct key module<br>PROFIBUS DP<br>6FC5247-0AF11-0AA0             |
| <b>Input voltage</b>                                    | 5 V DC                                                                          |
| <b>Power consumption, max.</b>                          | 0.75 W                                                                          |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP20                                                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F). |
| <b>Relative atmospheric humidity</b>                    |                                                                                 |
| • Storage                                               | 5 ... 95 % at 25 °C (77 °F)                                                     |
| • Transport                                             | 5 ... 95 % at 25 °C (77 °F)                                                     |
| • Operation                                             | 5 ... 80 % at 25 °C (77 °F)                                                     |
| <b>Ambient temperature</b>                              |                                                                                 |
| • Storage                                               | -20 ... +60 °C (-4 ... +140 °F)                                                 |
| • Transport                                             | -20 ... +60 °C (-4 ... +140 °F)                                                 |
| • Operation                                             | 0 ... 55 °C (32 ... 131 °F)                                                     |
| <b>Dimensions</b>                                       |                                                                                 |
| • Width                                                 | 106 mm (4.17 in)                                                                |
| • Height                                                | 42 mm (1.65 in)                                                                 |
| • Depth                                                 | 80 mm (3.15 in)                                                                 |
| <b>Weight, approx.</b>                                  | 0.6 kg (1.32 lb)                                                                |
| <b>Approvals, according to</b>                          | CE                                                                              |

#### Selection and ordering data

| Description                                                                              | Order No.                 |
|------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK direct key module PROFIBUS DP</b><br>With mounting kit for SINUMERIK OP 012 | <b>6FC5247-0AF11-0AA0</b> |
| <b>Accessories</b>                                                                       |                           |
| <b>Direct key module mounting kit</b><br>For SINUMERIK OP 015A/OP 019/TP 015A            | <b>6FC5247-0AF30-0AA0</b> |

# SINUMERIK Operate

## Panel Control Unit for operator panels

### SINUMERIK PCU 50.5

#### Overview



The powerful SINUMERIK PCU 50.5 Panel Control Unit provides maximum HMI performance and openness. It features all the onboard interfaces required to support communication via Ethernet and PROFIBUS (device-dependent), leaving the integrated slots free for other tasks.

The SINUMERIK PCU 50.5 is equipped with the Windows XP ProEmbSys operating system and with the Ghost data backup software for backing up and restoring data.

The operating software can be ordered separately.

The SINUMERIK Service Pack Recovery Media WIN XP ProEmbSys is available for the PCU with Windows XP ProEmbSys for reinstalling Windows software components and for restoring the delivery status.

#### Benefits

- Powerful and energy-efficient thanks to Intel Dual Core processor technology
- Reliable in operation through the use of error-correcting code RAM and solid-state drive as mass storage, as well as monitoring of temperature, SSD and fan
- Maximum processor performance up to 55 °C (131 °F) ambient temperature
- High shock and vibration resistance in all mounting positions
- Extremely compact design for space-saving installation thanks to compact housing design (6 liter volume)
- Service-friendly thanks to support of a USB boot device, for booting USB memory sticks, USB floppy drives or USB hard disks

#### Design

- Intel Dual Core processor technology
  - SINUMERIK PCU 50.5-C: Intel Celeron P4505 Dual Core/1.86 GHz/ 1 GB ECC RAM/2 MB Smart Cache
  - SINUMERIK PCU 50.5-P: Intel Core i5-520E Dual Core/2.4 GHz/ 2 GB ECC RAM/3 MB Smart Cache
- Replaceable 40 GB solid-state drive
- 12 GB for applications (SINUMERIK Operate, HMI-Advanced, MCIS software) and data (part programs, documentation, miscellaneous data)
- 15 GB for local backups and software to be installed
- Max. memory configuration 8 GB incl. graphics memory on 2 memory module slots (a maximum of 4 GB is usable with Windows XP.)
- Integral 2D/3D graphics; dynamic graphics memory (up to 256 MB); the graphics memory is taken from the main memory
- Windows XP ProEmbSys operating system
- Data backup/restore using the Ghost data backup software

#### Ports:

- 2 × Ethernet 10/100/1000 Mbit/s (RJ45)
- 4 × USB 2.0
- 1 × PROFIBUS/MPI interface (SINUMERIK PCU 50.5-C only)
- 1 × COM1 (RS232C)

#### Expansion slots:

- SINUMERIK PCU 50.5-C
  - 2 × PCI (1 × 185 mm/7.28 in)
- SINUMERIK PCU 50.5-P
  - 1 × PCI-Express ×16 (1 × 185 mm/7.28 in)
  - 1 × PCI (1 × 185 mm/7.28 in)

#### Integration

The SINUMERIK PCU 50.5 can be used for:

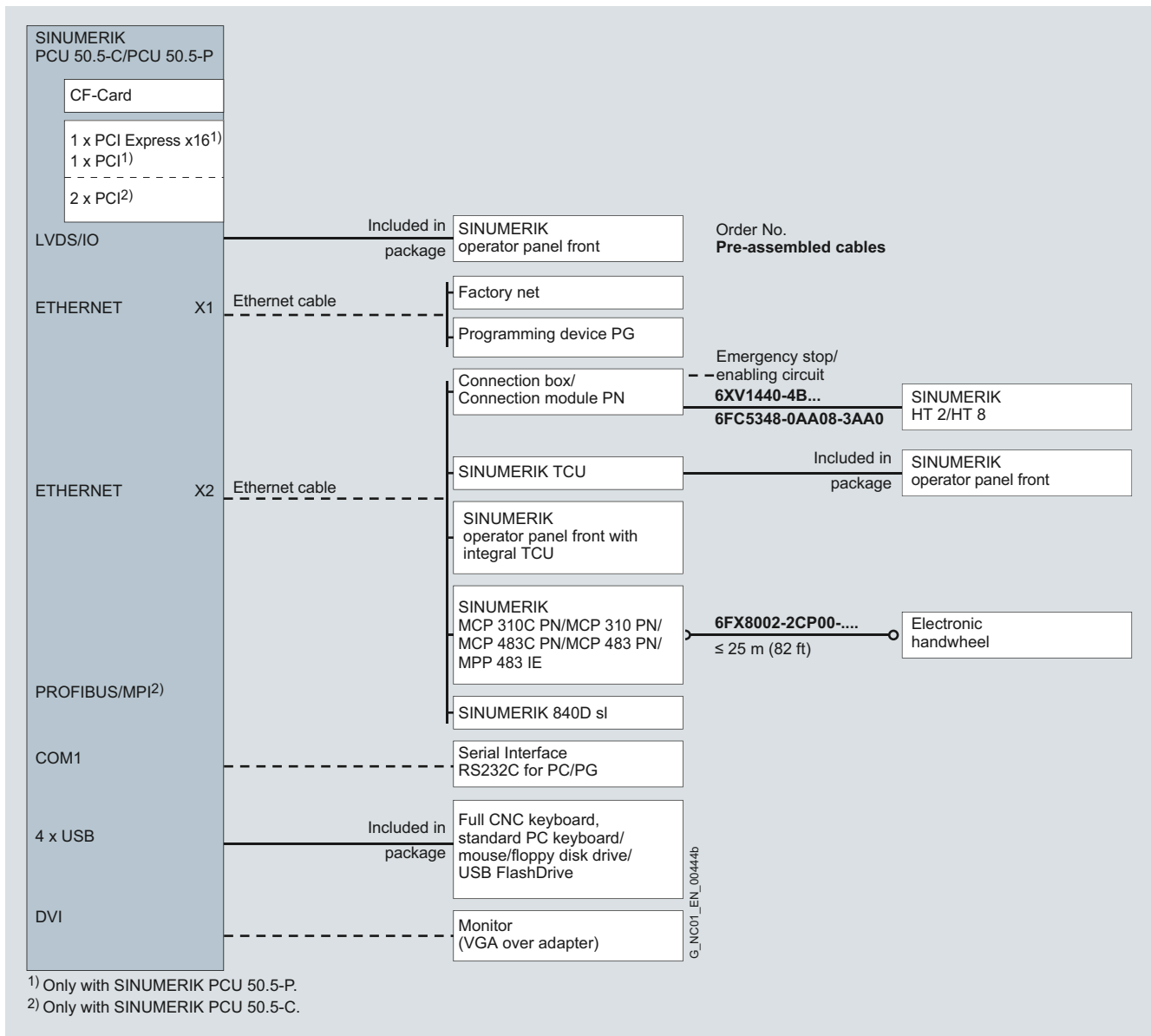
- SINUMERIK 840D sl (software version 7.6 or higher of HMI-Advanced operating software and SINUMERIK Operate software version 2.6 SP1)

# SINUMERIK Operate

## Panel Control Unit for operator panels

SINUMERIK PCU 50.5

### Integration



Connection overview for SINUMERIK PCU 50.5-C/PCU 50.5-P

More information about cables can be found under [MOTION-CONNECT](#) connection systems.



# SINUMERIK Operate

## Panel Control Unit for operator panels

### SINUMERIK PCU 50.5

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK PCU 50.5-C<br>6FC5210-0DF52-2AA0                                                                                                                                                                                                                                                                                                                                                                      | SINUMERIK PCU 50.5-P<br>6FC5210-0DF53-2AA0 |
| <b>Processor</b>                                        | Intel Celeron P4505<br>Dual Core/1.86 GHz                                                                                                                                                                                                                                                                                                                                                                       | Intel Core i5-520E<br>Dual Core/2.4 GHz    |
| <b>RAM</b>                                              | 1 GB ECC RAM                                                                                                                                                                                                                                                                                                                                                                                                    | 2 GB ECC RAM                               |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |
| <b>Power consumption</b>                                | <ul style="list-style-type: none"> <li>• Maximum 190 W</li> <li>• Typical 48 W</li> </ul>                                                                                                                                                                                                                                                                                                                       |                                            |
| <b>Power loss ride-through time</b>                     | 20 ms                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP20                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                                                                                                                    |                                            |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                                                                                                                       |                                            |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Max. 15 W for expansions 5 ... 55 °C (41 ... 131 °F)</li> <li>- Max. 20 W for expansions 5 ... 50 °C (41 ... 122 °F)</li> <li>- Max. 30 W for expansions 5 ... 45 °C (41 ... 113 °F)</li> </ul> </li> </ul> |                                            |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 297 mm (11.7 in)</li> <li>• Height 267 mm (10.5 in)</li> <li>• Depth 82 mm (3.23 in)</li> </ul>                                                                                                                                                                                                                                                                  |                                            |
| <b>Weight, approx.</b>                                  | 4.5 kg (9.92 lb)                                                                                                                                                                                                                                                                                                                                                                                                |                                            |
| <b>Approvals, according to</b>                          | CE, UL                                                                                                                                                                                                                                                                                                                                                                                                          |                                            |

#### Selection and ordering data

| Description                                                                                                                                                              | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK PCU 50.5-C</b><br>1.86 GHz/1 × 1 Gbyte,<br>Windows XP ProEmbSys<br>Delivered without mounting<br>brackets.<br>Please include mounting brackets<br>in order. | <b>6FC5210-0DF52-2AA0</b> |
| <b>SINUMERIK PCU 50.5-P</b><br>2.4 GHz/1 × 2 GB, Windows XP<br>ProEmbSys<br>Delivered without mounting<br>brackets.<br>Please include mounting brackets<br>in order.     | <b>6FC5210-0DF53-2AA0</b> |

#### Selection and ordering data (continued)

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Order No.                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>SINUMERIK Operate operating software</b><br>On hard disk of<br>SINUMERIK PCU <sup>1)</sup><br>Languages:<br>Chinese Simplified, English,<br>German, French, Italian, Spanish<br><ul style="list-style-type: none"> <li>• Single License current software version</li> <li>• Single License specific software version<sup>2)</sup></li> </ul>                                                                                                                                                                                                                                                                               | <b>6FC5860-1YF00-0YA0</b><br><br><b>6FC5860-1YF ■ ■ - ■ YA0</b> |
| <b>Accessories</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                 |
| <b>Memory expansion</b><br>For SINUMERIK PCU 50.5<br><ul style="list-style-type: none"> <li>• 1 GB</li> <li>• 2 GB</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>6ES7648-2AJ40-1KA0</b><br><b>6ES7648-2AJ50-1KA0</b>          |
| <b>Mounting bracket</b><br>For SINUMERIK PCU,<br>video link receiver or TCU<br>behind operator panel front                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>6FC5248-0AF20-2AA0</b>                                       |
| <b>Upright mounting bracket</b><br>For SINUMERIK PCU 50.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>6FC5248-0AF20-1AA1</b>                                       |
| <b>8 GB CompactFlash card</b><br>Blank                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>6FC5313-6AG00-0AA0</b>                                       |
| <b>SIMATIC IPC USB FlashDrive</b><br>8 GB, USB 2.0, metal enclosure,<br>boot capability, incl.<br>SIMATIC IPC BIOS Manager                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>6ES7648-0DC50-0AA0</b>                                       |
| <b>SINUMERIK Service Pack</b><br><b>Recovery Media</b><br><b>Windows XP ProEmbSys</b><br>For SINUMERIK PCU 50.5 with<br>Windows XP ProEmbSys on<br>DVD-ROM<br>Contents:<br><ul style="list-style-type: none"> <li>• Windows XP ProEmbSys including SP3</li> <li>• Ghost of basic software emergency boot</li> <li>• Multilingual User Interface Pack<br/>Chinese Simplified, Chinese Traditional, Czech, Danish, Dutch, Finnish, French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese/ Brazilian, Rumanian, Russian, Slovak, Spanish, Swedish, Turkish</li> <li>• Documentation German/English</li> </ul> | <b>6FC5253-1CX10-1XU8</b>                                       |

<sup>1)</sup> Please ensure that the Order No. for the software to be delivered on the hard disk is stated directly after the Order No. for the SINUMERIK PCU on the order form.

<sup>2)</sup> Order No. for software version 2.7 SP1 for operating software SINUMERIK Operate: 6FC5860-1YF**23-0**YA0



# SINUMERIK Operate

## TCU for operator panels

### SINUMERIK TCU

#### Overview



The SINUMERIK Thin Client Unit TCU for distributed installation allows operator panel fronts and the SINUMERIK PCUs/NCUs to be installed separately. This is made possible by copying the user interface to one or several operator panel fronts, each with a SINUMERIK TCU.

#### Benefits

- Design of flat operator panels through the shallow installation depth and low power dissipation.
- Low-vibration installation of the PCU in the control cabinet
- Efficient operation of larger machines using up to 5 uniform operator panels simultaneously (of which 4 are Thin Clients)
- Effective operation of interlinked machines: more than 4 Thin Client operator panels can be connected thanks to TCU suppression mechanism

#### Design

The SINUMERIK TCUs are coupled via Industrial Ethernet as Thin Clients in a dedicated subnet via DHCP server on the PCU/NCU.

- Graphic: Resolution 640 × 480 to 1024 × 768, 16-bit color depth

Ports:

- 2 × USB 1.1 for connection of mouse and keyboard
- Industrial Ethernet 10/100 Mbit/s

#### Function

- Signal transmission between SINUMERIK PCU/SINUMERIK NCU and operator panel front via Industrial Ethernet
- Easy installation and service-friendly layout thanks to the component structure
- Functionality of the SINUMERIK PCU as in centralized configuration, e.g. number of PCI slots. The same operating screen is shown synchronously on all operator panel fronts and can be operated from all panel fronts. Operator inputs on a Thin Client have equal priority with operator inputs on an operator panel directly connected to the SINUMERIK PCU. The operator panel in passive mode shows a darkened screen.

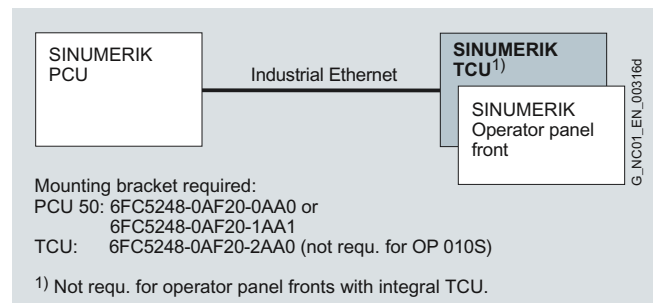
#### Function (continued)

- Operation is possible on the active operator panel. An enabling function permits a passive operator panel to request operation.
- The combined operation of operator panel fronts on a SINUMERIK TCU or with an integral TCU and an operator panel front directly connected to the SINUMERIK PCU is possible.
- The distance to the operator panel fronts is determined by the maximum distance between two network nodes/access points (100 m/328 ft).

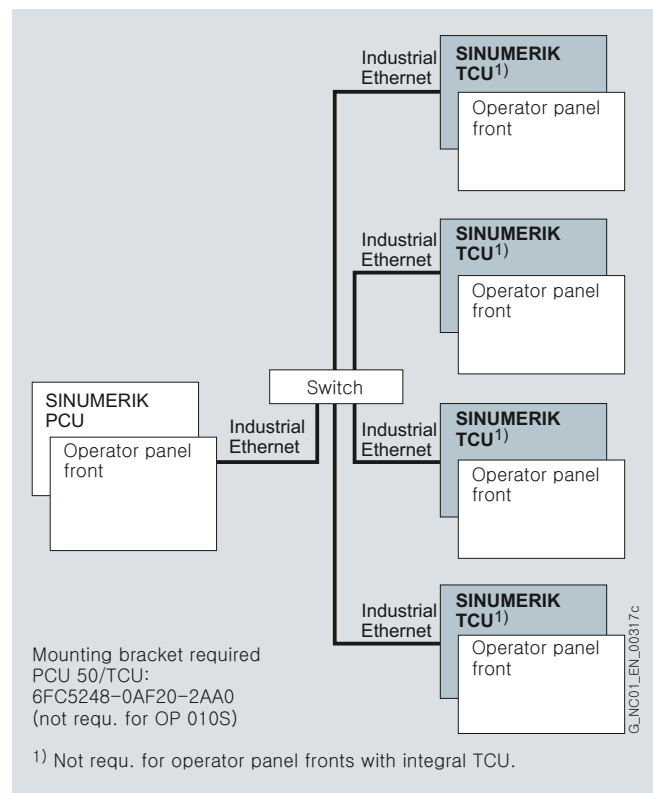
#### Integration

The SINUMERIK TCU can be used for:

- SINUMERIK 840D sl:  
OP 010, OP 010C, OP 010S, OP 012,  
OP 015, OP 015A, TP 015A operator panel fronts on  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5



Connection overview for SINUMERIK TCU without central OP on PCU



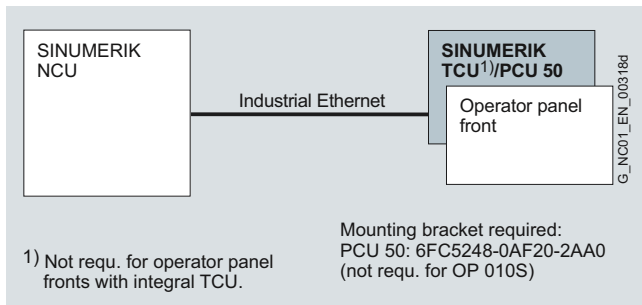
Connection overview for SINUMERIK TCU with central OP on PCU

# SINUMERIK Operate

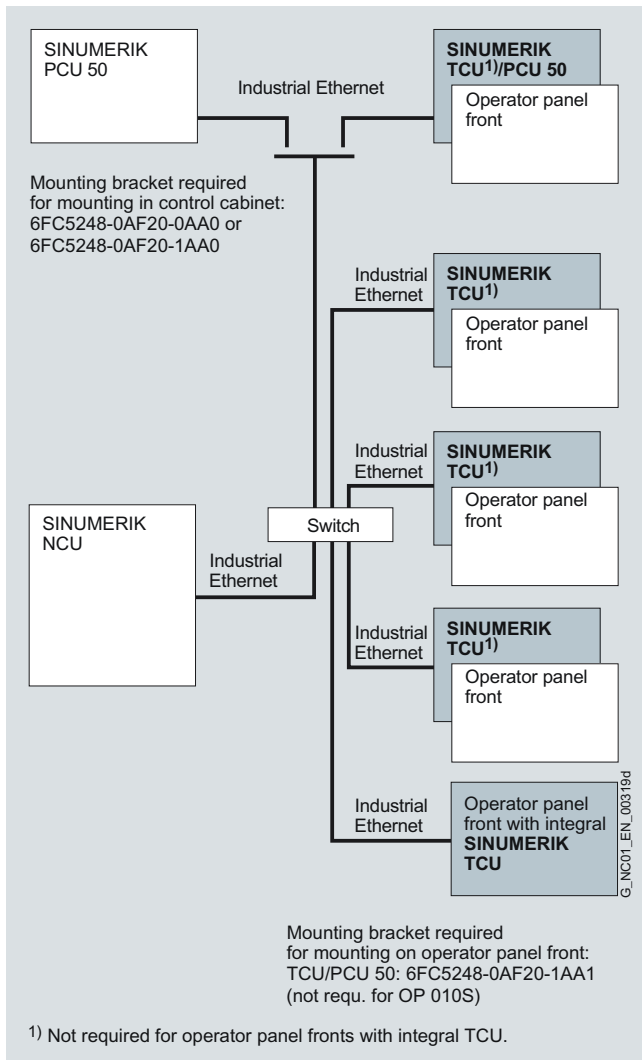
## TCU for operator panels

### SINUMERIK TCU

#### Integration (continued)



Connection overview for SINUMERIK TCU on NCU



Connection overview for SINUMERIK TCU with several TCUs on NCU

#### Technical specifications

|                                                         |                                                                                                                                                                                                  |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK Thin Client Unit TCU<br>6FC5312-0DA00-0AA1                                                                                                                                             |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                          |
| <b>Power consumption, max.</b>                          | 36 W                                                                                                                                                                                             |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP00                                                                                                                                                                                             |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                  |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>Storage: 5 ... 95 % at 25 °C (77 °F)</li> <li>Transport: 5 ... 95 % at 25 °C (77 °F)</li> <li>Operation: 5 ... 80 % at 25 °C (77 °F)</li> </ul>           |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>Storage: -25 ... +55 °C (-13 ... +131 °F)</li> <li>Transport: -25 ... +55 °C (-13 ... +131 °F)</li> <li>Operation: 0 ... 55 °C (32 ... 131 °F)</li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>Width: 260 mm (10.24 in)</li> <li>Height: 265 mm (10.43 in)</li> <li>Depth: 40 mm (1.57 in)</li> </ul>                                                    |
| <b>Weight, approx.</b>                                  | 1.7 kg (3.75 lb)                                                                                                                                                                                 |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                        |

#### Selection and ordering data

| Description                                                                                             | Order No.                 |
|---------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Thin Client Unit TCU</b>                                                                   | <b>6FC5312-0DA00-0AA1</b> |
| <b>Accessories</b>                                                                                      |                           |
| <b>Flat mounting bracket</b><br>For SINUMERIK PCU with/without videolink transmitter in control cabinet | <b>6FC5248-0AF20-0AA0</b> |
| <b>Upright mounting bracket</b><br>For SINUMERIK PCU 50.5                                               | <b>6FC5248-0AF20-1AA1</b> |
| <b>Standard mounting bracket</b><br>For SINUMERIK PCU, SINUMERIK TCU behind operator panel front        | <b>6FC5248-0AF20-2AA0</b> |

For ordering data for the SCALANCE industrial switches and the Industrial Ethernet FC TP Standard/Trailing Cable, see Industrial Switches – SCALANCE.

#### More information

Information on the SIMATIC NET components such as the Industrial Ethernet Electrical Lean Switches SCALANCE and the Industrial Ethernet FC TP Standard/Trailing Cable can be found in the IK PI Catalog or Siemens Industry Mail.

[www.siemens.com/industrymail](http://www.siemens.com/industrymail)

### Overview



The mobile SINUMERIK HT 2 handheld terminal is suitable for manually operating machine tools.

### Benefits

- Mobility for operator control and monitoring
- Two enabling buttons for right-handed or left-handed operators
- Easy hot swapping during operation (hot plug and play), without triggering the emergency stop in combination with the PN Plus connection box and without an additional, manual actuating element/key switch
- Rugged, light, and ergonomically designed
- Intuitive axis feed thanks to rugged, magnetic handwheel
- All keys can be freely configured and inscribed by the user (default key assignment preconfigured on shipped units)
- Slide-in labels for inscribing (accessory)
- Flexible mounting with different types of holders: Magnetic clamps or hooks (accessories)
- Easily replaceable signal cables, without special tools (accessories)

### Application

The SINUMERIK HT 2 is designed to allow manual operation of machine tools in any situation where the operator needs to be mobile, e.g. when setting up. It has been specifically developed with easy handling, ruggedness, and fitness for purpose in mind. The SINUMERIK HT 2 fits seamlessly into the operator component landscape of the SINUMERIK system.

### Design

The SINUMERIK HT 2 is connected via the PN Basic/PN Plus connection box when it is installed somewhere in the plant outside the control cabinet or via the PN Basic connection module when it is installed inside the control cabinet.

#### Control elements:

- 20 keys, all can be freely assigned and inscribed by the user
- Emergency stop button, 2-channel, three-step
- 2 enabling buttons (for right-handed and left-handed operators), 3-step, 2-channel
- Override rotary switch
- Magnetic handwheel
- Key switch (3 positions, 2 keys)

#### Key type:

- Membrane keys

#### Interfaces:

- Connecting cable to PN Basic/PN Plus connection box, PN Basic connection module

#### Display:

- 4-line display (128 × 64 pixels)

### Function

The easily accessible control elements, ergonomic design and light weight make this unit easy to use, even over long work shifts. Protection class IP65, rubber grips and magnetic hand-wheel make it suitable for use even when production conditions are rough. The key assignments match those on the previous B-MPI handheld unit model. This makes it easy to switch from one version to the next. The keys can be freely assigned and inscribed as required.

Hot swapping is available with the PN Plus connection box.

### Integration

The SINUMERIK HT 2 handheld terminal can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5

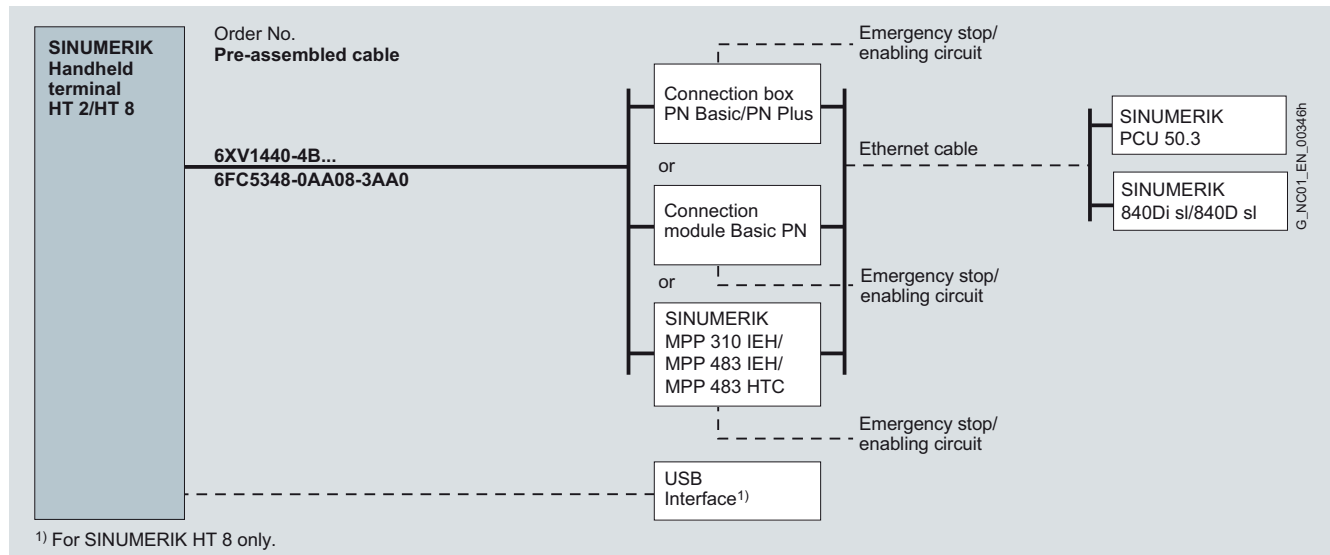
[More information about cables can be found under MOTION-CONNECT connection systems.](#)

# SINUMERIK Operate

## Handheld units

### SINUMERIK HT 2

#### Integration (continued)



Connection overview for SINUMERIK HT 2

#### Technical specifications

|                                                         |                                                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK HT 2 handheld terminal<br>6FC5303-0AA00-2AA0                          |
| <b>Input voltage</b>                                    | 24 V DC                                                                         |
| <b>Power consumption, max.</b>                          | 2.5 W                                                                           |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP65                                                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F). |
| <b>Relative atmospheric humidity</b>                    |                                                                                 |
| • Storage                                               | 5 ... 95 % at 25 °C (77 °F)                                                     |
| • Transport                                             | 5 ... 95 % at 25 °C (77 °F)                                                     |
| • Operation                                             | 5 ... 65 % at 25 °C (77 °F)                                                     |
| <b>Ambient temperature</b>                              |                                                                                 |
| • Storage                                               | -25 ... +60 °C (-13 ... +140 °F)                                                |
| • Transport                                             | -25 ... +60 °C (-13 ... +140 °F)                                                |
| • Operation                                             | 0 ... 50 °C (32 ... 122 °F)                                                     |
| <b>Dimensions</b>                                       |                                                                                 |
| • Width                                                 | 255 mm (10.04 in)                                                               |
| • Height (without control elements)                     | 100 mm (3.94 in)                                                                |
| • Depth (without control elements)                      | 76.2 mm (3.00 in)                                                               |
| <b>Weight, approx.</b>                                  | 0.69 kg (1.52 lb)                                                               |
| <b>Approvals, according to</b>                          | CE, cULus                                                                       |

#### Selection and ordering data

| Description                                                                                                   | Order No.                 |
|---------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK HT 2 handheld terminal</b>                                                                       | <b>6FC5303-0AA00-2AA0</b> |
| <b>Accessories</b>                                                                                            |                           |
| <b>PN Basic connection box</b>                                                                                | <b>6AV6671-5AE01-0AX0</b> |
| Degree of protection IP65, without automatic emergency stop override for mounting in the system               |                           |
| <b>PN Plus connection box</b>                                                                                 | <b>6AV6671-5AE11-0AX0</b> |
| Degree of protection IP65, with automatic emergency stop override for mounting in the system                  |                           |
| <b>Connection module Basic PN</b>                                                                             | <b>6FC5303-0AA01-1AA0</b> |
| Without automatic emergency stop override for mounting in the control cabinet, complete with terminating plug |                           |
| <b>Magnetic clamp</b>                                                                                         | <b>6FC5348-0AA08-0AA0</b> |
| For SINUMERIK HT 2                                                                                            |                           |
| <b>Holder</b>                                                                                                 | <b>6FC5348-0AA08-1AA0</b> |
| For SINUMERIK HT 2                                                                                            |                           |
| <b>Slide-in labels for inscribing</b>                                                                         | <b>6FC5348-0AA08-2AA0</b> |
| 3 DIN A4 sheets, for SINUMERIK HT 2                                                                           |                           |
| <b>Set of keys</b>                                                                                            | <b>6AV6574-1AG04-4AA0</b> |
| For SINUMERIK HT 2                                                                                            |                           |
| <b>Signal cable</b>                                                                                           |                           |
| For mobile panels                                                                                             |                           |
| • Length 2 m (6.56 ft)                                                                                        | <b>6XV1440-4BH20</b>      |
| • Length 5 m (16.41 ft)                                                                                       | <b>6XV1440-4BH50</b>      |
| • Length 8 m (26.25 ft)                                                                                       | <b>6XV1440-4BH80</b>      |
| • Length 10 m (32.81 ft)                                                                                      | <b>6XV1440-4BN10</b>      |
| • Length 15 m (49.22 ft)                                                                                      | <b>6XV1440-4BN15</b>      |
| • Length 20 m (65.62 ft)                                                                                      | <b>6XV1440-4BN20</b>      |
| • Length 25 m (82.03 ft)                                                                                      | <b>6XV1440-4BN25</b>      |
| <b>Coiled connecting cable</b>                                                                                | <b>6FC5348-0AA08-3AA0</b> |
| For SINUMERIK HT 2/HT 8<br>Length 1.5 m (4.92 ft), stretches to 3.5 m (11.48 ft)                              |                           |

### Overview



The mobile SINUMERIK HT 8 handheld terminal combines the functions of an operator panel and a machine control panel in a single device, permitting complete operator control and monitoring of machines. It can be used as a supplementary main operator panel or as a secondary control panel.

The supplied touch pen with a holding loop permits easy operation of the touch screen, even when operators are wearing gloves. The safety system is designed to allow personnel to work in the machine's hazard zone.

### Benefits

- Mobility for operator control and monitoring
- Rugged, compact and ergonomically designed
- Operation via touch screen, membrane keys and touch pen
- Pixel-graphics 7.5" TFT color display
- Emergency stop button and 2 enabling buttons for left-handed and right-handed operators
- Easy hot swapping during operation (hot plug and play), without triggering the emergency stop in combination with the PN Plus connection box and without an additional, manual actuating element/key switch
- Connecting cable can be easily replaced without special tools

### Design

The emergency stop button and the 2 enabling buttons (3-step) each have two channels.

Possible connections for SINUMERIK HT 8:

- In the control cabinet via the Basic PN connection module
- At any preferred mounting location in the plant via the Basic or PN Plus connection box

### Function

The SINUMERIK HT 8 operates according to the Thin Client principle. The operator software is already installed on a SINUMERIK NCU/PCU. An Ethernet link is used to transfer screen contents from the NCU/PCU to the HT 8 and key information from the HT 8 to the NCU/PCU. The HT 8 display shows the same operator interface that is displayed on the standard operator panels of the SINUMERIK control system.

Hot swapping is available with the PN Plus connection box.

The operator interface can be customized if required (see SINUMERIK Integrate).

### Technical specifications

| Product name                                     | SINUMERIK HT 8 handheld terminal                                             | SINUMERIK HT 8 handheld terminal with handwheel                              |
|--------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                                                  | 6FC5403-0AA20-0AA0                                                           | 6FC5403-0AA20-1AA0                                                           |
| Input voltage                                    | 24 V DC                                                                      | 24 V DC                                                                      |
| Power consumption, max.                          | 15 W                                                                         | 15 W                                                                         |
| Degree of protection to DIN EN 60529 (IEC 60529) | IP65                                                                         | IP65                                                                         |
| Humidity class based on DIN EN 60721-3-3         | Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F). | Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F). |
| Relative atmospheric humidity                    |                                                                              |                                                                              |
| • Storage                                        | 5 ... 95 % at 25 °C (77 °F)                                                  | 5 ... 95 % at 25 °C (77 °F)                                                  |
| • Transport                                      | 5 ... 95 % at 25 °C (77 °F)                                                  | 5 ... 95 % at 25 °C (77 °F)                                                  |
| • Operation                                      | 5 ... 80 % at 25 °C (77 °F)                                                  | 5 ... 80 % at 25 °C (77 °F)                                                  |
| Ambient temperature                              |                                                                              |                                                                              |
| • Storage                                        | -20 ... +60 °C (-4 ... +140 °F)                                              | -20 ... +60 °C (-4 ... +140 °F)                                              |
| • Transport                                      | -20 ... +60 °C (-4 ... +140 °F)                                              | -20 ... +60 °C (-4 ... +140 °F)                                              |
| • Operation                                      | 0 ... 45 °C (32 ... 113 °F)                                                  | 0 ... 45 °C (32 ... 113 °F)                                                  |
| Dimensions                                       |                                                                              |                                                                              |
| • External diameter of enclosure                 | 290 mm (11.42 in)                                                            | 290 mm (11.42 in)                                                            |
| • Height incl. override rotary switch            | 126 mm (4.96 in)                                                             | 126 mm (4.96 in)                                                             |
| Weight, approx.                                  | 1.73 kg (3.81 lb)                                                            | 1.73 kg (3.81 lb)                                                            |
| Approvals, according to                          | CE, cULus                                                                    | CE, cULus                                                                    |

# SINUMERIK Operate

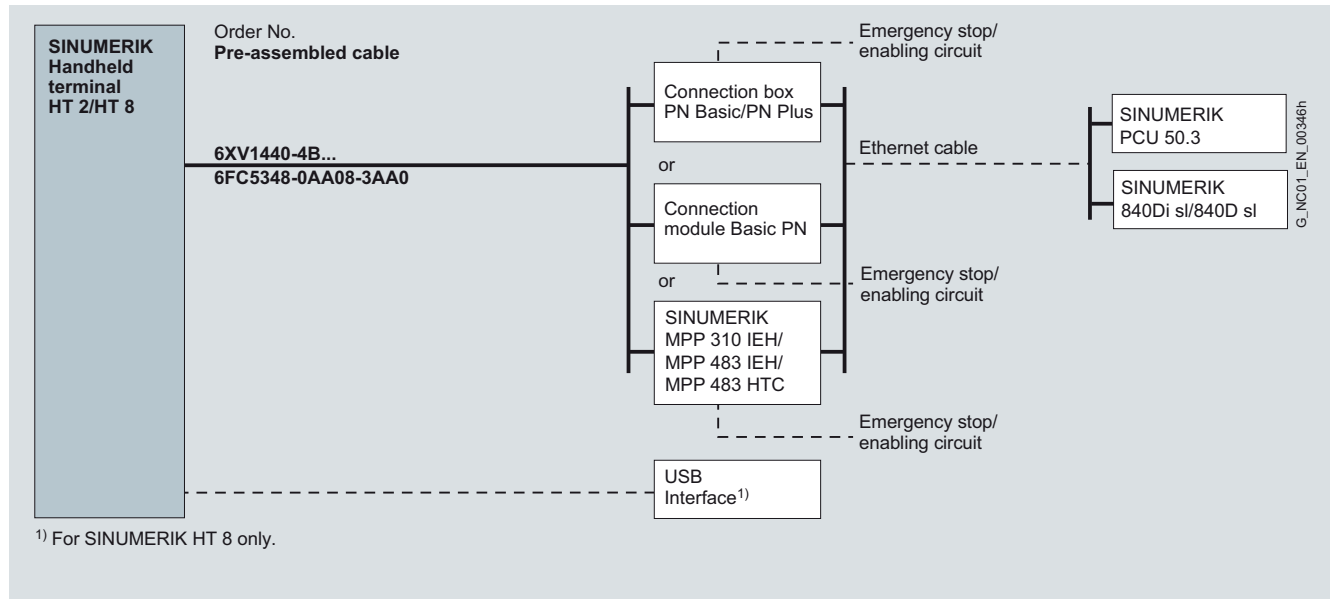
## Handheld units

### SINUMERIK HT 8

#### Integration

The SINUMERIK HT 8 handheld terminal can be used for:

- SINUMERIK 840D sl:  
NCU 7x0.3 PN  
SINUMERIK PCU 50.5



Connection overview for SINUMERIK HT 8

More information about cables can be found under MOTION-CONNECT connection systems.

#### Selection and ordering data

| Description                                                                                                                                    | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK HT 8 handheld terminal</b><br>Based on the Thin Client principle<br>Operating software in the<br>SINUMERIK NCU/PCU                | <b>6FC5403-0AA20-0AA0</b> |
| <b>SINUMERIK HT 8 handheld terminal with handwheel</b><br>Based on the Thin Client principle<br>Operating software in the<br>SINUMERIK NCU/PCU | <b>6FC5403-0AA20-1AA0</b> |

#### Accessories

|                                                                                                                                                |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>PN Basic connection box</b><br>Protection class IP65<br>Without automatic emergency stop<br>override for mounting in the system             | <b>6AV6671-5AE01-0AX0</b> |
| <b>PN Plus connection box</b><br>Protection class IP65<br>With automatic emergency stop<br>override for mounting in the system                 | <b>6AV6671-5AE11-0AX0</b> |
| <b>Connection module Basic PN</b><br>Without automatic emergency stop<br>override for mounting in the control<br>cabinet with terminating plug | <b>6FC5303-0AA01-1AA0</b> |

| Description                                                                                                           | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b>                                                                                        |                           |
| <b>Wall holder</b><br>For safe storage of the<br>SINUMERIK HT 8, also suitable<br>for stationary operation            | <b>6AV6574-1AF04-4AA0</b> |
| <b>Touch pen with holding loop</b><br>For SINUMERIK HT 8                                                              | <b>6FC5348-0AA08-4AA0</b> |
| <b>Protective film (2 units)</b><br>For MP 277 and SINUMERIK HT 8                                                     | <b>6AV6671-5BC00-0AX0</b> |
| <b>Signal cable</b><br>For mobile panels                                                                              |                           |
| • Length 2 m (6.56 ft)                                                                                                | <b>6XV1440-4BH20</b>      |
| • Length 5 m (16.41 ft)                                                                                               | <b>6XV1440-4BH50</b>      |
| • Length 8 m (26.25 ft)                                                                                               | <b>6XV1440-4BH80</b>      |
| • Length 10 m (32.81 ft)                                                                                              | <b>6XV1440-4BN10</b>      |
| • Length 15 m (49.22 ft)                                                                                              | <b>6XV1440-4BN15</b>      |
| • Length 20 m (65.62 ft)                                                                                              | <b>6XV1440-4BN20</b>      |
| • Length 25 m (82.03 ft)                                                                                              | <b>6XV1440-4BN25</b>      |
| <b>Coiled connecting cable</b><br>For SINUMERIK HT 2/HT 8<br>Length 1.5 m (4.92 ft),<br>stretches to 3.5 m (11.48 ft) | <b>6FC5348-0AA08-3AA0</b> |



### Overview



The convenient, ergonomically designed mini handheld unit with rugged metal connector is suitable for setting up and operating standard machines in the jobshop area.

### Benefits

- Mobile positioning of axes
- Since coarse, medium and fine infeed can easily be graduated, the operator control concept offers fast, increment-precise positioning
- Rugged and compact

### Design

- Emergency stop implemented in 2 channels with 4-wire connection
- The 2-channel, 3-step enabling button has a 3-wire connection.
- Rapid traverse key and two +/- keys
- A handwheel to traverse the axes in jog mode
- Facility to connect rotary switches for the selection of up to 5 axes
- Customer-specific applications can be implemented via 3 user-assignable function keys. If necessary, the customer can use slide-in labels to mark the keys specifically. Connection by means of a connection kit.
- Optional angle socket for a 90° rotated cable outlet direction (non-assembled use only in conjunction with the connection kit).
- Secured by means of integrated magnetic clamps or optional holder

### Integration

- The mini handheld unit can be used for:
- SINUMERIK 840D sl

### Technical specifications

|                                                                                  |                                                                                        |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Product name</b>                                                              | Mini handheld unit with coiled cable/straight cable<br>6FX2007-1AD03/<br>6FX2007-1AD13 |
| <b>Input voltage</b><br>(emergency stop and enabling)                            | 24 V DC                                                                                |
| <b>Handwheel operating voltage</b>                                               | 5 V DC                                                                                 |
| <b>Handwheel</b>                                                                 | 100 S/R, RS422                                                                         |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b><br>(without shaft input) | IP65                                                                                   |
| <b>Humidity class based on DIN EN 60721-3-3</b>                                  | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).        |
| <b>Ambient temperature</b>                                                       |                                                                                        |
| • Storage                                                                        | -20 ... +60 °C (-4 ... +140 °F)                                                        |
| • Transport                                                                      | -20 ... +60 °C (-4 ... +140 °F)                                                        |
| • Operation                                                                      | 0 ... 55 °C (32 ... 131 °F)                                                            |
| <b>Maximum distance between handwheel and NCU (when using the handwheel)</b>     | 25 m (82.03 ft)                                                                        |
| <b>Dimensions</b>                                                                |                                                                                        |
| • Length<br>(with emergency stop button)                                         | 175 mm (6.89 in)                                                                       |
| • Width                                                                          | 85 mm (3.35 in)                                                                        |
| • Height                                                                         | 70 mm (2.76 in)                                                                        |
| <b>Weight, approx.</b><br>(without connecting cable)                             | 0.5 kg (1.10 lb)                                                                       |
| <b>Approvals, according to</b>                                                   | CE, UL                                                                                 |

### Selection and ordering data

| Description                                                                                                                                                                                                                      | Order No.            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Mini handheld unit</b><br>3-step enabling button<br>incl. magnetic clamps and connecting cable with metal connector                                                                                                           |                      |
| • Coiled connecting cable, length 2.1 m (6.89 ft), stretches to 3.5 m (11.48 ft)                                                                                                                                                 | <b>6FX2007-1AD03</b> |
| • Straight cable, length 5 m (16.41 ft)                                                                                                                                                                                          | <b>6FX2007-1AD13</b> |
| <b>Accessories</b>                                                                                                                                                                                                               |                      |
| <b>Connection kit for mini handheld unit, non-assembled (connection socket for assembly by user)</b><br>Version with metal connector for connection to machine control panel <u>without</u> Industrial Ethernet, with terminator | <b>6FX2006-1BG03</b> |
| <b>Connection kit for mini handheld unit, assembled (prewired connection socket)</b><br>Version with metal connector for connection to machine control panel <u>with</u> Industrial Ethernet, with terminator                    | <b>6FX2006-1BG11</b> |
| <b>90° angle socket</b><br>For connection kit, non-assembled 6FX2006-1BG03, metal version                                                                                                                                        | <b>6FX2006-1BG56</b> |
| <b>Holder</b><br>For mini handheld units 6FX2007-1AD.3 and electronic handwheel in housing 6FC9320-5DE02                                                                                                                         | <b>6FX2006-1BG70</b> |



# SINUMERIK Operate

## Handheld units

### Electronic handwheel

#### Overview



Handwheels are used for manually traversing axes.

#### Benefits

- Positioning of axes
- Rugged and compact (housing variant)

#### Design

- Handwheels for assembly by user. The front panel can be removed.
- Handwheels with housing and coiled cable, secured by means of the integrated magnetic clamps or the optional holder.

#### Function

- The handwheels are equipped with a magnetic latching mechanism that supports traversing with incremental accuracy.
- The handwheels generate either 5 V DC TTL or 24 V DC HTL signals. The version with 24 V DC and an HTL interface is available for connection to I/O modules.

#### Technical specifications

| Product name                                     | Electronic handwheel<br>6FC9320-5DB01                                                                                                                                                            | Electronic handwheel<br>6FC9320-5DC01<br>6FC9320-5DF01<br>6FC9320-5DM00 | Portable electronic handwheel<br>6FC9320-5DE02 | Electronic handwheel<br>6FC9320-5DH01 |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------|---------------------------------------|
| Rated voltage                                    | 5 V DC $\pm$ 5 %                                                                                                                                                                                 |                                                                         |                                                | 10 ... 30 V DC                        |
| Rated current, max.                              | 60 mA                                                                                                                                                                                            |                                                                         |                                                | 15 mA                                 |
| Interface                                        | RS422 (TTL)                                                                                                                                                                                      |                                                                         |                                                | HTL                                   |
| Phase angle of pulse sequence A to B             | 90° electrical                                                                                                                                                                                   |                                                                         |                                                |                                       |
| Pulses                                           | 2 × 100 S/R                                                                                                                                                                                      |                                                                         |                                                |                                       |
| Actuating force                                  | 8 Ncm                                                                                                                                                                                            | 4 Ncm                                                                   |                                                |                                       |
| Output frequency, max.                           | 2 kHz                                                                                                                                                                                            |                                                                         |                                                |                                       |
| Distance to NCU, max.                            | 25 m (82.03 ft)                                                                                                                                                                                  |                                                                         | 20 m (65.62 ft)                                | 25 m (82.03 ft)                       |
| Degree of protection to DIN EN 60529 (IEC 60529) | <ul style="list-style-type: none"> <li>Front: IP65</li> <li>Rear: IP50</li> </ul>                                                                                                                |                                                                         |                                                |                                       |
| Relative atmospheric humidity                    | <ul style="list-style-type: none"> <li>Storage: 10 ... 95 % at 25 °C (77 °F)</li> <li>Transport: 10 ... 95 % at 25 °C (77 °F)</li> <li>Operation: 5 ... 80 % at 25 °C (77 °F)</li> </ul>         |                                                                         |                                                |                                       |
| Ambient temperature                              | <ul style="list-style-type: none"> <li>Storage: -40 ... +85 °C (-40 ... +185 °F)</li> <li>Transport: -40 ... +85 °C (-40 ... +185 °F)</li> <li>Operation: 0 ... 70 °C (32 ... 158 °F)</li> </ul> |                                                                         |                                                |                                       |
| Weight, approx.                                  | 0.6 kg (1.32 lb)                                                                                                                                                                                 | 0.4 kg (0.88 lb)                                                        | 1.3 kg (2.87 lb)                               | 0.4 kg (0.88 lb)                      |
| Approvals, according to                          | cULus                                                                                                                                                                                            |                                                                         |                                                |                                       |

#### Selection and ordering data

| Description                                                                                           | Order No.            |
|-------------------------------------------------------------------------------------------------------|----------------------|
| <b>Electronic handwheel</b>                                                                           |                      |
| • With front panel<br>120 mm × 120 mm<br>(4.72 in × 4.72 in),<br>with setting wheel,<br>5 V DC, RS422 | <b>6FC9320-5DB01</b> |
| • With front panel<br>76.2 mm × 76.2 mm<br>(3 in × 3 in),<br>with setting wheel,<br>5 V DC, RS422     | <b>6FC9320-5DC01</b> |
| • Portable in housing,<br>with setting wheel,<br>5 V DC, RS422 coiled cable,<br>length 2.5 m          | <b>6FC9320-5DE02</b> |
| • With front panel<br>76.2 mm × 76.2 mm<br>(3 in × 3 in),<br>with setting wheel,<br>24 V DC, HTL      | <b>6FC9320-5DH01</b> |
| • Without front panel,<br>with small setting wheel,<br>5 V DC, RS422                                  | <b>6FC9320-5DM00</b> |
| • Without front panel,<br>without setting wheel,<br>for installation,<br>5 V DC, RS422                | <b>6FC9320-5DF01</b> |

| Description                                                                                                               | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories</b>                                                                                                        |                           |
| <b>Adapter set</b><br>For installation in front panel<br>with 3-hole fixing                                               | <b>6FC9320-5DN00</b>      |
| <b>Flange socket</b><br>For portable handwheel                                                                            | <b>6FC9341-1AQ</b>        |
| <b>Holder</b><br>For mini handheld units<br>6FX2007-1AD.3 and electronic<br>handwheel in housing<br>6FC9320-5DE02         | <b>6FX2006-1BG70</b>      |
| <b>Pre-assembled signal cable</b><br>For connecting<br>electronic handwheel<br>Length, max. 25 m (82.03 ft) <sup>1)</sup> | <b>6FX8002-2CP00-....</b> |

<sup>1)</sup> For length code, see MOTION-CONNECT connection systems.

# SINUMERIK Operate

## Handheld units

### Handwheel connection module PROFIBUS

#### Overview



The SINUMERIK handwheel connection module for PROFIBUS can be used to connect two handwheels or the handwheel of the handheld unit type B-MPI and the mini handheld unit.

On the SINUMERIK handwheel connection module for PROFIBUS, digital inputs, outputs, connections for the override rotary switch and the handwheels are all provided as well as a PROFIBUS DP interface for communication.

The SINUMERIK handwheel connection module for PROFIBUS is designed for control cabinet mounting.

#### Application

In addition to the handwheel connections of the handwheel connection module, further PLC inputs and outputs are required for connecting the handheld unit type B-MPI or the mini handheld unit. For this reason we recommend using external I/O modules such as SIMATIC for the required input signals.

#### Design

Interfaces for:

- PROFIBUS DP
- 6 inputs
- 6 inputs and 6 outputs, additional cable set required
- 16 direct keys of SINUMERIK OP 012/OP 015A/TP 015A/OP 019
- 2 handwheels

#### Integration

The SINUMERIK handwheel connection module for PROFIBUS can be used for:

- SINUMERIK 840D sl via PROFIBUS DP

#### Technical specifications

|                                                         |                                                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>Handwheel connection module<br>PROFIBUS<br>6FC5303-0AA02-0AA0      |
| <b>Input voltage</b>                                    | 24 V DC                                                                         |
| <b>Power consumption, max.</b>                          | 15.2 W                                                                          |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP00                                                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F). |
| <b>Relative atmospheric humidity</b>                    |                                                                                 |
| • Storage                                               | 10 ... 95 % at 25 °C (77 °F)                                                    |
| • Transport                                             | 10 ... 95 % at 25 °C (77 °F)                                                    |
| • Operation                                             | 5 ... 95 % at 25 °C (77 °F)                                                     |
| <b>Ambient temperature</b>                              |                                                                                 |
| • Storage                                               | -25 ... +60 °C (-13 ... +140 °F)                                                |
| • Transport                                             | -25 ... +55 °C (-13 ... +131 °F)                                                |
| • Operation                                             | 0 ... 55 °C (32 ... 131 °F)                                                     |
| <b>Dimensions</b>                                       |                                                                                 |
| • Width                                                 | 234 mm (9.21 in)                                                                |
| • Height                                                | 137 mm (5.39 in)                                                                |
| • Depth                                                 | 40 mm (1.57 in)                                                                 |
| <b>Weight, approx.</b>                                  | 0.82 kg (1.81 lb)                                                               |
| <b>Approvals, according to</b>                          | CE, cULus                                                                       |

#### Selection and ordering data

| Description                                                                                                                                                    | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Handwheel connection module PROFIBUS</b>                                                                                                                    | <b>6FC5303-0AA02-0AA0</b> |
| <b>Accessories</b>                                                                                                                                             |                           |
| <b>Pre-assembled signal cable</b><br>For connecting an electronic handwheel<br>Length <sup>1)</sup> , max. 25 m (82.03 ft)                                     | <b>6FX8002-2CP00-....</b> |
| <b>Feed/rapid traverse override electronic rotary switch</b><br>1 × 23G, T=32, cap, button, pointer, and rapid traverse and feed dials <sup>2)</sup>           | <b>6FC5247-0AF13-1AA0</b> |
| <b>Spindle/rapid traverse override electronic rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>2)</sup>     | <b>6FC5247-0AF12-1AA0</b> |
| <b>Spindle/rapid traverse override non-electronic rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>2)</sup> | <b>6FC5247-0AA34-0AA2</b> |
| <b>Cable set (60 units)</b><br>For additional machine control panel command devices<br>Length 500 mm (19.69 in)                                                | <b>6FC5247-0AA35-0AA0</b> |

<sup>1)</sup> For length code, see MOTION-CONNECT connection systems.

<sup>2)</sup> 23G: Latching at position 23; T=32: 32 positions for 360°  
16G: Latching at position 16; T=24: 24 positions for 360°

#### Overview



The SINUMERIK MCP 310C PN machine control panel with mechanical keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to PROFINET functionality, SINUMERIK MCP 310C PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

All keys are designed with replaceable key covers for machine-specific adaptations. The key covers can be freely inscribed using laser. Transparent key covers can be used as an alternative.

The machine control panel is mounted from the rear using special clamps.

Included in the scope of delivery are the clamps, key caps (30 × ergo gray, 30 × clear, 9 × labeled) and a backing plate for the emergency stop.

#### Design

##### Control elements:

- Mode selectors and function keys
  - 49 keys with LEDs
  - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied in the accessories pack)
  - Default key assignment includes 16 freely assignable customer keys
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)

##### Key type:

- Mechanical keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 2 handwheels in conjunction with SINUMERIK 840D sl

##### Expansion facilities:

- 6 slots for control devices ( $d = 16 \text{ mm}/0.63 \text{ in}$ )
- 1 slot for emergency stop button or rotary override switch (up to  $d = 22 \text{ mm}/0.87 \text{ in}$ )

#### Integration

The SINUMERIK MCP 310C PN machine control panel can be used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                      |                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                  | SINUMERIK MCP 310C PN machine control panel<br>6FC5303-0AF23-0AA1                                                                                                                                                                                                                                                       |
| <b>Input voltage</b>                                 | 24 V DC                                                                                                                                                                                                                                                                                                                 |
| <b>Power consumption, max.</b>                       | 5 W                                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                                     |
| <b>Humidity class based on DIN EN 60721-3-3</b>      | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                         |
| <b>Relative atmospheric humidity</b>                 | <ul style="list-style-type: none"> <li>• Storage 5 ... 90 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                               |
| <b>Ambient temperature</b>                           | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation               <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Max. distance</b>                                 | 100 m (328 ft)                                                                                                                                                                                                                                                                                                          |
| <b>Dimensions</b>                                    | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 175 mm (6.89 in)</li> <li>• Depth 54 mm (2.13 in)</li> </ul>                                                                                                                                                                          |
| <b>Panel cutout</b>                                  | <ul style="list-style-type: none"> <li>• Width 285 mm (11.22 in)</li> <li>• Height 155 mm (6.1 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                                     |
| <b>Weight, approx.</b>                               | 1.2 kg (2.65 lb)                                                                                                                                                                                                                                                                                                        |
| <b>Approvals, according to</b>                       | CE, cULus                                                                                                                                                                                                                                                                                                               |

# SINUMERIK Operate

## Machine control panels

### SINUMERIK MCP 310C PN

#### Selection and ordering data

| Description                                                                                                                                                                           | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MCP 310C PN machine control panel</b><br>PROFINET/Industrial Ethernet<br>Width 310 mm (12.2 in),<br>with mechanical keys                                                 | <b>6FC5303-0AF23-0AA1</b> |
| <b>Accessories</b>                                                                                                                                                                    |                           |
| <b>Square key cover, for labeling</b><br>1 set comprising: 90 × ergo gray,<br>20 × red, 20 × yellow, 20 × green,<br>20 × mid-gray                                                     | <b>6FC5248-0AF12-0AA0</b> |
| <b>Square key cover, for labeling</b><br>90 × transparent                                                                                                                             | <b>6FC5248-0AF21-0AA0</b> |
| <b>Set of key caps</b><br>SINUMERIK key covers, square,<br>for inscription, 500 × ergo gray<br>(light basic)                                                                          | <b>6FC5348-0AF00-0AA0</b> |
| <b>Set of key caps</b><br>SINUMERIK key covers, square,<br>for inscription, 500 × mid-gray<br>(medium basic)                                                                          | <b>6FC5348-0AF01-0AA0</b> |
| <b>Actuating element, 22 mm (0.87 in)</b><br>Latching mushroom pushbutton,<br>red and non-illuminated with<br>40 mm (1.57 in) protection against<br>lifting and tilting, incl. holder | <b>3SB3000-1HA20</b>      |
| <b>Contact block with 2 contacts</b><br>1 NO + 1 NC, 2-pin, screw terminal                                                                                                            | <b>3SB3400-0A</b>         |
| <b>Key set (10 sets)</b><br>For machine control panel                                                                                                                                 | <b>6FC5148-0AA03-0AA0</b> |

| Description                                                                                                                                                                                                                                                                         | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b>                                                                                                                                                                                                                                                      |                           |
| <b>Spindle/rapid traverse override rotary switch</b><br>1 × 16G, T=24, cap, button,<br>pointer, and rapid traverse and<br>spindle dials <sup>1)</sup>                                                                                                                               | <b>6FC5247-0AF12-1AA0</b> |
| <b>Feed/rapid traverse override rotary switch</b><br>1 × 23G, T=32, cap, button,<br>pointer, and rapid traverse and<br>feed dials <sup>1)</sup>                                                                                                                                     | <b>6FC5247-0AF13-1AA0</b> |
| <b>Spindle/rapid traverse override non-electronic rotary switch</b><br>1 × 16G, T=24, cap, button,<br>pointer, and rapid traverse and<br>spindle dials <sup>1)</sup><br>(Not suitable for direct mounting in<br>MCP, suitable for implementing<br>additional overrides outside MCP) | <b>6FC5247-0AA34-0AA2</b> |
| <b>Cable set (60 units)</b><br>For additional machine control<br>panel command devices<br>Length 500 mm (19.69 in)                                                                                                                                                                  | <b>6FC5247-0AA35-0AA0</b> |
| <b>Pre-assembled signal cable</b><br>For connecting an electronic<br>handwheel<br>Length <sup>2)</sup> max. 25 m (82.03 ft)                                                                                                                                                         | <b>6FX8002-2CP00-....</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with<br>2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                                                                                                                                                               | <b>6FC5248-0AF14-0AA0</b> |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

<sup>1)</sup> 16G: Latching at position 16; T=24: 24 positions for 360°  
23G: Latching at position 23; T=32: 32 positions for 360°

<sup>2)</sup> For length code, see MOTION-CONNECT connection systems.

#### Overview



The SINUMERIK MCP 310 PN machine control panel with membrane keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to PROFINET, SINUMERIK MCP 310 PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

49 keys have user-inscribed slide-in strips for machine-specific adaptations. A DIN A4 sheet (for laser printers) for inscribing the slide-in labels is included in the scope of supply.

A connecting cable is included in the scope of supply for connecting the direct keys of the SINUMERIK operator panel fronts OP 012/OP 015A/OP 019/TP 015A.

The machine control panel is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Mode selectors and function keys
  - 49 keys with LEDs
  - Direction keys for milling machines with rapid traverse override
  - Default key assignment includes 16 freely assignable customer keys
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)

##### Key type:

- Membrane keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 16 direct keys of the OP 012/OP 015A/OP 019/TP 015A (connecting cable (850 mm/2.79 ft) included in scope of supply)
- For 2 handwheels

##### Expansion facilities:

- 6 slots for control devices ( $d = 16 \text{ mm}/0.63 \text{ in}$ )
- 1 slot for emergency stop button or rotary override switch (up to  $d = 22 \text{ mm}/0.87 \text{ in}$ )

#### Integration

The SINUMERIK MCP 310 PN machine control panel can be used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK MCP 310 PN machine control panel<br>6FC5303-0AF23-1AA1                                                                                                                                                                                                                                                        |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                                 |
| <b>Power consumption, max.</b>                          | 5 W                                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                                     |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                         |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                               |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation               <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Max. distance</b>                                    | 100 m (328 ft)                                                                                                                                                                                                                                                                                                          |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 175 mm (6.89 in)</li> <li>• Depth 54 mm (2.13 in)</li> </ul>                                                                                                                                                                          |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 285 mm (11.22 in)</li> <li>• Height 155 mm (6.1 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                                     |
| <b>Weight, approx.</b>                                  | 1.2 kg (2.65 lb)                                                                                                                                                                                                                                                                                                        |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                               |

# SINUMERIK Operate

## Machine control panels

### SINUMERIK MCP 310 PN

#### Selection and ordering data

| Description                                                                                                                                                                           | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MCP 310 PN machine control panel</b><br>PROFINET/Industrial Ethernet<br>Width 310 mm (12.2 in),<br>with membrane keys                                                    | <b>6FC5303-0AF23-1AA1</b> |
| <b>Accessories</b>                                                                                                                                                                    |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets                                                                                                                              | <b>6FC5248-0AF23-1AA0</b> |
| <b>Actuating element, 22 mm (0.87 in)</b><br>Latching mushroom pushbutton,<br>red and non-illuminated with<br>40 mm (1.57 in) protection against<br>lifting and tilting, incl. holder | <b>3SB3000-1HA20</b>      |
| <b>Contact block with 2 contacts</b><br>1 NO + 1 NC, 2-pin, screw terminal                                                                                                            | <b>3SB3400-0A</b>         |
| <b>Key switch with key</b><br>For SINUMERIK MCP<br>6FC5303-0AF22-0AA1<br>6FC5303-0AF22-1AA1<br>6FC5303-0AF23-0AA1<br>6FC5303-0AF23-1AA1                                               | <b>6FC5247-0AF02-0AA0</b> |
| <b>Key set (10 sets)</b><br>For machine control panel                                                                                                                                 | <b>6FC5148-0AA03-0AA0</b> |

| Description                                                                                                                                                                                                                                                                         | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b>                                                                                                                                                                                                                                                      |                           |
| <b>Spindle/rapid traverse override rotary switch</b><br>1 × 16G, T=24, cap, button,<br>pointer, and rapid traverse and<br>spindle dials <sup>1)</sup>                                                                                                                               | <b>6FC5247-0AF12-1AA0</b> |
| <b>Feed/rapid traverse override rotary switch</b><br>1 × 23G, T=32, cap, button,<br>pointer, and rapid traverse and<br>feed dials <sup>1)</sup>                                                                                                                                     | <b>6FC5247-0AF13-1AA0</b> |
| <b>Spindle/rapid traverse override non-electronic rotary switch</b><br>1 × 16G, T=24, cap, button,<br>pointer, and rapid traverse and<br>spindle dials <sup>1)</sup><br>(Not suitable for direct mounting in<br>MCP, suitable for implementing<br>additional overrides outside MCP) | <b>6FC5247-0AA34-0AA2</b> |
| <b>Cable set (60 units)</b><br>For additional machine control<br>panel command devices<br>Length: 500 mm (19.69 in)                                                                                                                                                                 | <b>6FC5247-0AA35-0AA0</b> |
| <b>Pre-assembled signal cable</b><br>For connecting an electronic<br>handwheel<br>Length <sup>2)</sup> : Max. 25 m (82.03 ft)                                                                                                                                                       | <b>6FX8002-2CP00-....</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with<br>2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                                                                                                                                                               | <b>6FC5248-0AF14-0AA0</b> |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

<sup>1)</sup> 16G: Latching at position 16; T=24: 24 positions for 360°  
23G: Latching at position 23; T=32: 32 positions for 360°

<sup>2)</sup> For length code, see MOTION-CONNECT connection systems.



#### Overview



The SINUMERIK MCP 483C PN machine control panel permits user-friendly operation of the machine functions. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to PROFINET, SINUMERIK MCP 483C PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

All keys are designed with replaceable key covers for machine-specific adaptations. The key covers can be freely inscribed using laser. Transparent key covers can be used as an alternative.

The machine control panel is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Mode selectors and function keys
  - 50 keys with LEDs
  - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied in the accessories pack)
- Spindle control with override spindle (rotary switch with 16 positions)
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)
- Emergency stop button (2 × (1 NO + 1 NC))

##### Key type:

- Mechanical keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 2 handwheels in conjunction with SINUMERIK 840D sl

##### Expansion facility:

- 2 slots for control devices ( $d = 16 \text{ mm}/0.63 \text{ in}$ )

#### Integration

The SINUMERIK MCP 483C PN machine control panel can be used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>MCP 483C PN<br>machine control panel<br>6FC5303-0AF22-0AA1                                                                                                                                                                                                                                                  |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 5 W                                                                                                                                                                                                                                                                                                                      |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                                      |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                                |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation               <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Max. distance</b>                                    | 100 m (328 ft)                                                                                                                                                                                                                                                                                                           |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 155 mm (6.1 in)</li> <li>• Depth 55 mm (2.17 in)</li> </ul>                                                                                                                                                                           |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 450 mm (17.72 in)</li> <li>• Height 135 mm (5.31 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                                     |
| <b>Weight, approx.</b>                                  | 2 kg (4.41 lb)                                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                          | CE, UL                                                                                                                                                                                                                                                                                                                   |

# SINUMERIK Operate

## Machine control panels

### SINUMERIK MCP 483C PN

#### Selection and ordering data

| Description                                                                                                                                                                  | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MCP 483C PN machine control panel</b><br>PROFINET/Industrial Ethernet, width 19", with mechanical keys, emergency stop 22 mm (0.87 in)                          | <b>6FC5303-0AF22-0AA1</b> |
| <b>Accessories</b>                                                                                                                                                           |                           |
| <b>Square key cover, for labeling</b><br>1 set comprising: 90 × ergo gray, 20 × red, 20 × yellow, 20 × green, 20 × mid-gray                                                  | <b>6FC5248-0AF12-0AA0</b> |
| <b>Square key cover, for labeling</b><br>90 × transparent                                                                                                                    | <b>6FC5248-0AF21-0AA0</b> |
| <b>Set of key caps</b><br>SINUMERIK key covers, square, for inscription, 500 × ergo gray (light basic)                                                                       | <b>6FC5348-0AF00-0AA0</b> |
| <b>Set of key caps</b><br>SINUMERIK key covers, square, for inscription, 500 × mid-gray (medium basic)                                                                       | <b>6FC5348-0AF01-0AA0</b> |
| <b>Actuating element, 22 mm (0.87 in)</b><br>Latching mushroom pushbutton, red and non-illuminated with 40 mm (1.57 in) protection against lifting and tilting, incl. holder | <b>3SB3000-1HA20</b>      |
| <b>Contact block with 2 contacts</b><br>1 NO + 1 NC, 2-pin, screw terminal                                                                                                   | <b>3SB3400-0A</b>         |
| <b>Key set (10 sets)</b><br>For machine control panel                                                                                                                        | <b>6FC5148-0AA03-0AA0</b> |

| Description                                                                                                                                                                                                                                                             | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b>                                                                                                                                                                                                                                          |                           |
| <b>Rapid traverse dial</b><br>(1 set = 20 units)<br>for MCP 483C<br>16-position rotary switch                                                                                                                                                                           | <b>6FC5248-0AF30-0AA0</b> |
| <b>Spindle/rapid traverse override rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>1)</sup>                                                                                                                         | <b>6FC5247-0AF12-1AA0</b> |
| <b>Feed/rapid traverse override rotary switch</b><br>1 × 23G, T=32, cap, button, pointer, and rapid traverse and feed dials <sup>1)</sup>                                                                                                                               | <b>6FC5247-0AF13-1AA0</b> |
| <b>Spindle/rapid traverse override non-electronic rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>1)</sup><br>(Not suitable for direct mounting in MCP, suitable for implementing additional overrides outside MCP) | <b>6FC5247-0AA34-0AA2</b> |
| <b>Cable set (60 units)</b><br>For additional machine control panel command devices<br>Length 500 mm (19.69 in)                                                                                                                                                         | <b>6FC5247-0AA35-0AA0</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                                                                                                                                                      | <b>6FC5248-0AF14-0AA0</b> |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

<sup>1)</sup> 16G: Latching at position 16; T=24: 24 positions for 360°  
23G: Latching at position 23; T=32: 32 positions for 360°

#### Overview



The SINUMERIK MCP 483 PN machine control panel with membrane keys is designed to permit user-friendly, well-structured operation of the machine functions. It is suitable for machine-level operation of milling and turning machines, and particularly grinding machines.

In addition to PROFINET, SINUMERIK MCP 483 PN has also retained its complete Industrial Ethernet functionality. The network technology can be changed over using DIP switches.

46 keys and both control device slots are equipped with user-inscribed slide-in labels for adapting to specific machines. A DIN A4 sheet (for laser printers) for inscribing the slide-in labels is included in the scope of supply.

A connecting cable is included in the scope of supply for connecting the direct keys of the SINUMERIK operator panel fronts OP 012/OP 015A/OP 019/TP 015A.

The machine control panel is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Mode selectors and function keys
  - 50 keys with LEDs
  - Direction keys for milling machines with rapid traverse override
  - Default key assignment includes 17 freely assignable customer keys
- Spindle control with override spindle (rotary switch with 16 positions)
- Feed control with feed/rapid traverse override (rotary switch with 23 positions)
- Key switch (4 positions and 3 different keys)
- Emergency stop button (2 × (1 NO + 1 NC))

##### Key type:

- Membrane keys

##### Interfaces:

- PROFINET/Industrial Ethernet
- 9 inputs/6 outputs for 9 control devices (additional cable set required for control devices)
- For 16 direct keys of the OP 012/OP 015A/OP 019/TP 015A (connecting cable (850 mm/2.79 ft) included in scope of supply)
- For 2 handwheels

##### Expansion facility:

- 2 slots for control devices ( $d = 16 \text{ mm}/0.63 \text{ in}$ )

#### Integration

The SINUMERIK MCP 483 PN machine control panel can be used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>MCP 483 PN<br>machine control panel<br>6FC5303-0AF22-1AA1                                                                                                                                                                                                                                                   |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 5 W                                                                                                                                                                                                                                                                                                                      |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                                      |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                          |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 65 % (annual mean) and max. 85 % over max. 2 months/year</li> </ul>                                                                                             |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation               <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Max. distance</b>                                    | 100 m (328 ft)                                                                                                                                                                                                                                                                                                           |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 155 mm (6.1 in)</li> <li>• Depth 55 mm (2.17 in)</li> </ul>                                                                                                                                                                           |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 450 mm (17.72 in)</li> <li>• Height 135 mm (5.31 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                                     |
| <b>Weight, approx.</b>                                  | 1.6 kg (3.53 lb)                                                                                                                                                                                                                                                                                                         |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                                |

# SINUMERIK Operate

## Machine control panels

### SINUMERIK MCP 483 PN

#### Selection and ordering data

| Description                                                                                                                                                                  | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MCP 483 PN machine control panel</b><br>PROFINET/Industrial Ethernet<br>Width 19", with membrane keys, emergency stop button 22 mm (0.87 in)                    | <b>6FC5303-0AF22-1AA1</b> |
| <b>Accessories</b>                                                                                                                                                           |                           |
| <b>Slide-in labels for inscribing</b><br>3 DIN A4 sheets                                                                                                                     | <b>6FC5248-0AF22-1AA1</b> |
| <b>Actuating element, 22 mm (0.87 in)</b><br>Latching mushroom pushbutton, red and non-illuminated with 40 mm (1.57 in) protection against lifting and tilting, incl. holder | <b>3SB3000-1HA20</b>      |
| <b>Contact block with 2 contacts</b><br>1 NO + 1 NC, 2-pin, screw terminal                                                                                                   | <b>3SB3400-0A</b>         |
| <b>Key switch with key</b><br>For SINUMERIK MCP<br>6FC5303-0AF22-0AA1<br>6FC5303-0AF22-1AA1<br>6FC5303-0AF23-0AA1<br>6FC5303-0AF23-1AA1                                      | <b>6FC5247-0AF02-0AA0</b> |
| <b>Key set (10 sets)</b><br>For machine control panel                                                                                                                        | <b>6FC5148-0AA03-0AA0</b> |

| Description                                                                                                                                                                                                                                                             | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b>                                                                                                                                                                                                                                          |                           |
| <b>Spindle/rapid traverse override rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>1)</sup>                                                                                                                         | <b>6FC5247-0AF12-1AA0</b> |
| <b>Feed/rapid traverse override rotary switch</b><br>1 × 23G, T=32, cap, button, pointer, and rapid traverse and feed dials <sup>1)</sup>                                                                                                                               | <b>6FC5247-0AF13-1AA0</b> |
| <b>Spindle/rapid traverse override non-electronic rotary switch</b><br>1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials <sup>1)</sup><br>(Not suitable for direct mounting in MCP, suitable for implementing additional overrides outside MCP) | <b>6FC5247-0AA34-0AA2</b> |
| <b>Cable set (60 units)</b><br>For additional machine control panel command devices<br>Length 500 mm (19.69 in)                                                                                                                                                         | <b>6FC5247-0AA35-0AA0</b> |
| <b>Pre-assembled signal cable</b><br>For connecting an electronic handwheel, Length <sup>2)</sup> , max. 25 m (82.03 ft)                                                                                                                                                | <b>6FX8002-2CP00-....</b> |
| <b>Set of clamps (9 units)</b><br>For operator components with 2.5 mm (0.10 in) profile<br>Length 20 mm (0.79 in)                                                                                                                                                       | <b>6FC5248-0AF14-0AA0</b> |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

<sup>1)</sup> 16G: Latching at position 16; T=24: 24 positions for 360°  
23G: Latching at position 23; T=32: 32 positions for 360°

<sup>2)</sup> For length code, see MOTION-CONNECT connection systems.

### Overview



Like the SINUMERIK MPP 483 IEH, the SINUMERIK Machine Push Button Panel MPP 310 IEH (Machine Push Button Panel, width 310 mm (12.2 in), for Industrial Ethernet with port for Hand-held terminal) offers 8 large, long-stroke keys for easy machine operation, as well as a membrane keyboard for powerful setup functions. The SINUMERIK MPP 310 IEH is ideally suited as a supplement to the SINUMERIK OP 08T operator panel front.

The SINUMERIK MPP 310 IEH is suitable for use with many different types of machine for any application which requires excellent ergonomics and flexibility of operation.

A DIN A4 sheet for laser printers for inscribing the slide-in labels plus a set of colored key caps are included in the scope of supply.

The SINUMERIK Machine Push Button Panel is mounted from the rear using special clamps supplied with the panel.

### Design

- Spindle override
- Feed override
- 8 customer keys (long-stroke keys, Schlegel) with LED, slide-in labels
- Blank cover for retrofit of Electronic Key System EKS (Euchner)
- 25 function keys with LED (membrane keys), slide-in labels
- With port for SINUMERIK HT 2/HT 8 handheld terminals
- Emergency stop override key
- Emergency stop button
- 4 extension keys (3SB3 keys) with LED, slide-in labels

### Integration

The SINUMERIK MPP 310 IEH Machine Push Button Panel can be used for:

- SINUMERIK 840D sl

### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK MPP 310 IEH<br>Machine Push Button Panel<br>6FC5303-1AF20-8AA1                                                                                                                                                                                                                                  |
| <b>Input voltage</b>                                    | 24 V DC                                                                                                                                                                                                                                                                                                   |
| <b>Power consumption, max.</b>                          | 25 W                                                                                                                                                                                                                                                                                                      |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                       |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                           |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 10 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 10 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                               |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -20 ... +60 °C (-4 ... +140 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 295 mm (11.61 in)</li> <li>• Depth 140 mm (5.51 in)<br/>(105 mm (4.13 in) without connector for handwheel connection)</li> </ul>                                                                                        |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 278.5 mm (10.96 in)</li> <li>• Height 276.5 mm (10.89 in)</li> </ul>                                                                                                                                                                                       |
| <b>Weight, approx.</b>                                  | 3 kg (6.62 lb)                                                                                                                                                                                                                                                                                            |
| <b>Approvals, according to</b>                          | CE, cULus                                                                                                                                                                                                                                                                                                 |

### Selection and ordering data

| Description                                                                                        | Order No.                 |
|----------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MPP 310 IEH<br/>Machine Push Button Panel</b><br>With port for<br>SINUMERIK HT 2/HT 8 | <b>6FC5303-1AF20-8AA1</b> |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

# SINUMERIK Operate

## Machine control panels

### SINUMERIK MPP 483 IE

#### Overview



The SINUMERIK MPP 483 IE (Machine Push Button Panel, width 483 mm (19.02 in) for Industrial Ethernet) is available as an expansion to SINUMERIK and PLC-controlled machines. Its modular design and ergonomically arranged control elements facilitate and simplify operation.

The SINUMERIK MPP 483 IE provides large, long-stroke keys for easy machine operation as well as a membrane keyboard for powerful set-up functions.

Tuned to the requirements of the powertrain sector, the SINUMERIK MPP 483 IE is suitable for use with many different types of machine wherever ergonomics and operating flexibility are priorities. A DIN A4 sheet for laser printers for inscribing the slide-in labels plus a set of colored key caps are included in the scope of supply.

The SINUMERIK Machine Push Button Panel is mounted from the rear using special clamps supplied with the panel.

#### Design

The basic version of the SINUMERIK MPP 483 IE Machine Push Button Panel offers, for example:

- Emergency stop button (4-wire), latching, tamper-proof
- 8 assembled illuminated pushbuttons for control elements ( $d = 22.5 \text{ mm}/0.89 \text{ in}$ )
- 2 blanking plugs for easy retrofitting
- 25 function keys with inscribed standard slide-in labels (membrane keys)
- Key switches with 2 positions for bridging the emergency stop circuit and for authorization of mode selection
- Direct key connection for SINUMERIK OP 012/OP 015A/TP 015A/OP 019, incl. ribbon cable
- Feed override

Interfaces for 2 handwheels when connected via Industrial Ethernet (function depends on CNC software)

- Communication via Industrial Ethernet

#### Expansion facilities:

- 2 spare slots ( $d = 22.5 \text{ mm}/0.89 \text{ in}$ )
- Spindle override
- Individual adaptation of colors and labels on membrane and long-stroke keys. As a general rule, all keys can be freely assigned and inscribed.
- SINUMERIK MPP 483 IEH with connection for a SINUMERIK HT 2/HT 8 handheld terminal

#### Special versions:

- SINUMERIK MPP 483 IE-S../MPP 483 IEH-S...: Special versions with virtually unlimited configuration options combining various control elements and options are available, for example, with the EKS identification system (Euchner Key System).
- SINUMERIK MPP 483 IE-L/MPP 483 IEH-L: This special Large version is characterized by a higher masking frame (244 mm/9.61 in) that offers additional mounting space as an integrated expansion panel.

#### Integration

The SINUMERIK MPP 483 IE Machine Push Button Panel can be used with:

- SINUMERIK 840D sl

### Technical specifications

|                                                         |                                                                                |                                                                          |
|---------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK<br>MPP 483 IE Machine Push Button Panel<br>6FC5303-1AF10-0AA0        | SINUMERIK<br>MPP 483 IEH Machine Push Button Panel<br>6FC5303-1AF10-8AA0 |
| <b>Input voltage</b>                                    | 24 V DC                                                                        |                                                                          |
| <b>Power consumption, max.</b>                          | 21 W                                                                           | 35 W                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> |                                                                                |                                                                          |
| • Front                                                 | IP54                                                                           |                                                                          |
| • Rear                                                  | IP10A                                                                          |                                                                          |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).   |                                                                          |
| <b>Relative atmospheric humidity</b>                    |                                                                                |                                                                          |
| • Storage                                               | 10 ... 95 % at 25 °C (77 °F)                                                   |                                                                          |
| • Transport                                             | 10 ... 95 % at 25 °C (77 °F)                                                   |                                                                          |
| • Operation                                             | 5 ... 80 % at 25 °C (77 °F)                                                    |                                                                          |
| <b>Ambient temperature</b>                              |                                                                                |                                                                          |
| • Storage                                               | -20 ... +60 °C (-4 ... +140 °F)                                                |                                                                          |
| • Transport                                             | -20 ... +60 °C (-4 ... +140 °F)                                                |                                                                          |
| • Operation                                             |                                                                                |                                                                          |
| - Front                                                 | 0 ... 45 °C (32 ... 113 °F)                                                    |                                                                          |
| - Rear                                                  | 0 ... 55 °C (32 ... 131 °F)                                                    |                                                                          |
| <b>Dimensions</b>                                       |                                                                                |                                                                          |
| • Width                                                 | 483 mm (19.02 in)                                                              |                                                                          |
| • Height                                                | 155 mm (6.1 in)                                                                |                                                                          |
| • Depth                                                 | 140 mm (5.51 in) (105 mm (4.13 in) without connector for handwheel connection) |                                                                          |
| <b>Panel cutout</b>                                     |                                                                                |                                                                          |
| • Width                                                 | 451 mm (17.76 in)                                                              |                                                                          |
| • Height                                                | 138 mm (5.43 in)                                                               |                                                                          |
| <b>Weight, approx.</b>                                  | 3 kg (6.62 lb)                                                                 |                                                                          |
| <b>Approvals, according to</b>                          | CE, cULus                                                                      |                                                                          |

### Selection and ordering data

| Description                                                | Order No.                 |
|------------------------------------------------------------|---------------------------|
| <b>SINUMERIK MPP 483 IE<br/>Machine Push Button Panel</b>  | <b>6FC5303-1AF10-0AA0</b> |
| <b>SINUMERIK MPP 483 IEH<br/>Machine Push Button Panel</b> | <b>6FC5303-1AF10-8AA0</b> |
| With port for<br>SINUMERIK HT 2/HT 8                       |                           |

For Ethernet or PROFINET ordering data, see Industrial Ethernet Switches – SCALANCE.

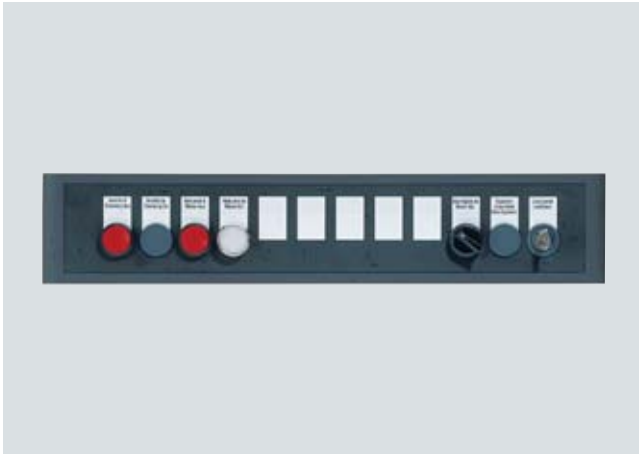


# SINUMERIK Operate

## Machine control panels

### SINUMERIK expansion panel

#### Overview



The SINUMERIK expansion panel is used to install up to 12 additional control elements, e.g. pushbuttons, indicator lights, and key switches as an expansion to a Machine Push Button Panel or a machine control panel or to expand the free inputs/outputs of a machine control panel.

The expansion panel has rounded edges in conformance with the new design of the SINUMERIK operator panels. Clamp-mounting facilitates installation.

#### Design

The expansion panel is 19" wide, and can accommodate up to twelve 22 mm (0.87 in) control elements of any type.

The 12 slots are pre-punched and can be easily broken out as required. Panels with customized complements can be provided on request.

Inscriptions are made on 2 slide-in labeling strips which are inserted from the rear.

For add-on control elements, see also the special variants of MPP 483/MPP 483 IE.

#### Technical specifications

|                                |                                                                     |
|--------------------------------|---------------------------------------------------------------------|
| <b>Product name</b>            | SINUMERIK expansion panel for MCP 483/MPP 483<br>6FC5247-0AA43-1AA0 |
| <b>Dimensions</b>              |                                                                     |
| • Width                        | 483 mm (19.02 in)                                                   |
| • Height                       | 95 mm (3.74 in)                                                     |
| • Depth                        | 30 mm (1.18 in)                                                     |
| <b>Panel cutout</b>            |                                                                     |
| • Width                        | 451 mm (17.76 in)                                                   |
| • Height                       | 78 mm (3.07 in)                                                     |
| <b>Weight, approx.</b>         | 0.5 kg (1.10 lb)                                                    |
| <b>Approvals, according to</b> | CE, cULus                                                           |

#### Selection and ordering data

| Description                                                                                                                                                               | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK expansion panel for MCP 483/MPP 483</b><br>19" wide with 12 slots for 22 mm (0.87 in) control elements, supplied without control elements, secured by clamps | <b>6FC5247-0AA43-1AA0</b> |
| <b>Accessories</b>                                                                                                                                                        |                           |
| <b>Set of clamps</b> (9 units)<br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                                                        | <b>6FC5248-0AF14-0AA0</b> |

### SIRIUS 3SB3

### Laser inscriptions

#### Overview



#### Innovative technology, simple installation

SIRIUS 3SB3 is our modular, tried-and-tested complete range of pushbuttons and indicator lights. Whether round or square, plastic or metal – we can supply the ideal solution for any application. You benefit because SIRIUS 3SB3 products are quick and easy to install – and are dependable in operation.

#### Benefits

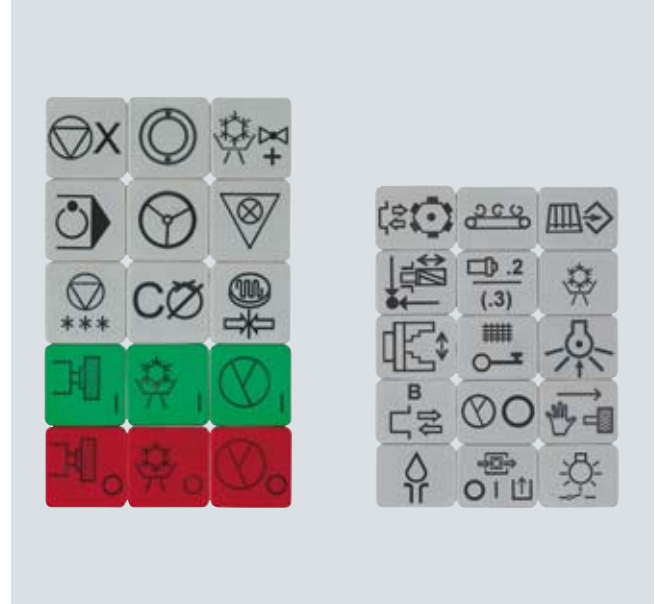
- Emergency stop with reliable direct connection to AS-Interface
- SIRIUS 3SB3 command devices in plastic and metal for the world market
- Rugged metal control devices: Degree of protection IP67/NEMA 4
- Cost-effective and uniquely identifiable with integral super-bright LED
- Multiple connection possibilities: screw-type, solder pin or spring-loaded terminals

#### More information

You can find further information in the Catalog IC 10 or Siemens Industry Mall.

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

#### Overview



High-quality, individual inscription of the mechanical keys on SINUMERIK machine control panels with special symbols as required by the customer is easy using lasers.

Laser inscription is possible on all materials in principle and can therefore be used for permanent and reliable identification, also for special keys in the case of SINUMERIK machine control panels.

The quality of inscription produced by laser is significantly higher than that attained conventional inscription techniques.

#### Benefits

- Maximum precision
- Long service life
- Professional key design enhances the ergonomics and appearance of the machine tool

#### More information

For professional advice and solutions regarding laser-inscribed, mechanical key caps/key symbols for the SINUMERIK machine control panels, please contact the specialist support personnel of these companies:

##### LASERline Teschauer GmbH

Contact: Ms. Margitta Teschauer, Dipl.-Ing.

Max-Planck-Strasse 22b  
D-09114 CHEMNITZ, Germany

Tel.: +49 371 3301057  
Fax: +49 371 3301058  
E-mail: [laserline@teschauer.de](mailto:laserline@teschauer.de)  
[www.teschauer.de](http://www.teschauer.de)

##### CoReKu

Contact: Mr. Bernhard Krompholz

Im Grünen Winkel 3A  
09337 CALLENBERG OT Langenchursdorf

Tel.: +49 37608 128-0  
Fax: +49 37608 128-20  
E-mail: [kontakt@coreku.de](mailto:kontakt@coreku.de)  
[www.coreku.de](http://www.coreku.de)

# SINUMERIK Operate

## Keyboards

### KBPC CG US standard PC keyboard

#### Overview



Programs and texts can be edited easily with the compact, ergonomically designed KBPC CG US standard PC keyboard.

The standard PC keyboard is not suitable for industrial use (EMC) and should not be used as a permanent installation. It may be used only for servicing and commissioning.

#### Integration

The KBPC CG US standard PC keyboard can be used for:

- SINUMERIK 840D sl with SINUMERIK PCU 50.5

The standard PC keyboard cannot be used in conjunction with the full CNC keyboard.

#### Technical specifications

|                                                         |                                                                                 |
|---------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK KBPC CG US standard PC keyboard<br>6FC5203-0AC01-3AA0                 |
| <b>Input voltage</b>                                    | 5.25 V DC                                                                       |
| <b>Power consumption, max.</b>                          | 0.1 W                                                                           |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP20                                                                            |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F). |
| <b>Ambient temperature</b>                              |                                                                                 |
| • Storage                                               | -20 ... +60 °C (-4 ... +140 °F)                                                 |
| • Transport                                             | -20 ... +60 °C (-4 ... +140 °F)                                                 |
| • Operation                                             | 0 ... 50 °C (32 ... 122 °F)                                                     |
| <b>Dimensions</b>                                       |                                                                                 |
| • Width                                                 | 405 mm (15.94 in)                                                               |
| • Height                                                | 44 mm (1.73 in)                                                                 |
| • Depth                                                 | 180 mm (7.09 in)                                                                |
| <b>Weight, approx.</b>                                  | 1.3 kg (2.87 lb)                                                                |
| <b>Approvals, according to</b>                          | FCC, GS, CE, c-tick, cURus                                                      |

#### Selection and ordering data

| Description                                                                                                                                           | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK KBPC CG US standard PC keyboard</b><br>MF-II compatible, 104 key layout, connection: USB, incl. connecting cable, length 1.7 m (5.58 ft) | <b>6FC5203-0AC01-3AA0</b> |

### Keyboard tray

#### Overview



The extremely stable 19" keyboard tray in anthracite makes work easier when using a standard external keyboard with an operator panel.

Special screws permit easy attachment of the keyboard tray, and equally easy removal after work is finished.

If required, a version with an additional removable tray for a mouse is also available.

#### Technical specifications

|                        |                                     |
|------------------------|-------------------------------------|
| <b>Product name</b>    | Keyboard tray<br>6FC5247-0AA40-0AA0 |
| <b>Dimensions</b>      |                                     |
| • Width                | 487 mm (19.17 in)                   |
| • Depth                | 196 mm (7.72 in)                    |
| <b>Weight, approx.</b> | 1.6 kg (3.53 lb)                    |

#### Selection and ordering data

| Description                                                 | Order No.                 |
|-------------------------------------------------------------|---------------------------|
| <b>Keyboard tray</b><br>For keyboard, incl. 2 collar screws | <b>6FC5247-0AA40-0AA0</b> |

#### Overview



The SINUMERIK KB 310C full CNC keyboard permits user-friendly input of programs and text.

The keyboard is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Standard/US QWERTY layout
- 75 mechanical keys
- Alpha block with special characters
- Numeric block with special characters
- Cursor key group
- CNC function keys with hot keys for fast selection of the control area

##### Interface:

- USB 1.1

#### Integration

The SINUMERIK KB 310C full CNC keyboard is used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK KB 310C full CNC keyboard<br>6FC5203-0AF21-0AA1                                                                                                                                                                                                                                                  |
| <b>Input voltage</b>                                    | 5.25 V DC                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 0.4 W                                                                                                                                                                                                                                                                                                      |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                        |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                            |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                  |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Distance to PCU</b>                                  | 3 m (9.84 ft)                                                                                                                                                                                                                                                                                              |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 310 mm (12.2 in)</li> <li>• Height 175 mm (6.89 in)</li> <li>• Depth 31 mm (1.22 in)</li> </ul>                                                                                                                                                             |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 285 mm (11.22 in)</li> <li>• Height 155 mm (6.1 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                        |
| <b>Weight, approx.</b>                                  | 0.9 kg (1.98 lb)                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                          | CE, UL                                                                                                                                                                                                                                                                                                     |

#### Selection and ordering data

| Description                                                                                                                                                        | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK KB 310C full CNC keyboard</b><br>Width 310 mm (12.2 in),<br>port USB 1.1,<br>with mechanical keys,<br>incl. connecting cable<br>Length 1.5 m (4.92ft) | <b>6FC5203-0AF21-0AA1</b> |
| <b>Accessories</b>                                                                                                                                                 |                           |
| <b>Set of clamps</b> (9 units)<br>For operator components with<br>2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                                              | <b>6FC5248-0AF14-0AA0</b> |

# SINUMERIK Operate

## Keyboards

### SINUMERIK KB 483C

#### Overview



The SINUMERIK KB 483C full CNC keyboard permits user-friendly input of programs and text.

The keyboard is mounted from the rear using special clamps supplied with the panel.

#### Design

##### Control elements:

- Standard/US QWERTY layout
- 78 mechanical keys
- Alpha block with special characters
- Numeric block with special characters
- Cursor key group
- CNC function keys with hot keys for fast selection of the control area

##### Interface:

- USB 1.1

#### Integration

The SINUMERIK KB 483C full CNC keyboard is used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK KB 483C full CNC keyboard<br>6FC5203-0AF20-0AA1                                                                                                                                                                                                                                                  |
| <b>Input voltage</b>                                    | 5.25 V DC                                                                                                                                                                                                                                                                                                  |
| <b>Power consumption, max.</b>                          | 0.4 W                                                                                                                                                                                                                                                                                                      |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP54</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                        |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                            |
| <b>Relative atmospheric humidity</b>                    | <ul style="list-style-type: none"> <li>• Storage 5 ... 95 % at 25 °C (77 °F)</li> <li>• Transport 5 ... 95 % at 25 °C (77 °F)</li> <li>• Operation 5 ... 80 % at 25 °C (77 °F)</li> </ul>                                                                                                                  |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul> |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width 483 mm (19.02 in)</li> <li>• Height 133 mm (5.24 in)</li> <li>• Depth 31 mm (1.22 in)</li> </ul>                                                                                                                                                            |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width 450 mm (17.72 in)</li> <li>• Height 112.5 mm (4.43 in)</li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul>                                                                                                                                                     |
| <b>Weight, approx.</b>                                  | 1.3 kg (2.87 lb)                                                                                                                                                                                                                                                                                           |
| <b>Approvals, according to</b>                          | CE, UL                                                                                                                                                                                                                                                                                                     |

#### Selection and ordering data

| Description                                                                                                                                  | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK KB 483C full CNC keyboard</b><br>Width 19", port USB 1.1, with mechanical keys, incl. connecting cable<br>Length 1.5 m (4.92ft) | <b>6FC5203-0AF20-0AA1</b> |
| <b>Accessories</b>                                                                                                                           |                           |
| <b>Set of clamps</b> (9 units)<br>For operator components with 2.5 mm (0.10 in) profile<br>Length: 20 mm (0.79 in)                           | <b>6FC5248-0AF14-0AA0</b> |

#### Overview



The full CNC membrane keyboards supplied by DEMME AG in Siemens design permit user-friendly input of programs and text.

The full CNC keyboards are mounted from the rear using special clamps supplied with the keyboard.

#### Design

##### Control elements:

- Standard/US QWERTY layout
- Membrane keyboard with 78 keys (QWERTY 483)
- Membrane keyboard with 75 keys (QWERTY 310)
- Alpha block with special characters
- Numeric block with special characters
- Cursor key group
- CNC function keys with hot keys for fast selection of the control area

##### Interface:

- USB 1.1

#### Integration

Membrane keyboards can be used for:

- SINUMERIK 840D sl

#### Technical specifications

|                                                         |                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | DEMME full CNC membrane keyboards                                                                                                                                                                                                                                                                                                                                         |
| <b>Input voltage</b>                                    | 5.25 V DC                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Power consumption, max.</b>                          | 0.4 W                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | <ul style="list-style-type: none"> <li>• Front IP65</li> <li>• Rear IP00</li> </ul>                                                                                                                                                                                                                                                                                       |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).                                                                                                                                                                                                                                                                                           |
| <b>Ambient temperature</b>                              | <ul style="list-style-type: none"> <li>• Storage -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Transport -25 ... +55 °C (-13 ... +131 °F)</li> <li>• Operation <ul style="list-style-type: none"> <li>- Front 0 ... 45 °C (32 ... 113 °F)</li> <li>- Rear 0 ... 55 °C (32 ... 131 °F)</li> </ul> </li> </ul>                                                                |
| <b>Dimensions</b>                                       | <ul style="list-style-type: none"> <li>• Width <ul style="list-style-type: none"> <li>- QWERTY 483 483 mm (19.02 in)</li> <li>- QWERTY 310 310 mm (12.2 in)</li> </ul> </li> <li>• Height <ul style="list-style-type: none"> <li>- QWERTY 483 133 mm (5.24 in)</li> <li>- QWERTY 310 175 mm (6.89 in)</li> </ul> </li> <li>• Depth 31 mm (1.22 in)</li> </ul>             |
| <b>Panel cutout</b>                                     | <ul style="list-style-type: none"> <li>• Width <ul style="list-style-type: none"> <li>- QWERTY 483 451 mm (17.76 in)</li> <li>- QWERTY 310 278.4 mm (10.96 in)</li> </ul> </li> <li>• Height <ul style="list-style-type: none"> <li>- QWERTY 483 115.1 mm (4.53 in)</li> <li>- QWERTY 310 157.6 mm (6.20 in)</li> </ul> </li> <li>• Tolerance + 1 mm (0.04 in)</li> </ul> |
| <b>Weight, approx.</b>                                  | <ul style="list-style-type: none"> <li>• QWERTY 483 1.3 kg (2.87 lb)</li> <li>• QWERTY 310 1.1 kg (2.43 lb)</li> </ul>                                                                                                                                                                                                                                                    |

#### More information

DEMME AG is famous for developing innovative, customized operating systems. We are experts in solving human-machine communication problems. Are you looking for solutions? We can help!

##### DEMME AG

Grünteweg 14  
88175 SCHEIDEgg, Germany

Tel.: +49 8381 919-00  
Fax: +49 8381 919-191  
E-mail: [info@demmel.de](mailto:info@demmel.de)  
[www.demmel.de](http://www.demmel.de)

# SINUMERIK Operate

## Storage devices

### SINUMERIK card reader USB 2.0

#### Overview



The SINUMERIK card reader for CF/SD/MMC memory media is suitable for archiving user data and can be installed in front panels. The connection is made via a USB interface.

#### Function

The SINUMERIK card reader is suitable for CF, SD and MMC cards and is designed for the archiving and exchange of user data (SD cards with up to max. 2 GB capacity).

Since the reader can be installed in front panels, data can be exchanged without opening the control cabinet door.

The card reader can be booted. Cards can be inserted and removed during operation.

#### Integration

The SINUMERIK card reader for CF/SD/MMC memory media can be connected to:

- SINUMERIK PCU 50.5
- SINUMERIK TCU (CompactFlash card only)

#### Technical specifications

|                                      |                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------|
| <b>Product name</b>                  | SINUMERIK card reader USB 2.0 for memory media CF/SD/MMC<br>6FC5335-0AA00-0AA0 |
| <b>Degree of protection</b>          |                                                                                |
| • Front                              | IP54                                                                           |
| • Rear                               | IP00                                                                           |
| <b>Relative atmospheric humidity</b> |                                                                                |
| • Storage                            | < 90 %                                                                         |
| • Transport                          | < 90 %                                                                         |
| • Operation                          | < 90 %                                                                         |
| <b>Ambient temperature</b>           |                                                                                |
| • Storage                            | -40 ... +70 °C (-40 ... +158 °F)                                               |
| • Transport                          | -40 ... +70 °C (-40 ... +158 °F)                                               |
| • Operation                          | 0 ... 60 °C (32 ... 140 °F)                                                    |
| <b>Dimensions</b>                    |                                                                                |
| • Width                              | 145 mm (5.71 in)                                                               |
| • Height                             | 50 mm (1.97 in)                                                                |
| • Depth                              | 143 mm (5.63 in)                                                               |
| <b>Weight, approx.</b>               | 0.4 kg (0.88 lb)                                                               |
| <b>Approvals, according to</b>       | CE, cULus                                                                      |

#### Selection and ordering data

| Description                                                                                                        | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK card reader USB 2.0</b><br>For memory media CF/SD/MMC, incl. connecting cable<br>Length 1 m (3.28 ft) | <b>6FC5335-0AA00-0AA0</b> |
| <b>Accessories</b>                                                                                                 |                           |
| <b>CompactFlash card</b><br>Empty memory card                                                                      |                           |
| • 1 GB                                                                                                             | <b>6FC5313-5AG00-0AA1</b> |
| • 8 GB                                                                                                             | <b>6FC5313-6AG00-0AA0</b> |



### Overview



The CompactFlash card is used to store user data or the CNC software.

### Integration

The CompactFlash card is suitable for:

- SINUMERIK 840D sl: Supplementary memory for user data in the SINUMERIK PCU 50.5

### Technical specifications

|                                                         |                                                                                       |
|---------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Product name</b>                                     | SINUMERIK CompactFlash card<br>1 GB/8 GB<br>6FC5313-5AG00-0AA1/<br>6FC5313-6AG00-0AA0 |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> | IP20                                                                                  |
| <b>Humidity class based on DIN EN 60721-3-3</b>         | Class 3K5 condensation and icing excluded.<br>Low air temperature 0 °C (32 °F).       |
| <b>Relative atmospheric humidity</b>                    |                                                                                       |
| • Storage                                               | 9 ... 95 %, without condensation                                                      |
| • Transport                                             | 8 ... 95 %, without condensation                                                      |
| • Operation                                             | 8 ... 95 %, without condensation                                                      |
| <b>Ambient temperature</b>                              |                                                                                       |
| • Storage                                               | -25 ... +85 °C (-13 ... +185 °F)                                                      |
| • Transport                                             | -25 ... +85 °C (-13 ... +185 °F)                                                      |
| • Operation                                             | 0 ... 70 °C (32 ... 158 °F)                                                           |
| <b>Dimensions</b>                                       |                                                                                       |
| • Width                                                 | 43 mm (1.69 in)                                                                       |
| • Height                                                | 3 mm (0.12 in)                                                                        |
| • Depth                                                 | 37 mm (1.46 in)                                                                       |
| <b>Weight, approx.</b>                                  | 12 g (0.42 oz)                                                                        |
| <b>Approvals, according to</b>                          | CE                                                                                    |

### Selection and ordering data

| Description              | Order No.                 |
|--------------------------|---------------------------|
| <b>CompactFlash card</b> |                           |
| Empty memory card        |                           |
| • 1 GB                   | <b>6FC5313-5AG00-0AA1</b> |
| • 8 GB                   | <b>6FC5313-6AG00-0AA0</b> |

# SINUMERIK Operate

## Storage devices

### Industrial USB hub 4

#### Overview



The Industrial USB hub 4 is essentially used as a USB hub for the connection of I/O devices to SINUMERIK PCU 50.5.

USB peripherals can be connected to the operator component and operated via the Industrial USB hub 4 without opening the cabinet door.

The Industrial USB hub 4 differs from commercially available USB hubs mainly in its suitability for use in rugged industrial environments (IP65).

#### Application

Use of the Industrial USB hub 4 means that up to 4 I/O devices, such as USB flash drive, USB floppy disk drive, USB card reader, etc. can be connected simultaneously to the operator component, thereby increasing the availability of the system to be operated. The cabinet door no longer has to be opened in order to connect the I/O devices. Continuous operation of the operator component is therefore possible.

In addition, the Industrial USB hub 4 has the following features:

- Inspection window for each interface
- Vibration-proof latching of connected USB cables and USB flash drives
- One LED per interface for checking the data traffic
- Sufficient interior space for easy insertion and removal
- Facility for attachment to a standard mounting rail

#### Integration

The Industrial USB hub 4 is suitable for connection to SINUMERIK PCU 50.5.

#### Technical specifications

|                                                         |                                            |
|---------------------------------------------------------|--------------------------------------------|
| <b>Product name</b>                                     | Industrial USB hub 4<br>6AV6671-3AH00-0AX0 |
| <b>Supply voltage</b>                                   | 24 V DC                                    |
| • Permissible range                                     | 20.4 ... 28.8 V DC                         |
| <b>USB-compliant interfaces</b>                         | 4; 500 mA each                             |
| <b>Degree of protection to DIN EN 60529 (IEC 60529)</b> |                                            |
| • Front                                                 | IP65                                       |
| • Rear                                                  | IP20                                       |
| <b>Relative humidity, max.</b>                          | 90 %                                       |
| <b>Ambient temperature</b>                              |                                            |
| • Storage                                               | -20 ... +60 °C (-4 ... +140 °F)            |
| • Transport                                             | -20 ... +60 °C (-4 ... +140 °F)            |
| • Operation (vertical installation)                     | 0 ... 50 °C (32 ... 122 °F)                |
| <b>Dimensions</b>                                       |                                            |
| • Width                                                 | 212 mm (8.35 in)                           |
| • Height                                                | 156 mm (6.14 in)                           |
| • Depth                                                 | 50 mm (1.97 in)                            |
| <b>Panel cutout</b>                                     |                                            |
| • Width                                                 | 182 mm (7.17 in)                           |
| • Height                                                | 138 mm (5.43 in)                           |
| <b>Weight, approx.</b>                                  | 0.5 kg (1.10 lb)                           |
| <b>Approvals, according to</b>                          | CE                                         |

#### Selection and ordering data

| Description                                         | Order No.                 |
|-----------------------------------------------------|---------------------------|
| <b>Industrial USB hub 4</b>                         | <b>6AV6671-3AH00-0AX0</b> |
| With 4 USB interfaces,<br>degree of protection IP65 |                           |

### Overview



The SIMATIC IPC USB FlashDrive is the ideal mobile storage medium. Thanks to the rugged and ultra-compact construction in a metal enclosure, fast data transfer (USB 2.0) and the high memory capacity of 8 GB, the USB FlashDrive offers optimum values for use in industrial applications. It can be used to replace floppy disks or CD-ROMs as data storage and it is supplied with boot capability.

### Benefits

- 2 USB FlashDrives can be plugged into the SIMATIC PC/SINUMERIK PCU 50 one above the other
- Suitable for use in industrial environments thanks to the metal enclosure
- Faultless operation (system test) with SIMATIC PC/PG (hardware and software)/SINUMERIK PCU 50
- Automation License Manager V2.0 can be installed.

### Application

The SIMATIC IPC USB FlashDrive is the fastest and simplest method for saving data (e.g. recipes, configuration data, user data) and transporting them easily from one place to another. It can also be used as boot medium, e.g. for SIMATIC PC BIOS Manager, SIMATIC PC Image Creator, or SINUMERIK PCU 50.

Typical users are development and servicing engineers as well as application and technical consultants.

### Function

- Formatted for boot capability incl. preinstalled operating system (FreeDOS) for use as a boot medium, e.g. for SIMATIC PC Image Creator
- High performance for faster data transfer – USB 2.0 high-speed
- High memory capacity of 8 GB
- Simple installation – plug and play, no drivers necessary
- High degree of data security thanks to write protection switch
- Status LED for data transfer and operating state
- SIMATIC BIOS Manager, a software tool for SIMATIC PCs for testing and duplication of BIOS setup settings (CMOS data) included in the scope of supply
- No external power supply necessary

### Integration

The SIMATIC IPC USB FlashDrive is suitable for:

- SIMATIC PC/PG
- SINUMERIK PCU 50.3/SINUMERIK PCU 50.5

Recommended operating systems:

- Windows XP

### Technical specifications

|                                    |                                                  |
|------------------------------------|--------------------------------------------------|
| <b>Product name</b>                | SIMATIC IPC USB FlashDrive<br>6ES7648-0DC50-0AA0 |
| <b>Supported operating systems</b> | Windows 98/2000/XP                               |
| <b>Write protection</b>            | Via switch                                       |
| <b>Ambient temperature</b>         |                                                  |
| • Storage                          | -20 ... +70 °C (-4 ... +158 °F)                  |
| • Operation                        | 5 ... 55 °C (41 ... 131 °F)                      |
| <b>Dimensions</b>                  |                                                  |
| • Length                           | 52.7 mm (2.07 in)                                |
| • Width                            | 13.5 mm (0.53 in)                                |
| • Height                           | 5.5 mm (0.22 in)                                 |
| <b>Weight, approx.</b>             | 13.5 g (0.48 oz)                                 |
| <b>Approvals, according to</b>     | CE                                               |

### Selection and ordering data

| Description                                                                                                               | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SIMATIC IPC USB FlashDrive</b><br>8 GB, USB 2.0, metal enclosure,<br>boot capability, incl.<br>SIMATIC PC BIOS Manager | <b>6ES7648-0DC50-0AA0</b> |

# SINUMERIK Operate

## Industrial switches

### Industrial Ethernet Switches – SCALANCE

#### Overview



SCALANCE X is the product group of industrial switches from SIMATIC NET for Industrial Ethernet. Switches are active network components that specifically distribute data to the relevant addressees.

#### Application

##### SCALANCE XB005 (IP20 degree of protection)

- The unmanaged Industrial Ethernet Switch SCALANCE XB005 is optimized for configuring Industrial Ethernet networks with 10/100 Mbit/s in line and star topologies
- Enclosure for space-saving installation in control cabinets or boxes on a standard mounting rail

##### SCALANCE X005/X108 (IP30 degree of protection)

- For configuring Industrial Ethernet networks in line and star topologies
- The 5/8 RJ45 sockets are industry-compatible and feature additional retaining collars for connection to the IE FC RJ45 Plug 180

##### SCALANCE X208/X208PRO (IP30/IP65 degree of protection)

- For configuring Industrial Ethernet networks in line, star or ring topologies (8 electrical ports):
  - SCALANCE X208 for installation in the control cabinet
  - SCALANCE X208PRO, specially for use outside the control cabinet
- The 8 RJ45 sockets of the SCALANCE X208 are industry-compatible and feature additional retaining collars for connection to the IE FC RJ45 Plug 180
- The 8 PROFINET-compatible M12 sockets of the SCALANCE X208PRO are designed with IP65 degree of protection for connection to the IE M12 Plug PRO or the pre-assembled IE M12 connecting cable
- The SCALANCE X208PRO can be installed on a DIN rail/ S7-300 rail or as a compact flat or upright model directly on the installation or machine
- Status information can be read in any mounting position thanks to the inclined row of LEDs
- Power can also be supplied to the SCALANCE X208PRO from outside the control cabinet from the PS791-1PRO power supply module (for 230 V AC)

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                             | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Industrial Ethernet Switch SCALANCE XB005 unmanaged</b><br>With 5 x 10/100 Mbit/s RJ45 ports for configuring small star and line topologies<br>IP20 degree of protection                                                                                                                             | <b>6GK5005-0BA00-1AB2</b> |
| <b>Industrial Ethernet Switch SCALANCE X005 unmanaged</b><br>With 5 x 10/100 Mbit/s RJ45 ports for configuring small star and line topologies<br>IP30 degree of protection                                                                                                                              | <b>6GK5005-0BA00-1AA3</b> |
| <b>Industrial Ethernet Switch SCALANCE X108 unmanaged</b><br>With 8 x 10/100 Mbit/s RJ45 ports for configuring star and line topologies<br>IP30 degree of protection                                                                                                                                    | <b>6GK5108-0BA00-2AA3</b> |
| <b>Industrial Ethernet Switch SCALANCE X208 managed</b><br>With 8 x 10/100 Mbit/s RJ45 ports for configuring line, star and ring topologies<br>IP30 degree of protection                                                                                                                                | <b>6GK5208-0BA10-2AA3</b> |
| <b>Industrial Ethernet Switch SCALANCE X208PRO managed</b><br>With 8 x 10/100 Mbit/s RJ45 ports for configuring linear, star and ring topologies<br>IP65 degree of protection incl. 8 x RJ45 and 3 x M12 dust protection caps                                                                           | <b>6GK5208-0HA00-2AA6</b> |
| <b>Ethernet cables and connections</b>                                                                                                                                                                                                                                                                  |                           |
| <b>IE FC RJ45 plug 180</b><br>RJ plug connector for Industrial Ethernet with robust metal casing and integrated cutting/clamping contacts; with 180° outgoing cable                                                                                                                                     | <b>6GK1901-1BB10-2AA0</b> |
| <b>IE FC Standard Cable GP 2 x 2 (Type A)</b><br>4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m (3281 ft), minimum order quantity 20 m (65.62 ft)                             | <b>6XV1840-2AH10</b>      |
| <b>IE FC Trailing Cable GP 2 x 2 (Type C)</b><br>4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/IE FC RJ45 Plug 180/90 for use in trailing cables; PROFINET-compatible; without UL approval; sold by the meter; max. length 1000 m (3281 ft), minimum order 20 m (65.62 ft) | <b>6XV1840-3AH10</b>      |

#### More information

Information on the SIMATIC NET components such as the Industrial Ethernet SCALANCE Electrical Lean Switches and the Industrial Ethernet FC TP Standard/Trailing Cable can be found in the IK PI Catalog or Siemens Industry Mall.

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

#### Technical specifications

| Product name                      | SCALANCE XB005<br>6GK5005-0BA00-1AB2 | SCALANCE X005<br>6GK5005-0BA00-1AA3       | SCALANCE X108<br>6GK5108-0BA00-2AA3 | SCALANCE X208<br>6GK5208-0BA10-2AA3    | SCALANCE X208PRO<br>6GK5208-0HA00-2AA6     |
|-----------------------------------|--------------------------------------|-------------------------------------------|-------------------------------------|----------------------------------------|--------------------------------------------|
| Transmission rate 1               | 10 Mbit/s                            |                                           |                                     |                                        |                                            |
| Transmission rate 2               | 100 Mbit/s                           |                                           |                                     |                                        |                                            |
| Number of electrical connections  |                                      |                                           |                                     |                                        |                                            |
| • Signaling contact               | –                                    | –                                         | 1                                   | 1                                      | 1                                          |
| • Network components or terminals | 5                                    | 5                                         | 8                                   | 8                                      | 8                                          |
| • Redundant power supply          | –                                    | –                                         | 1                                   | 1                                      | 1                                          |
| • Power supply                    | 1                                    | 1                                         | 1                                   | 1                                      | 1                                          |
| Type of electrical connection     |                                      |                                           |                                     |                                        |                                            |
| • Signaling contact               | –                                    | –                                         | 2-pin terminal block                |                                        | 5-pin M12 socket                           |
| • Network components or terminals | RJ45 port                            | RJ45 port (10/100 Mbit/s; TP)             |                                     |                                        | 4-pin M12 socket, (10/100 Mbit/s; D-coded) |
| • Power supply                    | 3-pin terminal block                 | 2-pin terminal block                      | 4-pin terminal block                |                                        | 4-pin M12 interface                        |
| Design of the swap medium C-Plug  | –                                    | –                                         | –                                   | Yes                                    | Yes                                        |
| Type of mounting                  | Mounting rail                        | Mounting rail, S7-300 rail, wall mounting |                                     |                                        |                                            |
| Type of supply voltage            | DC                                   |                                           |                                     |                                        |                                            |
| Supply voltage, external          | 24 V                                 |                                           |                                     |                                        |                                            |
| • Range                           | 19.2 ... 28.8 V                      | –                                         | 18 ... 32 V                         |                                        |                                            |
| Current consumption               | 70 mA                                | 80 mA                                     | 140 mA                              | 140 mA                                 | 185 mA                                     |
| Effective power loss at 24 V DC   | 1.68 W                               | 2 W                                       | 3.36 W                              | 4 W                                    | 4 W                                        |
| Degree of protection              | IP20                                 | IP30                                      | IP30                                | IP30                                   | IP65                                       |
| Ambient temperature               |                                      |                                           |                                     |                                        |                                            |
| • Storage                         | -40 ... +80 °C<br>(-40 ... +176 °F)  |                                           |                                     | -40 ... +70 °C<br>(-40 ... +158 °F)    | -40 ... +80 °C<br>(-40 ... +176 °F)        |
| • Transport                       | -40 ... +80 °C<br>(-40 ... +176 °F)  |                                           |                                     | -40 ... +70 °C<br>(-40 ... +158 °F)    | -40 ... +80 °C<br>(-40 ... +176 °F)        |
| • Operation                       | -10 °C ... +60 °C<br>(14 ... 140 °F) | 0 °C ... 65 °C<br>(32 ... 149 °F)         | -20 ... +70 °C<br>(-4 ... +158 °F)  | -40 °C ... +60 °C<br>(-40 ... +140 °C) | -20 ... +70 °C<br>(-4 ... +158 °F)         |
| Relative atmospheric humidity     | 95 % at 25 °C (77 °F)                |                                           |                                     |                                        | 100 % at 25 °C (77 °F)                     |
| Dimensions                        |                                      |                                           |                                     |                                        |                                            |
| • Width                           | 45 mm (1.77 in)                      | 45 mm (1.77 in)                           | 60 mm (2.36 in)                     | 60 mm (2.36 in)                        | 90 mm (3.54 in)                            |
| • Height                          | 100 mm (3.94 in)                     | 125 mm (4.92 in)                          |                                     |                                        |                                            |
| • Depth                           | 87 mm (3.43 in)                      | 124 mm (4.88 in)                          |                                     |                                        |                                            |
| Weight, approx.                   | 165 g (5.82 oz)                      | 550 g (1.21 lb)                           | 780 g (1.72 lb)                     | 780 g (1.72 lb)                        | 1000 g (2.21 lb)                           |
| Approvals, according to           | CSA, UL                              |                                           |                                     |                                        |                                            |

# SINUMERIK Operate

## Housing systems

### Rittal command panel systems

#### Overview



Rittal command panel systems are manufactured with exact dimensions for any combination of SINUMERIK operator components and are ready for installation. Operator components can be optimally installed in these individually dimensioned panels. Select from a wide range of different housing systems, e.g.:

#### **Rittal VIP 6000 – Multi-talented in shape and function**

The increased surface size resulting from cooling fins and screw channels is the most reliable and cheapest type of heat dissipation.

- Individual mounting depths from 155 mm to 438 mm (6.10 in to 17.24 in)
- 3 frame versions (wide, narrow or combined), depending on application and design requirements
- Optimum heat dissipation with 3 types of housing
- Versatile housing connectors
- Continuous edge profile, 3 versions in 5 colors
- Keyboard housing, mounting depths: 27 mm/44 mm/105 mm (1.06 in/1.73 in/4.13 in), tray for keyboards
- Continuous screw channels for flexible internal design
- Rear panel screwed or hinged

#### **Rittal Optipanel – The slimline alternative design**

- Individual mounting depths: 50 mm/100 mm (3.94 in)/150 mm
- Standard housing matched to SINUMERIK operator panels 19" x 7 HU, mounting depth 100 mm (3.94 in), available ex stock
- Continuous edge profile
- Keyboard housing, mounting depths: 50 mm/100 mm (1.97 in/3.94 in), tray for keyboards, tilting angle continuously adjustable from 80° to 155°
- Continuous T slot for flexible internal design
- Rear panel screwed or hinged

#### Overview (continued)

#### **Rittal Comfort Panel – Functional and reliable**

The "third dimension" command panel in the HMI sector. With a new design and additional functions, the Rittal Comfort Panel is ideally matched to SINUMERIK operator components.

- Individual mounting depths from 74 mm to 464 mm (2.91 in to 18.27 in)
- Standard housing matched to SINUMERIK operator panels 19" x 7 HU, mounting depths: 74 mm/113 mm/152 mm/191 mm/308 mm (2.91 in/4.45 in/5.98 in/7.52 in/12.13 in), available ex stock
- Keyboard housing, mounting depths: 35 mm/74 mm (1.38 in/2.91 in), tray for keyboards, tilting angle from 88° to 136°, with toothed wheel adjustable in 8° steps; can be swung up out of the way after use to save space.
- Rear panel screwed or hinged
- Design profile for color coordination with the machine or equipment ID
- All-round soft profile made of plastic reduces the risk of injury
- Flat front frame for optimum access to lateral drives
- Continuous mounting channels for individual dismounting of accessories, internally and externally

#### Accessories

##### **Support arm systems**

- **CP-S** compact, for small and flat panel housings
- **CP-L** open for simple cable inlet, closed for small to medium panel housings
- **CP-C** for medium to high loads
- **CP-XL** open for simple cable inlet, closed for high loads

##### **Stand systems**

- Stationary
- Mobile
- Adjustable height
- Console as stable base for supporting arm systems

#### More information

##### **Rittal Service**

Configure your Optipanel/Comfort Panel online now – quickly, easily and reliably at:

[www.rittal.de/konfigurator](http://www.rittal.de/konfigurator)

Sending of:

- Visual presentation of the selected Optipanel/Comfort Panel
- 3D data for integration in the machine and plant construction for virtual sample construction on the screen

For full details, please refer to the Rittal Manual. Contact your Rittal representative or order the manual directly from Rittal.

##### **Rittal GmbH & Co. KG**

Postfach 16 62  
35726 HERBORN, Germany

Tel.: +49 2772 505-0

Fax: +49 2772 505-2319

E-mail: [info@rittal.de](mailto:info@rittal.de)

[www.rittal.de](http://www.rittal.de)



### Overview



#### Slim Line Commander

The ROSE SL 2000 and SL 3000 Slim Line Commanders are tailored housing systems for built-in control components with numerous configuration possibilities.

With various mounting depths, the basic versions of the aluminum section housing systems in various sizes provide ideal surface-mounting possibilities for CNC with:

- SINUMERIK OP 010/OP 010S/OP 010C/OP 012/OP 015/OP 015A/TP 015A
- SINUMERIK full CNC keyboards/machine control panels
- SINUMERIK Machine Push Button Panel

#### SL 2000

- Multifunctional built-in and add-on system with all-round fixing slots
- Individual front panel installation from front or back
- Mounting depths:  
80 mm/110 mm/185 mm (3.15 in/4.33 in/7.28 in)



### Overview (continued)

#### SL 3000

- Variable depth by combining sections
- Hollow chamber profile for hidden installation of drives and connectors
- Mounting depths: 60 mm/160 mm/200 mm (2.36 in/6.30 in/7.87 in)  
Mounting depths with combined profiles:  
120 mm/220 mm/260 mm/360 mm (4.72 in/8.66 in/10.24 in/14.17 in)

#### LIMANDA



LIMANDA is the ideal polyamide panel housing for installing small operator panels and control devices for mobile and fixed applications to the IP65 degree of protection.

- Dimensions of Limanda 1:  
317 mm × 287 mm × 75 mm (12.48 in × 11.30 in × 2.95 in)
- Dimensions of Limanda 2:  
270 mm × 248 mm × 64 mm (10.63 in × 9.76 in × 2.52 in)

Suitable for SIMATIC Panels:

- PP7/PP17
- OP7/OP15/OP17
- TP27-6/TP 170
- C7

### More information

Are you looking for an individual solution for your application?  
Ask us!

Your partner for industrial housing systems:

#### ROSE Systemtechnik GmbH

Erbeweg 13-15  
D-32457 PORTA WESTFALICA, Germany

Tel.: +49 571 5041-0  
Fax: +49 571 5041-6  
E-mail: [rose@rose-pw.de](mailto:rose@rose-pw.de)  
[www.rose-pw.de](http://www.rose-pw.de)





# SINUMERIK Integrate



|             |                            |
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## Security note

In the case of software for remote maintenance or connection to higher-level networks, suitable protection measures must be taken (including industrial security, e.g. network segmentation) to guarantee safe operation of the system.

You can find more information on Industrial Security on the Internet at:  
[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

# SINUMERIK Integrate

## Introduction

### Overview

#### Simple, all-round process integration

Integration of the machine tool into a company's workflow is an essential precondition for achieving a lean, efficient manufacturing operation. SINUMERIK Integrate offers a broad range of products for integrating machine tools into communication, engineering and production processes associated with metal-cutting manufacturing.

#### Integration of man and machine

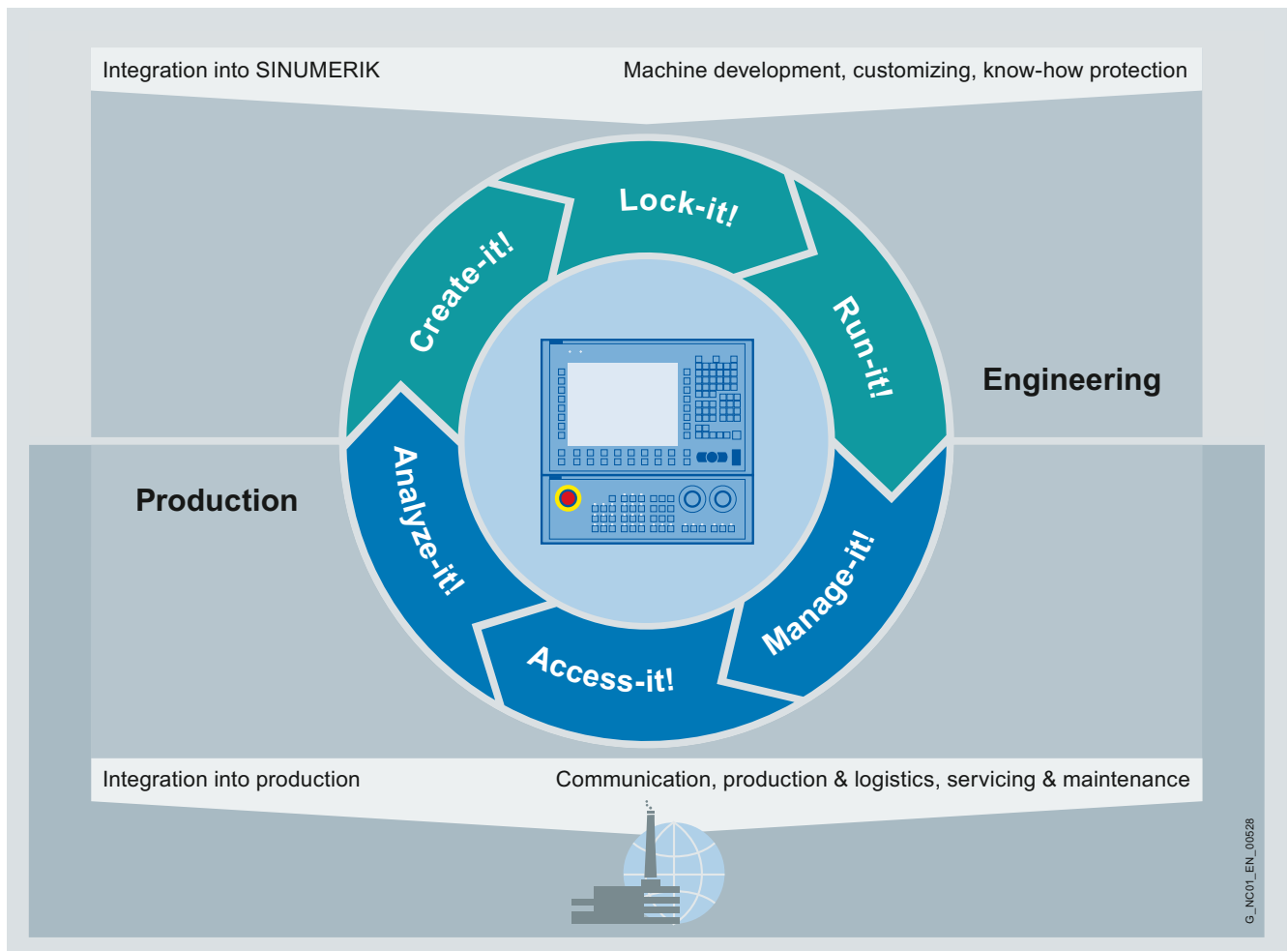
SINUMERIK Integrate bundles IT-related functions into a uniform process suite and fully integrates the machine tool into the company's workflow. This integration of manufacturing and IT processes means the production manager, the plant operator, the programmer in the job planning department, the maintenance technician as well as those mechanical engineers with responsibility for design and servicing are networked and incorporated into the overall system by means of defined processes.

#### Integration into engineering processes

SINUMERIK Integrate employs an innovative PLM process to help users boost the productivity of machine tools over their entire service life and to commission them more effectively. The openness of the SINUMERIK system offers potential for optimizing technology, programming and operation for specific machines and end users.

#### Integration into production processes

SINUMERIK Integrate integrates machine tools quickly, simply and efficiently into the complicated production and communication processes of a company. Even the process of integrating machines into an existing, complex company IT network is quick and simple. The result is higher productivity and availability combined with an overall reduction in production costs. A closed CAD/CAM/CNC chain minimizes the time and cost involved in creating and simulating programs and for conducting trial program runs.



Integration of the CNC into the company's workflow

### Overview (continued)

#### Software modules for open integration

##### Create-it!

Solutions for creating and configuring user-specific functions in the SINUMERIK Operate user and programming interface and for programming interfaces to the machine tool and to a company server are bundled in this module. It offers extensive function libraries, for example, which allow the use of PLC, NC and HMI functions throughout the network.

##### Lock-it!

Protection of technological know-how against unauthorized access, e.g. copy protection or the safekeeping of data containing in-house expertise.

##### Run-it!

Includes the entire runtime system for the execution of individual user interfaces, the execution of customized compile cycles on the NC kernel, the control of drives and the execution of the virtual NC kernel (VNCK).

#### Software modules for integration into the production process

##### Manage-it!

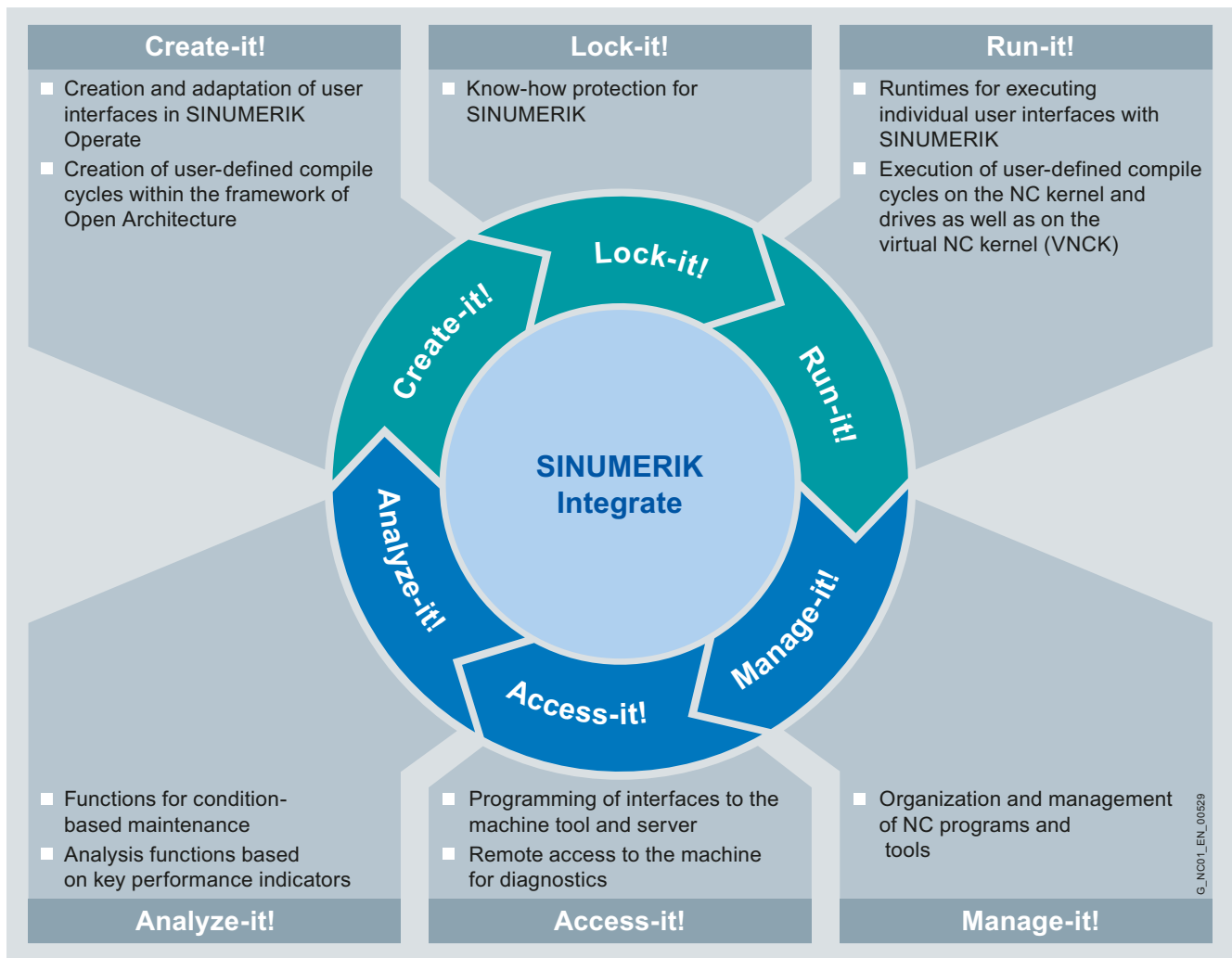
Organization and management of NC programs and tools. It includes solutions for every aspect of tool, data and program management to permit fast and general availability of manufacturing information. It also establishes an optimum link between design, production planning and production. The integrated interface in Teamcenter optimizes processes and represents them consistently.

##### Access-it!

Uniform communication interface for the SINUMERIK CNC which permits remote access for the purpose of machine tool diagnostics. It therefore reduces repair times and increases machine availability by supporting fast online access. Backups can be created and downloaded via interfaces to higher-level data backup programs.

##### Analyze-it!

Sophisticated functions for condition-based maintenance and analytical functions based on key performance indicators. Continuous evaluation of data in the production process helps to increase machine operating times and reduce outages and downtimes by the deployment of condition-oriented maintenance routines. It also supports the evaluation of key performance indicators relating to the wear and tear of mechatronic components.



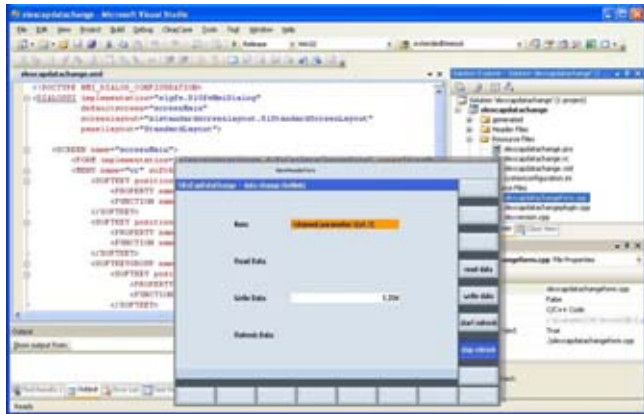
SINUMERIK Integrate software modules

# SINUMERIK Integrate

## Create-it!

### Create MyHMI

#### Overview



The openness in the HMI enables customers to implement their own integrated operating and display functions or their own user interfaces. This means that users can tailor HMI functions and technological machine operating procedures to meet their own requirements.

The HMI application can be created either by programming in a high-level language or by means of a text editor.

A simple configuring process using a standard editor is available with SINUMERIK Integrate Run MyScreens.

#### Application

|                                                              | SINUMERIK Operate user interface                                                                                                                      | Requirements                                                        |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <b>SINUMERIK Integrate Create MyHMI /3GL</b>                 | SINUMERIK Operate<br>NCU 710.3 PN,<br>NCU 720.3 PN,<br>NCU 730.3 PN<br>PCU 50.5                                                                       | SINUMERIK Integrate<br>Run MyHMI /3GL<br>Software option P60        |
| <b>Editor</b>                                                | SINUMERIK Operate<br>NCU 710.3 PN,<br>NCU 720.3 PN,<br>NCU 730.3 PN<br>PCU 50.5                                                                       | SINUMERIK Integrate<br>Run MyScreens<br>Software option P64         |
| <b>SIMATIC HMI</b>                                           |                                                                                                                                                       |                                                                     |
| <b>SINUMERIK HMI configuring package WinCC flexible 2008</b> | OP 170B, OP 177B,<br>OP 277, TP 170B,<br>TP 177B, TP 277,<br>Mobile Panel 170,<br>Mobile Panel 177,<br>Mobile Panel 277,<br>MP 277, MP 370,<br>MP 377 | SINUMERIK Integrate<br>Run MyHMI /SIMATIC OP<br>Software option P03 |

Use of the openness in the HMI is always subject to conclusion of an OEM contract.

#### Function

##### **SINUMERIK Integrate Create MyHMI /3GL**

The SINUMERIK Integrate Create MyHMI /3GL programming package allows users to develop high-level language applications in programming language Qt/C++ for the SINUMERIK Operate user interface. A Microsoft .NET-based interface is also provided so that users can create a customized user interface with individual look and feel.

- Integration of single or multiple operating screens as well as user-defined operating areas in SINUMERIK Operate with NCU and PCU.
- User interfaces for stand-alone execution
- Support for Microsoft .NET interfaces

To develop customized applications, the software release of the SINUMERIK Integrate Create MyHMI /3GL programming package which is compatible with the relevant SINUMERIK Operate version will be required for execution on the target hardware.

Example: SINUMERIK Operate software version 4.4 requires version 4.4 of the SINUMERIK Integrate Create MyHMI /3GL package.

##### **SINUMERIK HMI configuring package WinCC flexible 2008**

With the SINUMERIK HMI configuring package WinCC flexible 2008, any skilled worker with basic technical experience can create technology-related modules for programming, operation and visualization, without the need for high-level language expertise.

It is therefore possible to create user interfaces that are capable of execution on SIMATIC CE operator panels and which utilize the SINUMERIK communication interfaces.

The graphics-supported engineering tool SIMATIC WinCC flexible Advanced is used as the basis for configuration. You are therefore able to create stand-alone user interfaces for operating and visualizing plant and machine tools. The SINUMERIK HMI configuring package WinCC flexible 2008 is required additionally in order to create user interfaces for SIMATIC CE panels.

This package permits user interfaces to be integrated in SIMATIC CE panels on the SINUMERIK (SIMATIC HMI panels of the 170 and 270 series and the MP 370).

SIMATIC WinCC flexible 2008 Advanced is not included in the SINUMERIK HMI configuring package WinCC flexible 2008 and must be ordered separately if required.

#### Integration

##### **SINUMERIK Integrate Run MyHMI /3GL**

HMI Open Architecture applications created with the programming package SINUMERIK Integrate Create MyHMI /3GL can be executed on NCUs and PCUs with software option SINUMERIK Integrate Run MyHMI /3GL.

HMI Open Architecture applications which utilize the .NET interface can execute only on PCUs and require software option SINUMERIK Integrate Run MyHMI /3GL.

Software option SINUMERIK Integrate Run MyHMI /3GL is required for the installation and operation of other software which is integrated in SINUMERIK Operate or in parallel with it. This also applies in cases where the supplementary software does not utilize SINUMERIK communication interfaces.

##### **SINUMERIK Integrate Run MyScreens**

The software option SINUMERIK Integrate Run MyScreens permits the execution of text files with EasyScreen format. These configurations can execute on NCUs or PCUs.

### Selection and ordering data

| Description                                                                                                                                                                                                                                                                  | Order No.                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>SINUMERIK Integrate Create MyHMI /3GL</b><br>Including operating software<br>SINUMERIK Operate for PC/PG<br>for SINUMERIK 840D sl<br>Engineering system languages:<br>English, German<br>Runtime system languages:<br>Supports all languages of the<br>HMI runtime system |                            |
| <ul style="list-style-type: none"> <li>Single license on DVD-ROM for current software version incl. Automation Value Card with 400 credits</li> </ul>                                                                                                                        | <b>6FC5861-1YC00-0YA0</b>  |
| <ul style="list-style-type: none"> <li>Single license on DVD-ROM for specific software version incl. Automation Value Card with 400 credits</li> </ul>                                                                                                                       | <b>6FC5861-1YC■■■-■YA0</b> |
| <ul style="list-style-type: none"> <li>Single license without data carrier</li> </ul>                                                                                                                                                                                        | <b>6FC5861-1YP00-0YB0</b>  |
| <ul style="list-style-type: none"> <li>Software update service</li> </ul>                                                                                                                                                                                                    | <b>6FC5861-1YP00-0YL8</b>  |
| <b>Qt license key</b><br>For SINUMERIK Integrate Create MyHMI /3GL                                                                                                                                                                                                           | <b>Digia Ltd.</b>          |

#### Accessories

|                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>SINUMERIK HMI configuring package WinCC flexible 2008</b><br><ul style="list-style-type: none"> <li>Single license on DVD-ROM for current software version incl. Automation Value Card with 400 credits</li> <li>Single license on DVD-ROM for specific software version incl. Automation Value Card with 400 credits</li> <li>Single license without data carrier</li> <li>Software update service</li> </ul> | <b>6FC5253-0CX25-0AG0</b><br><br><b>6FC5253-1CX25-3AG0</b><br><br><b>6FC5253-0CX25-0AG1</b><br><br><b>6FC5253-0CX25-0AG2</b> |
| <b>SINUMERIK Integrate Run MyHMI /3GL</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK Operate operating software)                                                                                                                                                                                                                                                               |                                                                                                                              |
| <ul style="list-style-type: none"> <li>Single license without data carrier</li> </ul>                                                                                                                                                                                                                                                                                                                             | <b>6FC5800-0AP60-0YB0</b>                                                                                                    |

### Selection and ordering data (continued)

| Description                                                                                                                                                                          | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories (continued)</b><br><b>SINUMERIK Integrate Run MyScreens</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK Operate operating software) |                           |
| <ul style="list-style-type: none"> <li>Single license without data carrier</li> </ul>                                                                                                | <b>6FC5800-0AP64-0YB0</b> |
| <b>SINUMERIK Integrate Run MyHMI /SIMATIC OP</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK Operate operating software)                           |                           |
| <ul style="list-style-type: none"> <li>Single license without data carrier</li> </ul>                                                                                                | <b>6FC5800-0AP03-0YB0</b> |
| Example of a specific software version 2.7:<br>6FC5861-1YC <b>23-0</b> YA0                                                                                                           |                           |

### More information

- You will find further information in the "Updates" at:  
[www.siemens.com/automation/support](http://www.siemens.com/automation/support)

- You can obtain technical support and advice from:

**Siemens AG**  
Industry Sector

Stuttgart office  
Competence Center Stuttgart

Fax: +49 711 137-2838  
E-mail: [info.mc-hmi-oa.rd@siemens.com](mailto:info.mc-hmi-oa.rd@siemens.com)

- You can obtain the Qt license key directly from:

**Digia Ltd.**

Contact: Joachim Hagene

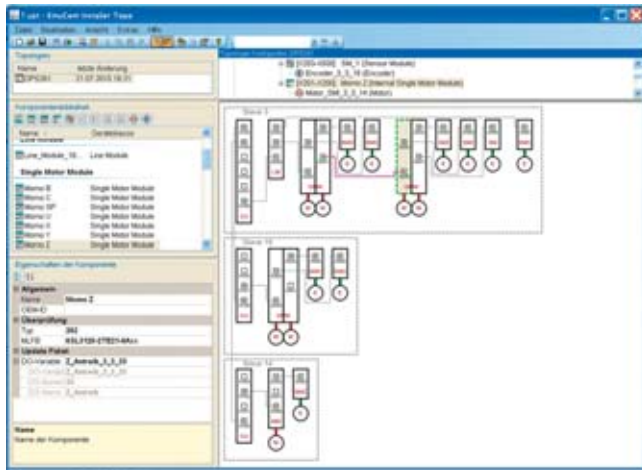
Tel.: +47 47 451220  
Fax: +47 22 237040  
E-mail: [qt-sales@digia.com](mailto:qt-sales@digia.com)

# SINUMERIK Integrate

## Create-it!

### Create MyConfig

#### Overview



Create MyConfig is used by the machine manufacturer to create and run a project for automated commissioning/production of machines with SINUMERIK 840D sl control systems. Even upgrades of those CNC systems at the end customer can be configured and executed automatically.

Thanks to its modular concept, Create MyConfig allows different machines of a series to be commissioned and upgraded with one Installer package.

The individual operations on the machine can be performed faster and with greater ease and reliability.

#### Benefits

- Significant reduction of the required commissioning or upgrade time
- Avoidance of errors during commissioning or upgrade processes through structured preparation and automation of process steps
- Reproducibility of the automatic commissioning or upgrade process
- Simplification of the commissioning or upgrade process at the system
- Detailed knowledge of the control system is essential only to configure the InstallerUpdate package, but not to perform commissioning or upgrades at the machine

#### Design

Create MyConfig comprises the following components:

- Expert  
Configuring an Installer package, which contains a configurable sequence of production or upgrade steps and the associated data
- Diff  
Data comparison between folders, SINUMERIK archives, files and CNC data
- Topo  
Creating an image of the SINAMICS topology and a library of SINAMICS components

#### Function

Create MyConfig offers support for the installation and the upgrade and retrofit of, for example:

- HMI installations
- OEM applications
- NCK area (CNC software, archives)
- ShopMill/ShopTurn applications
- Standard cycles
- Measuring cycles
- Languages
- PLC (for CNC software, function blocks)
- OEM screen forms
- Machine data manipulations
- Drives
  - Manipulation of SINAMICS data in drive archives
  - Creation of a SINAMICS archive with predetermined topology
  - Assignment of drive data in different SINAMICS topologies

#### Integration

Requirements:

- SINUMERIK 840D sl with SINUMERIK Operate

Requirements for PC/PG:

- Windows XP/Windows 7 operating system
- Drive with 100 MB of free memory space
- Network/Ethernet connection

The following must also be installed on the PC/PG:

- Microsoft .NET Framework
- Microsoft Internet Explorer, version 6 or later
- Acrobat Reader, version 4 or later

#### Selection and ordering data

| Description                                                                                                                                       | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate<br/>Create MyConfig</b><br>For series start-up and software upgrades<br>• Single license on CD-ROM<br>Software version 4.5 | <b>6FC5862-2YC41-0YA0</b> |



### Overview



#### Implement OEM-specific solutions in the CNC software with SINUMERIK Integrate Create MyCC

Create MyCC can be used to implement manufacturer-specific NCK functions (compile cycles). They are programmed in C or C++ on a SUN workstation with the Solaris operating system. The result is uploaded to the SINUMERIK as an executable file and permits the real-time area of the control to be adjusted and expanded.

Create MyCCI supports the development of loadable compile cycles based on customized interfaces without requiring special hardware as a development environment. For this special application, the customer uses software (GNU compiler and GNU linker) in an environment known as "Cygwin software shell" on a Windows PC. Use of this application is conditional upon installation of the corresponding interface as a loaded compile cycle on the control system.

The Create MyCC package is subject to the issue of an export license. It is also subject to the conclusion of an OEM contract.

### Selection and ordering data

| Description                                                                                                                         | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Create MyCC</b><br>For openness in the NCK<br>OEM contract required.                                         | <b>On request</b>         |
| <b>SINUMERIK Integrate Create MyCCI</b><br>For openness in the NCK based on customized interface<br>OEM contract required.          | <b>6FC5863-1YP00-0YB8</b> |
| <b>SINUMERIK Integrate Create MyCCI /Int</b><br>For openness in the NCK based on Interpreter interface<br>OEM contract required.    | <b>6FC5863-0YP00-0YB8</b> |
| <b>Accessories</b>                                                                                                                  |                           |
| <b>SINUMERIK Integrate Run MyCC</b><br>License for compile cycles developed by the OEM<br><br>• Single license without data carrier | <b>6FC5800-0AM04-0YB0</b> |

# SINUMERIK Integrate

## Create-it!

### Create MyInterface

#### Overview

The Create MyInterface software is used to integrate SINUMERIK controls into a customer's production network. All essential machine data (such as status information, piece counts, alarms, messages, CNC programs, tool service life) can be exchanged via Create MyInterface between a central control system and the PLC.

#### Benefits

- Simple integration of the control system with customer/project applications through a defined Ethernet/TCP-IP-based interface
- Simple configuring of the data to be transferred on the PLC
- Create MyInterface as a tool that can be used to implement measures designed to boost productivity:
  - Machine capacity utilization improved by production control
  - Machine downtimes reduced by transmission of maintenance data, etc.
- Simple application through the use of standard hardware/software components from the PC world
  - Networking hardware/software (Ethernet cards, TCP-IP)
  - Familiarization
  - Commissioning, maintenance

#### Function

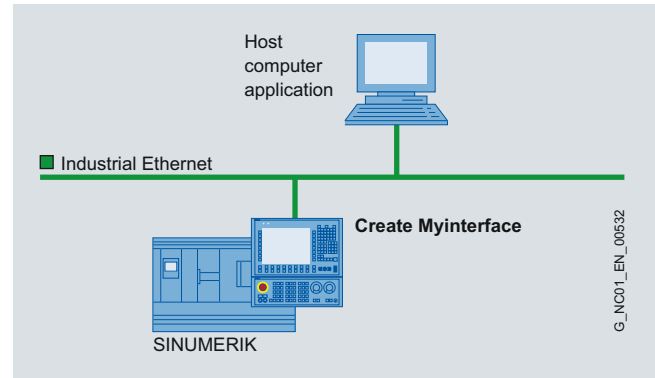
- Defined, opened communications interface for exchanging essential data of the SINUMERIK control
- Data transmission can be initiated by the host computer and/or by the SINUMERIK control
- The host application is created by the user in the Create MyInterface environment (interfaces, examples)
- The following data can be exchanged:
  - CNC programs, tool data
  - Machine status data
  - Messages
  - Production dialog data
  - Mode switchover, synchronization
  - Transport jobs
  - Configurable data from PLC or CNC

Even without its own user interface, Create MyInterface can run with additional languages (e.g., Korean, Russian, Simplified Chinese).

#### Integration

##### Requirements:

- SINUMERIK 840D sl with SINUMERIK PCU 50, max. 4 NCUs
- Computer-controlled loading and unloading of tools requires Manage MyTools.



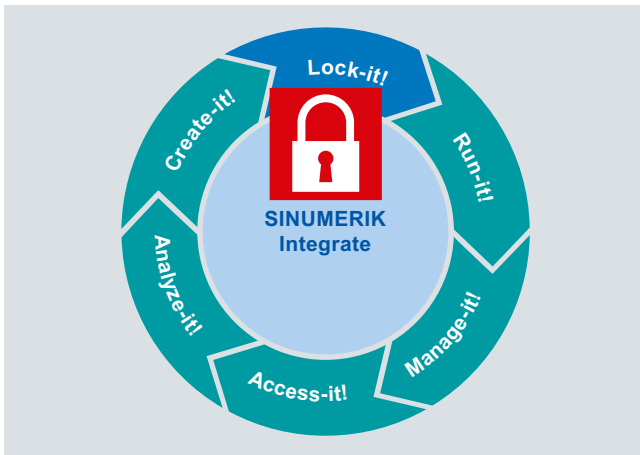
Create MyInterface cannot run by itself in a given systems environment. An application to be created for a customer specifically (not included in Create MyInterface) must always be provided on the host computer side.

#### Selection and ordering data

| Description                                            | Order No.                 |
|--------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate<br/>Create MyInterface</b>      |                           |
| Communication software for host computer interface     |                           |
| Languages:<br>English, German                          |                           |
| • CD-ROM without license for current software version  | <b>6FC6000-7AC00-0AA8</b> |
| • CD-ROM without license for specific software version | <b>6FC6000-7AC02-0AA8</b> |
| • Single license without data carrier                  | <b>6FC5800-0AP50-0YB0</b> |

Example of a specific software version 2.6:  
6FC6000-7AC02-0AA8

### Overview



Lock MyCycles can be used to encrypt cycles and then store them as protected data in the control. Execution in the NC is possible without restrictions, but it is not possible to view the cycle. This protects the internal company know-how. The cycle can, however, be copied in encrypted form. It can, therefore, be used on other machines. However, it is also possible to permanently link the cycle to a specific CNC hardware.

### Lock MyPLC

All-round PLC machine program protection (SW version 4.6 and higher) is afforded with SIMATIC STEP 7 V5.5 and higher by encrypted block protection with the S7 Block Privacy program for the offline and online views. The KNOW-HOW-PROTECT function is still included in the application to guard technological knowledge against unauthorized access.

### Selection and ordering data

| Description                                                                                                                                 | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate<br/>LOCK MyCycles</b><br>Cycle protection (OEM)<br>for SINUMERIK 840D sl<br>• Single license<br>without data carrier | <b>6FC5800-0AP54-0YB0</b> |

# SINUMERIK Integrate

Run-it!

Run MyCC

## Overview



The openness in the NCK area of the SINUMERIK 840D sl allows users to develop solutions for (almost) every technological problem and application!

This is possible with the integration of technological add-on functions in the CNC software for NCU in the form of compile cycles. This kind of compile cycle can either be programmed by the user based on Create MyCC and the appropriate development environment, or through development and testing in industrial conditions contracted to Siemens.

Loadable compile cycles that offer special interfaces for customized developments can be implemented with Run MyCCI.

## Application

A typical example for the use of compile cycles are special transformations for specific machine kinematics. With these transformations, workpieces can be programmed in Cartesian coordinates while the transformation calculates the required machine axis movements.

## Selection and ordering data

| Description                                                                                                                                              | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Run MyCC</b><br>For SINUMERIK 840D sl<br>License for compile cycles developed by the OEM<br>• Single license without data carrier | <b>6FC5800-0AM04-0YB0</b> |
| <i>Technological add-on functions in the form of loadable compile cycles as an option for SINUMERIK 840D sl</i>                                          |                           |
| <b>SINUMERIK Integrate Run MyCC /RESU</b><br>Continue machining at the contour (retrace support)                                                         | <b>6FC5800-0AM24-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /2TRA</b><br>Transformation: DOUBLETRANSMIT                                                                              | <b>6FC5800-0AM25-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /RCTRA</b><br>Transformation: Handling                                                                                   | <b>6FC5800-0AM31-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /HSLC</b><br>High-speed laser switching signal                                                                           | <b>6FC5800-0AM38-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /CLC</b><br>Clearance control 1D/3D in position control cycle                                                            | <b>6FC5800-0AM40-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /PACO</b><br>Transformation: PARACOP 3 AXES                                                                              | <b>6FC5800-0AM44-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /SCIS</b><br>Transformation: Pantograph kinematics                                                                       | <b>6FC5800-0AM51-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /SEC-KT</b><br>Spatial compensation for kinematic transformations                                                        | <b>6FC5800-0AM57-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /TPM-PB</b><br>PROFIBUS tool and process monitoring                                                                      | <b>6FC5800-0AM62-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /SCRA</b><br>Transformation: SCARA, 2/3 axes                                                                             | <b>6FC5800-0AM68-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /SKID</b><br>Transformation: Double slide                                                                                | <b>6FC5800-0AM80-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /AXCO</b><br>Compensation of a forced mechanical coupling                                                                | <b>6FC5800-0AM81-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /KPXT</b><br>Drive current measurement                                                                                   | <b>6FC5800-0AM82-0YB0</b> |
| <b>SINUMERIK Integrate Run MyCC /DSTT</b><br>Transformation: Dynamic swivel tripod                                                                       | <b>6FC5800-0AM84-0YB0</b> |

## Selection and ordering data (continued)

| Description                                                                                                                 | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <i>Technological add-on functions in the form of loadable compile cycles as an option for SINUMERIK 840D sl (continued)</i> |                           |
| <b>SINUMERIK Integrate<br/>Run MyCC /CRIP</b><br>Crank interpolation                                                        | <b>6FC5800-0AN04-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /PROT</b><br>Axis collision protection                                                  | <b>6FC5800-0AN06-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /ADAS</b><br>Axis data output via PROFIBUS                                              | <b>6FC5800-0AN07-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /VIBX</b><br>Vibration extinction                                                       | <b>6FC5800-0AN11-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /IMD-L</b><br>Integrated tool monitoring and diagnostics, IMD light                     | <b>6FC5800-0AN12-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /VCS-A3</b><br>Spatial compensation VCS-A3                                              | <b>6FC5800-0AN15-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /VCS-A5</b><br>Spatial compensation VCS-A5                                              | <b>6FC5800-0AN16-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /VCS-A5 PLUS</b><br>Spatial compensation VCS-A5 PLUS                                    | <b>6FC5800-0AN17-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /PCTS</b><br>Package: Coupling, transformation and sensor technology                    | <b>6FC5800-0AN21-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /RDCC</b><br>Transformation:<br>Redundant axes at workpiece                             | <b>6FC5800-0AN26-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /VCS-ROT</b><br>Spatial compensation for 2 rotary axes                                  | <b>6FC5800-0AN31-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /DGEN</b><br>Transformation: Double GENeric                                             | <b>6FC5800-0AN34-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /THYK</b><br>Transformation:<br>Tripod hybrid kinematics                                | <b>6FC5800-0AN36-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /ROTE</b><br>Transformation:<br>Rotating eccentric                                      | <b>6FC5800-0AN37-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /ECCE</b><br>Transformation: Eccentric                                                  | <b>6FC5800-0AN41-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /MSPZ</b><br>Metal spinning protection area                                             | <b>6FC5800-0AN42-0YB0</b> |

| Description                                                                                                                 | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <i>Technological add-on functions in the form of loadable compile cycles as an option for SINUMERIK 840D sl (continued)</i> |                           |
| <b>SINUMERIK Integrate<br/>Run MyCC /2RPT</b><br>Transformation:<br>Rotating workpiece and tool                             | <b>6FC5800-0AN43-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /ECCA</b><br>Transformation: Eccentric axis                                             | <b>6FC5800-0AN44-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /SW2A</b><br>Transformation:<br>Swivel by 2 linear axes                                 | <b>6FC5800-0AN45-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /COCO</b><br>Magnetic cogging torque compensation                                       | <b>6FC5800-0AN46-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /SANS</b><br>Scalable analog setpoint                                                   | <b>6FC5800-0AN48-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /COTE</b><br>Technological functions with compressor                                    | <b>6FC5800-0AN50-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /XOUT</b><br>Extrapolated switching signals                                             | <b>6FC5800-0AN51-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /PIVA</b><br>Transformation: Swivel axis                                                | <b>6FC5800-0AN52-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /ROBX</b><br>Transformation: ROBotic eXtended                                           | <b>6FC5800-0AN54-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /PROX</b><br>Measuring inputs, expanded (16) for axial measurements with TM17           | <b>6FC5800-0AN57-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /AMOV</b><br>Variable-based axis movement                                               | <b>6FC5800-0AN62-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCC /PRIG</b><br>Path-related pulse output                                                  | <b>6FC5800-0AN76-0YB0</b> |
| <i>Loadable compile cycles that offer special interfaces for customized developments can be implemented with Run MyCCI.</i> |                           |
| <b>SINUMERIK Integrate<br/>Run MyCCI /COOC</b><br>COA interface for compiled OEM cycles                                     | <b>6FC5800-0AM67-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCCI /IMD-B</b><br>Integrated tool monitoring and diagnostics, Base                         | <b>6FC5800-0AN13-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCCI /VCI</b><br>Spatial compensation interface                                             | <b>6FC5800-0AN74-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyCCI /UCI</b><br>Universal compensation interface                                           | <b>6FC5800-0AN75-0YB0</b> |

# SINUMERIK Integrate

## Run-it!

### Run MyHMI

#### Overview



#### Run MyHMI

Programmable HMI applications can be executed with Run MyHMI. The applications are programmed with either QT/C++, Visual Basic .NET or C#. The programming package offers complete flexibility and a very wide range of functions for generating customized operating screens. The user is given very broad scope for expanding the SINUMERIK user interface, from the simple operation of integrating individual user screens in SINUMERIK Operate to the more complex process of creating customized user interfaces.

#### Run MyHMI /3GL

Run MyHMI /3GL permits programmed HMI applications to be executed on the PCU 50.5 or the NCU and also allows

- the integration of individual screens
- the creation of user-defined operating areas

#### Run MyHMI /3GL (.NET)

Run MyHMI /3GL permits programmed HMI applications to be executed on the PCU 50.5 under the Windows operating system, and also allows the creation of

- user-defined operating areas with .NET Framework
- background functions with data communication

#### Run MyScreens

The Run MyScreens functionality allows users to design their own user interfaces in order to visualize either machine-manufacturer or end-user functional expansions or simply their own screen form layouts.

#### Run MyHMI /PRO

Run MyHMI /PRO allows users to run configurations on the PCU 50.5 or the NCU that have been created with the Configuration System HMI PRO CS. It includes the standardized operating screens within HMI PRO as well as the freely configurable user screens that have been created by variable layout.

#### Run MyHMI /SIMATIC OP

The software option SINUMERIK Integrate Run MyHMI /SIMATIC OP allows users to run their own HMI applications on SIMATIC CE panels on the SINUMERIK control. The SIMATIC WinCC flexible 2008 engineering software and the SINUMERIK HMI configuring package WinCC flexible 2008 are needed to create these applications.

When the SINUMERIK HMI configuring package WinCC flexible 2008 is added, the functions can be used in conjunction with:

- CNC variable dialog (symbolic presentation)
- CNC file management, e.g. selection of part program
- CNC functions, e.g. Create tool, CNC Start/Stop and other PI services
- Alarms and messages in plain text

SIMATIC CE Panels can be connected via PROFIBUS or Ethernet depending on which interface is provided on the panel.

One SINUMERIK Integrate Run MyHMI /SIMATIC OP software option is required per NCU in order to execute OEM applications on the SIMATIC CE Panels (OP 170B, OP 177B, OP 277, TP 170B, TP 177B, TP 277, Mobile Panel 170, Mobile Panel 177, Mobile Panel 277, MP 277, MP 370, MP 377).

### Selection and ordering data

| Description                                                                                                                                                                                                   | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate<br/>Run MyHMI /3GL</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK<br>Operate operating software)<br>• Single license<br>without data carrier        | <b>6FC5800-0AP60-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyHMI /3GL (.NET)</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK<br>Operate operating software)<br>• Single license<br>without data carrier | <b>6FC5800-0AP66-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyScreens</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK<br>Operate operating software)<br>• Single license<br>without data carrier         | <b>6FC5800-0AP64-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyHMI /PRO</b><br>For SINUMERIK 840D sl<br>Software option<br>• Single license<br>without data carrier                                                                         | <b>6FC5800-0AP47-0YB0</b> |
| <b>SINUMERIK Integrate<br/>Run MyHMI /SIMATIC OP</b><br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK<br>Operate operating software)<br>• Single license<br>without data carrier | <b>6FC5800-0AP03-0YB0</b> |

### More information

- You will find further information in the "Updates" at:  
[www.siemens.com/automation/support](http://www.siemens.com/automation/support)

- You can obtain technical support and advice from:

**Siemens AG**  
Industry Sector

Stuttgart office  
Competence Center Stuttgart

Fax: +49 711 137-2838  
E-mail: [info.mc-hmi-oa.rd@siemens.com](mailto:info.mc-hmi-oa.rd@siemens.com)

- You can obtain the Qt license key directly from:

**Digia Ltd.**

Contact: Joachim Hagene

Tel.: +47 47 451220  
Fax: +47 22 237040  
E-mail: [qt-sales@digia.com](mailto:qt-sales@digia.com)

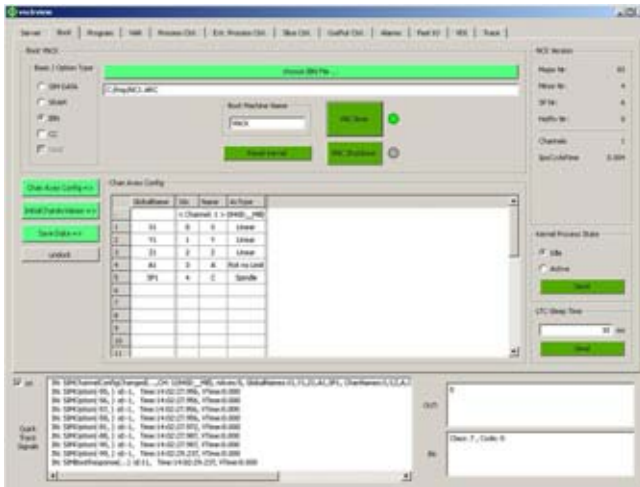


# SINUMERIK Integrate

## Run-it!

### Run MyVNCK

#### Overview



#### Selection and ordering data

| Description                                                                                                                                              | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Run MyVNCK</b><br>VNCK basic package for PC                                                                                       | <b>6FC5868-0XC40-0YA8</b> |
| <b>SINUMERIK 840D sl VNCK</b><br><ul style="list-style-type: none"> <li>Basic package up to 4 axes simultaneously for 1 machine configuration</li> </ul> | <b>6FC5868-0XF00-0YB0</b> |
| <ul style="list-style-type: none"> <li>Basic package for 5 axes or more simultaneously for 1 machine configuration</li> </ul>                            | <b>6FC5868-0XF01-0YB0</b> |
| <ul style="list-style-type: none"> <li>Expansion &gt;1 machine configuration</li> </ul>                                                                  | <b>6FC5868-0XF03-0YB0</b> |
| <b>SINUMERIK Option VNCK-Link</b><br>for 1 machine configuration                                                                                         | <b>6FC5261-0AX30-0AB0</b> |

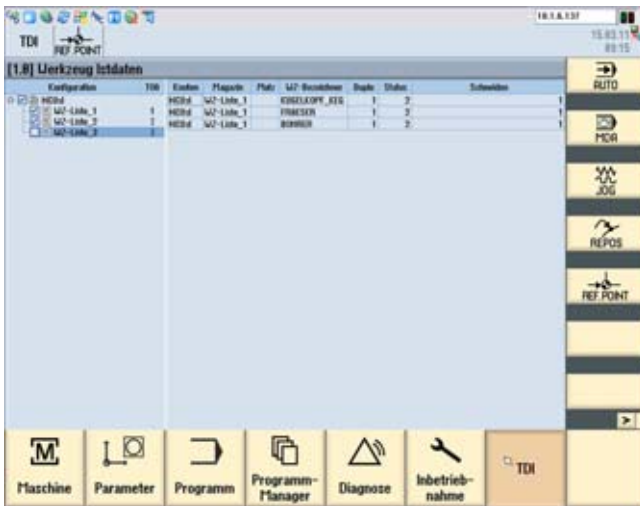
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Run MyVNCK integrates NC functions into the simulation process. The kernel uses the same source code as the NC kernel in the control system, allowing NC algorithms, language scope, commissioning, data management and communication to be handled in the same way for both Run MyVNCK and NCK. Run MyVNCK is capable of simulating control sequences with their full range of functions. NC programs including all their high-level language elements can therefore be checked for syntactic correctness and executability. The working area can be reliably assessed for risk of collision and the workpiece geometry and motion behavior can be evaluated. Program runtimes can also be calculated.

By deploying other components such as the CAD data for the real machine, the machine manufacturer or CAM system manufacturer can create a virtual machine that resembles the real machine as closely as possible.

Use of SINUMERIK Integrate Run MyVNCK is always subject to conclusion of an integration contract.

## Overview



### Network-wide tool management

Tool organization across the entire production area is one of the central tasks of CNC production. Requirements are:

- Smooth tool handling processes
- Cost control
- Cost savings

Integrated software solution for managing the tool cycle from tool setting to the tool stores and finally to setup on the machine.

Forward tool planning reduces machine downtimes caused by missing tools.

Optimization of cycle and nonproductive times with respect to tools.

This is where Manage MyTools makes the difference. It makes this potential for rationalization transparent and provides functions that help attain the potential savings revealed.

SINUMERIK Integrate Manage MyTools has the correct connection concepts and functions for a complete overview of the tools used and to permit a closed tool data cycle in the production area for:

- Single machines, flexible transfer lines, or complete machinery
- Highly automated SINUMERIK CNCs
- SIMATIC S7-based controls
- Integration of tool setting stations or cross-factory tool management systems.

## Benefits

- Clear overview of tool circulation makes it possible to cut tool costs.
- The modularity of the Manage MyTools modules permits optimized customer-oriented and demand-oriented application.
- Use scalable from a single machine up to a complete machine park.

## Function

All Manage MyTools functions are designed such that they can operate on a single machine or within networked, interconnected systems, e.g., they can display an overview of all actual tool data on a single machine or a central control system.

Scope of functions:

- Actual tool data
- Service life can be varied from 10 to 100 %
- Lock tool, tool details
- Import/export file interface
- Tool transfer

Thanks to the consistent design as a client-server solution and the use of communication mechanisms, it is possible to vary the distribution of the modules in the network and to access them from any position. This means up-to-date information can always be accessed wherever it is needed.

The Manage MyTools interfaces have been designed to run and operate both on a SINUMERIK platform (function keys) and on a PC platform (pull-down menus).

The following functions are available:

- Availability of actual tool data throughout the network
- Operator-prompted loading and unloading with TO data import from the tool setting station
- Planning of tool demand based on current magazine loading
- Statistical evaluations of tool use
- Interface client for connecting external tool management systems
- All available functions combined on a single server and network-wide operation of client-based interfaces
- Stand-alone non-network-compatible function package for tool planning and connection to tool setting stations

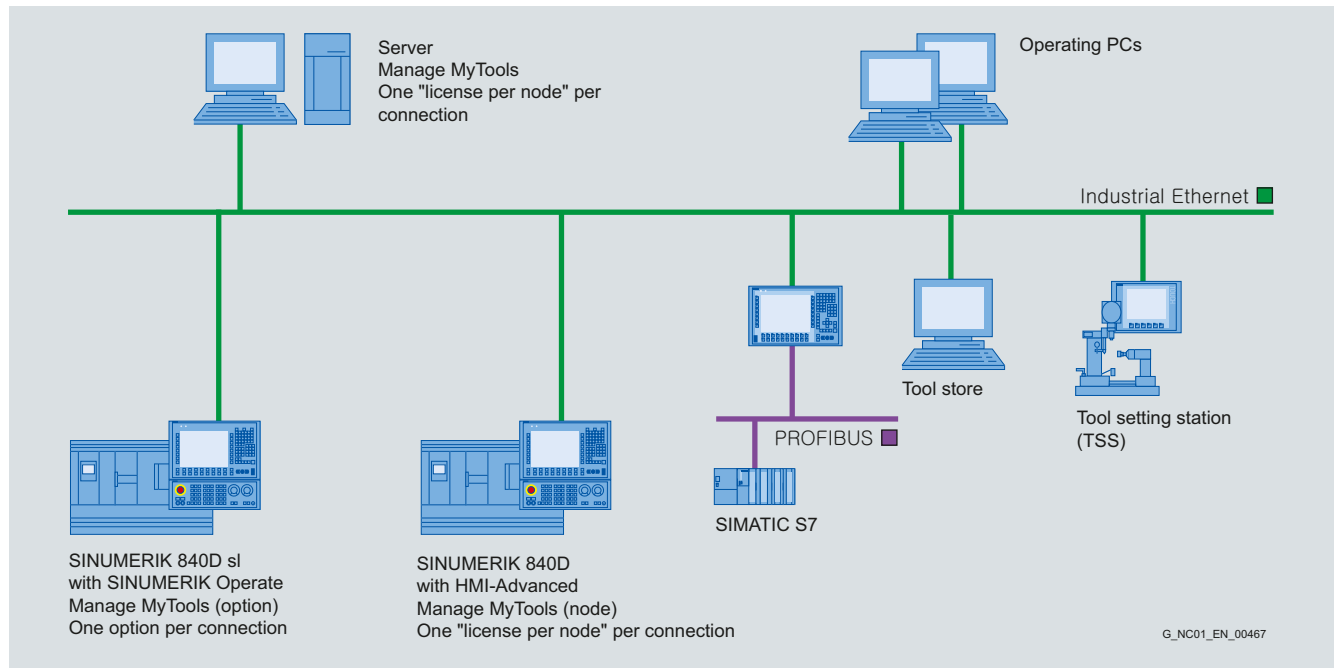
# SINUMERIK Integrate Manage-it!

## Manage MyTools

### Integration

#### Requirements:

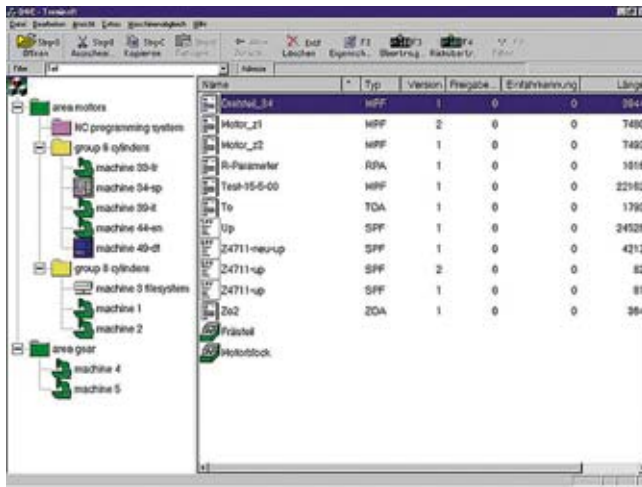
- With SINUMERIK controls, it is assumed that the standard tool management option is installed. SINUMERIK controls without standard or machine-manufacturer-specific tool management can be configured as SIMATIC S7-based machines or must be connected specific to the project.
- In the case of controls from other vendors, the manageable tool data are reduced to a simplified tool data structure. A basic precondition is that the component must be Windows-based, the control must be accessible via Ethernet and the interface must be OPC-compatible
- If tools stored in tool cabinets are to be recorded and managed, a user interface for loading and unloading the tools (e.g., a Windows PC integrated in the network) must be assigned to the respective storage location



### Selection and ordering data

| Description                                                                                                                                                                         | Order No.                 | Description                                                                                                                                                                         | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Manage MyTools</b><br>Option for SINUMERIK Operate<br>For SINUMERIK 840D sl<br>Software option<br>(in conjunction with SINUMERIK Operate operating software) |                           | <b>SINUMERIK Integrate Manage MyTools</b><br>Data carrier for installation of server, PC, PCU 50.5 and SINUMERIK 840D sl (in conjunction with SINUMERIK Operate operating software) |                           |
| <ul style="list-style-type: none"> <li>Single license, without data carrier</li> </ul>                                                                                              | <b>6FC5800-0AP37-0YB0</b> | <ul style="list-style-type: none"> <li>CD-ROM without license, specific version<br/>Languages:<br/>Chinese Simplified, English, French, German, Italian, Spanish</li> </ul>         | <b>6FC6000-2XC0-■-AA8</b> |
| <b>SINUMERIK Integrate Manage MyTools</b><br>License per system participant (e.g. HMI-Advanced, server, operating stations), order data carrier separately                          |                           | <ul style="list-style-type: none"> <li>CD-ROM without license, current version</li> </ul>                                                                                           | <b>6FC6000-2XC02-4AA8</b> |
| <ul style="list-style-type: none"> <li>Single license per connection node without data carrier</li> </ul>                                                                           | <b>6FC6000-2NF00-0YB0</b> | Example of a specific software version 2.4:<br>6FC6000-2XC02-4AA8                                                                                                                   |                           |

### Overview



The SINUMERIK Integrate NC program management module Manage MyPrograms allows NC programs to be organized and managed on a network-wide basis and reduces the costs of NC data organization.

As a result of the convenience of managing and archiving NC programs electronically, the latest program versions are always available to the machines throughout the entire production area. This is particularly relevant in production areas with a high degree of flexibility and variation and where NC data frequently change, for example in machining centers, special-purpose machines and flexible production lines.

### Overview (continued)

The NC program management module Manage MyPrograms consists of software modules which can be scaled to suit functional requirements.

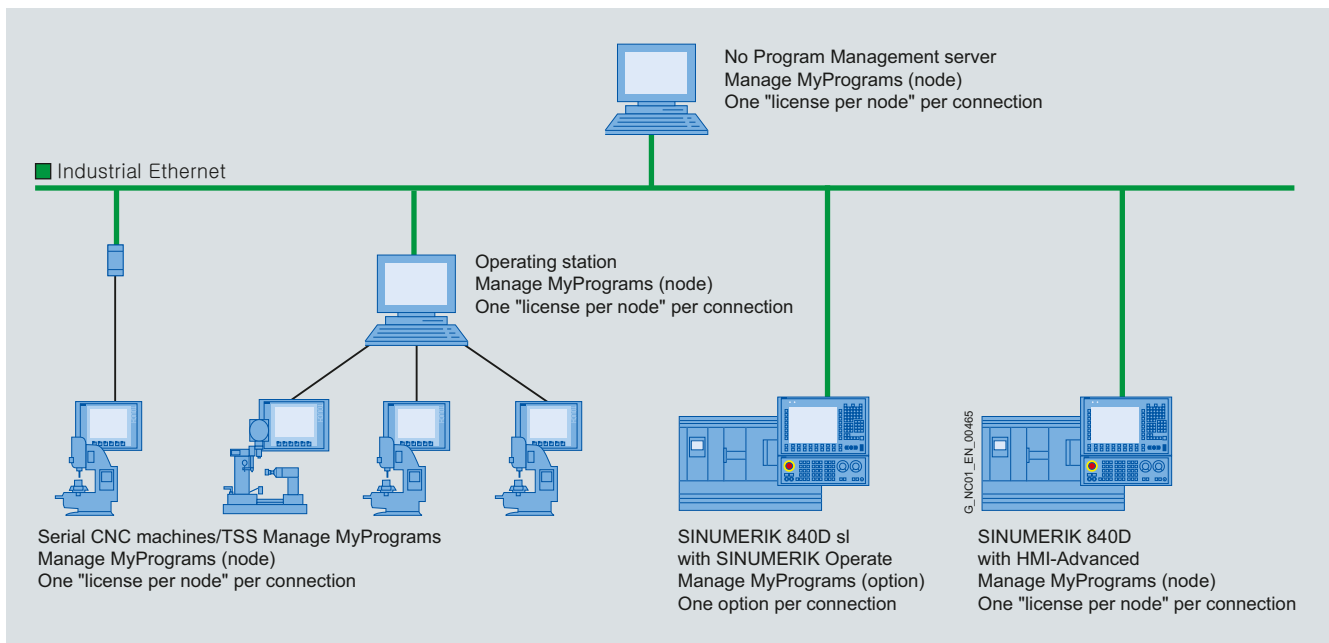
SINUMERIK Integrate Manage MyPrograms is available as a software option with SINUMERIK Operate.

A license per node is available for PC systems and controls on which HMI-Advanced is installed. This license is required for each participating device (= node). In addition to the license per node, a data carrier for installing the software is also available.

### Benefits

- Costs of CNC data organization are reduced:
  - Convenient, central CNC program management which provides access to CNC programs and attachments, e.g. PDFs, images, etc.
  - Low organization overhead and simple handling eliminate the need for external data carriers for archiving CNC data
- Increase in machine operating times and reduction in setup times through fast, reliable supply of CNC programs
- Cost-effective and reliable electronic data archiving
- Automatic CNC data archiving of the SINUMERIK control
- Simple integration of many different types and generations of CNCs
- Direct connection of SINUMERIK PCU 50.5 with Windows via standard Industrial Ethernet network
- Easy CNC program import and export functions to/from Manage MyPrograms

4



# SINUMERIK Integrate

## Manage-it!

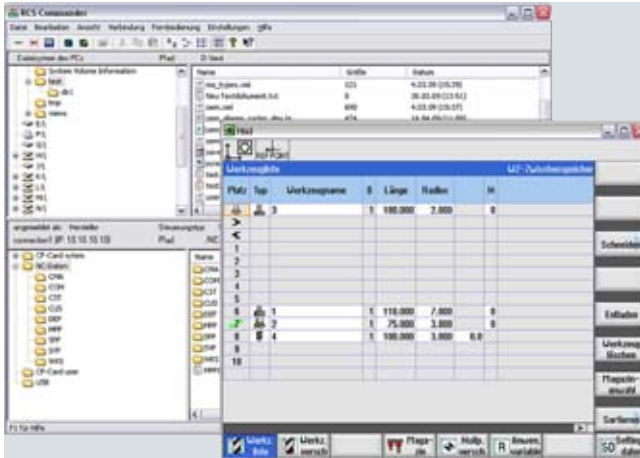
### Manage MyPrograms

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                | Order No.                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>SINUMERIK Integrate<br/>Manage MyPrograms</b><br>For SINUMERIK 840D sl<br>Software option<br><ul style="list-style-type: none"> <li>• Single license,<br/>without data carrier</li> </ul>                                                                                                                                                                                                                                                               | <b>6FC5800-0AP41-0YB0</b>                                   |
| <b>SINUMERIK Integrate<br/>Manage MyPrograms</b><br>License per connection node,<br>per system participant<br>(e.g. HMI-Advanced, server,<br>operating station),<br>order data carrier separately<br><ul style="list-style-type: none"> <li>• Single license per connection<br/>node without data carrier</li> </ul>                                                                                                                                       | <b>6FC6000-0NF00-0YB0</b>                                   |
| <b>SINUMERIK Integrate<br/>Manage MyPrograms</b><br>Data carrier for installation of<br>server, PC, PCU 50.5 and<br>SINUMERIK 840D sl<br>(in conjunction with SINUMERIK<br>Operate operating software)<br><ul style="list-style-type: none"> <li>• CD-ROM without license,<br/>specific version<br/>Languages:<br/>Chinese Simplified, English,<br/>French, German, Italian,<br/>Spanish</li> <li>• CD-ROM without license,<br/>current version</li> </ul> | <b>6FC6000-0XC0-■-■AA8</b><br><br><b>6FC6000-0XC02-4AA8</b> |

Example of a specific software version 2.4:  
 6FC6000-0XC02-4AA8

### Overview



### Commissioning support and remote diagnostics with SINUMERIK Operate

SINUMERIK Integrate Access MyMachine /P2P supports the commissioning of machines with SINUMERIK Operate (software version 2.6 and higher) using a standard Windows PC. Its scope of functions includes the exchange of files between the service PC and the control as well as operation of the HMI user interface. The file exchange functionality permits access from the NCU to files stored on the CF card and to files in the NCK. Various user profiles are also supported.

The file exchange only requires the Access MyMachine /P2P software, which is installed on the PC.

If remote access, e.g. via modem, to the HMI user interface is required, the approved modem for this application is the TS Adapter IE (2 variants: analog or ISDN telecommunications networks).

### Benefits

Cost savings in service thanks to:

- Less frequent service calls for the machines
- More efficient deployment of on-site service personnel
- Better preparation of service calls

Machine availability is enhanced thanks to:

- Rapid online presence on site
- Rapid file transfer to and from the machine

### Function

- Remote control, monitoring and administration (Access MyMachine /P2P option required)
- File transfer to CF card and NC file system
- Connection is established following confirmation by the operator
- Status display on the operator panel
- Optional with teleservice software: Machine connections can be maintained centrally and access data administered via remote connections.

### Integration

The components can be connected via:

- Point-to-point connection in combination with TS Adapter IE (analog, ISDN modem)
- Ethernet in local networks (LAN and WLAN)
- Internet (VPN), taking account of local IT security regulations (IT Policy)

### Selection and ordering data

| Description                                                                                                                                                                    | Order No.                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>SINUMERIK Integrate Access MyMachine /P2P</b><br>For SINUMERIK 840D sl<br>Software option<br>Languages:<br>Chinese Simplified, English,<br>French, German, Italian, Spanish | <b>6FC5800-0AP30-0YB0</b>    |
| <b>SINUMERIK Integrate Access MyMachine /P2P for PC/PG</b>                                                                                                                     |                              |
| • Current software version<br>single license with CD-ROM                                                                                                                       | <b>6FC5860-7YC00-0YA0</b>    |
| • Specific software version<br>single license with CD-ROM                                                                                                                      | <b>6FC5860-7YC ■ ■ ■ YA0</b> |
| <b>TS Adapter IE modem</b><br>with integrated analog modem                                                                                                                     | <b>6ES7972-0EM00-0XA0</b>    |
| <b>TS Adapter IE ISDN</b><br>with integrated ISDN terminal<br>adapter                                                                                                          | <b>6ES7972-0ED00-0XA0</b>    |
| <b>Teleservice software</b><br>With floating license<br>Languages:<br>English, French, German, Italian,<br>Spanish                                                             | <b>6ES7842-0CE00-0YE0</b>    |

Example of a specific software version 2.7:  
6FC5860-7YC**10-2**YA0

### More information

#### Security note

In the case of software for remote maintenance or connection to higher-level networks, suitable protection measures must be taken (including industrial security, e.g. network segmentation) to guarantee safe operation of the system.

You can find more information on Industrial Security on the Internet at:

[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

# SINUMERIK Integrate

## Access-it!

### Access MyMachine /Ethernet

#### Overview



Access MyMachine /Ethernet enables worldwide, secure remote operation and monitoring of a machine tool automated with SINUMERIK.

The machine can be accessed remotely via Intranet (local network – LAN) or via the Internet (worldwide).

The following services are provided within Access MyMachine /Ethernet:

#### Remote desktop

This function allows remote operation and monitoring of the user interface of the control system. The user interface is not only accessible to the operator at the machine, but also to service personnel in cases where they are providing support from a remote location, for example.

#### File transfer

The File transfer function allows files to be copied into the archive system of the CNC. In addition, files can be transferred from the CNC's archive system to the remote desktop.

#### Selection and ordering data

| Description                                                      | Order No.                 |
|------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate<br/>Access MyMachine /Ethernet</b>        |                           |
| Diagnostic Services<br>(Network Services)                        |                           |
| • 1st year (term of contract<br>15 months) <sup>1)</sup>         | <b>6FC6001-0EE00-0DS0</b> |
| • 12 months extension <sup>1)</sup>                              | <b>6FC6001-0EE00-0DS1</b> |
| <b>Requirements for the use of Access MyMachine/Ethernet are</b> |                           |
| <b>SINUMERIK Integrate<br/>Access MyMachine /Ethernet</b>        |                           |
| Account (Company Account)                                        | <b>6FC6001-0EE00-0CA1</b> |
| <b>SINUMERIK Integrate<br/>Access MyMachine /Ethernet</b>        |                           |
| Setup Fee (Connect Machine)                                      |                           |
| • Without EUNA                                                   | <b>6FC6001-0EE00-0CE0</b> |
| • With EUNA                                                      | <b>6FC6001-0EE00-0CE1</b> |

EUNA: End User Notification Administration

#### More information

##### Security note

In the case of software for remote maintenance or connection to higher-level networks, suitable protection measures must be taken (including industrial security, e.g. network segmentation) to guarantee safe operation of the system.

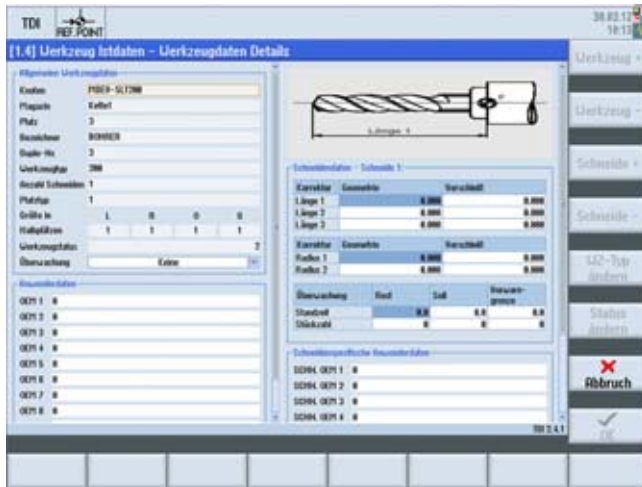
You can find more information on Industrial Security on the Internet at:

[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

<sup>1)</sup> Including 6 hours of remote online time per machine and year.



## Overview



SINUMERIK Integrate Access MyTool ID is a software module for the SINUMERIK system which is designed to allow easy loading of tools with tool identification systems from the PLC. The tool data can be loaded from the tool cabinet or the code carrier to the control system, or vice versa.

## Benefits

- Free code parsing allows use of a broad variety of data carriers
- Various connection possibilities
- Use of low-cost read-only data media through addition of tool data via network
- Reduction of fault-prone manual inputs
- Transparent tool data because data are carried on the tool

## Function

- The following data carriers are supported depending on the type of connection and interface:
  - PROFIBUS/PLC: Balluff, Bilz, MOBY, barcode
  - RS232C interface of the SINUMERIK PCU: Balluff (BIS C-480 or BIS C-600), barcode
- Loading/unloading of tool data with/without searching for empty location
- Reading/writing tool and cutting edge data
- Creating/deleting tool in tool list
- Loading/unloading tool in tool cabinet
- Supplementing tool data on code carrier with saved tool data from the tool cabinet or list, e.g., when using read-only chips and barcode
- PLC interface for starting the write/read procedure, e.g. via OP 177B, key or limit switch, e.g. automatic execution of loading/unloading points with reading/writing on code carrier

## Integration

### Requirements:

- SINUMERIK 840D sl with SINUMERIK Operate

## Selection and ordering data

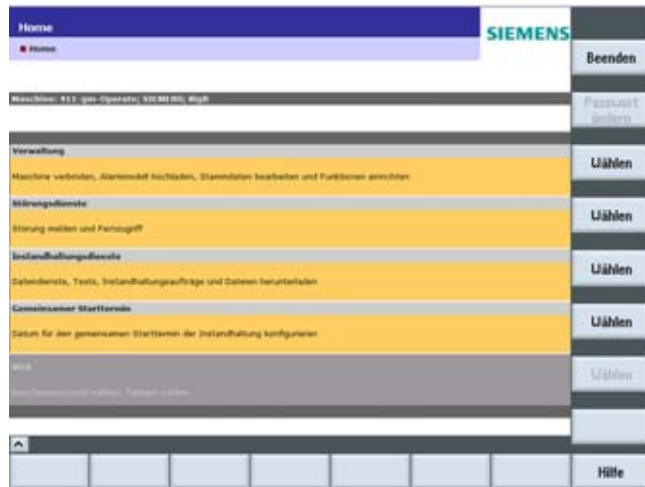
| Description                                                                                                                                                                                                                                               | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Access MyTool ID</b><br>Option for SINUMERIK Operate<br>For SINUMERIK 840D sl, the software is included in the SINUMERIK Operate package<br><ul style="list-style-type: none"> <li>Single license, without data carrier</li> </ul> | <b>6FC5800-0AP52-0YB0</b> |

# SINUMERIK Integrate

## Analyze-it!

### Analyze MyCondition

#### Overview



Analyze MyCondition provides test cycles for equability, circularity and universal axis tests, and also offers functionality for continuous data acquisition during the production process. It also supports the reporting of parameters about wear and tear of mechatronic components. By employing a condition-oriented maintenance routine, you will keep your machines running longer as well as reduce downtimes and outages.

By means of standardized test procedures, Analyze MyCondition supports machine operators, maintenance technicians and service engineers with determining the machine condition and monitoring the wear on the machine over time. Through continuous evaluation of the condition of the machine tools, trends can be detected early and measures can be taken or planned on time. Individual machine components can also be monitored cyclically.

#### Benefits

- Designing and optimizing the maintenance measures for your machine
- Early spare parts disposition through status monitoring and analysis of machine components
- Provision of a planning service for your customers for preventative or condition-oriented maintenance measures

#### Integration

Requirement:

- SINUMERIK 840D sl with SINUMERIK Operate

#### Selection and ordering data

| Description                                                                                                       | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SINUMERIK Integrate Analyze MyCondition</b><br>(Condition Monitoring Basic) for condition-oriented maintenance |                           |
| • 1st year (term of contract 15 months)                                                                           | <b>6FC6001-0EE00-0MB0</b> |
| • 12 months extension                                                                                             | <b>6FC6001-0EE00-0MB1</b> |
| <b>Requirements for the use of Analyze MyCondition are</b>                                                        |                           |
| <b>SINUMERIK Integrate Access MyMachine/Ethernet</b>                                                              |                           |
| Account (Company Account)                                                                                         | <b>6FC6001-0EE00-0CA1</b> |
| <b>SINUMERIK Integrate Access MyMachine/Ethernet</b>                                                              |                           |
| Setup Fee (Connect Machine)                                                                                       |                           |
| • Without EUNA                                                                                                    | <b>6FC6001-0EE00-0CE0</b> |
| • With EUNA                                                                                                       | <b>6FC6001-0EE00-0CE1</b> |

EUNA: End User Notification Administration

### Overview

| Complete designation                           | Abbreviation | Former designation                                                                                                                             | Order No.                                                                                                  |
|------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>SINUMERIK Integrate Create-it!</b>          |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Create MyHMI /3GL          | CMH/3        | SINUMERIK Operate Programming Package                                                                                                          | 6FC5861-1YC00-0YA0<br>6FC5861-1YC...YA0<br>6FC5861-1YP00-0YB0<br>6FC5861-1YP00-0YL8                        |
| SINUMERIK Integrate Create MyConfig            | CMC          | SinuCOM Installer                                                                                                                              | 6FC5862-2YC41-0YA0                                                                                         |
| SINUMERIK Integrate Create MyCC                | CMCC         | OEM contract, Open Architecture NCK                                                                                                            | On request                                                                                                 |
| SINUMERIK Integrate Create MyCCI               | CMCI         | COA contract, Customized Open Architecture NCK                                                                                                 | 6FC5863-1YP00-0YB8                                                                                         |
| SINUMERIK Integrate Create MyCCI /INT          | CMCI/I       | COA contract, Customized Open Architecture NCK light                                                                                           | 6FC5863-0YP00-0YB8                                                                                         |
| SINUMERIK Integrate Create MyInterface         | CMI          | RPC Remote Procedure Call (computer coupling)                                                                                                  | 6FC6000-7AC00-0AA8<br>6FC6000-7AC0...AA8<br>6FC5800-0AP50-0YB0                                             |
| <b>SINUMERIK Integrate Lock-it!</b>            |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Lock MyCycles              | LMC          | – (new product)                                                                                                                                | 6FC5800-0AP54-0YB0                                                                                         |
| <b>SINUMERIK Integrate Run-it!</b>             |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Run MyCC                   | RMCC         | SINUMERIK NCK RUNTIME OA                                                                                                                       | 6FC5800-0AM04-0YB0                                                                                         |
| SINUMERIK Integrate Run MyHMI /3GL             | RMH/3        | SINUMERIK Operate Runtime OA Programming                                                                                                       | 6FC5800-0AP60-0YB0<br>6FC5800-0AP66-0YB0                                                                   |
| SINUMERIK Integrate Run MyScreens              | RMS          | SINUMERIK Operate Runtime OA Easy Screen +<br>SINUMERIK Operate WinCC RT                                                                       | 6FC5800-0AP64-0YB0                                                                                         |
| SINUMERIK Integrate Run MyHMI /PRO             | RMH/P        | SINUMERIK HMI PRO sl RT                                                                                                                        | 6FC5800-0AP47-0YB0                                                                                         |
| SINUMERIK Integrate Run MyHMI /SIMATIC OP      | RMH/S        | SINUMERIK HMI copy license CE                                                                                                                  | 6FC5800-0AP03-0YB0                                                                                         |
| SINUMERIK Integrate Run MyVNCK                 | RMV          | SINUMERIK Virtual NCK                                                                                                                          | 6FC5868-0XC40-0YA8<br>6FC5868-0XF00-0YB0<br>6FC5868-0XF01-0YB0<br>6FC5868-0XF03-0YB0                       |
| <b>SINUMERIK Integrate Manage-it!</b>          |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Manage MyTools             | MMT          | MCIS TDI Machine (package incl. MCIS TDI Overview,<br>MCIS TDI Toolhandling) under construction <GAPs><br>Operate: TDI Planning, TDI Statistic | 6FC5800-0AP37-0YB0<br>6FC6000-2NF00-0YB0<br>6FC6000-2XC0...AA8<br>6FC6000-2XC02-4AA8                       |
| SINUMERIK Integrate Manage MyPrograms          | MMP          | MCIS DNC                                                                                                                                       | 6FC5800-0AP41-0YB0<br>6FC6000-0NF00-0YB0<br>6FC6000-0XC0...AA8<br>6FC6000-0XC02-4AA8                       |
| <b>SINUMERIK Integrate Access-it!</b>          |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Access MyMachine /P2P      | AMM/P        | MCIS RCS Host + RCS Commander                                                                                                                  | 6FC5800-0AP30-0YB0<br>6FC5860-7YC00-0YA0<br>6FC5860-7YC...YA0                                              |
| SINUMERIK Integrate Access MyMachine /Ethernet | AMM/E        | ePS Remote Access                                                                                                                              | 6FC6001-0EE00-0DS0<br>6FC6001-0EE00-0DS1<br>6FC6001-0EE00-0CA1<br>6FC6001-0EE00-0CE0<br>6FC6001-0EE00-0CE1 |
| SINUMERIK Integrate Access MyTool ID           | AMT          | MCIS TDI Ident Connection                                                                                                                      | 6FC5800-0AP52-0YB0                                                                                         |
| <b>SINUMERIK Integrate Analyze-it!</b>         |              |                                                                                                                                                |                                                                                                            |
| SINUMERIK Integrate Analyze MyCondition (ASP)  | AMC          | EPS COND. MON. BASIC                                                                                                                           | 6FC6001-0EE00-0MB0<br>6FC6001-0EE00-0MB1<br>6FC6001-0EE00-0CA1<br>6FC6001-0EE00-0CE0<br>6FC6001-0EE00-0CE1 |

Comparison between current and former product designations.



# SINAMICS S120 drive system



|             |                                             |              |                                                |
|-------------|---------------------------------------------|--------------|------------------------------------------------|
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# SINAMICS S120 drive system

## Introduction

### Overview

#### *SINUMERIK and SINAMICS automation system components*

#### SINAMICS S120 drive system

##### Line-side components

Line reactors  
Line filters  
Active Interface  
Modules



##### Line Modules

Smart Line  
Modules  
Active Line  
Modules  
Active Interface  
Modules



##### DC link components

Braking Module  
Braking resistors  
Capacitor Module  
Control Supply Module



##### Control Units

CU310-2  
CU320-2  
CUA31



##### Control Units SINUMERIK 840D sl

NCU 710.3 PN  
NCU 720.3 PN  
NCU 730.3 PN

NX10.3/NX15.3

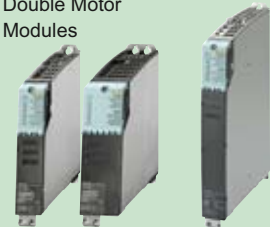


##### SINAMICS S120 Combi



##### Motor Modules

Single Motor  
Modules  
Double Motor  
Modules



##### Sensor Modules

SMC10/SMC20/SMC30  
SME20/SME25  
SME120/SME125



##### Supplementary system components

DMC20  
DME20  
TM41  
TM120  
TM15



##### Power Modules



G\_NC01\_EN\_00523



### Overview (continued)



Control Units CU310-2 PN, CU320-2 PN, NCU 730.3 PN and Numeric Control Extension NX15.3 (from left)

#### Platform concept and Totally Integrated Automation

All SINAMICS versions are based on a platform concept. Joint hardware and software components, as well as standardized tools for design, configuration, and commissioning tasks ensure high-level integration across all components.

SINAMICS handles a wide variety of drive tasks with no system gaps. The different SINAMICS versions can be easily combined with each other.

SINAMICS is part of the Siemens "Totally Integrated Automation" concept. Integrated SINAMICS systems covering engineering, data management and communication at automation level, ensure low-effort solutions with the SINUMERIK, SIMOTION, and SIMATIC control systems.

#### All formats can be combined freely

The different formats of SINAMICS S120 can be combined freely thanks to their innovative drive architecture with DRIVE-CLiQ interfaces, e.g. Line Modules in chassis format can be freely combined with Motor Modules in booksize format for multi-axis applications with high total output.



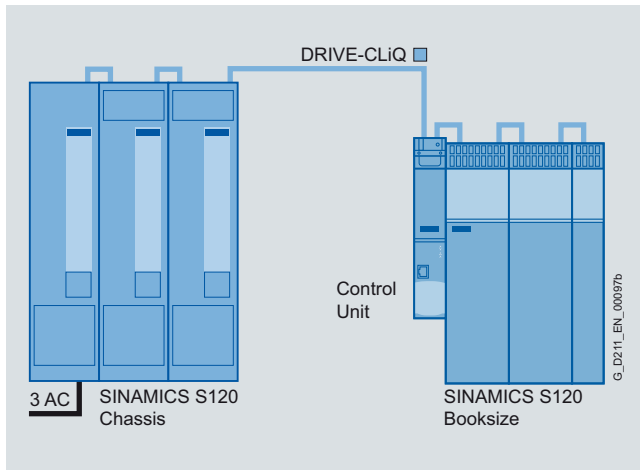
SINAMICS S120 blocksize, booksize, and chassis formats



# SINAMICS S120 drive system

## Introduction

### Overview (continued)



#### Modular system toolbox for complex drive tasks

SINAMICS S120 solves demanding drive tasks for a wide range of industrial applications and is, therefore, designed as a modular system. Users can choose from many different harmonized components and functions to create a solution that best meets their requirements. The powerful SIZER for Siemens Drives engineering tool makes it easier to choose and determine the optimum drive configuration. This is possible due to the consistent subdivision of the drive in hardware and software function objects, which ensures that the power unit and Control Unit are isolated from each other.

The power units are selected in accordance with the requirements for energy consumption for the motion of the working machine and for exchange of energy with the power supply network. The Control Unit is selected in accordance with the number of drives to be controlled and the performance required. Communication between the Control Unit and power unit takes place very simply via the digital system interface DRIVE-CLiQ.

SINAMICS S120 is enhanced by a wide range of SIMOTICS motors. Whether synchronous or asynchronous, all motor types are supported by SINAMICS S120.

#### Particularly suitable for multi-axis applications

Coordinated drives that carry out a drive and motion task together are used in many mechanical and plant engineering applications. These require drives with a connected DC link, which allows cost-saving energy balancing between braking and driving axes.

SINAMICS S120 includes Line Modules (line infeed) and Motor Modules (inverters) for a wide performance range. Their format enables a contiguous installation for space-saving multi-axis drive configurations.

#### System architecture with a central Control Unit

Electronically coordinated single drives work together to perform the drive tasks. Higher-level computerized numerical controls such as SINUMERIK operate the drives to achieve the required coordinated movement. This requires cyclic data exchange between the CNC and all the drives. To solve this task, the SINAMICS S120 uses a central Control Unit that is designed as a higher-level drive controller for all connected axes.

Simple technological tasks can be carried out by the SINAMICS S120 Control Unit itself. For more complex numerical tasks, it is replaced by powerful modules from the SINUMERIK product range.

As well as motion control, coordinate transformation and logic functions, these products also integrate the SINAMICS drive control. The NCUs of SINUMERIK can be positioned in or alongside the SINAMICS S120 drive group and connected via DRIVE-CLiQ. In case of tasks that require a greater number of motion axes due to the machine kinematics, the system base units can be expanded with the additional Numeric Control Extensions NX10.3/NX15.3.

#### DRIVE-CLiQ – the digital interface between all components

All SINAMICS S120 drive system components, including the motors and encoders, are interconnected by a shared serial interface called DRIVE-CLiQ. The standardized cables and connectors reduce the variety of different parts and cut storage costs.

Sensor Modules (converter boards) for converting standard encoder signals to DRIVE-CLiQ are available for motors and encoders without a DRIVE-CLiQ interface or for retrofitting applications. DRIVE-CLiQ cables are designed to allow decentralized attachments up to 100 m (328 ft).

#### Swift and automatic: The electronic rating plate

All SINAMICS S120 components with a DRIVE-CLiQ interface have an electronic rating plate. This rating plate contains all the relevant data about that particular component. For motors, for example, these data include the parameters of the electric equivalent circuit diagram and characteristic values for the built-in motor encoder. The Control Unit records this component-specific data automatically via DRIVE-CLiQ so that it does not need to be entered during commissioning or when the equipment is replaced.

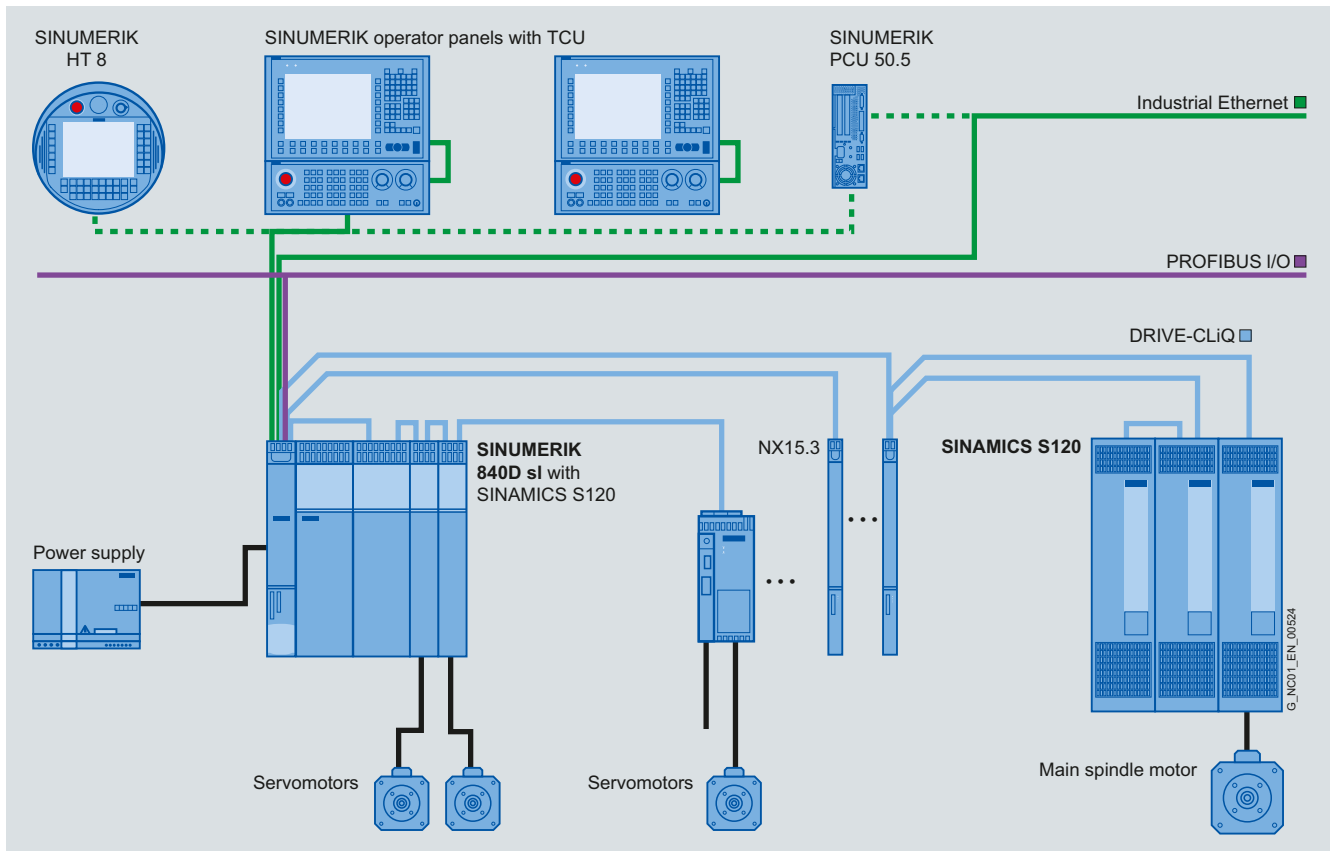
In addition to the technical specifications, the rating plate includes logistical data (manufacturer ID, order number, and globally unique ID). Since this data can be called up electronically on site or remotely, all the components used in a machine can always be individually identified, which helps simplify servicing.

The following overview features the SINAMICS S120 components that are primarily used for multi-axis drive tasks.

# SINAMICS S120 drive system

## Introduction

### Overview (continued)



SINAMICS S120 drive system with SINUMERIK 840D sl

# SINAMICS S120 drive system

## Introduction

### Overview (continued)

#### Control Units



CU310-2 PN, CU310-2 DP, CU320-2 PN,  
CU320-2 DP, NCU 730.3 PN, Numeric Control Extension NX15.3

#### Control Units for drive control in SINUMERIK, the Numeric Control Extensions NX and the CU320-2

##### SINAMICS S120 Control Unit CU320-2

These central Control Units can be used to create links between individual drives and implement simple technology functions.

The CU320-2 Control Unit has been designed to control multiple drives. With the SINUMERIK, up to 6 drives can be operated in servo control mode on one Control Unit.

The Control Units in the SINUMERIK CNCs are available in various rating classes for implementing coordinated motion control in a multi-axis interpolation grouping on machine tools:

#### SINUMERIK 840D sl

- NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN with integrated drive control for up to 6 axes
- Numeric Control Extensions NX10.3/NX15.3 for extended control of up to 3/6 axes

Commissioning and diagnosis of the various Control Units in combination with the power components is performed in combination with the SINUMERIK using the drive wizard of the SinuCom NC commissioning tool. Alternatively, the drive can be commissioned using the STARTER commissioning tool.

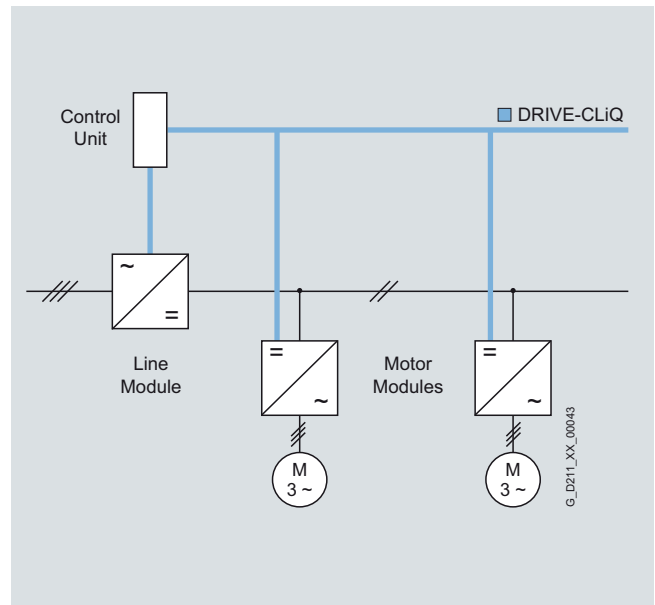
For further information about STARTER, see Engineering software.

#### Motor Modules

The Motor Modules are the final controlling element for the motor and feature a DC link that is fed from a DC voltage and, as an output, an inverter for feeding the motor.



Line Module and three Motor Modules in booksize format



Motor Modules are designed for multi-axis drives and are controlled by a SINUMERIK NCU or a CU320 Control Unit. The Motor Modules are interconnected through a common DC bus. Since the Motor Modules share the same DC link, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The DC link is supplied from the line voltage by a Line Module.

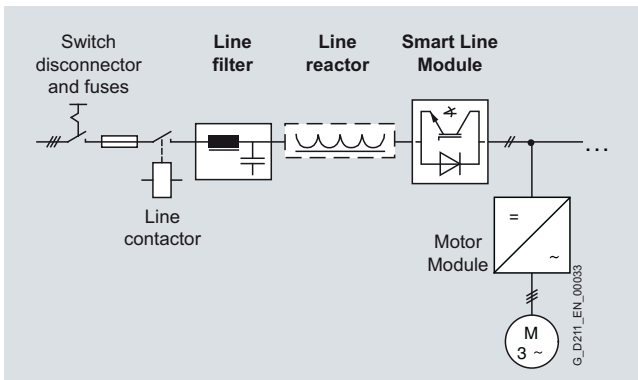
### Overview (continued)

#### Line Modules

Line Modules generate a DC voltage from the line voltage and supply Motor Modules with energy via the voltage-source DC link. The SINAMICS S120 range contains the following types of Line Modules:

##### Smart Line Modules

Smart Line Modules can feed energy to the DC link of a drive group through a non-stabilized converter and also feed back the generated excess energy into the power supply system. The line voltage variations are mirrored proportionately in the DC link voltage. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner for island supply systems or after a power failure (i.e. when energy cannot be recovered to the supply). When a Smart Line Module is used as the infeed, the matching line reactor must be installed. A line filter can be installed optionally to restrict the interference voltage level to EN 61800-3 Class C2 limits.

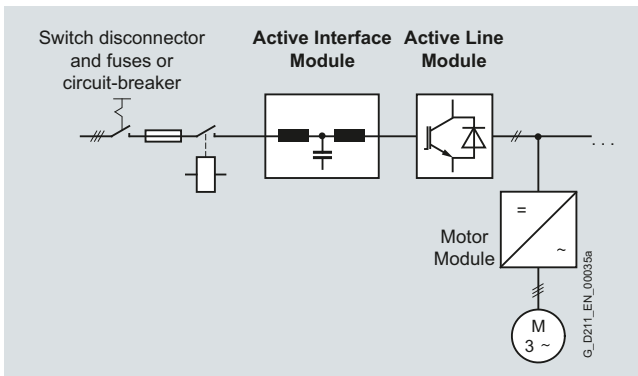


##### Active Line Modules

Active Line Modules can supply energy to the DC link rail and return regenerative energy to the supply system. In contrast to Smart Line Modules, Active Line Modules generate a regulated DC voltage which remains constant despite fluctuations in the line voltage. In this case, the line voltage must remain within the permissible tolerance range. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner even after a power failure (when energy cannot be recovered to the supply). Active Line Modules draw a virtually sinusoidal current from the supply which virtually rules out any harmful harmonics. It is essential that the Active Interface Module matched to the output type is used (block diagram, see Active Line Modules in chassis format).

##### Active Line Modules in chassis format

All the components required to operate an Active Line Module are integrated in the Active Interface Module. An external bypass contactor is required in addition for sizes HX and JX.

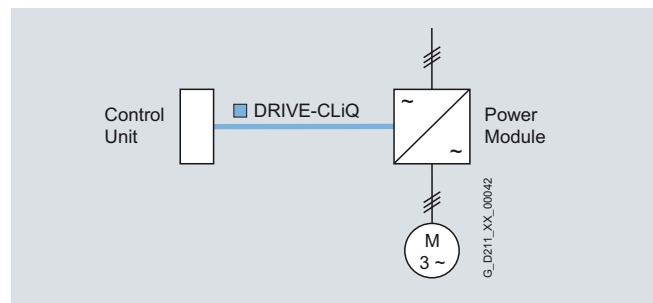


#### Power Modules

The simplest version of a SINAMICS S120 drive system consists of a CU310-2 Control Unit and a Power Module. A mains rectifier, a voltage-source DC link and an inverter for supplying a motor are integrated in the Power Module.



Power Module in blocksize format with CU310-2 PN Control Unit



Power Modules are designed for single drives which are not capable of regenerating energy to the supply. Generated energy produced during braking is converted to heat via braking resistors.

Power Modules can also be operated by a CU320-2 Control Unit or a drive control integrated in SINUMERIK, e.g. in configurations where a single drive has been added to a multi-axis drive group. In this case, the Power Modules in blocksize format must be equipped with the CUA31 Control Unit Adapter. This is connected with the CU320-2 Control Unit or the NCU in SINUMERIK using DRIVE-CLiQ. Power Modules in chassis format are directly connected to the Control Unit using a DRIVE-CLiQ cable.

The following versions are available:

- Motor Modules and Line Modules in booksize and chassis formats
- Power Modules in blocksize and chassis formats
- Motor Modules in booksize compact format
- SINAMICS S120 Combi

# SINAMICS S120 drive system

## Introduction

### Overview (continued)

#### Booksize format

Booksize format units are optimized for multi-axis applications and are mounted adjacent to one another. The connection for the common DC link is an integral feature.



With respect to control cabinet cooling, SINAMICS S120 in booksize format offers a number of highly effective options. Depending on the application, component heat loss can be transferred to the environment using three different heat dissipation methods. The design of the components differs only in the format of the backplane and the location of the external fan module. The front panel (where the connections are located) and the width of the components are common to all designs.

#### Internal air cooling

In this standard solution, the power loss from the electronics and power units of the drive components is removed by natural cooling or by a forced-ventilation system and routed to the interior of the control cabinet.

#### External air cooling

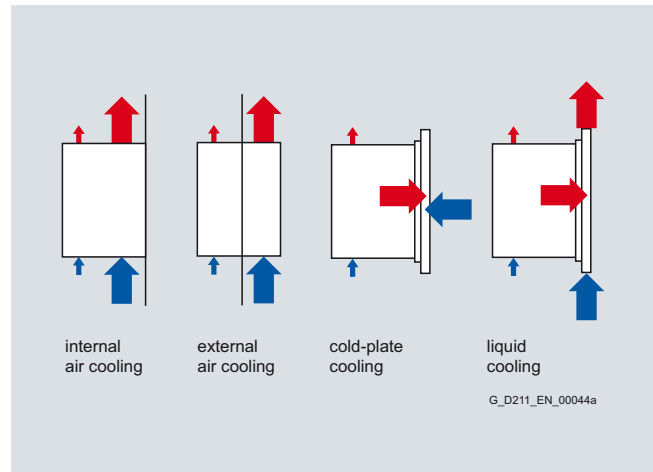
External air cooling uses the through-hole technology. The components' power unit heat sinks pass through the mounting surface in the control cabinet and can thus dissipate the heat losses of the power circuit to a separate external cooling circuit. Degree of protection IP54 can be achieved at this "mechanical interface" - the external heat sink. The heat sink, with its cooling fins and the fan module (part of the scope of supply), protrudes through the back into a separate ventilation duct, which can also be open to the outside. The only heat loss that remains in the cabinet is largely emitted by the electronics.

#### Cold plate cooling

Units designed with cold-plate cooling can pass the power unit heat losses to an external heat sink via a thermal interface on the unit's rear panel. This external heat sink is water-cooled, for example.

#### Liquid cooling

For liquid cooling, the power semiconductors are mounted on a heat sink, through which cooling medium flows. The power loss of the device is, to large extent, absorbed by the cooling medium and can be dissipated outside the cabinet.



#### Chassis format

Higher-output units (approximately 100 kW and above) are constructed in chassis format. These devices are available as Line Modules and Motor Modules. Chassis format units are cooled by an internal air cooling circuit.



### Overview (continued)

#### Blocksize format

The units in blocksize format are optimized for single-axis applications.

The CU310-2 DP/CU310-2 PN Control Units or CUA31 Control Unit Adapters can be snapped on directly. The units are cooled by an internal air cooling circuit.



Power Module with CU310-2 PN Control Unit plugged in

#### SINAMICS S120 Combi

SINAMICS S120 Combi is a very compact and rugged drive system for compact turning and milling machines.

The prerequisite for operation of the SINAMICS S120 Combi is a NCU 710.3 PN.

SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability, power units for spindle and feed motors as well as a TTL encoder interface into a single Power Module.

Special features are the minimum space requirement in the control cabinet, low energy requirement thanks to state-of-the-art 400-V technology, and perfected expendability using additional Motor Modules in booksize compact format.

The expansion using Motor Modules in booksize compact format is only permissible in combination with a NCU 710.3 PN and the SINAMICS S120 Combi (SINUMERIK 840D sl BASIC).

An intelligent DRIVE-CLiQ interface is provided for cabling.



SINAMICS S120 Combi



# SINAMICS S120 drive system

## Introduction

### Overview (continued)

#### **Additional system components**

The structure of the drive system is defined by the selected Control Unit, Line Module, and Motor Modules or Power Module. An optimal solution can be obtained for the drive task using these system components.

**Additional system components** can be installed to expand the system's scope of functions and adapt it perfectly to the drive task in question.

System components are divided into the following categories:

- **DC link components**  
e.g. Braking Modules and braking resistors  
Further DC link components are optionally installed to stabilize the DC link voltage and/or to support the electronic power supply.
- **Additional system components**  
e.g. Terminal Modules for expanding the I/O interfaces to the machine interface
- **Encoder system connection**  
for connecting various types of encoders to SINAMICS S120
- **Line-side power components**  
such as fuses, contactors, reactors, and filters for switching the power supply and meeting EMC requirements

#### **Energy efficiency**

The SINAMICS S120 drive system saves energy by recovering energy from the axes and using it within the DC link group of a multi-axis configuration and by feeding it back into the supply system. Even at full infeed capacity, no unnecessary heat is generated in the control cabinet. With intelligent compensation of capacitive and inductive reactive currents, SINAMICS S120 also ensures that no unnecessary power losses occur in the power supply and that no current harmonics occur. This not only prevents detrimental effects on other loads, but it also reduces the heat generated in the control cabinet.

#### **The SINAMICS S120 components have been developed for installation in cabinets**

They have the following features and characteristics:

- Ease of handling
- Simple assembly and wiring
- Practical connection system, cable routing in accordance with EMC requirements
- Uniform design
- Contiguous assembly
- Various cooling solutions

#### **Rugged units**

The SINAMICS units are equipped as standard with varnished or partially varnished modules for enhanced robustness.

The coating on the modules protects the sensitive SMD components against corrosive gases, chemically active dust and moisture.



### Technical specifications

Unless specified otherwise, the following Technical specifications are valid for all the following components of the SINAMICS S120 drive system.

|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Drive system</b>                                                   | SINAMICS S120                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Electronic power supply</b>                                        | 24 V DC, -15 %/+20 %                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Vibratory load</b>                                                 | <ul style="list-style-type: none"> <li>• Transport<sup>1)</sup> acc. to EN 60721-3-2 <ul style="list-style-type: none"> <li>- All units and components except for chassis format</li> <li>- Chassis format units</li> </ul> </li> <li>• Operation <ul style="list-style-type: none"> <li>- Test values acc. to EN 60068-2-6</li> </ul> </li> </ul>                                                                                                                        |
|                                                                       | Class 2M3<br>Class 2M2<br>Test Fc<br>10 ... 58 Hz:<br>Constant deflection 0.075 mm (0.003 in)<br>58 ... 150 Hz:<br>Constant acceleration 9.81 m/s <sup>2</sup> (3.2 ft/s <sup>2</sup> ) (1 × g)                                                                                                                                                                                                                                                                           |
| <b>Shock load</b>                                                     | <ul style="list-style-type: none"> <li>• Transport<sup>1)</sup> acc. to EN 60721-3-2 <ul style="list-style-type: none"> <li>- All units and components except for chassis format</li> <li>- Chassis format units</li> </ul> </li> <li>• Operation <ul style="list-style-type: none"> <li>- Test values acc. to EN 60068-2-27</li> <li>- Booksize and blocksize formats FSA to FSB</li> <li>- Blocksize format FSC to FSF</li> <li>- Chassis format</li> </ul> </li> </ul> |
|                                                                       | Class 2M3<br>Class 2M2<br>Test Ea<br>147 m/s <sup>2</sup> (482 ft/s <sup>2</sup> ) (15 × g)/11 ms<br>49 m/s <sup>2</sup> (161 ft/s <sup>2</sup> ) (5 × g)/30 ms<br>98 m/s <sup>2</sup> (321 ft/s <sup>2</sup> ) (10 × g)/20 ms                                                                                                                                                                                                                                            |
| <b>Ambient conditions</b>                                             | <ul style="list-style-type: none"> <li>• Protection class acc. to EN 61800-5-1</li> <li>• Touch protection</li> <li>• Cooling method</li> </ul>                                                                                                                                                                                                                                                                                                                           |
|                                                                       | Class I (with protective conductor system) and Class III (PELV)<br>DIN VDE 0106 Part 100 and BGV A 3 when used properly<br>Internal/external air cooling, power units with increased air cooling by means of built-in fan                                                                                                                                                                                                                                                 |
| <b>Permissible ambient/coolant temperature (air) during operation</b> | <ul style="list-style-type: none"> <li>• For line-side components, Power Modules, Line Modules and Motor Modules</li> <li>• For Control Units, supplementary system components, DC link components, and Sensor Modules</li> </ul>                                                                                                                                                                                                                                         |
|                                                                       | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F), see derating characteristics<br>0 ... 55 °C (32 ... 131 °F) up to 2000 m (6562 ft) above sea level                                                                                                                                                                                                                                                                                      |
| <b>Climatic ambient conditions</b>                                    | <ul style="list-style-type: none"> <li>• Storage<sup>1)</sup> acc. to EN 60721-3-1</li> <li>• Transport<sup>1)</sup> acc. to EN 60721-3-2</li> <li>• Operation acc. to EN 60721-3-3</li> </ul>                                                                                                                                                                                                                                                                            |
|                                                                       | Class 1K4<br>Temperature -25 ... +70 °C (-13 ... +158 °F)<br>Class 2K4<br>Temperature -40 ... +70 °C (-40 ... +158 °F)<br>Max. air humidity 95 % at 40 °C (104 °F)<br>Class 3K3<br>Temperature 0 ... 55 °C (32 ... 131 °F)<br>Condensation, splashwater, and ice formation are not permitted (EN 60204, Part 1)                                                                                                                                                           |

|                                                        |                                                                                                                                                                                                |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Drive system</b>                                    | SINAMICS S120                                                                                                                                                                                  |
| <b>Environmental class/harmful chemical substances</b> | <ul style="list-style-type: none"> <li>• Storage<sup>1)</sup> acc. to EN 60721-3-1</li> <li>• Transport<sup>1)</sup> acc. to EN 60721-3-2</li> <li>• Operation acc. to EN 60721-3-3</li> </ul> |
|                                                        | Class 1C2<br>Class 2C2<br>Class 3C2                                                                                                                                                            |
| <b>Organic/biological influences</b>                   | <ul style="list-style-type: none"> <li>• Storage<sup>1)</sup> acc. to EN 60721-3-1</li> <li>• Transport<sup>1)</sup> acc. to EN 60721-3-2</li> <li>• Operation acc. to EN 60721-3-3</li> </ul> |
|                                                        | Class 1B1<br>Class 2B1<br>Class 3B1                                                                                                                                                            |
| <b>Degree of contamination</b> acc. to EN 61800-5-1    | 2                                                                                                                                                                                              |
| <b>European standards</b>                              |                                                                                                                                                                                                |
| EN 954-1<br>Successor standard: ISO 13849-1            | Safety of machinery – Safety-related parts of control systems<br>Part 1:<br>General principles for design                                                                                      |
| EN 61508-1                                             | Functional safety of electrical/electronic/programmable electronic safety-related systems<br>Part 1:<br>General requirements                                                                   |
| EN 50370-1                                             | Electromagnetic compatibility (EMC) – Product family standard for machine tools<br>Part 1:<br>Emission                                                                                         |
| EN 55011                                               | Industrial, scientific and medical high-frequency equipment (ISM devices) – Radio-frequency disturbance characteristics – Limits and methods of measurement                                    |
| EN 60204-1                                             | Electrical equipment of machines<br>Part 1:<br>General requirements                                                                                                                            |
| EN 61800-3                                             | Adjustable speed electrical power drive systems<br>Part 3:<br>EMC requirements and specific test methods                                                                                       |
| EN 61800-5-1                                           | Adjustable speed electrical power drive systems<br>Part 5: Safety requirements<br>Main section 1:<br>Electrical and thermal requirements                                                       |
| <b>North American standards</b>                        |                                                                                                                                                                                                |
| UL508C                                                 | Power conversion equipment                                                                                                                                                                     |
| CSA C22.2 No. 14                                       | Industrial control equipment                                                                                                                                                                   |
| <b>Approvals</b>                                       |                                                                                                                                                                                                |
| cULus                                                  | Testing by UL (Underwriters Laboratories) according to UL and CSA standards<br><a href="http://www.ul.com">www.ul.com</a>                                                                      |

<sup>1)</sup> In transport packaging.

# SINAMICS S120 drive system

## Introduction

### More information

For satisfactory and reliable operation of the drive system, original components of the SINAMICS system in conjunction with the original Siemens accessories as described in this Catalog and the Configuration Manuals, in the functional descriptions or user manuals should be used.

The user must observe the configuring instructions.

Combinations that differ from the configuring instructions (also in conjunction with non-Siemens products) require a special agreement.

If no original components are used, for example for repairs, approvals such as UL, EN, Safety Integrated, etc. can become invalid and thus the operation authorization for the machine with the non-Siemens components installed becomes invalid.

All of the approvals, certificates, declarations of conformity, test certificates, e.g. CE, UL, Safety Integrated etc. have been performed with the associated system components as they are described in the Catalogs and Configuration Manuals. The certificates are only valid if the products are used with the described system components, are installed according to the Installation Guidelines and are used for their intended purpose. In other cases, the vendor of these products is responsible for arranging that new certificates are issued.

### Overview



#### What is PROFIBUS?

PROFIBUS is the most successful open fieldbus used for automation technology which can be used for a wide range of applications. Standardization according to IEC 61158/EN 50170 secures your investments for the future.

PROFIBUS defines the technical and functional features of a serial fieldbus system, with which the distributed field automation devices in the lower area (sensor/actuator level) can be networked up to the mid performance range (cell level).

The requirements of users for an open, non-proprietary communication system have resulted in the specification and standardization of the PROFIBUS protocol.

#### Multi-vendor installations

Using the conformity and interoperability test performed by the test laboratories authorized from PROFIBUS & PROFINET International (PI) and the certification of the devices by PI, users have the security that the quality and functionality is guaranteed, even in multi-vendor installations.

#### PROFIBUS versions

**PROFIBUS FMS (Fieldbus Message Specification)**  
The universal solution for communication tasks on the field and cell level of the industrial communication hierarchy.

**PROFIBUS PA (Process Automation)**  
The version for applications in process automation. PROFIBUS PA uses intrinsically secure data transfer technology defined in IEC 61158-2.

**PROFIBUS DP (Distributed Peripherals)**  
This version, which is optimized for speed, is tailored especially for the communication of automation systems with distributed I/O stations and drives. The outstanding features of PROFIBUS DP are

- very short response times
- high interference immunity

PROFIBUS DP replaces cost-intensive parallel signal transmission with 24 V and the measured value transmission with 0 mA or 4 mA to 20 mA technology.

#### PROFIBUS and SINAMICS

SINAMICS uses the PROFIBUS protocol PROFIBUS DP.

### Design

#### Bus nodes

PROFIBUS DP distinguishes between two different master classes and one slave class:

##### DP master Class 1

For PROFIBUS DP, DP master Class 1 is the central component. In a defined message cycle that always repeats itself, the central master station exchanges information with distributed stations (DP slaves).

##### DP master Class 2

When commissioning, to configure the DP system, for diagnostics or to operate the plant or system in operation, devices of this type are used (programming, configuring or operator control devices). A DP master Class 2 can be used, for example, to read the input, output, diagnostic and configuration data of the slaves.

##### DP slave

A DP slave is an I/O device, which receives output information or setpoints from the DP master, and as response, returns input information, measured values and actual values to the DP master. A DP slave never sends data automatically, but only when requested by the DP master.

The quantity of input and output information depends on the device, and for each DP slave in each send direction can be a maximum of 244 bytes.

# SINAMICS S120 drive system

## Communication

### PROFIBUS

#### Function

##### *Functions on PROFIBUS DP*

The functional scope can differ between DP masters and DP slaves. The functional scope is different for DP-V0, DP-V1 and DP-V2.

##### DP-V0

The DP master functions (DP-V0) comprise the functions "Configuration", "Parameter assignment", "Read diagnostic data" as well as "Cyclic reading of input data/actual values" and "Writing output data/setpoints".

##### DP-V1

The additional DP function expansions (DP-V1) make it possible to perform acyclic read and write functions as well as processing cyclic data communication. This type of slave must be supplied with extensive parameterization data during start-up and during normal operation. These acyclically transferred parameterization data are only rarely changed in comparison to the cyclic setpoints, actual values, and measured values, and are transferred at lower priority in parallel with the cyclic high-speed user data transfer. Detailed diagnostic information can be transferred in the same way.

##### DP-V2

The extended DP master functions (DP-V2) mainly comprise functions for isochronous operation and direct data exchange between DP slaves.

Isochronous mode is implemented by means of a signal with a constant bus cycle for the bus system. This cyclic, equidistant cycle is sent by the DP master to all bus nodes in the form of a Global Control Telegram. Master and slaves can then synchronize their applications with this signal. The jitter of the clock signal from cycle to cycle is less than 1  $\mu$ s.

The "publisher/subscriber model" is used to implement slave-to-slave communication. Slaves declared as publishers make their input data/actual values and measured values available to other slaves, the subscribers, for reading. This is performed by sending the response frame to the master as a broadcast. Slave-to-slave communication is therefore a cyclic process.

##### *SINAMICS and PROFIBUS DP*

The SINAMICS S120 drive system can operate only as a DP slave and supports all communication functions, i.e. DP-V0, DP-V1 and DP-V2.

##### *SINUMERIK and PROFIBUS DP*

The SINUMERIK 840D sl control system functions as the DP master for drive axes and supports all DP-V0, DP-V1 and DP-V2 communication functions. SINAMICS S120 drives as well as distributed hydraulic axes can be linked as slaves to these systems. The decentralized hydraulic axes can only be used with isochronous PROFIBUS.

### Overview



PROFINET is the innovative, open Industrial Ethernet standard (IEC 61158) for the industrial automation environment. With PROFINET, devices can be linked up from the field level through to the management level.

PROFINET enables system-wide communication, supports plant-wide engineering and applies IT standards right down to the field level. IT communication, data communication and cyclic process communication are combined on the basis of Industrial Ethernet.

Existing fieldbus systems such as PROFIBUS can also be simply integrated without having to change existing devices.

#### Your advantages at a glance

| Flexibility                                                                                                                                                                                         | Efficiency                                                                                                                                                                                                                                   | Performance                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tailor-made plant concepts                                                                                                                                                                          | Optimal use of resources                                                                                                                                                                                                                     | Increased productivity                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>▶ Industrial Wireless LAN</li> <li>▶ Safety</li> <li>▶ Flexible topologies</li> <li>▶ Open standard</li> <li>▶ Web tools</li> <li>▶ Expandability</li> </ul> | <ul style="list-style-type: none"> <li>▶ One cable for all purposes</li> <li>▶ Device/network diagnostics</li> <li>▶ Energy efficiency</li> <li>▶ Easy cabling</li> <li>▶ Fast device replacement</li> <li>▶ Ruggedness/stability</li> </ul> | <ul style="list-style-type: none"> <li>▶ Speed</li> <li>▶ High precision</li> <li>▶ Large quantity structures</li> <li>▶ High transmission rate</li> <li>▶ Media redundancy</li> <li>▶ Fast start-up</li> </ul> |

G\_IK10\_XX\_10304

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### Design

#### PROFINET device concept

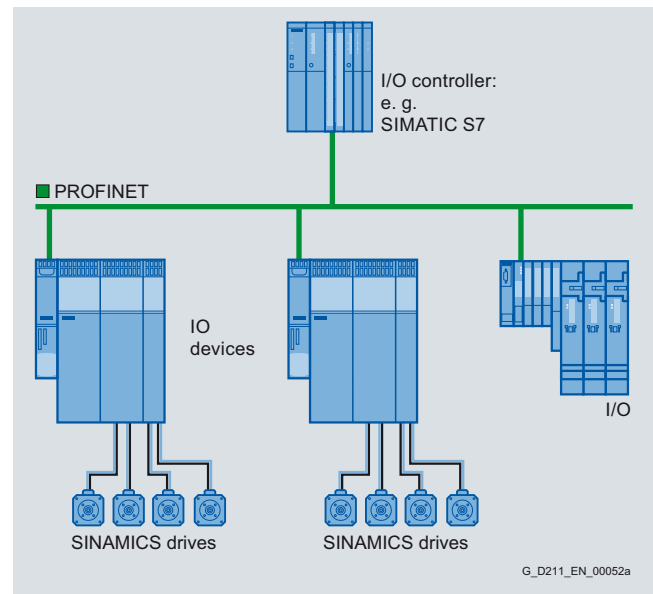
PROFINET distinguishes between the controller and its assigned devices. These are initialized and parameterized by the controllers on power-up. The controller and its devices together constitute a PROFINET I/O system (compare master/slave system for PROFIBUS).

For PROFINET, cyclic communication between an IO Controller and its IO Devices is performed in the same way as for PROFIBUS over the process image. The process image is updated cyclically. Depending on the requirements and device characteristic, this takes place in real-time (RT, devices are typically distributed IO Devices) or isochronous real-time (IRT, devices are typically servo drives). Further, PROFINET permits communication between the controllers and devices of different IO systems.

#### PROFINET IO with RT for simple standard drive applications

With typical cycle times between 4 ms and 10 ms, PROFINET IO with RT offers the same performance characteristics as PROFIBUS as regards cyclic data transmission.

With this performance level, all standard drive applications belonging to PROFIdrive application categories 1 to 3 can be automated, i.e. those categories requiring the specification of speed, torque and current setpoints or target positions which do not need to be linked isochronously.



# SINAMICS S120 drive system

## Communication

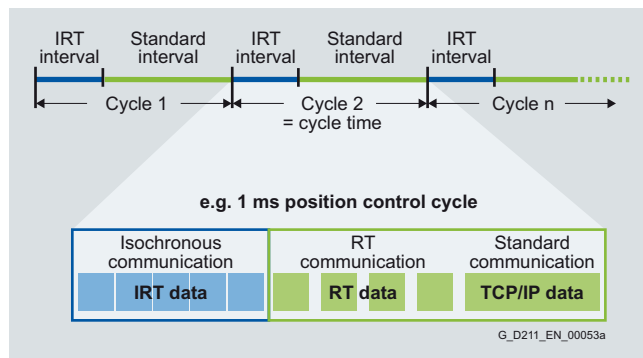
### PROFINET

#### Design

##### PROFINET IO with IRT for Motion Control<sup>1)</sup>

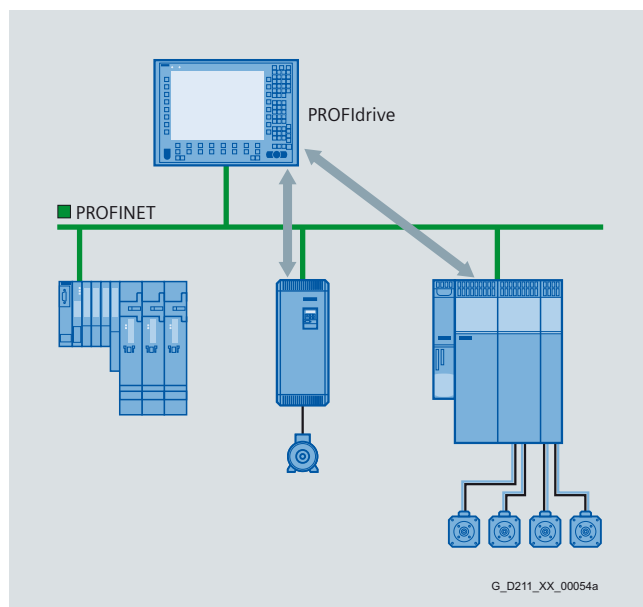
In this case, a Motion Control system controls or synchronizes axes using the PROFINET network. This requires cyclic, isochronous data exchange with the drives. PROFINET IO with IRT fulfills this requirement. The communication cycle is subdivided into different, time-specific channels for this purpose. The first channel is used for isochronous real-time communication (IRT), followed by real-time communication (RT) and standard TCP/IP communication. By appropriately configuring the application, e.g. a synchronous relationship between axes, IRT telegrams are implicitly determined and the appropriate configuration data generated.

The optimum time sequence of the individual messages for each network section is calculated with a special algorithm which takes the topology into account. This means that the switch is in a position to transfer the IRT telegrams without delay from the input port to the defined output port and then to the target device.



##### Transition from PROFIBUS to PROFINET

The functional interface between the controller and the SINAMICS drives for PROFINET and PROFIBUS is defined by the PROFIdrive V4 of PROFIBUS International. It is not necessary to change an user program for transfer from PROFIBUS to PROFINET.



PROFINET with PROFIdrive

#### Design (continued)

##### Motion Control concepts with PROFINET

With SINAMICS, PROFINET supports the implementation of different automation structures. Distributed drive-based motion control concepts or central architectures with a control are supported in the same way as distributed automation solutions with modular automation components.

##### PROFINET – interface on SINAMICS

- SINAMICS S120 with a CU320-2 DP Control Unit and a CBE20 Communication Board  
The CU320-2 DP Control Unit on SINAMICS S120 is linked to the PROFINET IO network via the CBE20 Communication Board.
- SINAMICS S120 with a CU320-2 PN Control Unit  
The CU320-2 Control Unit on SINAMICS S120 is linked to the PROFINET IO network via the on-board PROFINET interface.
- SINAMICS S120 with a CU320-2 PN Control Unit and a CBE20 Communication Board  
The CU320-2 PN Control Unit on SINAMICS S120 is linked to the PROFINET IO network via the CBE20 Communication Board.
- SINAMICS S120 with a CU310-2 PN Control Unit  
The CU310-2 PN Control Unit on SINAMICS S120 is linked to the PROFINET IO network via the on-board PROFINET interface.

#### Function

##### Real-time communication with PROFINET IO

PROFINET uses standard TCP/IP for parameter assignment, configuration and diagnostics. Real-time communication for the transmission of process data is performed on the same line. PROFINET IO has the following real-time features:

- Real Time (RT)  
uses the option of prioritizing the communication stack of the bus nodes. This permits high-performance data transmission based on standard network components.
- Isochronous Real-Time (IRT)  
permits strict deterministic, cyclic data transmission with short response times and minimum jitter for high performance motion control applications. This feature is implemented with a special ASIC, named ERTEC (Enhanced Real Time Ethernet Controller), in the corresponding interfaces (switch integrated into device) or network components (switch).

##### Automation with PROFINET

With these and other features, PROFINET fulfills all automation requirements: Industry-compatible installation technology, real-time capability, deterministic responses, integration of distributed field devices, simple network administration and diagnosis, protection against unauthorized access, efficient vendor-independent engineering as well as isochronous motion control applications.

PROFINET relies on switch technology and has expanded this technology for real-time applications (IRT). This has the advantage that the network topology can be optimally utilized, since it can be adapted to the requirements of the machine. Collisions are avoided and therefore optimum data flow rates achieved.

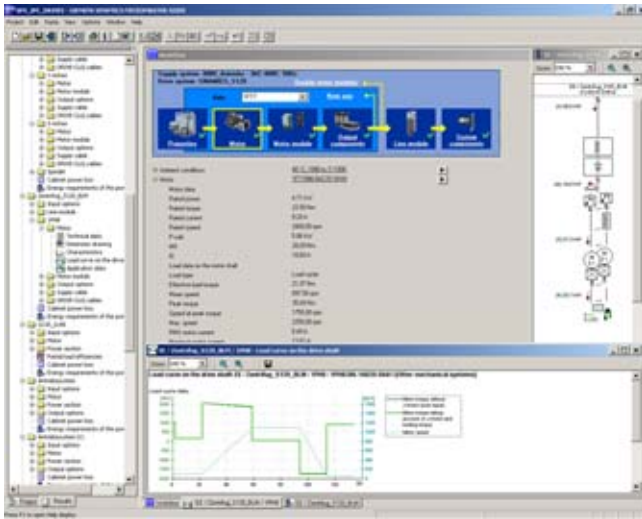
<sup>1)</sup> IRT interpolation with SINUMERIK NCK coming soon

# SINAMICS S120 drive system

## Engineering software

### SIZER for Siemens Drives engineering tool

#### Overview



The following drives and controls can be engineered in a user-friendly way using the SIZER for Siemens Drives engineering tool:

- SINAMICS Low Voltage, MICROMASTER 4 and DYNAVERT T drive systems
- Motor starters
- SINUMERIK CNC system
- SIMOTION Motion Control System
- SIMATIC Technology

It provides technical support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from simple single drives to complex multi-axis applications.

SIZER for Siemens Drives supports all of the configuring steps in a workflow:

- Configuring the power supply
- Designing the motor and gearbox, including calculation of mechanical transmission elements
- Configuring the drive components
- Compiling the required accessories
- Selecting the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER for Siemens Drives was being designed, particular importance was placed on a high degree of usability and a universal, function-based approach to the drive application. The extensive user guidance makes using the tool easy. Status information keeps you continually informed about the progress of the configuration process.

The SIZER for Siemens Drives user interface is available in English, French, German and Italian.

#### Overview (continued)

The drive configuration is saved in a project. In the project, the components and functions used are displayed in a hierarchical tree structure.

The project view permits the configuration of drive systems and the copying/inserting/modifying of drives already configured.

The configuration process produces the following results:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to SAP)
- Technical specifications of the system
- Characteristics
- Comments on system reactions
- Mounting arrangement of drive and control components and dimension drawings of motors
- Energy requirements of the configured application

These results are displayed in a results tree and can be reused for documentation purposes.

Technological online help is available:

- Detailed technical specifications
- Information about the drive systems and their components
- Decision-making criteria for the selection of components
- Online help in German, English, French, Italian, Chinese and Japanese

#### System requirements

- PG or PC with Pentium III min. 800 MHz (recommended > 1 GHz)
- 512 MB RAM (recommended 1 GB RAM)
- At least 4.1 GB of free hard disk space
- An additional 100 MB of free hard disk space on the Windows system drive
- Screen resolution 1024 × 768 pixels (recommended 1280 × 1024 pixels)
- Operating system:
  - Windows XP Home Edition SP2
  - Windows XP Professional 32 bit SP2
  - Windows XP Professional 64 bit SP2
  - Windows Vista Business
  - Windows 7 Ultimate 32 bit
  - Windows 7 Professional 32 bit
- Microsoft Internet Explorer V5.5 SP2

#### Selection and ordering data

| Description                                      | Order No.                 |
|--------------------------------------------------|---------------------------|
| <b>SIZER for Siemens Drives engineering tool</b> | <b>6SL3070-0AA00-0AG0</b> |
| DVD-ROM                                          |                           |
| English, French, German, Italian                 |                           |

#### More information

The SIZER for Siemens Drives engineering tool is available free on the Internet at:

[www.siemens.com/sizer](http://www.siemens.com/sizer)

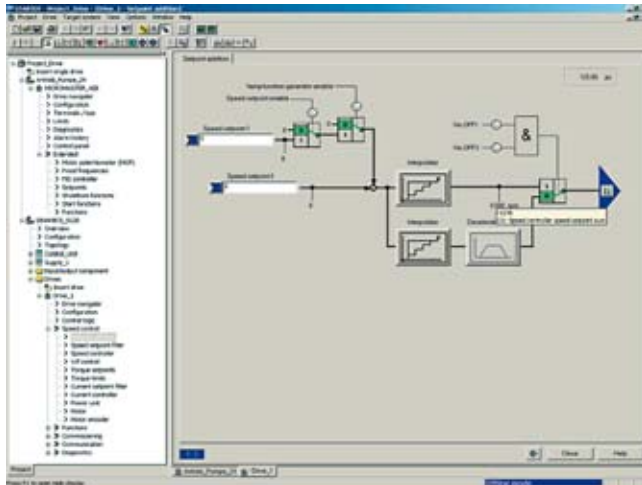


# SINAMICS S120 drive system

## Engineering software

### STARTER commissioning tool

#### Overview



The user-friendly STARTER commissioning tool can be used for:

- Commissioning
- Optimization
- Diagnostics

This software can be operated either as a standalone PC application, integrated in SIMATIC STEP 7 with TIA compatibility via Drive ES Basic, or it can be integrated into the SCOUT engineering system (for SIMOTION). The basic functions and handling are the same in both cases.

In addition to the SINAMICS drives, the STARTER also supports MICROMASTER 4 devices.

The project wizards can be used to create the drives within the structure of the project tree.

Beginners are supported by solution-based dialog guidance, whereby a standard graphics-based display maximizes clarity when setting the drive parameters.

First commissioning is guided by a wizard which makes all of the basic settings in the drive. Therefore, getting a motor up and running is merely a question of setting a few of the drive parameters as part of the drive configuration process.

The individual settings required are made using graphics-based parameterization screens, which also precisely visualize the principle of operation of the drive.

Examples of individual settings that can be made include:

- How terminals are used
- Bus interface
- Setpoint channel (e.g., fixed setpoints)
- Closed-loop speed control (e.g., ramp-function generator, limits)
- BICO interconnections
- Diagnostics

For experts, the expert list can be used to specifically and quickly access individual parameters at any time. An individual compilation of frequently used parameters can be saved in dedicated user lists and watch tables.

#### Overview (continued)

In addition, the following functions are available for optimization purposes:

- Self-optimization of the controller settings (depending on drive unit)
- Trace  
depending on the drive device, this is not supported for
  - MICROMASTER 4
  - SINAMICS G110
  - SINAMICS G120 < firmware V4.4
  - SINAMICS G110D
  - SINAMICS G120D

Diagnostics functions provide information about:

- Control/status Words
- Parameter status
- Conditions of use
- Communication states

#### Performance features

- User-friendly: Only a small number of settings need to be made for successful first commissioning: The motor starts to rotate
- Solution-oriented dialog-based user guidance simplifies commissioning
- Self-optimization functions reduce manual effort for optimization

#### System requirements V4.2 and higher

- PG or PC Pentium III min. 1 GHz (recommended > 1 GHz)
- 1 GB RAM (recommended 2 GB RAM)
- Screen resolution 1024 × 768 pixels, 16-bit color depth
- Free hard disk memory min. 3 GB
- Operating system:
  - Windows 2000 SP4
  - Windows 2003 Server SP2
  - Windows 2008 Server
  - Windows XP Professional SP3
  - Windows 7 Professional 32 bit
  - Windows 7 Ultimate 32 bit
- Microsoft Internet Explorer V6.0 and higher

#### Selection and ordering data

| Description                                                                                                                     | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>STARTER commissioning tool</b><br>for SINAMICS and<br>MICROMASTER<br>DVD-ROM<br>English, French, German, Italian,<br>Spanish | <b>6SL3072-0AA00-0AG0</b> |

### Accessories

#### Connection of SINAMICS S120

Depending on the version of the Control Unit (CU), the Control Unit of the drive unit can communicate with the programming device (PG) or PC via a serial interface, USB, PROFIBUS, or Ethernet/PROFINET. The following accessories are available for the particular drive system as listed in the following table:

| Description              | Recommended accessories<br>for communication between the drive unit and the programming device or PC                                                              | Order No.                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>RS232</b>             | <b>SIMATIC S7 connecting cable</b><br>Null modem cable, 6 m (19.69 ft)                                                                                            | <b>6ES7901-1BF00-0XA0</b> |
| <b>PROFIBUS</b>          | <b>CP 5512 communications module</b><br>PCMCIA type 2 card + adapter with 9-pin sub D socket,<br>for Windows 2000/Windows XP Professional and PCMCIA 32           | <b>6GK1551-2AA00</b>      |
|                          | <b>CP 5711 communications module</b><br>USB adapter for connecting a PG or notebook to PROFIBUS or MPI<br>USB cable (2 m) (6.56 ft) included in scope of delivery | <b>6GK1571-1AA00</b>      |
|                          | <b>SIMATIC DP plug-in cable</b><br>12 Mbaud, for PG connector, pre-assembled with 2 × 9-pin sub D connector,<br>3 m (9.84 ft)                                     | <b>6ES7901-4BD00-0XA0</b> |
| <b>PROFINET/Ethernet</b> | Standard CAT5 Ethernet cable or PROFINET cable                                                                                                                    | –                         |

### More information

The STARTER commissioning tool is also available for update purposes on the Internet at:  
[www.siemens.com/starter](http://www.siemens.com/starter)

# SINAMICS S120 drive system

## Control Units

### Overview

#### Overview of key open-loop and closed-loop control functions

| Description           | Closed-loop control types S120                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Open-loop control types S120                                                                                                                                                                                                                               | Main functions S120 for booksize/chassis formats                                                                                                                                                                                                                                                                                      | Comment, note                                                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Infeed Control</b> | <ul style="list-style-type: none"> <li>• Booksize               <ul style="list-style-type: none"> <li>- Current control with/without mains sensor</li> <li>- <math>V_{DC}</math> control with/without mains sensor</li> </ul> </li> <li>• Chassis               <ul style="list-style-type: none"> <li>- Current control with mains sensor</li> <li>- <math>V_{DC}</math> control with mains sensor</li> </ul> </li> </ul>                                                                                                                          | <ul style="list-style-type: none"> <li>• Booksize               <ul style="list-style-type: none"> <li>- Smart Line mode can be selected</li> </ul> </li> <li>• Chassis               <ul style="list-style-type: none"> <li>- None</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Mains identification</li> <li>• Controller optimization</li> <li>• Harmonics filter</li> <li>• Integral reactive current compensation can be activated for the drive components</li> <li>• Automatic restart</li> </ul>                                                                      | The mains sensor is the VSM10 Voltage Sensing Module; "current" is the line current; 3-phase with line frequency <sup>1)</sup> |
| <b>Servo Control</b>  | <ul style="list-style-type: none"> <li>• Asynchronous motor               <ul style="list-style-type: none"> <li>- Torque control with encoder</li> <li>- Speed control with/without encoder</li> </ul> </li> <li>• Synchronous motor, linear motor and torque motor               <ul style="list-style-type: none"> <li>- Torque control with encoder</li> <li>- Speed control with encoder</li> </ul> </li> <li>• For all motor types               <ul style="list-style-type: none"> <li>- Position control with encoder</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Linear/parabolic characteristic</li> <li>• Fixed-frequency characteristic (textiles)</li> <li>• Independent voltage setpoint input</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>• Data set switchover</li> <li>• Setpoint input</li> <li>• Motor identification</li> <li>• Damping application</li> <li>• Reduced magnetic flux in the asynchronous motor for reducing the thermal load on the machine</li> <li>• Technology controller</li> <li>• Basic positioner</li> </ul> | The position control can be selected as a function module (stand-alone drives)                                                 |

<sup>1)</sup> Operation of a Voltage Sensing Module is not approved with a SINUMERIK system.

# SINAMICS S120 drive system

## Control Units

### CU310-2 Control Unit for single-axis drives

#### Overview



CU310-2 PN and CU310-2 DP Control Units

The CU310-2 Control Unit that is designed for the communication and open-loop/closed-loop control functions of a SINAMICS S120 (AC/AC) is combined with the PM340 Power Module to create a powerful single-axis drive. A PROFINET (PN) variant and a PROFIBUS (DP) variant are available for fieldbus communication.

#### Design

The CU310-2 Control Unit features the following interfaces as standard:

- Fieldbus interface
  - CU310-2 PN: 1 PROFINET interface with 2 ports (RJ45 sockets) with PROFIdrive V4 profile
  - CU310-2 DP: 1 PROFIBUS interface with PROFIdrive V4 profile
- 1 DRIVE-CLiQ socket for communication with the DRIVE-CLiQ motor or other DRIVE-CLiQ nodes (e.g. Sensor Modules or Terminal Modules<sup>1)</sup>)
- 1 encoder evaluation for evaluating the following encoder signals
  - Incremental encoder TTL/HTL
  - SSI encoder without incremental signals
- 1 PE (protective earth) connection
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 temperature sensor input (KTY84-130 or PTC)
- 3 parameterizable, fail-safe (can be used with firmware V4.5 and higher) digital inputs (isolated) or alternatively 6 parameterizable digital inputs (isolated).  
The fail-safe digital inputs can be routed, i.e. they can be routed via PROFIsafe to a higher-level controller.
- 5 parameterizable digital inputs (isolated)
- 1 parameterizable, fail-safe (can be used with firmware V4.5 and higher) digital output (isolated) or alternatively 1 digital output (isolated)
- 8 parameterizable bidirectional digital inputs/outputs (non-isolated)
- 1 analog input:  $\pm 10$  V, resolution 12 bit + sign
- 1 Ethernet interface (socket RJ45) for commissioning and diagnostics
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 1 PM-IF interface for communication with the Power Modules in blocksize format
- 3 test sockets and one reference ground for commissioning support
- 1 interface for the BOP20 Basic Operator Panel<sup>2)</sup>

#### Design (continued)

The status of the CU310-2 Control Unit is indicated via multi-color LEDs.

As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

#### Integration

The CU310-2 Control Unit drives Power Modules in blocksize format via the PM-IF interface. DRIVE-CLiQ motors or Sensor Modules (SMC) can also be connected to the integrated DRIVE-CLiQ socket to permit the operation of motors without a DRIVE-CLiQ interface.

The CU310-2 Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool. The CU310-2 Control Unit requires a CompactFlash card with firmware V4.4 or higher.

A CU310-2 PN Control Unit communicates with the higher-level control system using PROFINET IO and the PROFIdrive V4 profile.

The SINAMICS S120 drive system with the CU310-2 PN Control Unit then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
  - RT (Real-Time)
  - IRT (Isochronous Real-Time), minimum send cycle 500  $\mu$ s
- Connects to controls as PROFINET IO devices using PROFIdrive compliant with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 2-port switch with two RJ45 sockets based on the ERTEC ASIC. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

An external 24 V power supply can be connected to the CU310-2 Control Unit to power it when the power connection for the Power Module is not occupied. The CU310-2 Control Unit then requires a CompactFlash card with firmware V4.5 or higher.

<sup>1)</sup> Only for use with SINAMICS S120 drive solutions without SINUMERIK.

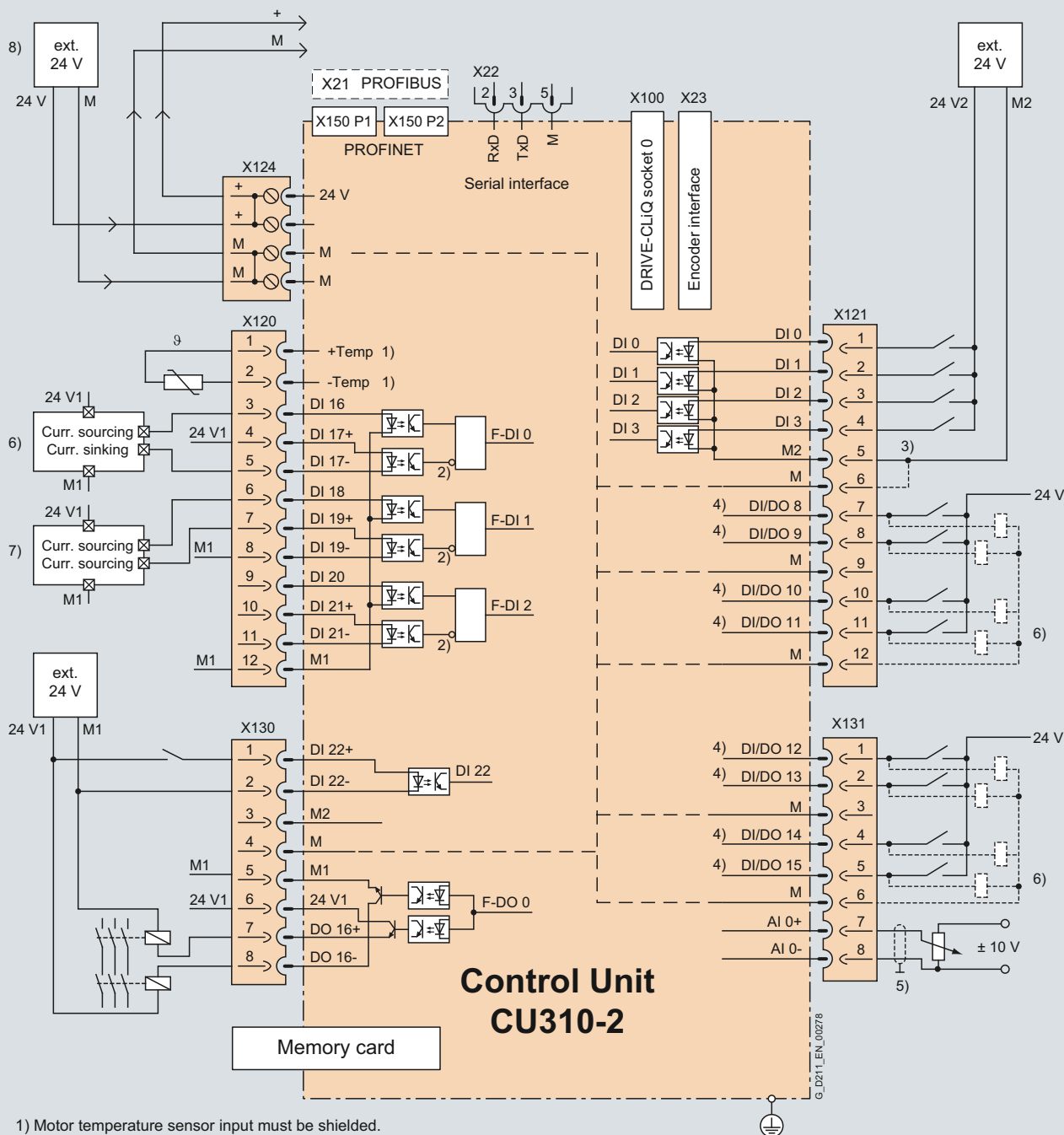
<sup>2)</sup> BOP20 is not used on machine tools.

# SINAMICS S120 drive system

## Control Units

### CU310-2 Control Unit for single-axis drives

#### Integration (continued)



- 1) Motor temperature sensor input must be shielded.
- 2) Inversion can be parameterized.
- 3) Jumper open, isolation for digital inputs (DI)
- 4) High-speed inputs must be shielded.
- 5) Analog input must be shielded.
- 6) Safety-related control with current sourcing and current sinking outputs.
- 7) Safety-related control with two current sourcing outputs.
- 8) In order to use the digital outputs, an external 24 V power supply must be connected to terminal X124.

Connection example of CU310-2 Control Unit

# SINAMICS S120 drive system

## Control Units

### CU310-2 Control Unit for single-axis drives

#### Technical specifications

|                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                   | CU310-2 Control Unit<br>PROFINET:<br>6SL3040-1LA01-0AA0<br>PROFIBUS:<br>6SL3040-1LA00-0AA0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking account of digital<br>outputs and DRIVE-CLiQ supply | 0.35 A for CU310-2 + 0.5 A for<br>PM340 Power Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Conductor cross-section, max.</b>                                                                                  | 2.5 mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Fuse protection, max.</b>                                                                                          | 20 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Digital inputs</b>                                                                                                 | In accordance with IEC 61131-2<br>Type 1<br>5 isolated digital inputs<br>4 bidirectional non-isolated<br>digital inputs/digital outputs<br>3 parameterizable, fail-safe<br>(available soon) digital inputs<br>(isolated), or alternatively<br>6 parameterizable digital inputs<br>(isolated)<br>5 bidirectional isolated digital<br>inputs/outputs<br><br>• Voltage<br>-3 ... +30 V<br>• Low level (an open digital input is<br>interpreted as "low")<br>-3 ... +5 V<br>• High level<br>15 ... 30 V<br>• Current consumption at 24 V DC,<br>typ.<br>10 mA<br>• Delay time of<br>digital inputs <sup>1)</sup> , approx.<br>- L → H<br>50 μs<br>- H → L<br>100 μs<br>• Delay time of high-speed<br>digital inputs <sup>1)</sup> , approx.<br>(high-speed digital inputs can be<br>used for position detection)<br>- L → H<br>5 μs<br>- H → L<br>50 μs<br>• Conductor cross-section, max.<br>0.5 mm <sup>2</sup> |
| <b>Digital outputs</b><br>(resistant to sustained short<br>circuits)                                                  | 8 bidirectional non-isolated<br>digital outputs/<br>digital inputs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| • Voltage                                                                                                             | 24 V DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| • Load current per digital output <sup>2)</sup> ,<br>max.                                                             | 500 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| • Delay time <sup>1)</sup> , typ./max.<br>- L → H<br>150 μs/400 μs<br>- H → L<br>75 μs/100 μs                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| • Conductor cross-section, max.                                                                                       | 0.5 mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>           | CU310-2 Control Unit<br>PROFINET:<br>6SL3040-1LA01-0AA0<br>PROFIBUS:<br>6SL3040-1LA00-0AA0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Encoder evaluation</b>     | Incremental encoder TTL/HTL<br>SSI encoder without incremental<br>signals<br><br>• Input impedance<br>- TTL<br>570 Ω<br>- HTL, max.<br>16 mA<br>• Encoder power supply<br>24 V DC/0.35 A or 5 V DC/0.35 A<br>• Encoder frequency, max.<br>300 kHz<br>• SSI baud rate<br>100 ... 250 kBaud<br>• Resolution absolute position SSI<br>30 bit<br>• Cable length, max.<br>- TTL encoder<br>100 m (328 ft)<br>(only bipolar signals permitted) <sup>3)</sup><br>- HTL encoder<br>100 m (328 ft) for<br>unipolar signals<br>300 m (984 ft) for<br>bipolar signals <sup>3)</sup><br>- SSI encoder<br>100 m (328 ft) |
| <b>Power loss</b>             | < 20 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>PE connection</b>          | M5 screw                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Dimensions</b>             | • Width<br>73 mm (2.87 in)<br>• Height<br>191 mm (7.52 in)<br>• Depth<br>75 mm (2.95 in)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Weight, approx.</b>        | 0.95 kg (2 lb)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Approvals according to</b> | cULus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>CU310-2 PN Control Unit</b><br>Without CompactFlash card                                                | <b>6SL3040-1LA01-0AA0</b> |
| <b>CU310-2 DP Control Unit</b><br>Without CompactFlash card                                                | <b>6SL3040-1LA00-0AA0</b> |
| <b>Accessories</b>                                                                                         |                           |
| <b>STARTER commissioning tool</b>                                                                          | <b>6SL3072-0AA00-0AG0</b> |
| <b>Accessories for re-ordering</b>                                                                         |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port | <b>6SL3066-4CA00-0AA0</b> |

For information on connectors and cables, please refer to  
Catalog IK PI and the Siemens Industry Mail:  
[www.siemens.com/industrymail](http://www.siemens.com/industrymail)

<sup>1)</sup> The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input or output is processed.

<sup>2)</sup> In order to use the digital outputs, an external 24 V power supply must be connected to terminal X124.

<sup>3)</sup> Signal cables twisted in pairs and shielded.

# SINAMICS S120 drive system

## Control Units

### CompactFlash card for CU310-2

#### Overview



The CompactFlash card contains the firmware and parameter settings. The CompactFlash card is plugged into the appropriate slot on the CU310-2 Control Unit.

#### Design

A CU310-2 Control Unit can perform the communication, open-loop and closed-loop control functions for one Power Module. The performance expansion is not required in this case.

In addition to the firmware, the CompactFlash card also contains licensing codes which are required to enable firmware options (Safety Integrated Extended Functions in the current version). The Safety Integrated Extended Functions must be ordered via the order code **F01** in addition to the Order No.

The firmware option can also be enabled on-site, for example, if the Safety Integrated Extended Functions are to be enabled retrospectively. You will need the serial number of the CompactFlash card and the Order No. of the firmware option to be enabled. With this information, you can purchase the associated license code from a license database and enable the firmware option. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

#### Selection and ordering data

| Description                                                                                                                                                                                                           | Order No.                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>CompactFlash card for CU310-2 PN and CU310-2 DP Control Units without Safety license</b><br>including Certificate of License                                                                                       | <b>6SL3054-0E 00-1BA0</b>                               |
| <b>CompactFlash card for CU310-2 PN and CU310-2 DP Control Units with Safety license</b><br>including Certificate of License and with Safety license<br>Firmware <b>V4.4</b><br>Firmware <b>V4.5</b> (available soon) | <b>6SL3054-0E 00-1BA0-Z F01</b><br><b>E</b><br><b>F</b> |
| <b>Subsequent licensing</b><br>Safety Integrated Extended Functions option including Certificate of License for one axis for subsequent licensing of a CompactFlash card.                                             | <b>6SL3074-0A A 10-0AA0</b>                             |



# SINAMICS S120 drive system

## Control Units

### CU320-2 Control Unit

#### Overview



The communication, open-loop and closed-loop control functions for one or more Motor Modules and the Line Module are executed in a CU320-2 Control Unit. The CU320-2 Control Unit is designed fundamentally for multi-axis operation.

#### Design

The CU320-2 Control Unit features the following interfaces as standard:

- 4 DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ nodes, e.g., Motor Modules, Active Line Modules, Sensor Modules, Terminal Modules<sup>1)</sup>
- CU320-2 PN: 1 PROFINET interface with 2 ports (RJ45 sockets) with PROFINET V4 profile
- CU320-2 DP: 1 PROFIBUS interface with PROFINET V4 profile
- 12 parameterizable digital inputs (isolated)
- 8 parameterizable bidirectional digital inputs/digital outputs (non-isolated)
- 1 serial RS232 interface
- 1 interface for the BOP20 Basic Operator Panel<sup>2)</sup>
- 1 slot for the CompactFlash card on which firmware and parameters are stored
- 1 slot for mounting an option module (e.g. TB30 Terminal Board)
- 2 rotary coding switches for manually setting the PROFIBUS address
- 1 Ethernet interface for commissioning and diagnostics
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection
- 1 ground connection

A shield connection for the signal cable shield on the option module is located on the CU320-2 Control Unit.

The available option slot is used to expand the interfaces, for example, to include additional terminals or for communication purposes.

The status of the CU320-2 Control Unit is indicated via multi-color LEDs.

As the firmware and parameter settings are stored on a plug-in CompactFlash card, the Control Unit can be changed without the need for software tools.

The CU320-2 Control Unit can be mounted on the side of the Line Module in booksize format via brackets integrated in a Line Module. The CU320-2 Control Unit can also be fixed to the wall of the control cabinet using the integrated fixing lugs. As the CU320-2 Control Unit is not as deep as a Line Module, suitable spacers are available to increase the depth of the CU320-2 Control Unit to 270 mm (10.63 in).

#### Integration

DRIVE-CLiQ components, for example, Motor Modules and Active Line Modules, can be connected to a CU320-2 Control Unit. The number of modules depends on the performance required, including duty type and additional functions.

The CU320-2 Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool.

The CU320-2 Control Unit requires a CompactFlash card with firmware V4.4 or higher.

The CU320-2 DP Control Unit requires a CompactFlash card with firmware V4.3 or higher.

<sup>1)</sup> Only for use with SINAMICS S120 drive solutions without SINUMERIK.

<sup>2)</sup> BOP20 is not used on machine tools.

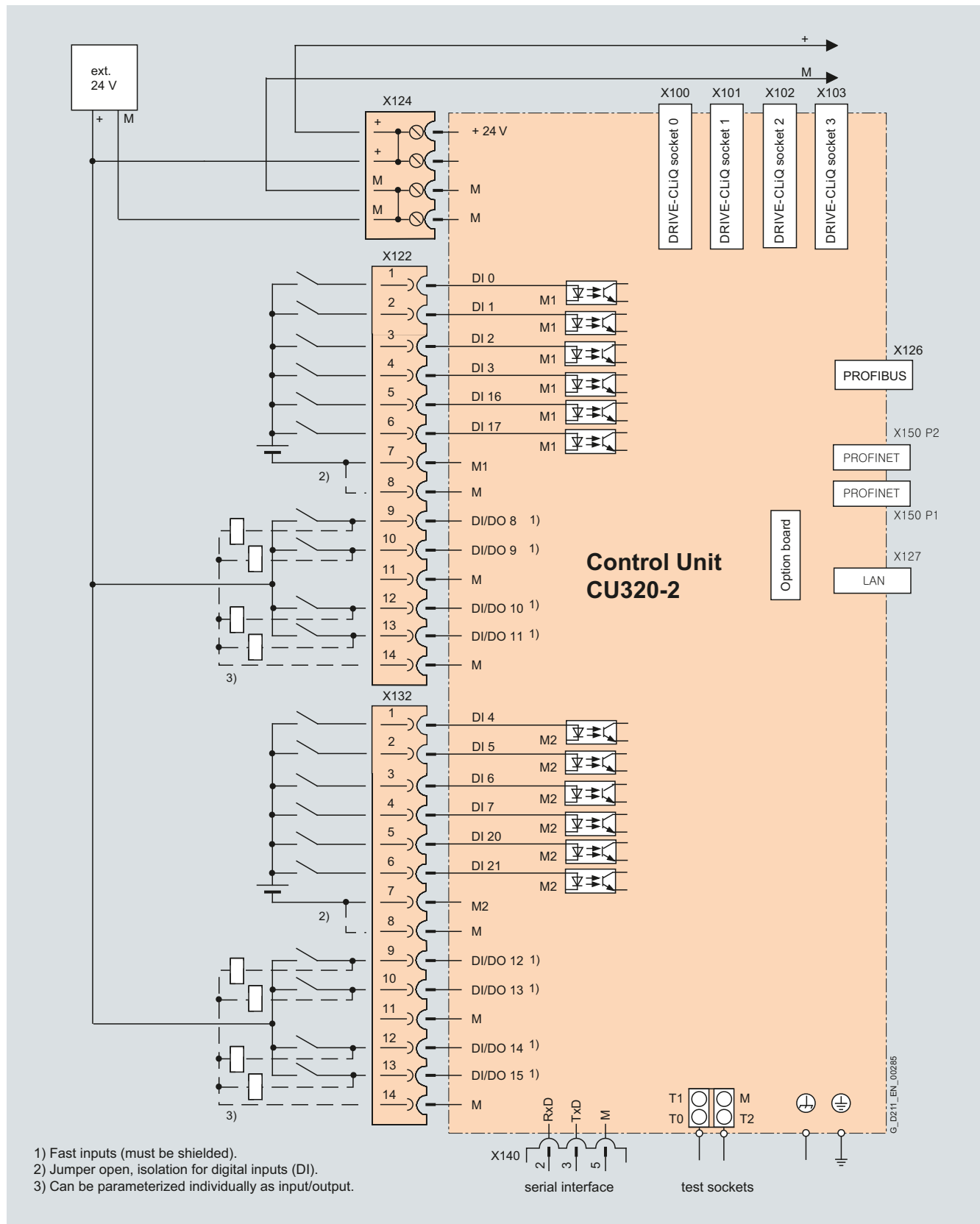
# SINAMICS S120 drive system

## Control Units

### CU320-2 Control Unit

#### Integration (continued)

5



Connection example of a CU320-2 Control Unit

# SINAMICS S120 drive system

## Control Units

### CU320-2 Control Unit

#### Technical specifications

|                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                                             | CU320-2 Control Unit<br>PROFINET:<br>6SL3040-1MA01-0AA0<br>PROFIBUS:<br>6SL3040-1MA00-0AA0                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking account of digital<br>outputs, expansion option slot and<br>DRIVE-CLiQ supply | 1.0 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Conductor cross-section, max.</b>                                                                                                            | 2.5 mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Fuse protection, max.</b>                                                                                                                    | 20 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Digital inputs</b>                                                                                                                           | In accordance with IEC 61131-2<br>Type 1<br>12 isolated digital inputs<br>8 bidirectional non-isolated<br>digital inputs/digital outputs<br><br>• Voltage<br>-3 ... +30 V<br>• Low level (an open digital input is<br>interpreted as "low")<br>-3 ... +5 V<br>• High level<br>15 ... 30 V<br>• Current consumption at 24 V DC,<br>typ.<br>9 mA<br>• Delay time of<br>digital inputs <sup>1)</sup> , approx.<br>- L → H<br>5 μs<br>- H → L<br>50 μs<br>• Conductor cross-section, max.<br>1.5 mm <sup>2</sup> |
| <b>Digital outputs</b><br>(resistant to sustained short<br>circuits)                                                                            | 8 bidirectional non-isolated<br>digital outputs/digital inputs<br><br>• Voltage<br>24 V DC<br>• Load current per digital output,<br>max.<br>500 mA<br>• Delay time <sup>1)</sup> , typ./max.<br>- L → H<br>150 μs/400 μs<br>- H → L<br>75 μs/100 μs<br>• Conductor cross-section, max.<br>1.5 mm <sup>2</sup>                                                                                                                                                                                                |
| <b>Power loss</b>                                                                                                                               | 24 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>PE connection</b>                                                                                                                            | M5 screw                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Ground connection</b>                                                                                                                        | M5 screw                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Dimensions</b>                                                                                                                               | • Width<br>50 mm (1.97 in)<br>• Height<br>300 mm (11.81 in)<br>• Depth<br>226 mm (8.90 in)                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Weight, approx.</b>                                                                                                                          | 2.3 kg (5.07 lb)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Approvals according to</b>                                                                                                                   | cULus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

#### Selection and ordering data

| Description                                                                                                                                                                                                             | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Control Unit CU320-2 PN</b>                                                                                                                                                                                          | <b>6SL3040-1MA01-0AA0</b> |
| <b>Control Unit CU320-2 DP</b>                                                                                                                                                                                          | <b>6SL3040-1MA00-0AA0</b> |
| <b>Accessories</b>                                                                                                                                                                                                      |                           |
| <b>Spacers</b><br>(2 units)<br>For increasing the depth of the<br>CU320-2 DP Control Unit to<br>270 mm (10.63 in) (if the inte-<br>grated brackets are not used,<br>but the depth still has to be<br>270 mm (10.63 in)) | <b>6SL3064-1BB00-0AA0</b> |
| <b>STARTER commissioning tool</b>                                                                                                                                                                                       | <b>6SL3072-0AA00-0AG0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                      |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof blanking<br/>plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                                                                                                              | <b>6SL3066-4CA00-0AA0</b> |

<sup>1)</sup> The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input or output is processed.

# SINAMICS S120 drive system

## Control Units

### CompactFlash card for CU320-2

#### Overview



The CompactFlash card contains the firmware and parameter settings. The CompactFlash card is plugged into the appropriate slot on the CU320-2 Control Unit.

#### Design

A CU320-2 Control Unit can perform the communication, open-loop and closed-loop control functions for several Motor Modules. The computing capacity requirement increases in proportion to the number of connected Motor Modules and system components and in relation to the dynamic response required. The performance expansion is required for the CU320-2 Control Unit for 4 axes or more. The utilization of the CU320-2 Control Unit can be calculated with the SIZER for Siemens Drives engineering tool.

In addition to the firmware, the CompactFlash card also contains licensing codes which are required to enable firmware options (the performance expansion and the Safety Integrated Extended Functions in the current version). The Safety Integrated Extended Functions must be enabled retrospectively. You will need the serial number of the CompactFlash card and the Order No. of the firmware option to be enabled. With this information, you can purchase the associated license code from a license database and enable the firmware option. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

The firmware options can also be enabled on-site, for example, if the performance expansions required are not known at the time of placing the order or the Safety Integrated Extended Functions must be enabled retrospectively. You will need the serial number of the CompactFlash card and the Order No. of the firmware option to be enabled. With this information, you can purchase the associated license code from a license database and enable the firmware option. The license code is only valid for the CompactFlash card declared and cannot be transferred to other CompactFlash cards.

#### Selection and ordering data

| Description                                                                                                                                                                                                                    | Order No.                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>CompactFlash card for CU320-2 Control Unit without Safety license</b>                                                                                                                                                       |                            |
| - Without performance expansion                                                                                                                                                                                                | 6SL3054-0E ■ 00-1BA0       |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0       |
| <b>CompactFlash card for CU320-2 Control Unit with Safety license</b>                                                                                                                                                          |                            |
| • For 1 axis                                                                                                                                                                                                                   |                            |
| - Without performance expansion                                                                                                                                                                                                | 6SL3054-0E ■ 00-1BA0-Z F01 |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F01 |
| • For 2 axes                                                                                                                                                                                                                   |                            |
| - Without performance expansion                                                                                                                                                                                                | 6SL3054-0E ■ 00-1BA0-Z F02 |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F02 |
| • For 3 axes                                                                                                                                                                                                                   |                            |
| - Without performance expansion                                                                                                                                                                                                | 6SL3054-0E ■ 00-1BA0-Z F03 |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F03 |
| • For 4 axes                                                                                                                                                                                                                   |                            |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F04 |
| • For 5 axes                                                                                                                                                                                                                   |                            |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F05 |
| • For 6 axes                                                                                                                                                                                                                   |                            |
| - With performance expansion firmware option                                                                                                                                                                                   | 6SL3054-0E ■ 01-1BA0-Z F06 |
| Firmware V4.4                                                                                                                                                                                                                  | E                          |
| Firmware V4.5 (available soon)                                                                                                                                                                                                 | F                          |
| <b>Subsequent licensing</b>                                                                                                                                                                                                    |                            |
| • Performance expansion option including Certificate of License for subsequent licensing of a CompactFlash card                                                                                                                | 6SL3074-0A A 01-0AA0       |
| • Safety Integrated Extended Functions option including Certificate of License for one axis for subsequent licensing of a CompactFlash card. This option should be ordered once for each axis, max. 6x for a CompactFlash card | 6SL3074-0A A 10-0AA0       |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules

#### Overview



Smart Line Modules are stall-protected, line-commutated in-feed/regenerative feedback units (diode bridge for incoming supply; stall-protected, line-commutated regenerative feedback via IGBTs) with 100 % continuous regenerative feedback power. The regenerative feedback capability of the modules can be deactivated via a digital input (Smart Line Modules 5 kW and 10 kW) or by parameter setting (Smart Line Modules 16 kW and 36 kW). Smart Line Modules are designed for connection to grounded, star (TN, TT) and non-grounded, symmetrical IT supply systems.

The DC link is pre-charged via integrated pre-charging resistors.

The associated line reactor is absolutely essential for operating a Smart Line Module.

#### Design

Smart Line Modules in booksize format feature the following interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronic power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 2 PE/protective conductor connections
- 2 digital outputs (only on 5 kW and 10 kW Smart Line Modules)
- 1 digital output (only on 5 kW and 10 kW Smart Line Modules)
- 3 DRIVE-CLiQ sockets (only on 16 kW and 36 kW Smart Line Modules)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The signal cable shield can be connected to the Line Module by means of a shield terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

<sup>1)</sup> Smart Line Modules 16 kW (18 HP) and 36 kW (40 HP) in booksize format with firmware version V2.5 or higher with appropriate parameterization and reduced power rating are also operable on networks with 200 ... 240 V 3 AC  $\pm 10$  %.

<sup>2)</sup> The DC link voltage adjusts itself to the mean value of the rectified line voltage.

#### Design (continued)

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control (on 16 kW and 36 kW Smart Line Modules only)
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets (only on 16 kW and 36 kW Smart Line Modules)
- DRIVE-CLiQ cable (length depends on module width) to connect Smart Line Modules to adjacent Motor Module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs and outputs
- Connector X22 for digital inputs and outputs (only on 5 kW and 10 kW Smart Line Modules)
- Connector X1 for Line connection (only on 5 kW and 10 kW Smart Line Modules)
- 1 set of warning signs in 30 languages
- 1 heat conducting foil (only on Smart Line Modules with cold plate cooling)

#### Technical specifications

|                                                                                                                                   |                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                               | Smart Line Modules in booksize format<br>6SL313-6....-....                                                                                                     |
| <b>Line supply voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                              | 380 ... 480 V 3 AC $\pm 10$ %<br>( $-15$ % < 1 min) <sup>1)</sup>                                                                                              |
| <b>Line frequency</b>                                                                                                             | 47 ... 63 Hz                                                                                                                                                   |
| <b>Line power factor</b><br>At rated power                                                                                        |                                                                                                                                                                |
| • Fundamental ( $\cos \varphi_1$ )                                                                                                | > 0.96                                                                                                                                                         |
| • Total ( $\lambda$ )                                                                                                             | 0.65 ... 0.90                                                                                                                                                  |
| <b>Overvoltage category</b><br>In accordance with EN 60664-1                                                                      | Class III                                                                                                                                                      |
| <b>DC link voltage, approx.</b>                                                                                                   | $1.35 \times \text{line voltage}^{2)}$                                                                                                                         |
| <b>Electronic power supply</b>                                                                                                    | 24 V DC, $-15$ %/+20 %                                                                                                                                         |
| <b>Radio interference suppression</b>                                                                                             |                                                                                                                                                                |
| • Standard                                                                                                                        | No radio interference suppression                                                                                                                              |
| • With line filter                                                                                                                | Category C2 according to EN 61800-3<br>up to 350 m (1148 ft) total cable length (shielded)                                                                     |
| <b>Cooling method</b>                                                                                                             | Internal air cooling<br>External air cooling, power units with increased air cooling by built-in fans<br>Cold-plate cooling (5 kW (6.71 HP) / 10 kW (13.4 HP)) |
| <b>Permissible ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                                  |
| <b>Installation altitude</b>                                                                                                      | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics                |
| <b>Declarations of conformity</b>                                                                                                 | CE (Low Voltage and EMC Directives)                                                                                                                            |
| <b>Approvals according to</b>                                                                                                     | cULus                                                                                                                                                          |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules

#### Technical specifications (continued)

| Line voltage 380 ... 480 V 3 AC                                     |                                        | Smart Line Module in booksize format                        |                                                             |                                                             |                  |                  |
|---------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|------------------|------------------|
| Internal air cooling                                                | 6SL3130-...                            | 6AE15-0AB0                                                  | 6AE21-0AB0                                                  | 6TE21-6AA3                                                  | 6TE23-6AA3       | 6TE25-5AA3       |
| External air cooling                                                | 6SL3131-...                            | 6AE15-0AA0                                                  | 6AE21-0AA0                                                  | 6TE21-6AA3                                                  | 6TE23-6AA3       | 6TE25-5AA3       |
| Cold plate cooling                                                  | 6SL3136-...                            | 6AE15-0AA0                                                  | 6AE21-0AA0                                                  | –                                                           | –                | –                |
| <b>Infeed/regenerative feedback power</b>                           |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Rated power $P_{rated}$                                           |                                        |                                                             |                                                             |                                                             |                  |                  |
| - at 380 V 3 AC                                                     | kW                                     | 5                                                           | 10                                                          | 16                                                          | 36               | 55               |
| - at 460 V 3 AC <sup>3)</sup>                                       | (HP)                                   | (5)                                                         | (10)                                                        | (18)                                                        | (40)             | (60)             |
| • For S6 duty $P_{S6}$ (40 %)                                       | kW                                     | 6.5                                                         | 13                                                          | 21                                                          | 47               | 71               |
| • $P_{max}$                                                         | kW                                     | 10                                                          | 20                                                          | 35                                                          | 70               | 91               |
| <b>DC link current</b>                                              |                                        |                                                             |                                                             |                                                             |                  |                  |
| • At 540/600 V DC                                                   | A                                      | 9.3/8.3                                                     | 18.5/16.6                                                   | 30/27                                                       | 67/60            | 105/92           |
| • For S6 duty (40 %)                                                | A                                      | 11                                                          | 22                                                          | 35                                                          | 79               | 138              |
| • Maximum                                                           | A                                      | 16.6                                                        | 33.2                                                        | 59                                                          | 117              | 178              |
| <b>Input current</b>                                                |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Rated current at 380/400/480 V 3 AC                               | A                                      | 8.6/8.1/6.7                                                 | 17/16.2/12.8                                                | 26/25/21                                                    | 58/55/46         | 94/90/77         |
| • For S6 duty (40 %) at 400 V                                       | A                                      | 10.6                                                        | 21.1                                                        | 33                                                          | 72               | 106              |
| • At 400 V max.                                                     | A                                      | 15.7                                                        | 31.2                                                        | 54                                                          | 107              | 130              |
| <b>Current requirement</b><br>24 V DC electronic power supply, max. | A                                      | 0.8                                                         | 0.9                                                         | 0.95                                                        | 1.5              | 1.9              |
| <b>Current carrying capacity</b>                                    |                                        |                                                             |                                                             |                                                             |                  |                  |
| • 24 V DC busbars                                                   | A                                      | 20                                                          | 20                                                          | 20                                                          | 20               | 20               |
| • DC link busbars                                                   | A                                      | 100                                                         | 100                                                         | 100                                                         | 200              | 200              |
| <b>DC link capacitance</b>                                          |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Smart Line Module                                                 | μF                                     | 220                                                         | 330                                                         | 710                                                         | 1410             | 1880             |
| • Drive line-up, max.                                               | μF                                     | 6000                                                        | 6000                                                        | 20000                                                       | 20000            | 20000            |
| <b>Internal/external air cooling</b>                                |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Power loss <sup>1)</sup>                                          |                                        |                                                             |                                                             |                                                             |                  |                  |
| - Internal air cooling                                              | kW                                     | 0.08                                                        | 0.14                                                        | 0.19                                                        | 0.405            | 0.665            |
| - External air cooling int. <sup>2)</sup> /ext./total               | kW                                     | 0.04/0.04/0.08                                              | 0.065/0.075/0.14                                            | 0.065/0.125/0.19                                            | 0.115/0.29/0.405 | 0.185/0.48/0.665 |
| • Cooling air requirement                                           | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.008 (0.3)                                                 | 0.008 (0.3)                                                 | 0.016 (0.6)                                                 | 0.031 (1.1)      | 0.044 (1.6)      |
| • Sound pressure level $L_{pA}$ (1 m)                               | dB                                     | < 60                                                        | < 60                                                        | < 60                                                        | < 60             | < 60             |
| <b>Cold plate cooling</b>                                           |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Power loss <sup>1)</sup> int. <sup>2)</sup> /ext.                 | kW                                     | 0.035/0.04                                                  | 0.055/0.08                                                  | –                                                           | –                | –                |
| • Thermal resistance $R_{th}$                                       | K/W                                    | 0.175                                                       | 0.175                                                       | –                                                           | –                | –                |
| <b>Line connection</b><br>U1, V1, W1                                |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Conductor cross-section                                           | mm <sup>2</sup>                        | 2.5 ... 6                                                   | 2.5 ... 6                                                   | 2.5 ... 10                                                  | 2.5 ... 50       | 2.5 ... 95       |
| <b>Shield connection</b>                                            |                                        |                                                             |                                                             |                                                             |                  |                  |
|                                                                     |                                        | Cable shield connection plate integrated into the connector | Cable shield connection plate integrated into the connector | Cable shield connection plate integrated into the connector | See Accessories  | See Accessories  |
| <b>PE connection</b>                                                |                                        |                                                             |                                                             |                                                             |                  |                  |
|                                                                     |                                        | M5 screw                                                    | M5 screw                                                    | M5 screw                                                    | M6 screw         | M6 screw         |
| <b>Cable length, max.</b><br>Total of all motor cables and DC link  |                                        |                                                             |                                                             |                                                             |                  |                  |
| • Shielded                                                          | m (ft)                                 | 350 (1148)                                                  | 350 (1148)                                                  | 350 (1148)                                                  | 350 (1148)       | 350 (1148)       |
| • Unshielded                                                        | m (ft)                                 | 560 (1837)                                                  | 560 (1837)                                                  | 560 (1837)                                                  | 560 (1837)       | 560 (1837)       |
| <b>Degree of protection</b>                                         |                                        |                                                             |                                                             |                                                             |                  |                  |
|                                                                     |                                        | IP20                                                        | IP20                                                        | IP20                                                        | IP20             | IP20             |

<sup>1)</sup> Power loss of Smart Line Module at rated power including losses of 24 V DC electronic power supply.

<sup>2)</sup> Power loss of the power electronics + power loss of the 24 V electronics

<sup>3)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules

#### Technical specifications (continued)

| Line voltage 380 ... 480 V 3 AC                        |             | Smart Line Module in booksize format |                      |                      |                    |                    |
|--------------------------------------------------------|-------------|--------------------------------------|----------------------|----------------------|--------------------|--------------------|
| Internal air cooling                                   | 6SL3130-... | 6AE15-0AB0                           | 6AE21-0AB0           | 6TE21-6AA3           | 6TE23-6AA3         | 6TE25-5AA3         |
| External air cooling                                   | 6SL3131-... | 6AE15-0AA0                           | 6AE21-0AA0           | 6TE21-6AA3           | 6TE23-6AA3         | 6TE25-5AA3         |
| Cold plate cooling                                     | 6SL3136-... | 6AE15-0AA0                           | 6AE21-0AA0           | –                    | –                  | –                  |
| <b>Dimensions</b>                                      |             |                                      |                      |                      |                    |                    |
| • Width                                                | mm (in)     | 50 (1.97)                            | 50 (1.97)            | 100 (3.94)           | 150 (5.91)         | 200 (7.87)         |
| • Height                                               | mm (in)     | 380 (14.96)                          | 380 (14.96)          | 380 (14.96)          | 380 (14.96)        | 380 (14.96)        |
| • Depth                                                |             |                                      |                      |                      |                    |                    |
| - With internal air cooling                            | mm (in)     | 270 (10.63)                          | 270 (10.63)          | 270 (10.63)          | 270 (10.63)        | 270 (10.63)        |
| - With external air cooling on/behind mounting surface | mm (in)     | 226/66.5 (8.90/2.62)                 | 226/66.5 (8.90/2.62) | 226/66.5 (8.90/2.62) | 226/71 (8.90/2.79) | 226/92 (8.90/3.62) |
| - With cold plate cooling                              | mm (in)     | 226 (8.90)                           | 226 (8.90)           | –                    | –                  | –                  |
| <b>Weight, approx.</b>                                 |             |                                      |                      |                      |                    |                    |
| • With internal air cooling                            | kg (lb)     | 4.7 (10.4)                           | 4.8 (10.6)           | 7 (15.4)             | 10.3 (22.7)        | 17 (37.5)          |
| • With external air cooling                            | kg (lb)     | 5.3 (11.7)                           | 5.4 (11.9)           | 8.8 (19.4)           | 13.8 (30.4)        | 18.5 (40.8)        |
| • With cold plate cooling                              | kg (lb)     | 4 (8.82)                             | 4 (8.82)             | –                    | –                  | –                  |



# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules

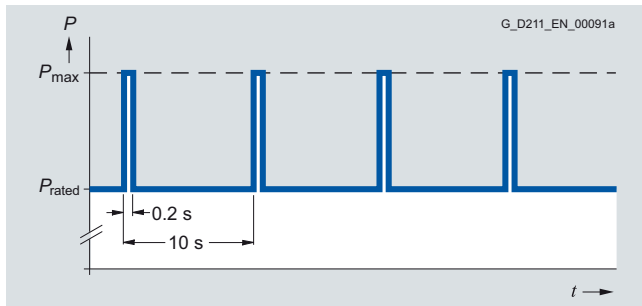
#### Selection and ordering data

| Description                                                                                                                                                                         | Order No.                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Smart Line Module in booksize format</b>                                                                                                                                         |                           |
| <b>Internal air cooling</b><br>Rated power:                                                                                                                                         |                           |
| • 5 kW (5 HP)                                                                                                                                                                       | <b>6SL3130-6AE15-0AB0</b> |
| • 10 kW (10 HP)                                                                                                                                                                     | <b>6SL3130-6AE21-0AB0</b> |
| • 16 kW (18 HP)                                                                                                                                                                     | <b>6SL3130-6TE21-6AA3</b> |
| • 36 kW (40 HP)                                                                                                                                                                     | <b>6SL3130-6TE23-6AA3</b> |
| • 55 kW (60 HP)                                                                                                                                                                     | <b>6SL3130-6TE25-5AA3</b> |
| <b>External air cooling</b><br>Rated power:                                                                                                                                         |                           |
| • 5 kW (5 HP)                                                                                                                                                                       | <b>6SL3131-6AE15-0AA0</b> |
| • 10 kW (10 HP)                                                                                                                                                                     | <b>6SL3131-6AE21-0AA0</b> |
| • 16 kW (18 HP)                                                                                                                                                                     | <b>6SL3131-6TE21-6AA3</b> |
| • 36 kW (40 HP)                                                                                                                                                                     | <b>6SL3131-6TE23-6AA3</b> |
| • 55 kW (60 HP)                                                                                                                                                                     | <b>6SL3131-6TE25-5AA3</b> |
| <b>Cold plate cooling</b><br>Rated power:                                                                                                                                           |                           |
| • 5 kW (5 HP)                                                                                                                                                                       | <b>6SL3136-6AE15-0AA0</b> |
| • 10 kW (10 HP)                                                                                                                                                                     | <b>6SL3136-6AE21-0AA0</b> |
| <b>Accessories</b>                                                                                                                                                                  |                           |
| <b>Shield connection kit</b><br>For Line/Motor Modules in booksize format with a width of 150 mm (5.91 in)                                                                          | <b>6SL3162-1AF00-0AA1</b> |
| <b>DC link rectifier adapter</b><br>For direct infeed of DC link voltage                                                                                                            |                           |
| • Screw-type terminals 0.5 ... 10 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)                      | <b>6SL3162-2BD00-0AA0</b> |
| • Screw-type terminals 35 ... 95 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 150 mm, 200 mm and 300 mm (5.91 in, 7.87 in and 11.81 in) | <b>6SL3162-2BM00-0AA0</b> |
| <b>DC link adapter (2 units)</b><br>For multi-tier configuration<br>Screw-type terminals 35 ... 95 mm <sup>2</sup><br>For all Line Modules and Motor Modules in booksize format     | <b>6SL3162-2BM01-0AA0</b> |
| <b>24 V terminal adapter</b><br>For all Line Modules and Motor Modules in booksize format                                                                                           | <b>6SL3162-2AA00-0AA0</b> |
| <b>24 V jumper</b><br>For connection of the 24 V busbars (for booksize format)                                                                                                      | <b>6SL3162-2AA01-0AA0</b> |

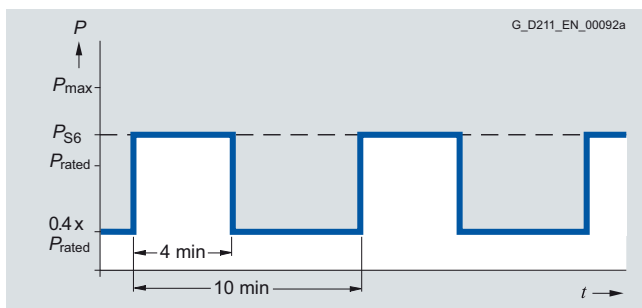
| Description                                                                                                                                                                                                                                                                                                                                                                                   | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Warning labels in 30 languages</b><br>This label set can be glued over the standard German or English labels to provide warnings in other languages.<br>One set of labels is supplied with the devices.<br>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                                                                            |                           |
| <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs)<br>For DRIVE-CLiQ port                                                                                                                                                                                                                                                                           |                           |
| • For modules with a width of 50 mm/100 mm (1.97 in/3.94 in)                                                                                                                                                                                                                                                                                                                                  | <b>6SL3163-8KB00-0AA0</b> |
| • For modules with a width of 100 mm (3.94 in)                                                                                                                                                                                                                                                                                                                                                | <b>6SL3163-8FD00-0AA0</b> |
| • For modules with a width of 150 mm (5.91 in)                                                                                                                                                                                                                                                                                                                                                | <b>6SL3163-8GF00-0AA0</b> |
| <b>SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                                                                                                                                                                                                                                                                                             | <b>6SL3066-4CA00-0AA0</b> |

### Characteristic curves

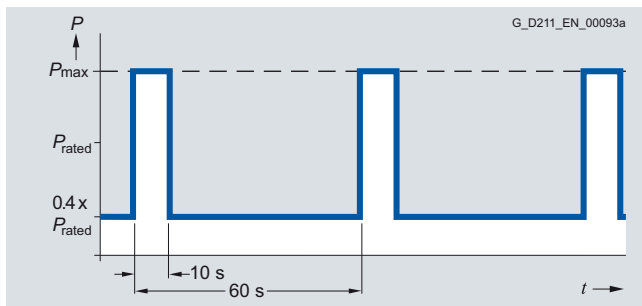
#### Overload capability



Load cycle with previous load

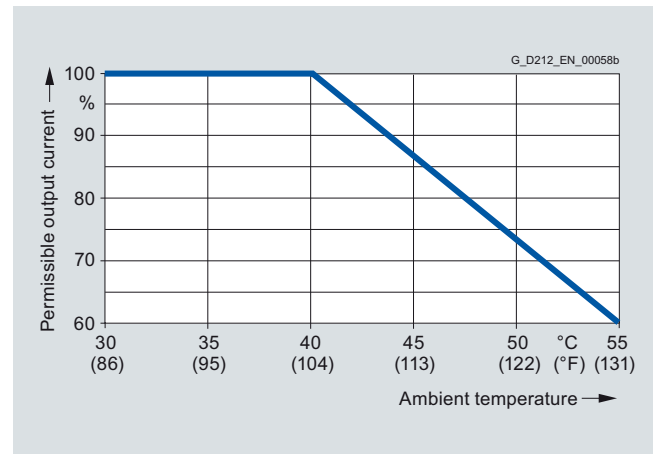


S6 load cycle with previous load

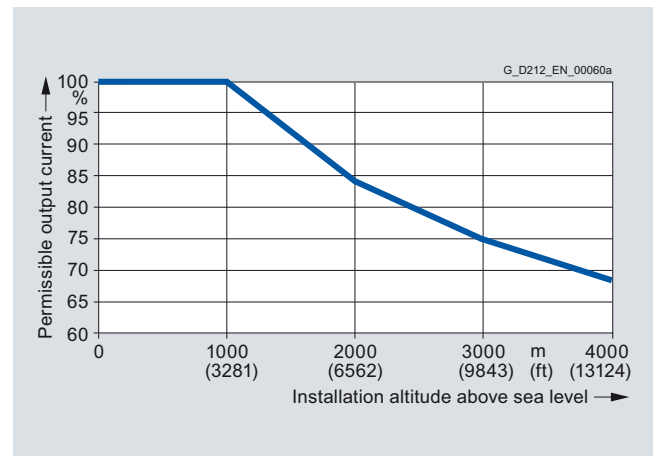


S6 load cycle with previous load

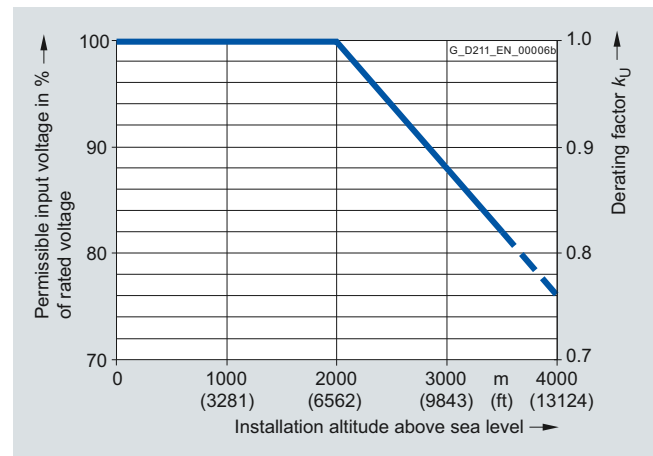
#### Derating characteristics



Output power dependent on ambient temperature



Output power dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules Line reactors

#### Overview



Smart Line Modules are not warranted to operate without the specified line reactors. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

#### Selection and ordering data

| Rated power of the Smart Line Module<br>kW (HP) | Suitable for Smart Line Module in booksize format              | Line reactor<br>Order No. |
|-------------------------------------------------|----------------------------------------------------------------|---------------------------|
| 5 (5)                                           | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | <b>6SL3000-OCE15-0AA0</b> |
| 10 (10)                                         | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | <b>6SL3000-OCE21-0AA0</b> |
| 16 (18)                                         | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3                       | <b>6SL3000-OCE21-6AA0</b> |
| 36 (40)                                         | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3                       | <b>6SL3000-OCE23-6AA0</b> |
| 55 (60)                                         | 6SL3130-6TE25-5AA3<br>6SL3131-6TE25-5AA3                       | <b>6SL3000-OCE25-5AA0</b> |

#### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                      | Line reactors   |                                                                |                                                                |                                          |                                          |                                          |
|----------------------------------------------------------------|-----------------|----------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
|                                                                | 6SL3000-...     | OCE15-0AA0                                                     | OCE21-0AA0                                                     | OCE21-6AA0                               | OCE23-6AA0                               | OCE25-5AA0                               |
| <b>Rated current</b>                                           | A               | 14                                                             | 28                                                             | 35                                       | 69                                       | 103                                      |
| <b>Power loss</b>                                              | W               | 62                                                             | 116                                                            | 110                                      | 170                                      | 190                                      |
| <b>Line/load connection</b><br>1U1, 1V1, 1W1/<br>1U2, 1V2, 1W2 |                 | Screw-type terminals                                           | Screw-type terminals                                           | Screw-type terminals                     | Screw-type terminals                     | Screw-type terminals                     |
| • Conductor cross-section                                      | mm <sup>2</sup> | 4                                                              | 10                                                             | 10                                       | 16                                       | 70                                       |
| <b>PE connection</b>                                           |                 | Screw-type terminals                                           | Screw-type terminals                                           | M5 screw studs according to DIN 46234    | M6 screw studs according to DIN 46234    | M8 screw studs according to DIN 46234    |
| • Conductor cross-section                                      | mm <sup>2</sup> | 4                                                              | 10                                                             | –                                        | –                                        | –                                        |
| <b>Degree of protection</b>                                    |                 | IP20                                                           | IP20                                                           | IP20                                     | IP20                                     | IP20                                     |
| <b>Dimensions</b>                                              |                 |                                                                |                                                                |                                          |                                          |                                          |
| • Width                                                        | mm (in)         | 150 (5.91)                                                     | 177 (6.97)                                                     | 219 (8.62)                               | 228 (8.98)                               | 270 (10.63)                              |
| • Height                                                       | mm (in)         | 175 (6.89)                                                     | 196 (7.72)                                                     | 180 (7.09)                               | 235 (9.25)                               | 275 (10.83)                              |
| • Depth                                                        | mm (in)         | 70 (2.76)                                                      | 110 (4.33)                                                     | 144 (5.67)                               | 224 (8.82)                               | 290 (11.42)                              |
| <b>Weight, approx.</b>                                         | kg (lb)         | 3.7 (8)                                                        | 7.5 (17)                                                       | 9.5 (21)                                 | 17 (37)                                  | 36 (79)                                  |
| <b>Approvals according to</b>                                  |                 | cURus                                                          | cURus                                                          | cURus                                    | cURus                                    | cURus                                    |
| <b>Suitable for Smart Line Module in booksize format</b>       | Type            | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3 | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3 | 6SL3130-6TE25-5AA3<br>6SL3131-6TE25-5AA3 |
| • Rated power of the Smart Line Module                         | kW              | 5                                                              | 10                                                             | 16                                       | 36                                       | 55                                       |

# SINAMICS S120 drive system

## Booksize format – Line Modules

Smart Line Modules  
Line filters

### Overview



In plants which have been specifically designed to ensure EMC, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN-systems.

### Selection and ordering data

| Rated power of the Smart Line Module<br>kW (HP) | Suitable for Smart Line Module in booksize format              | Line filter<br>Order No.  |
|-------------------------------------------------|----------------------------------------------------------------|---------------------------|
| 5 (5)                                           | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | <b>6SL3000-0HE15-0AA0</b> |
| 10 (10)                                         | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | <b>6SL3000-0HE21-0AA0</b> |
| 16 (18)                                         | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3                       | <b>6SL3000-0BE21-6DA0</b> |
| 36 (40)                                         | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3                       | <b>6SL3000-0BE23-6DA1</b> |
| 55 (60)                                         | 6SL3130-6TE25-5AA3<br>6SL3131-6TE25-5AA3                       | <b>6SL3000-0BE25-5DA0</b> |

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### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                | Line filter     |                                                                |                                                                |                                          |                                          |                                          |
|----------------------------------------------------------|-----------------|----------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
|                                                          | 6SL3000-...     | 0HE15-0AA0                                                     | 0HE21-0AA0                                                     | 0BE21-6DA0                               | 0BE23-6DA1                               | 0BE25-5DA0                               |
| <b>Rated current</b>                                     | A               | 12                                                             | 25                                                             | 36                                       | 74                                       | 105                                      |
| <b>Power loss</b>                                        | W               | 20                                                             | 20                                                             | 16                                       | 26                                       | 43                                       |
| <b>Line/load connection</b><br>L1, L2, L3 / U, V, W      |                 | Screw-type terminals                                           | Screw-type terminals                                           | Screw-type terminals                     | Screw-type terminals                     | Screw-type terminals                     |
| • Conductor cross-section                                | mm <sup>2</sup> | 10                                                             | 10                                                             | 10                                       | 35                                       | 50                                       |
| <b>PE connection</b>                                     |                 | M6 screw studs according to DIN 46234                          | M6 screw studs according to DIN 46234                          | M6 screw studs according to DIN 46234    | M6 screw studs according to DIN 46234    | M6 screw studs according to DIN 46234    |
| <b>Degree of protection</b>                              |                 | IP20                                                           | IP20                                                           | IP20                                     | IP20                                     | IP20                                     |
| <b>Dimensions</b>                                        |                 |                                                                |                                                                |                                          |                                          |                                          |
| • Width                                                  | mm (in)         | 60 (2.36)                                                      | 60 (2.36)                                                      | 50 (1.97)                                | 75 (2.95)                                | 100 (3.94)                               |
| • Height                                                 | mm (in)         | 285 (11.22)                                                    | 285 (11.22)                                                    | 420 (16.54)                              | 433 (17.05)                              | 466 (18.34)                              |
| • Depth                                                  | mm (in)         | 122 (4.80)                                                     | 122 (4.80)                                                     | 226 (8.90)                               | 226 (8.90)                               | 226 (8.90)                               |
| <b>Weight, approx.</b>                                   | kg (lb)         | 2.1 (5)                                                        | 2.3 (5)                                                        | 5.0 (11)                                 | 7.5 (17)                                 | 11.5 (25)                                |
| <b>Approvals according to</b>                            |                 | cURus                                                          | cURus                                                          | cURus                                    | cURus                                    | cURus                                    |
| <b>Suitable for Smart Line Module in booksize format</b> | Type            | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3 | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3 | 6SL3130-6TE25-5AA3<br>6SL3131-6TE25-5AA3 |
| • Rated infeed power of the Smart Line Module            | kW              | 5                                                              | 10                                                             | 16                                       | 36                                       | 55                                       |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Smart Line Modules Recommended line-side components

#### Overview

Suitable line-side power components are assigned depending on the power rating of the Smart Line Module.

The tables below list recommended components.

Additional information about the line contactors, switch disconnectors, circuit breakers and fuses specified in the table can be found in Catalog IC 10.

#### Assignment of line-side power components to Smart Line Modules in booksize format

| Rated power | Suitable for Smart Line Module in booksize format              | Line contactor     | Circuit breaker IEC 60947 | Circuit breaker UL489/CSA C22.2 No. 5-02 | Main circuit breaker |
|-------------|----------------------------------------------------------------|--------------------|---------------------------|------------------------------------------|----------------------|
| kW (HP)     |                                                                | Type               | Order No.                 | Type                                     | Order No.            |
| 5 (5)       | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | <b>3RT1023-...</b> | <b>3RV1031-4BA10</b>      | <b>3VL1102-2KM30-....</b>                | <b>3LD2003-0TK51</b> |
| 10 (10)     | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | <b>3RT1026-...</b> | <b>3RV1031-4FA10</b>      | <b>3VL1135-2KM30-....</b>                | <b>3LD2203-0TK51</b> |
| 16 (18)     | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3                       | <b>3RT1035-...</b> | <b>3RV1031-4FA10</b>      | <b>3VL2105-2KN30-....</b>                | <b>3LD2504-0TK51</b> |
| 36 (40)     | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3                       | <b>3RT1045-...</b> | <b>3RV1041-4LA10</b>      | <b>3VL2108-2KN30-....</b>                | <b>3LD2704-0TK51</b> |
| 55 (60)     | 6SL3130-6TE25-5AA3                                             | <b>3RT1054-...</b> | <b>3VL2712-1DC33-....</b> | <b>3VL2112-2KW30-....</b>                | <b>3KA5330-1GE01</b> |

| Rated power | Suitable for Smart Line Module in booksize format              | Fuse switch disconnector | Switch disconnector with fuse holders | NH fuse (gL/gG) |      |                | UL/CSA fuse, Class J<br>Available from:<br>Mersen<br><a href="http://www.ep.mersen.com">www.ep.mersen.com</a> |          |               |
|-------------|----------------------------------------------------------------|--------------------------|---------------------------------------|-----------------|------|----------------|---------------------------------------------------------------------------------------------------------------|----------|---------------|
| kW (HP)     |                                                                | Order No.                | Order No.                             | Rated current   | Size | Order No.      | Rated current                                                                                                 | Size     | Reference No. |
| 5 (5)       | 6SL3130-6AE15-0AB0<br>6SL3131-6AE15-0AA0<br>6SL3136-6AE15-0AA0 | <b>3NP1123-1CA20</b>     | <b>3KL5030-1GB01</b>                  | 16 A            | 000  | <b>3NA3805</b> | 17.5 A                                                                                                        | 21 × 57  | AJT17-1/2     |
| 10 (10)     | 6SL3130-6AE21-0AB0<br>6SL3131-6AE21-0AA0<br>6SL3136-6AE21-0AA0 | <b>3NP1123-1CA20</b>     | <b>3KL5030-1GB01</b>                  | 35 A            | 000  | <b>3NA3814</b> | 35 A                                                                                                          | 27 × 60  | AJT35         |
| 16 (18)     | 6SL3130-6TE21-6AA3<br>6SL3131-6TE21-6AA3                       | <b>3NP1123-1CA20</b>     | <b>3KL5030-1GB01</b>                  | 35 A            | 000  | <b>3NA3814</b> | 35 A                                                                                                          | 27 × 60  | AJT35         |
| 36 (40)     | 6SL3130-6TE23-6AA3<br>6SL3131-6TE23-6AA3                       | <b>3NP1123-1CA20</b>     | <b>3KL5230-1GB01</b>                  | 80 A            | 000  | <b>3NA3824</b> | 80 A                                                                                                          | 27 × 117 | AJT80         |
| 55 (60)     | 6SL3130-6TE25-5AA3                                             | <b>3NP1143-1DA20</b>     | <b>3KL5530-1GB01</b>                  | 125 A           | 000  | <b>3NA3132</b> | 125 A                                                                                                         | 41 × 146 | AJT125        |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Overview



Active Line Modules are self-commutated infeed/regenerative feedback units (with IGBTs in infeed and regenerative feedback directions) and generate a regulated DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage. Active Line Modules are designed for connection to grounded, star (TN, TT) and non-grounded, symmetrical IT supply systems.

The DC link is pre-charged via integrated pre-charging resistors.

In order to operate an Active Line Module, it is absolutely essential to use the appropriate Active Interface Module.

#### Design

The Active Line Modules in booksize format feature the following interfaces as standard:

- 1 power connection via screw-type terminals
- 1 connection for the 24 V DC electronic power supply via the 24 V terminal adapter included in the scope of supply
- 1 DC link connection via integrated DC link busbars
- 3 DRIVE-CLiQ sockets
- 2 PE/protective conductor connections

The status of the Active Line Modules is indicated via two multi-color LEDs.

On the 100 mm (3.94 in) wide Active Line Module, the shield for the power supply cable can be connected to the integrated shield connection plate via a terminal element or tube clip, e.g. type KLBÜ CO 4 by Weidmüller. The terminal element must not be used for strain relief. Shield connection plates are available for the 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide modules.

The signal cable shield can be connected to the Line Module by means of a shield terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Active Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control, length 0.11 m (4.33 in)
- DRIVE-CLiQ cable (length depends on module width) to connect Active Line Module to adjacent Motor Module, length = width of Active Line Module + 0.11 m (4.33 in)
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs
- Fan insert for Active Line Modules of 80 kW and 120 kW (the voltage is supplied by the Active Line Module)
- 1 set of warning signs in 30 languages
- 1 heat conducting foil (only on Active Line Modules with cold plate cooling)

#### Integration

The Active Line Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
  - Numeric Control Extensions NX10.3/NX15.3

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Technical specifications

|                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                                                          | Active Line Modules<br>in booksize format<br>6SL313 . -7TE...                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Line supply voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                                                         | 380 ... 480 V 3 AC $\pm 10\%$<br>( $-15\% < 1 \text{ min}$ ) <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Line frequency</b>                                                                                                                                        | 47 ... 63 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Line power factor</b><br>• Active Mode<br>- Fundamental ( $\cos \varphi_1$ )<br><br>- Total ( $\lambda$ )<br><br>• Smart Mode<br>- Fundamental<br>- Total | 1.0 (factory setting)<br>can be altered by entering a<br>reactive current setpoint<br><br>1.0 (factory setting)<br><br><br><br>> 0.96<br><br>0.65 ... 0.90                                                                                                                                                                                                                                                                                                |
| <b>Efficiency in %</b>                                                                                                                                       | 98                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Overvoltage category</b><br>In accordance with EN 60664-1                                                                                                 | Class III                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>DC link voltage <math>V_d</math></b>                                                                                                                      | In Active Mode, the DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage.<br><br>In Smart Mode, the DC link voltage is regulated in proportion to the line voltage to the mean rectified line voltage value.<br><br>Factory setting for DC link voltage:<br>380 ... 400 V 3 AC: 600 V (Active Mode)<br>400 ... 415 V 3 AC: 625 V (Active Mode)<br>416 ... 480 V 3 AC:<br>1.35 $\times$ line voltage (Smart Mode) |
| <b>Electronic power supply</b>                                                                                                                               | 24 V DC, $-15\%/+20\%$                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Active Line Modules<br>in booksize format<br>6SL313 . -7TE...                                                                                                                                                                                                                                                                                |
| <b>Radio interference suppression</b><br>• Standard combination, consisting of: Active Line Module + Active Interface Module<br><br>• Extended combination, consisting of: Active Line Module + Active Interface Module + Basic Line Filter<br><br>• Alternative combination, consisting of: Active Line Module + HFD line reactor<br><br>• Extended alternative combination, consisting of: Active Line Module + HFD line filter package (including Wideband Line Filter) | Category C3 to EN 61800-3 up to 350 m (1148 ft) total cable length<br><br>Category C2 according to EN 61800-3 up to 350 m (1148 ft) total cable length<br>Category C3 according to EN 61800-3 from 350 m to 1000 m (1148 ... 3281 ft) total cable length<br><br>No radio interference suppression<br><br>Category C2 according to EN 61800-3 |
| <b>Cooling method</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Internal air cooling (power units with increased air cooling by built-in fans)<br><br>External air cooling (power units with increased air cooling by built-in fans)<br><br>Cold plate cooling<br><br>Liquid cooling                                                                                                                         |
| <b>Ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules                                                                                                                                                                                                                                                                                                                                                      | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                                                                                                                                                                                                                |
| <b>Installation altitude</b>                                                                                                                                                                                                                                                                                                                                                                                                                                               | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics                                                                                                                                                                                              |
| <b>Declarations of conformity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                          | CE (Low Voltage and EMC Directives)                                                                                                                                                                                                                                                                                                          |
| <b>Approvals according to</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              | cULus                                                                                                                                                                                                                                                                                                                                        |

<sup>1)</sup> Active Line Modules 16 kW to 55 kW as of firmware version V2.5 with appropriate parameterization and reduced output also operable on networks with 200 ... 240 V 3 AC  $\pm 10\%$ .



# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Technical specifications (continued)

|                                                                                                                        |                                        |             |             |                          |                           |                            |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------|-------------|--------------------------|---------------------------|----------------------------|
| <b>Line supply voltage</b><br>380 ... 480 V 3 AC                                                                       | Active Line Module in booksize format  |             |             |                          |                           |                            |
| <b>Internal air cooling</b>                                                                                            | 6SL3130-...                            | 7TE21-6AA3  | 7TE23-6AA3  | 7TE25-5AA3               | 7TE28-0AA3                | 7TE31-2AA3                 |
| <b>External air cooling</b>                                                                                            | 6SL3131-...                            | 7TE21-6AA3  | 7TE23-6AA3  | 7TE25-5AA3               | 7TE28-0AA3                | 7TE31-2AA3                 |
| <b>Cold plate cooling</b>                                                                                              | 6SL3136-...                            | 7TE21-6AA3  | 7TE23-6AA3  | 7TE25-5AA3               | 7TE28-0AA3                | 7TE31-2AA3                 |
| <b>Liquid cooling</b>                                                                                                  | 6SL3135-...                            | –           | –           | –                        | –                         | 7TE31-2AA3                 |
| <b>Infeed/regenerative feedback power</b>                                                                              |                                        |             |             |                          |                           |                            |
| • Rated power $P_{rated}$                                                                                              |                                        |             |             |                          |                           |                            |
| - at 380 V 3 AC                                                                                                        | kW                                     | 16          | 36          | 55                       | 80 (64 <sup>1)</sup>      | 120 (84 <sup>1)</sup>      |
| - at 460 V 3 AC <sup>5)</sup>                                                                                          | (HP)                                   | (18)        | (40)        | (60)                     | (100) (75 <sup>1)</sup> ) | (150) (100 <sup>1)</sup> ) |
| • For S6 duty $P_{S6}$ (40 %)                                                                                          | kW                                     | 21          | 47          | 71                       | 106                       | 145                        |
| • $P_{max}$                                                                                                            | kW                                     | 35          | 70          | 91 (110 <sup>2)</sup> )  | 131                       | 175                        |
| <b>DC link current</b>                                                                                                 |                                        |             |             |                          |                           |                            |
| • At 600 V DC                                                                                                          | A                                      | 27          | 60          | 92                       | 134                       | 200                        |
| • For S6 duty (40 %)                                                                                                   | A                                      | 35          | 79          | 121                      | 176                       | 244                        |
| • Maximum                                                                                                              | A                                      | 59          | 117         | 152 (176 <sup>2)</sup> ) | 218                       | 292                        |
| <b>Input current</b>                                                                                                   |                                        |             |             |                          |                           |                            |
| • Rated current at 380/400/480 V 3 AC                                                                                  | A                                      | 26/25/21    | 58/55/46    | 88/84/70                 | 128/122/102               | 192/182/152                |
| • For S6 duty (40 %) at 400 V                                                                                          | A                                      | 32          | 71          | 108                      | 161                       | 220                        |
| • At 400 V max.                                                                                                        | A                                      | 54          | 107         | 139 (168 <sup>2)</sup> ) | 200                       | 267                        |
| <b>Current requirement</b><br>24 V DC electronic power supply, max.                                                    | A                                      | 1.1         | 1.5         | 1.9                      | 2.0                       | 2.5 (2.1 <sup>3)</sup> )   |
| <b>Current carrying capacity</b>                                                                                       |                                        |             |             |                          |                           |                            |
| • 24 V DC busbars                                                                                                      | A                                      | 20          | 20          | 20                       | 20                        | 20                         |
| • DC link busbars                                                                                                      | A                                      | 100         | 200         | 200                      | 200                       | 200                        |
| <b>DC link capacitance</b>                                                                                             |                                        |             |             |                          |                           |                            |
| • Active Line Module                                                                                                   | μF                                     | 710         | 1410        | 1880                     | 2820                      | 3995                       |
| • Drive line-up, max.                                                                                                  | μF                                     | 20000       | 20000       | 20000                    | 20000                     | 20000                      |
| <b>Internal/external air cooling</b>                                                                                   |                                        |             |             |                          |                           |                            |
| • Power loss <sup>4)</sup>                                                                                             |                                        |             |             |                          |                           |                            |
| - Total power loss for cooling methods: internal air cooling, external air cooling; cold plate cooling, liquid cooling | kW                                     | 0.29        | 0.67        | 0.95                     | 1.39                      | 2.26                       |
| - With external air cooling, int./ext.                                                                                 | kW                                     | 0.09/0.2    | 0.17/0.5    | 0.25/0.7                 | 0.3/1.0                   | 0.55/1.71                  |
| • Cooling air requirement                                                                                              | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.016 (0.6) | 0.031 (1.1) | 0.044 (1.6)              | 0.144 (5.1)               | 0.144 (5.1)                |
| • Sound pressure level $L_{pA}$ (1 m)                                                                                  | dB                                     | < 60        | < 65        | < 60                     | < 75                      | < 75                       |
| <b>Cold plate cooling</b>                                                                                              |                                        |             |             |                          |                           |                            |
| • Power loss, int./ext. <sup>4)</sup>                                                                                  | kW                                     | 0.07/0.21   | 0.13/0.52   | 0.19/0.74                | 0.3/1.1                   | 0.46/1.8                   |
| • Thermal resistance $R_{th}$                                                                                          | K/W                                    | 0.075       | 0.055       | 0.05                     | 0.028                     | 0.028                      |

<sup>1)</sup> In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

<sup>2)</sup> Higher peak output is possible in combination with the Active Interface Module 6SL3100-0BE25-5AB0 (for operating cycle constraints, see SINAMICS S120 Manual).

<sup>3)</sup> For 6SL3135-7TE31-2AA3

<sup>4)</sup> Power loss of Active Line Module at rated power including losses of 24 V DC electronic power supply.

<sup>5)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Technical specifications (continued)

|                                                                               |                                       |                             |                          |                     |                                                     |                                                     |
|-------------------------------------------------------------------------------|---------------------------------------|-----------------------------|--------------------------|---------------------|-----------------------------------------------------|-----------------------------------------------------|
| <b>Line supply voltage</b><br>380 ... 480 V 3 AC                              | Active Line Module in booksize format |                             |                          |                     |                                                     |                                                     |
| <b>Internal air cooling</b>                                                   | 6SL3130-...                           | 7TE21-6AA3                  | 7TE23-6AA3               | 7TE25-5AA3          | 7TE28-0AA3                                          | 7TE31-2AA3                                          |
| <b>External air cooling</b>                                                   | 6SL3131-...                           | 7TE21-6AA3                  | 7TE23-6AA3               | 7TE25-5AA3          | 7TE28-0AA3                                          | 7TE31-2AA3                                          |
| <b>Cold plate cooling</b>                                                     | 6SL3136-...                           | 7TE21-6AA3                  | 7TE23-6AA3               | 7TE25-5AA3          | 7TE28-0AA3                                          | 7TE31-2AA3                                          |
| <b>Liquid cooling</b>                                                         | 6SL3135-...                           | —                           | —                        | —                   | —                                                   | 7TE31-2AA3                                          |
| <b>Infeed/regenerative feedback power</b>                                     |                                       |                             |                          |                     |                                                     |                                                     |
| • Rated power $P_{rated}$<br>- at 380 V 3 AC<br>- at 460 V 3 AC <sup>7)</sup> | kW<br>(HP)                            | 16<br>(18)                  | 36<br>(40)               | 55<br>(60)          | 80 (64 <sup>1)</sup> )<br>(100) (75 <sup>1)</sup> ) | 120 (84 <sup>1</sup> )<br>(150) (100 <sup>1</sup> ) |
| <b>Liquid cooling<sup>2)</sup></b>                                            |                                       |                             |                          |                     |                                                     |                                                     |
| • Power loss, int./ext. <sup>3)</sup>                                         | kW                                    | —                           | —                        | —                   | —                                                   | 0.46/1.8                                            |
| - Rated volumetric flow for water at 70 kPa pressure drop <sup>4)</sup>       | l/min<br>(US gal/min)                 | —                           | —                        | —                   | —                                                   | 8 (2.1)                                             |
| - Volume of liquid, internal                                                  | ml                                    | —                           | —                        | —                   | —                                                   | 100                                                 |
| - Coolant temperature, max.                                                   |                                       |                             |                          |                     |                                                     |                                                     |
| - Without derating                                                            | °C (°F)                               | —                           | —                        | —                   | —                                                   | 45 (113)                                            |
| - With derating                                                               | °C (°F)                               | —                           | —                        | —                   | —                                                   | 50 (122)                                            |
| - Sound pressure level $L_{pA}$ (1 m)                                         | dB                                    | —                           | —                        | —                   | —                                                   | < 73                                                |
| <b>Line connection</b><br>U1, V1, W1                                          |                                       | Screw-type terminals (X1)   | M6 screw studs (X1)      | M8 screw studs (X1) | M8 screw studs (X1)                                 | M8 screw studs (X1)                                 |
| • Conductor cross-section, max. mm <sup>2</sup>                               |                                       | 2.5 ... 10                  | 2.5 ... 50               | 2.5 ... 95, 2 × 35  | 2.5 ... 120, 2 × 50                                 | 2.5 ... 120, 2 × 50                                 |
| <b>Shield connection</b>                                                      |                                       | Integrated in the connector | See Accessories          | See Accessories     | See Accessories                                     | See Accessories                                     |
| <b>PE connection</b>                                                          |                                       | M5 screw                    | M6 screw                 | M6 screw            | M8 screw                                            | M8 screw                                            |
| <b>Cable length, max.</b><br>Total of all motor cables and DC link            |                                       |                             |                          |                     |                                                     |                                                     |
| • Shielded                                                                    | m (ft)                                | 630 (2067) <sup>5)</sup>    | 630 (2067) <sup>5)</sup> | 1000 (3281)         | 1000 (3281)                                         | 1000 (3281)                                         |
| <b>Degree of protection</b>                                                   |                                       | IP20                        | IP20                     | IP20                | IP20                                                | IP20                                                |
| <b>Dimensions</b>                                                             |                                       |                             |                          |                     |                                                     |                                                     |
| • Width                                                                       | mm (in)                               | 100 (3.94)                  | 150 (5.91)               | 200 (7.87)          | 300 (11.81)                                         | 300 (11.81)                                         |
| • Height                                                                      | mm (in)                               | 380 (14.96)                 | 380 (14.96)              | 380 (14.96)         | 380 (14.96)                                         | 380 (14.96)                                         |
| - With fan <sup>6)</sup>                                                      | mm (in)                               | —                           | —                        | —                   | 629 (24.76)                                         | 629 (24.76)                                         |
| - With screwed fitting                                                        | mm (in)                               | —                           | —                        | —                   | 629 (24.76)                                         | 553 (21.77) <sup>2)</sup>                           |
| • Depth                                                                       |                                       |                             |                          |                     |                                                     |                                                     |
| - With internal air cooling                                                   | mm (in)                               | 270 (10.63)                 | 270 (10.63)              | 270 (10.63)         | 270 (10.63)                                         | 270 (10.63)                                         |
| - With external air cooling on/behind mounting surface                        | mm (in)                               | 226/66.5 (8.90/2.62)        | 226/71 (8.90/2.80)       | 226/92 (8.90/3.62)  | 226/82 (8.90/3.23)                                  | 226/82 (8.90/3.23)                                  |
| - With cold plate cooling                                                     | mm (in)                               | 226 (8.90)                  | 226 (8.90)               | 226 (8.90)          | 226 (8.90)                                          | 226 (8.90)                                          |
| - With liquid cooling                                                         | mm (in)                               | —                           | —                        | —                   | —                                                   | 226 (8.90)                                          |
| <b>Weight, approx.</b>                                                        |                                       |                             |                          |                     |                                                     |                                                     |
| • With internal air cooling                                                   | kg (lb)                               | 7 (15.4)                    | 10.3 (22.7)              | 17 (37.5)           | 23 (50.7)                                           | 23 (50.7)                                           |
| • With external air cooling                                                   | kg (lb)                               | 8.8 (19.4)                  | 13.8 (30.4)              | 18.5 (40.8)         | 27.7 (61.1)                                         | 30.7 (67.7)                                         |
| • With cold plate cooling                                                     | kg (lb)                               | 6.1 (13.5)                  | 10.2 (22.5)              | 13.8 (30.4)         | 20.3 (44.8)                                         | 20.4 (45.0)                                         |
| • With liquid cooling                                                         | kg (lb)                               | —                           | —                        | —                   | —                                                   | 23 (50.7)                                           |

<sup>1)</sup> In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

<sup>2)</sup> The coolant connections are located on the lower side of the components. All connection elements can be accessed using an appropriate tool.  
Thread type of water connections: Pipe thread ISO 228 G ½ B.

<sup>3)</sup> Power loss of Active Line Module at rated power including losses of 24 V DC electronic power supply.

<sup>4)</sup> This value applies to water as coolant; for other coolants, refer to the SINAMICS S120 Manual.

<sup>5)</sup> Max. cable lengths in conjunction with Active Interface Module and Basic Line Filter (Category C3 in accordance with EN 61800-3).

<sup>6)</sup> The fan is supplied with the Active Line Module and must be installed before the Active Line Module is commissioned.

<sup>7)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Selection and ordering data

| Description                                                                                                         | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Active Line Module in booksize format</b>                                                                        |                           |
| <b>Internal air cooling</b><br>Rated power:                                                                         |                           |
| • 16 kW (18 HP)                                                                                                     | <b>6SL3130-7TE21-6AA3</b> |
| • 36 kW (40 HP)                                                                                                     | <b>6SL3130-7TE23-6AA3</b> |
| • 55 kW (60 HP)                                                                                                     | <b>6SL3130-7TE25-5AA3</b> |
| • 80 kW (100 HP)                                                                                                    | <b>6SL3130-7TE28-0AA3</b> |
| • 120 kW (150 HP)                                                                                                   | <b>6SL3130-7TE31-2AA3</b> |
| <b>External air cooling</b><br>Rated power:                                                                         |                           |
| • 16 kW (18 HP)                                                                                                     | <b>6SL3131-7TE21-6AA3</b> |
| • 36 kW (40 HP)                                                                                                     | <b>6SL3131-7TE23-6AA3</b> |
| • 55 kW (60 HP)                                                                                                     | <b>6SL3131-7TE25-5AA3</b> |
| • 80 kW (100 HP)                                                                                                    | <b>6SL3131-7TE28-0AA3</b> |
| • 120 kW (150 HP)                                                                                                   | <b>6SL3131-7TE31-2AA3</b> |
| <b>Cold plate cooling</b><br>Rated power:                                                                           |                           |
| • 16 kW (18 HP)                                                                                                     | <b>6SL3136-7TE21-6AA3</b> |
| • 36 kW (40 HP)                                                                                                     | <b>6SL3136-7TE23-6AA3</b> |
| • 55 kW (60 HP)                                                                                                     | <b>6SL3136-7TE25-5AA3</b> |
| • 80 kW (100 HP)                                                                                                    | <b>6SL3136-7TE28-0AA3</b> |
| • 120 kW (150 HP)                                                                                                   | <b>6SL3136-7TE31-2AA3</b> |
| <b>Liquid cooling</b><br>Rated power:                                                                               |                           |
| • 120 kW (150 HP)                                                                                                   | <b>6SL3135-7TE31-2AA3</b> |
| <b>Accessories for re-ordering</b>                                                                                  |                           |
| <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs)<br>For DRIVE-CLiQ port |                           |
| • For Active Line Modules with a width of 100 mm (3.94 in), int./ext. air cooling                                   | <b>6SL3163-8FD00-0AA0</b> |
| • For Active Line Modules with a width of 150 mm (5.91 in) wide, int./ext. air cooling                              | <b>6SL3163-8GF00-0AA0</b> |
| • For Active Line Modules with a width of 200 mm (7.87 in) wide, int./ext. air cooling                              | <b>6SL3163-8HH00-0AA0</b> |
| • For Active Line Modules with a width of 300 mm (11.81 in) wide, int./ext. air cooling                             | <b>6SL3163-8JM00-0AA0</b> |
| <b>SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                   | <b>6SL3066-4CA00-0AA0</b> |

| Description                                                                                                                                                                                                                                                                                                                                                                                    | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories</b>                                                                                                                                                                                                                                                                                                                                                                             |                           |
| <b>Shield connection plate</b><br>For Line/Motor Modules in booksize format                                                                                                                                                                                                                                                                                                                    |                           |
| • 150 mm (5.91 in) wide for internal air cooling                                                                                                                                                                                                                                                                                                                                               | <b>6SL3162-1AF00-0AA1</b> |
| • 150 mm (5.91 in) wide for external air cooling and cold plate cooling                                                                                                                                                                                                                                                                                                                        | <b>6SL3162-1AF00-0BA1</b> |
| • 200 mm (7.87 in) wide for internal air cooling                                                                                                                                                                                                                                                                                                                                               | <b>6SL3162-1AH01-0AA0</b> |
| • 200 mm (7.87 in) wide for external air cooling and cold plate cooling                                                                                                                                                                                                                                                                                                                        | <b>6SL3162-1AH01-0BA0</b> |
| • 300 mm (11.81 in) wide for all cooling types                                                                                                                                                                                                                                                                                                                                                 | <b>6SL3162-1AH00-0AA0</b> |
| <b>DC link rectifier adapter</b><br>For direct infeed of DC link voltage                                                                                                                                                                                                                                                                                                                       |                           |
| • Screw-type terminals 0.5 ... 10 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)                                                                                                                                                                                                                                 | <b>6SL3162-2BD00-0AA0</b> |
| • Screw-type terminals 35 ... 95 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 150 mm, 200 mm and 300 mm (5.91 in, 7.87 in and 11.81 in)                                                                                                                                                                                                            | <b>6SL3162-2BM00-0AA0</b> |
| <b>DC link adapter (2 units)</b><br>For multi-tier configuration<br>Screw-type terminals 35 ... 95 mm <sup>2</sup><br>For all Line Modules and Motor Modules in booksize format                                                                                                                                                                                                                | <b>6SL3162-2BM01-0AA0</b> |
| <b>24 V terminal adapter</b><br>For all Line Modules and Motor Modules in booksize format                                                                                                                                                                                                                                                                                                      | <b>6SL3162-2AA00-0AA0</b> |
| <b>24 V jumper</b><br>For connection of the 24 V busbars (for booksize format)                                                                                                                                                                                                                                                                                                                 | <b>6SL3162-2AA01-0AA0</b> |
| <b>Warning labels in 30 languages</b><br>This set of foreign language warning signs can be placed on top of the standard English or German signs.<br>A set of signs is supplied with the units.<br>One sign in each of the following languages is provided in each set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b> |

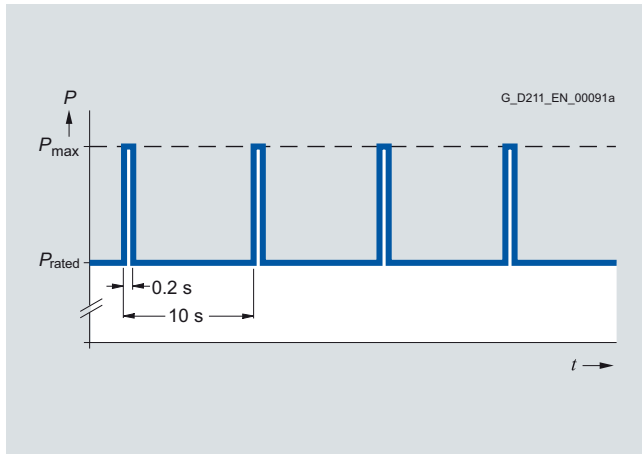
# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

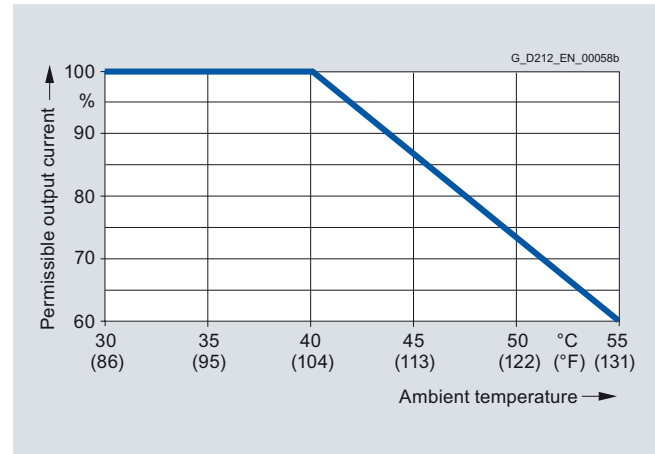
#### Characteristic curves

##### Overload capability



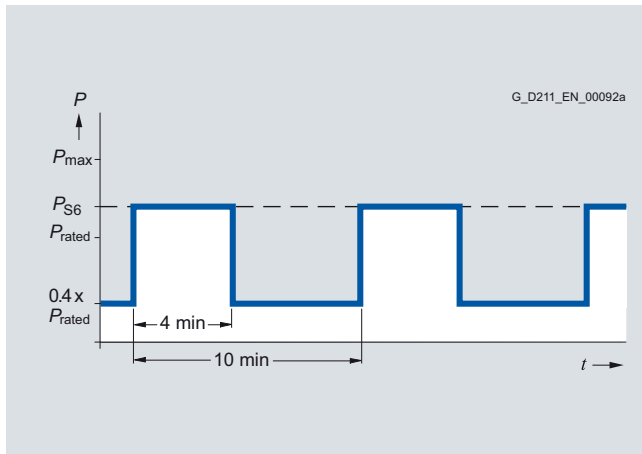
Load cycle with previous load

##### Derating characteristics

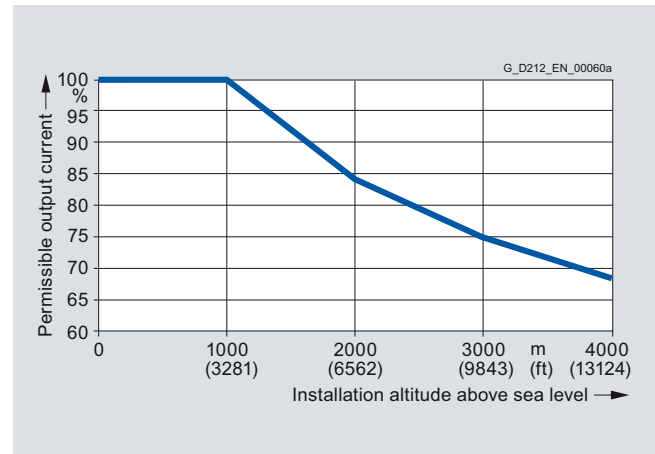


Output power dependent on ambient temperature

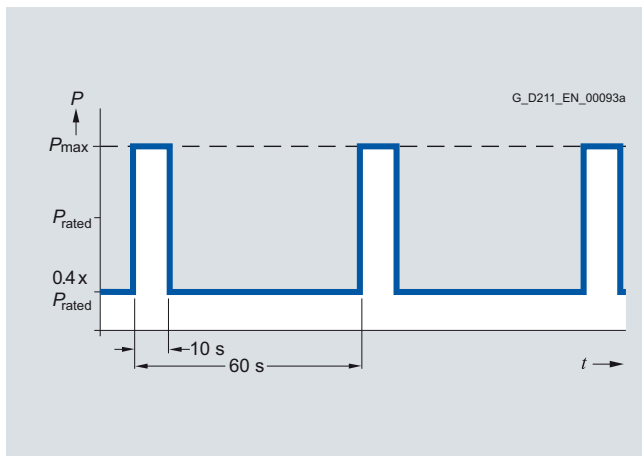
5



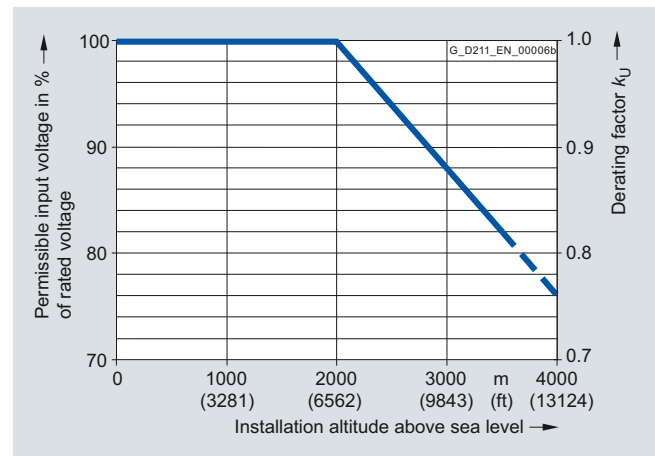
S6 load cycle with previous load



Output power dependent on installation altitude



S6 load cycle with previous load



Voltage derating dependent on installation altitude

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules Active Interface Modules

#### Overview



Active Interface Modules for 16 kW, 36 kW, 55 kW and 80 kW/120 kW

The Active Interface Modules combine with the Active Line Modules to form a functional unit and are essential for operation of the associated Active Line Module. The Active Interface Modules contain a Clean Power Filter and basic interference suppression to ensure compliance with Category C3 in accordance with EN 61800-3 regarding emitted interference.

The Clean Power Filter protects the mains connection from switching-frequency harmonics. The drive system therefore draws a sinusoidal current from the supply and causes almost no harmonics.

The Active Line Modules in combination with the Active Interface Module can also be operated with supply systems with an isolated star point (IT systems).

#### Design

The scope of supply of the Active Interface Modules includes:

- Connector X21 for temperature evaluation and fan control
- Connector X24 for connecting the 24 V supply for the integrated fan
- DRIVE-CLiQ cable for connecting the Control Unit to the Active Line Module; length of the DRIVE-CLiQ cable = width of the Active Interface Module + 0.11 m (4.33 in)
- Shield connection plate for Active Interface Module 16 kW
- 1 set of warning signs in 30 languages

#### Selection and ordering data

| Rated power of the Active Line Module<br>kW (HP) | Suitable for Active Line Module in booksize format                                   | Active Interface Module<br>Order No. |
|--------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------|
| 16 (18)                                          | 6SL3130-7TE21-6AA3<br>6SL3131-7TE21-6AA3<br>6SL3136-7TE21-6AA3                       | <b>6SL3100-0BE21-6AB0</b>            |
| 36 (40)                                          | 6SL3130-7TE23-6AA3<br>6SL3131-7TE23-6AA3<br>6SL3136-7TE23-6AA3                       | <b>6SL3100-0BE23-6AB0</b>            |
| 55 (60)                                          | 6SL3130-7TE25-5AA3<br>6SL3131-7TE25-5AA3<br>6SL3136-7TE25-5AA3                       | <b>6SL3100-0BE25-5AB0</b>            |
| 80 (100)                                         | 6SL3130-7TE28-0AA3<br>6SL3131-7TE28-0AA3<br>6SL3136-7TE28-0AA3                       | <b>6SL3100-0BE28-0AB0</b>            |
| 120 (150)                                        | 6SL3130-7TE31-2AA3<br>6SL3131-7TE31-2AA3<br>6SL3136-7TE31-2AA3<br>6SL3135-7TE31-2AA3 | <b>6SL3100-0BE31-2AB0</b>            |

#### Accessories

| Description                                                                          | Order No.                 |
|--------------------------------------------------------------------------------------|---------------------------|
| <b>Shield connection plate<sup>1)</sup></b>                                          |                           |
| • For Active Interface Module 36 kW                                                  | <b>6SL3163-1AF00-0AA0</b> |
| • For Active Interface Module 55 kW                                                  | <b>6SL3163-1AH00-0AA0</b> |
| • For Active Interface Modules 80 kW                                                 | <b>6SL3163-1AM00-0AA0</b> |
| <b>DRIVE-CLiQ cable, preassembled</b><br>Degree of protection of connector IP20/IP20 |                           |
| • For Active Interface Module 16 kW, 0.31 m (1.02 ft) in length                      | <b>6SL3060-4AK00-0AA0</b> |
| • For Active Interface Module 36 kW, 0.41 m (1.35 ft) in length                      | <b>6SL3060-4AP00-0AA0</b> |
| • For Active Interface Module 55 kW, 0.6 m (1.97 ft) in length                       | <b>6SL3060-4AU00-0AA0</b> |
| • For Active Interface Module 80 kW and 120 kW, 0.95 m (3.12 ft) in length           | <b>6SL3060-4AA10-0AA0</b> |

#### Accessories for re-ordering

|                                                                   |                           |
|-------------------------------------------------------------------|---------------------------|
| <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper) |                           |
| • For Active Interface Module 16 kW                               | <b>6SL3160-8CD10-0AA0</b> |
| • For Active Interface Module 36 kW                               | <b>6SL3160-8DF10-0AA0</b> |
| • For Active Interface Module 55 kW                               | <b>6SL3160-8EH10-0AA0</b> |
| • For Active Interface Modules 80 kW and 120 kW                   | <b>6SL3160-8FM10-0AA0</b> |

<sup>1)</sup> For Active Interface Module 16 kW, included in scope of supply.

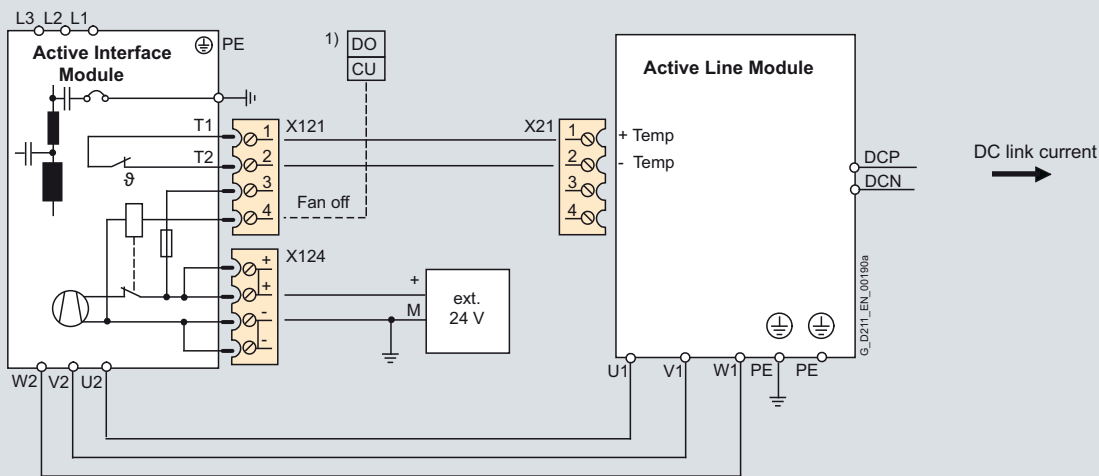
# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

### Active Interface Modules

#### Integration



1) Digital input (DI) or digital output (DO), controlled via Control Unit.

#### Connection example for Active Interface Module

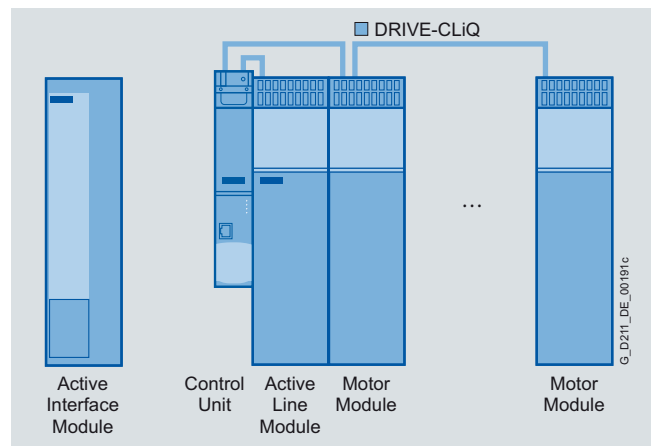
The Active Interface Module requires a 24 V DC supply to operate the integrated fan.

The fan turns when the 24 V DC supply is applied and, if required (service life, noise), can be switched off from the Control Unit via the "Fan off" input. It is only permitted to switch off the fan when the infeed of the drive system is not operating, otherwise the Active Interface Module will overheat.

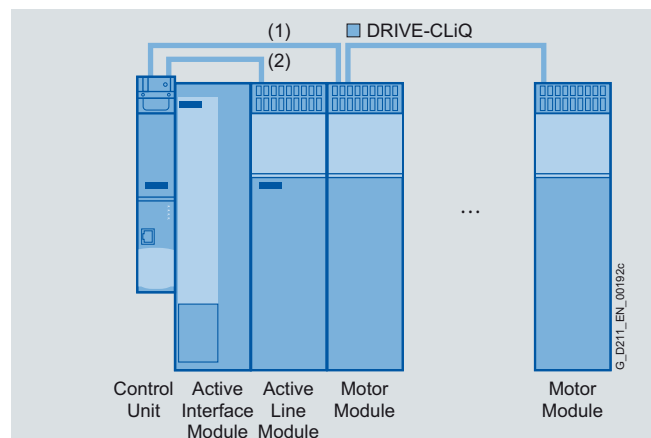
The thermostatic switch installed in the Active Interface Module is evaluated over the connected Active Line Module.

The power cables between the Active Interface Module and Active Line Module must be shielded if limit values for interference suppression are to be complied with. The cable shield can be routed over the shield connection set (option) to the Active Interface Module or Active Line Module.

Depending on the position of the Active Interface Module in the drive system, additional DRIVE-CLiQ cables may be required. If it is separately installed next to the left side of the Control Unit and Active Line Module, no additional DRIVE-CLiQ cables are required. If the Active Interface Module is placed between the Control Unit and Active Line Module, the DRIVE-CLiQ cables supplied with the Active Line Modules are suitable for setting up a line topology, i.e. Active Line Module and all Motor Modules in series on one DRIVE-CLiQ line. If the Active Line Module is connected over a separate DRIVE-CLiQ line, the DRIVE-CLiQ cable marked with (1) must be ordered. A DRIVE-CLiQ cable suitable for connection (2) is included in the scope of supply of the Active Line Module. For DRIVE-CLiQ cables for different configurations, see the MOTION CONNECT connection system.



Separate Active Interface Module



(1) DRIVE-CLiQ cable between Control Unit and Motor Module

|                                           |                          |
|-------------------------------------------|--------------------------|
| Active Interface Module 16 kW:            | 0.31 m (see Accessories) |
| Active Interface Module 36 kW:            | 0.41 m (see Accessories) |
| Active Interface Module 55 kW:            | 0.60 m (see Accessories) |
| Active Interface Module 80 kW and 120 kW: | 0.95 m (see Accessories) |

(2) Included in scope of supply of Active Line Modules

Active Interface Module integrated in the drive line-up

# SINAMICS S120 drive system

## Booksize format – Line Modules

Active Line Modules  
Active Interface Modules

### Technical specifications

|                                                                      |                                        |                                                                |                                                                |                                                                |                                                                |                                                                                      |
|----------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Line connection voltage</b><br>380 ... 480 V 3 AC                 | Active Interface Module                |                                                                |                                                                |                                                                |                                                                |                                                                                      |
| <b>Internal air cooling</b>                                          | 6SL3100-...                            | 0BE21-6AB0                                                     | 0BE23-6AB0                                                     | 0BE25-5AB0                                                     | 0BE28-0AB0                                                     | 0BE31-2AB0                                                                           |
| <b>Rated current</b>                                                 | A                                      | 27                                                             | 60                                                             | 88                                                             | 132                                                            | 200                                                                                  |
| <b>Current requirement</b><br>24 V DC electronic power supply, max.  | A                                      | 0.25                                                           | 0.5                                                            | 0.6                                                            | 1.2                                                            | 1.2                                                                                  |
| <b>Internal resistance</b><br>Digital input<br>"Fan off" (X21/Pin 4) | Ω                                      | 1440 ± 10 %                                                    | 1440 ± 10 %                                                    | 1440 ± 10 %                                                    | 1440 ± 10 %                                                    | 1440 ± 10 %                                                                          |
| <b>Power loss</b>                                                    | kW                                     | 0.3                                                            | 0.39                                                           | 0.45                                                           | 0.575                                                          | 0.8                                                                                  |
| <b>Cooling air requirement</b>                                       | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.03 (1.1)                                                     | 0.04 (1.4)                                                     | 0.075 (2.6)                                                    | 0.15 (5.3)                                                     | 0.15 (5.3)                                                                           |
| <b>Sound pressure level</b><br><i>L<sub>pA</sub></i> (1 m)           | dB                                     | 57                                                             | 60                                                             | 66                                                             | 68                                                             | 68                                                                                   |
| <b>Line/load connection</b><br>L1, L2, L3/U2, V2, W2                 |                                        | Screw-type terminals                                           | Screw-type terminals                                           | M8 screw stud                                                  | M8 screw stud                                                  | M8 screw stud                                                                        |
| • Conductor cross-section                                            | mm <sup>2</sup>                        | 16                                                             | 50                                                             | 2.5 ... 95 or 2 × 35                                           | 2.5 ... 120 or 2 × 50                                          | 2.5 ... 120 or 2 × 50                                                                |
| <b>Thermostatic switch</b><br>(NC contact)                           |                                        |                                                                |                                                                |                                                                |                                                                |                                                                                      |
| • Switching capacity                                                 |                                        | 250 V AC/1.6 A<br>60 V DC/0.75 A                               | 250 V AC/1.6 A<br>60 V DC/0.75 A                               | 250 V AC/1.6 A<br>60 V DC/0.75 A                               | 250 V AC/1.6 A<br>60 V DC/0.75 A                               | 250 V AC/1.6 A<br>60 V DC/0.75 A                                                     |
| <b>PE connection</b>                                                 |                                        | M5 screw                                                       | M5 screw                                                       | M6 screw                                                       | M8 screw                                                       | M8 screw                                                                             |
| <b>Degree of protection</b>                                          |                                        | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                                                 |
| <b>Dimensions</b>                                                    |                                        |                                                                |                                                                |                                                                |                                                                |                                                                                      |
| • Width                                                              | mm (in)                                | 100 (3.94)                                                     | 150 (5.91)                                                     | 200 (7.87)                                                     | 300 (11.81)                                                    | 300 (11.81)                                                                          |
| • Height                                                             | mm (in)                                | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                                          |
| • Depth                                                              | mm (in)                                | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                                          |
| <b>Weight, approx.</b>                                               | kg (lb)                                | 11 (24.3)                                                      | 18.5 (40.8)                                                    | 21 (46.3)                                                      | 29 (63.9)                                                      | 36 (79.4)                                                                            |
| <b>Approvals according to</b>                                        |                                        | cURus                                                          | cURus                                                          | cURus                                                          | cURus                                                          | cURus                                                                                |
| <b>Suitable for Active Line Module in booksize format</b>            | Type                                   | 6SL3130-7TE21-6AA3<br>6SL3131-7TE21-6AA3<br>6SL3136-7TE21-6AA3 | 6SL3130-7TE23-6AA3<br>6SL3131-7TE23-6AA3<br>6SL3136-7TE23-6AA3 | 6SL3130-7TE25-5AA3<br>6SL3131-7TE25-5AA3<br>6SL3136-7TE25-5AA3 | 6SL3130-7TE28-0AA3<br>6SL3131-7TE28-0AA3<br>6SL3136-7TE28-0AA3 | 6SL3130-7TE31-2AA3<br>6SL3131-7TE31-2AA3<br>6SL3136-7TE31-2AA3<br>6SL3135-7TE31-2AA3 |
| <b>Rated power of the Active Line Module</b>                         | kW                                     | 16                                                             | 36                                                             | 55                                                             | 80                                                             | 120                                                                                  |

### Characteristic curves

See Active Line Modules (page 5/42).



# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules

#### Line filters

#### Overview



In plants with strict EMC requirements, line filters work together with Active Interface Modules to restrict the conducted interference emanating from the power modules to the limit values of Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN systems.

Note: According to product standard IEC 61800-3, radio interference suppression commensurate with the relevant rated conditions must be provided and is a legal requirement in the EU (EMC Directive). Line filters and line reactors are required for this purpose. The use of line filters of other makes can lead to limit value violations, resonance, overvoltages and irreparable damage to motors or other equipment. The machine manufacturer must provide verification that the machinery to be operated with the drive products and the installed suppression elements, e.g. line filters, are CE-EMC-compliant.

Optional Basic Line Filters that are coordinated with the power ranges in booksize format are available for the SINAMICS S120 drive system.

With the Basic Line Filters in combination with the Active Interface Modules, the limits for the interference voltages can be extended to Category C2 (IEC 61800-3) or, retaining Category C3, longer total cable lengths are possible for the configuration.

# SINAMICS S120 drive system

## Booksize format – Line Modules

Active Line Modules  
Basic Line Filters

### Overview



Basic Line Filters are used on machines on which conducted interference emissions in the frequency range between 150 kHz and 30 MHz need to be damped in accordance with the requirements of CE-EMC legislation.

### Selection and ordering data

| Rated power of the Active Line Module<br>kW (HP) | Suitable for Active Line Module in booksize format                                   | Basic Line Filter<br>Order No. |
|--------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------|
| 16 (18)                                          | 6SL3130-7TE21-6AA3<br>6SL3131-7TE21-6AA3<br>6SL3136-7TE21-6AA3                       | <b>6SL3000-0BE21-6DA0</b>      |
| 36 (40)                                          | 6SL3130-7TE23-6AA3<br>6SL3131-7TE23-6AA3<br>6SL3136-7TE23-6AA3                       | <b>6SL3000-0BE23-6DA1</b>      |
| 55 (60)                                          | 6SL3130-7TE25-5AA3<br>6SL3131-7TE25-5AA3<br>6SL3136-7TE25-5AA3                       | <b>6SL3000-0BE25-5DA0</b>      |
| 80 (100)                                         | 6SL3130-7TE28-0AA3<br>6SL3131-7TE28-0AA3<br>6SL3136-7TE28-0AA3                       | <b>6SL3000-0BE28-0DA0</b>      |
| 120 (150)                                        | 6SL3130-7TE31-2AA3<br>6SL3131-7TE31-2AA3<br>6SL3136-7TE31-2AA3<br>6SL3135-7TE31-2AA3 | <b>6SL3000-0BE31-2DA0</b>      |

### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                 | Basic Line Filters |                                                                |                                                                |                                                                |                                                                |                                                                                      |
|-----------------------------------------------------------|--------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                                                           | 6SL3000-...        | 0BE21-6DA0                                                     | 0BE23-6DA1                                                     | 0BE25-5DA0                                                     | 0BE28-0DA0                                                     | 0BE31-2DA0                                                                           |
| <b>Rated current</b>                                      | A                  | 36                                                             | 74                                                             | 105                                                            | 132                                                            | 192                                                                                  |
| <b>Power loss</b>                                         | kW                 | 0.016                                                          | 0.028                                                          | 0.041                                                          | 0.048                                                          | 0.086                                                                                |
| <b>Line/load connection</b><br>L1, L2, L3 / U, V, W       |                    | Screw-type terminals                                           | Screw-type terminals                                           | Screw-type terminals                                           | Screw-type terminals                                           | Screw-type terminals                                                                 |
| • Conductor cross-section                                 | mm <sup>2</sup>    | 10                                                             | 35                                                             | 50                                                             | 95                                                             | 95                                                                                   |
| <b>PE connection</b>                                      |                    | M6 screw studs according to DIN 46234                          | M6 screw studs according to DIN 46234                          | M8 screw studs according to DIN 46234                          | M10 screw studs according to DIN 46234                         | M10 screw studs according to DIN 46234                                               |
| <b>Degree of protection</b>                               |                    | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                                                 |
| <b>Dimensions</b>                                         |                    |                                                                |                                                                |                                                                |                                                                |                                                                                      |
| • Width                                                   | mm (in)            | 50 (1.97)                                                      | 75 (2.95)                                                      | 100 (3.94)                                                     | 150 (5.91)                                                     | 150 (5.91)                                                                           |
| • Height                                                  | mm (in)            | 429 (16.89)                                                    | 433 (17.05)                                                    | 466 (18.35)                                                    | 479 (18.86)                                                    | 479 (18.86)                                                                          |
| • Depth                                                   | mm (in)            | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                                           |
| <b>Weight, approx.</b>                                    | kg (lb)            | 5 (11.0)                                                       | 7.5 (16.5)                                                     | 11.5 (25.4)                                                    | 18.2 (40.1)                                                    | 18.8 (41.5)                                                                          |
| <b>Approvals according to</b>                             |                    | cURus                                                          | cURus                                                          | cURus                                                          | cURus                                                          | cURus                                                                                |
| <b>Suitable for Active Line Module in booksize format</b> | Type               | 6SL3130-7TE21-6AA3<br>6SL3131-7TE21-6AA3<br>6SL3136-7TE21-6AA3 | 6SL3130-7TE23-6AA3<br>6SL3131-7TE23-6AA3<br>6SL3136-7TE23-6AA3 | 6SL3130-7TE25-5AA3<br>6SL3131-7TE25-5AA3<br>6SL3136-7TE25-5AA3 | 6SL3130-7TE28-0AA3<br>6SL3131-7TE28-0AA3<br>6SL3136-7TE28-0AA3 | 6SL3130-7TE31-2AA3<br>6SL3131-7TE31-2AA3<br>6SL3136-7TE31-2AA3<br>6SL3135-7TE31-2AA3 |
| • <b>Rated power of the Active Line Module</b>            | kW                 | 16                                                             | 36                                                             | 55                                                             | 80                                                             | 120                                                                                  |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Active Line Modules Recommended line-side components

#### Overview

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

The tables below list recommended components.

Additional information about the line contactors, switch disconnectors, circuit breakers and fuses specified in the table can be found in Catalog IC 10.

#### Assignment of line-side power components to Active Line Modules in booksize format

| Rated power | Assignment to Active Line Module in booksize format | Line contactor     | Output coupling device for line contactor | Main circuit breaker | Leading auxiliary switch for main switch |
|-------------|-----------------------------------------------------|--------------------|-------------------------------------------|----------------------|------------------------------------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3131-                        | Type               | Order No.                                 | Order No.            | Order No.                                |
| 16 (18)     | 7TE21-6AA3                                          | <b>3RT1035-...</b> | <b>3TX7004-1LB00</b>                      | <b>3LD2504-0TK51</b> | <b>3LD9200-5B</b>                        |
| 36 (40)     | 7TE23-6AA3                                          | <b>3RT1045-...</b> | <b>3TX7004-1LB00</b>                      | <b>3LD2704-0TK51</b> | <b>3LD9200-5B</b>                        |
| 55 (60)     | 7TE25-5AA3                                          | <b>3RT1054-...</b> | <b>3TX7004-1LB00</b>                      | <b>3KA5330-1GE01</b> | <b>3KX3552-3EA01</b>                     |
| 80 (100)    | 7TE28-0AA3                                          | <b>3RT1056-...</b> | <b>3TX7004-1LB00</b>                      | <b>3KA5330-1GE01</b> | <b>3KX3552-3EA01</b>                     |
| 120 (150)   | 7TE31-2AA3                                          | <b>3RT1065-...</b> | <b>3TX7004-1LB00</b>                      | <b>3KA5730-1GE01</b> | <b>3KX3552-3EA01</b>                     |

| Rated power | Assignment to Active Line Module in booksize format  | Circuit breaker IEC 60947 | Circuit breaker UL489/ CSA C22.2 No. 5-02 | Fuse switch disconnect | Switch disconnector with fuse holders | Leading auxiliary switch for switch disconnector with fuse holders |
|-------------|------------------------------------------------------|---------------------------|-------------------------------------------|------------------------|---------------------------------------|--------------------------------------------------------------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3131-<br>6SL3136-<br>6SL3135- | Order No.                 | Order No.                                 | Order No.              | Order No.                             | Order No.                                                          |
| 16 (18)     | 7TE21-6AA3                                           | <b>3RV1031-4FA10</b>      | <b>3VL2105-2KN30-....</b>                 | <b>3NP1123-1CA20</b>   | <b>3KL5030-1GB01</b>                  | <b>3KX3552-3EA01</b>                                               |
| 36 (40)     | 7TE23-6AA3                                           | <b>3RV1041-4LA10</b>      | <b>3VL2108-2KN30-....</b>                 | <b>3NP1123-1CA20</b>   | <b>3KL5230-1GB01</b>                  | <b>3KX3552-3EA01</b>                                               |
| 55 (60)     | 7TE25-5AA3                                           | <b>3VL2712-1DC33-....</b> | <b>3VL2112-2KN30-....</b>                 | <b>3NP1123-1DA20</b>   | <b>3KL5530-1GB01</b>                  | <b>3KX3552-3EA01</b>                                               |
| 80 (100)    | 7TE28-0AA3                                           | <b>3VL3720-1DC33-....</b> | <b>3VL3117-2KN30-....</b>                 | <b>3NP1123-1DA20</b>   | <b>3KL5530-1GB01</b>                  | <b>3KX3552-3EA01</b>                                               |
| 120 (150)   | 7TE31-2AA3                                           | <b>3VL3725-1DC36-....</b> | <b>3VL3125-2KN30-....</b>                 | <b>3NP1123-1DA20</b>   | <b>3KL5730-1GB01</b>                  | <b>3KX3552-3EA01</b>                                               |

| Rated power | Assignment to Active Line Module in booksize format  | NEOZED fuse (gL/gG) |      |                | DIAZED fuse (gL/gG) |      |               | NH fuse (gL/gG) |      |                | UL/CSA fuse, Class J <sup>1)</sup><br>Available from:<br>Mersen<br><a href="http://www.ep.mersen.com">www.ep.mersen.com</a> |          |               |
|-------------|------------------------------------------------------|---------------------|------|----------------|---------------------|------|---------------|-----------------|------|----------------|-----------------------------------------------------------------------------------------------------------------------------|----------|---------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3131-<br>6SL3136-<br>6SL3135- | Rated current       | Size | Order No.      | Rated current       | Size | Order No.     | Rated current   | Size | Order No.      | Rated current                                                                                                               | Size     | Reference No. |
| 16 (18)     | 7TE21-6AA3                                           | 35 A                | D02  | <b>5SE2335</b> | 35 A                | DIII | <b>5SB411</b> | 35 A            | 000  | <b>3NA3814</b> | 35 A                                                                                                                        | 27 × 60  | AJT35         |
| 36 (40)     | 7TE23-6AA3                                           | –                   | –    | –              | 80 A                | DIV  | <b>5SC211</b> | 80 A            | 000  | <b>3NA3824</b> | 80 A                                                                                                                        | 29 × 117 | AJT80         |
| 55 (60)     | 7TE25-5AA3                                           | –                   | –    | –              | –                   | –    | –             | 125 A           | 1    | <b>3NA3132</b> | 125 A                                                                                                                       | 41 × 146 | AJT125        |
| 80 (100)    | 7TE28-0AA3                                           | –                   | –    | –              | –                   | –    | –             | 160 A           | 1    | <b>3NA3136</b> | 175 A                                                                                                                       | 41 × 146 | AJT175        |
| 120 (150)   | 7TE31-2AA3                                           | –                   | –    | –              | –                   | –    | –             | 250 A           | 1    | <b>3NA3144</b> | 250 A                                                                                                                       | 54 × 181 | AJT250        |

<sup>1)</sup> Not suitable for 3NP and 3KL switch disconnectors.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Overview



Basic Line Modules in booksize format

Basic Line Modules are available for applications in which no energy is returned to the supply or where the energy exchange between motor and generator axes takes place in the DC link. Basic Line Modules can only feed energy from the supply system into the DC link, energy cannot be fed back into the supply system. The DC link voltage is directly derived from the 3-phase line voltage via a 6-pulse bridge circuit. Basic Line Modules are designed for connection to grounded, star (TN, TT) and non-grounded, symmetrical IT supply systems. The connected Motor Modules are pre-charged over the integrated pre-charging resistors (20 kW and 40 kW) or through activation of the thyristors (100 kW).

The 20 kW and 40 kW Basic Line Modules are equipped with an integrated brake chopper and can be directly used for applications in generating mode after connecting an external braking resistor.

A Braking Module is only required with a 100 kW Basic Line Module in generating mode.

#### Design

The Basic Line Modules in booksize format feature the following interfaces as standard:

- 1 line connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection
- 3 DRIVE-CLiQ sockets
- 1 connection for braking resistor (20 kW and 40 kW Basic Line Modules only)
- 1 temperature sensor input

The status of the Basic Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Basic Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit on the immediate left for drive control, length 0.11 m (4.33 in)
- DRIVE-CLiQ cable (length depends on module width) to connect Basic Line Module to adjacent Motor Module, length = width of Basic Line Module + 0.11 m (4.33 in)
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- 1 set of warning signs in 30 languages
- 1 heat conducting foil (for Basic Line Modules with cold plate cooling only)

#### Integration

The Basic Line Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
  - Numeric Control Extensions NX10.3/NX15.3

**Note:** The thermostatic switch built into the braking resistor must be looped into the shutdown chain of the drive to prevent thermal overloading of the system in the event of a fault. If a braking resistor is not connected, a jumper must be connected between X21.1 and X21.2.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Technical specifications

|                                                                      |                                                                                                  |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                  | Basic Line Modules<br>in booksize format<br>6SL313 . -1TE...                                     |
| <b>Line supply voltage</b><br>Up to 2000 m (6562 ft) above sea level | 380 ... 480 V 3 AC $\pm 10\%$<br>( $-15\% < 1 \text{ min}$ ) <sup>1)</sup>                       |
| <b>Line frequency</b>                                                | 47 ... 63 Hz                                                                                     |
| <b>Line power factor</b><br>At rated power                           |                                                                                                  |
| • Fundamental ( $\cos \varphi_1$ ) <sup>2)</sup>                     | > 0.96                                                                                           |
| • Total ( $\lambda$ )                                                | 0.75 ... 0.93                                                                                    |
| <b>Overvoltage category</b><br>In accordance with EN 60664-1         | Class III                                                                                        |
| <b>DC link voltage, approx.</b>                                      | $1.35 \times \text{line voltage}^{2)}$                                                           |
| <b>Electronic power supply</b>                                       | 24 V DC, $-15\%/+20\%$                                                                           |
| <b>Radio interference suppression</b>                                |                                                                                                  |
| • Standard<br>- 20 kW and 40 kW Basic Line Modules                   | No radio interference<br>suppression                                                             |
| - 100 kW Basic Line Module                                           | Category C3 according to<br>EN 61800-3<br>up to 350 m (1148 ft) total<br>cable length (shielded) |
| • With line filter                                                   | Category C2 according to<br>EN 61800-3<br>up to 350 m (1148 ft) total<br>cable length (shielded) |

|                                                                                                                                       |                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                                   | Basic Line Modules<br>in booksize format<br>6SL313 . -1TE...                                                                                                      |
| <b>Cooling method</b>                                                                                                                 | Internal ventilator, power<br>units with increased air<br>cooling by built-in fans<br>Cold plate cooling                                                          |
| <b>Permissible ambient and coolant temperature (air)</b><br>In operation for line-side components,<br>Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F)<br>without derating,<br>> 40 ... 55 °C<br>(104 ... 131 °F) see<br>derating characteristics                                            |
| <b>Installation altitude</b>                                                                                                          | Up to 1000 m (3281 ft)<br>above sea level<br>without derating,<br>> 1000 ... 4000 m<br>(3281 ... 13124 ft)<br>above sea level,<br>see derating<br>characteristics |
| <b>Declarations of conformity</b>                                                                                                     | CE (Low Voltage and EMC<br>Directives)                                                                                                                            |
| <b>Approvals according to</b>                                                                                                         | cULus                                                                                                                                                             |

|                                                                                      |                                      |            |            |              |
|--------------------------------------------------------------------------------------|--------------------------------------|------------|------------|--------------|
| <b>Line supply voltage</b><br>380 ... 480 V 3 AC                                     | Basic Line Module in booksize format |            |            |              |
| <b>Internal air cooling with<br/>varnished modules</b>                               | 6SL3130-...                          | 1TE22-0AA0 | 1TE24-0AA0 | 1TE31-0AA0   |
| <b>Cold plate cooling</b>                                                            | 6SL3136-...                          | 1TE22-0AA0 | 1TE24-0AA0 | 1TE31-0AA0   |
| <b>Power</b>                                                                         |                                      |            |            |              |
| • Rated power $P_{\text{rated}}$<br>- at 380 V 3 AC<br>- at 460 V 3 AC <sup>3)</sup> | kW<br>(HP)                           | 20<br>(25) | 40<br>(50) | 100<br>(125) |
| • For S6 duty $P_{\text{S6}}$ (40 %)                                                 | kW                                   | 26         | 52         | 130          |
| • $P_{\text{max}}$                                                                   | kW                                   | 60         | 120        | 175          |
| <b>Braking power</b><br>With external braking resistor                               |                                      |            |            |              |
| • $P_{\text{Bmax.}}$ ( $= 2 \times P_{\text{rated}}$ )                               | kW                                   | 40         | 80         | —            |
| • Continuous braking power $P_{\text{d}}$<br>( $= 0.25 \times P_{\text{rated}}$ )    | kW                                   | 5          | 10         | —            |
| <b>DC link current</b>                                                               |                                      |            |            |              |
| • At 600 V DC                                                                        | A                                    | 34         | 67         | 167          |
| • For S6 duty (40 %)                                                                 | A                                    | 43         | 87         | 217          |
| • Maximum                                                                            | A                                    | 100        | 200        | 292          |
| <b>Input current</b>                                                                 |                                      |            |            |              |
| • Rated current<br>at 380 V 3 AC                                                     | A                                    | 35         | 69         | 172          |
| • Maximum                                                                            | A                                    | 113        | 208        | 301          |
| <b>Activation threshold</b><br>Braking module                                        | V                                    | 774        | 774        | —            |

<sup>1)</sup> Can also be operated on supply systems with 200 ... 240 V 3 AC  $\pm 10\%$  with appropriate parameter assignment and reduced output.

<sup>2)</sup> The DC link voltage is unregulated and load-dependent

<sup>3)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Technical specifications (continued)

|                                                                                                                                 |                                                    |                                                        |                                                        |                                                        |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| <b>Line supply voltage</b><br>380 ... 480 V 3 AC                                                                                | Basic Line Module in booksize format               |                                                        |                                                        |                                                        |
| <b>Internal air cooling with varnished modules</b>                                                                              | 6SL3130-...                                        | 1TE22-0AA0                                             | 1TE24-0AA0                                             | 1TE31-0AA0                                             |
| <b>Cold plate cooling</b>                                                                                                       | 6SL3136-...                                        | 1TE22-0AA0                                             | 1TE24-0AA0                                             | 1TE31-0AA0                                             |
| <b>Resistance value</b><br>External braking resistor                                                                            | Ω                                                  | ≥ 14.8                                                 | ≥ 7.4                                                  | –                                                      |
| <b>Cable length</b><br>To braking resistor, max.                                                                                | m (ft)                                             | 15 (50)                                                | 15 (50)                                                | –                                                      |
| <b>Connection for braking resistor (X2)</b><br>• Conductor cross-section, max.                                                  | mm <sup>2</sup>                                    | Screw-type terminals<br>0.5 ... 4                      | Screw-type terminals<br>0.5 ... 10                     | –                                                      |
| <b>Current requirement</b><br>24 V DC electronic power supply, max.                                                             | A                                                  | 1                                                      | 1.4                                                    | 2                                                      |
| <b>Current carrying capacity</b><br>• 24 V DC busbars<br>• DC link busbars                                                      | A                                                  | 20<br>100                                              | 20<br>200                                              | 20<br>200                                              |
| <b>DC link capacitance</b><br>• Basic Line Module<br>• Drive line-up, max.                                                      | μF<br>μF                                           | 940<br>20000                                           | 1880<br>20000                                          | 4100<br>50000                                          |
| <b>Internal air cooling</b><br>• Power loss <sup>1)</sup><br>• Cooling air requirement<br>• Sound pressure level $L_{pA}$ (1 m) | kW<br>m <sup>3</sup> /s (ft <sup>3</sup> /s)<br>dB | 0.144<br>0.016 (0.6)<br>< 60                           | 0.284<br>0.031 (1.1)<br>< 65                           | 0.628<br>0.05 (1.8)<br>< 65                            |
| <b>Cold plate cooling</b><br>• Power loss, int./ext. <sup>1)</sup><br>• Thermal resistance $R_{th}$                             | kW<br>K/W                                          | 0.047/0.095<br>0.075                                   | 0.071/0.205<br>0.05                                    | 0.168/0.450<br>0.045                                   |
| <b>Line connection</b><br>U1, V1, W1<br>• Conductor cross-section, max.                                                         | mm <sup>2</sup>                                    | Screw-type terminals<br>0.5 ... 16                     | Screw-type terminals<br>10 ... 50                      | M8 screw stud<br>1 × 35 ... 120 or<br>2 × 50           |
| <b>Shield connection</b>                                                                                                        |                                                    | Integrated into the power plug                         | See Accessories                                        | See Accessories                                        |
| <b>PE connection</b>                                                                                                            |                                                    | M5 screw                                               | M6 screw                                               | M6 screw                                               |
| <b>Cable length, max.</b><br>Total of all motor cables and DC link<br>• Shielded<br>• Unshielded                                | m (ft)<br>m (ft)                                   | 630 (2067)<br>850 (2788)                               | 630 (2067)<br>850 (2788)                               | 1000 (3281)<br>1500 (4921)                             |
| <b>Degree of protection</b>                                                                                                     |                                                    | IP20                                                   | IP20                                                   | IP20                                                   |
| <b>Dimensions</b><br>• Width<br>• Height<br>• Depth<br>- With internal air cooling<br>- With cold plate cooling                 | mm (in)<br>mm (in)<br>mm (in)<br>mm (in)           | 100 (3.94)<br>380 (14.96)<br>270 (10.63)<br>226 (8.90) | 150 (5.91)<br>380 (14.96)<br>270 (10.63)<br>226 (8.90) | 200 (7.87)<br>380 (14.96)<br>270 (10.63)<br>226 (8.90) |
| <b>Weight, approx.</b><br>- With internal air cooling<br>- With cold plate cooling                                              | kg (lb)<br>kg (lb)                                 | 6.8 (15.0)<br>6.4 (14.1)                               | 11.3 (24.9)<br>10.9 (24.0)                             | 15.8 (34.8)<br>16.4 (36.2)                             |

<sup>1)</sup> Power loss of Basic Line Module at rated power including losses of 24 V DC electronic power supply.

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Selection and ordering data

| Description                                 | Order No.                 |
|---------------------------------------------|---------------------------|
| <b>Basic Line Module in booksize format</b> |                           |
| <b>Internal air cooling</b><br>Rated power: |                           |
| • 20 kW (25 HP)                             | <b>6SL3130-1TE22-0AA0</b> |
| • 40 kW (50 HP)                             | <b>6SL3130-1TE24-0AA0</b> |
| • 100 kW (125 HP)                           | <b>6SL3130-1TE31-0AA0</b> |
| <b>Cold plate cooling</b><br>Rated power:   |                           |
| • 20 kW (25 HP)                             | <b>6SL3136-1TE22-0AA0</b> |
| • 40 kW (50 HP)                             | <b>6SL3136-1TE24-0AA0</b> |
| • 100 kW (125 HP)                           | <b>6SL3136-1TE31-0AA0</b> |

#### Accessories

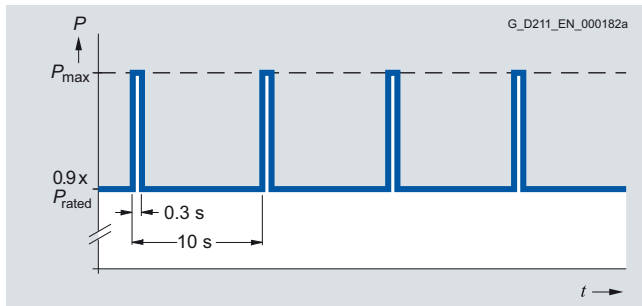
|                                                                                                                                                                                                                                                                                                                                                                                               |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Shield connection plate</b><br>For Line/Motor Modules in booksize format                                                                                                                                                                                                                                                                                                                   |                           |
| • 150 mm (5.91 in) wide for internal air cooling                                                                                                                                                                                                                                                                                                                                              | <b>6SL3162-1AF00-0AA1</b> |
| • 150 mm (5.91 in) wide for cold plate cooling                                                                                                                                                                                                                                                                                                                                                | <b>6SL3162-1AF00-0BA1</b> |
| • 200 mm (7.87 in) wide for internal air cooling                                                                                                                                                                                                                                                                                                                                              | <b>6SL3162-1AH01-0AA0</b> |
| • 200 mm (7.87 in) wide for cold plate cooling                                                                                                                                                                                                                                                                                                                                                | <b>6SL3162-1AH01-0BA0</b> |
| <b>DC link rectifier adapter</b><br>For direct infeed of DC link voltage                                                                                                                                                                                                                                                                                                                      |                           |
| • Screw-type terminals<br>0.5 ... 10 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)                                                                                                                                                                                                                             | <b>6SL3162-2BD00-0AA0</b> |
| • Screw-type terminals<br>35 ... 95 mm <sup>2</sup><br>For Line Modules and Motor Modules in booksize format with a width of 150 mm, 200 mm and 300 mm (5.91 in, 7.87 in and 11.81 in)                                                                                                                                                                                                        | <b>6SL3162-2BM00-0AA0</b> |
| <b>DC link adapter (2 units)</b><br>For multi-tier configuration<br>Screw-type terminals<br>35 ... 95 mm <sup>2</sup><br>For all Line Modules and Motor Modules in booksize format                                                                                                                                                                                                            | <b>6SL3162-2BM01-0AA0</b> |
| <b>24 V terminal adapter</b><br>For all Line Modules and Motor Modules in booksize format                                                                                                                                                                                                                                                                                                     | <b>6SL3162-2AA00-0AA0</b> |
| <b>24 V jumper</b><br>For connection of the 24 V busbars (for booksize format)                                                                                                                                                                                                                                                                                                                | <b>6SL3162-2AA01-0AA0</b> |
| <b>Warning labels in 30 languages</b><br>This label set can be glued over the standard German or English labels to provide warnings in other languages.<br>One set of labels is supplied with the devices.<br>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b> |

| Description                                                                                                         | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories for re-ordering</b>                                                                                  |                           |
| <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs)<br>For DRIVE-CLiQ port |                           |
| • For Basic Line Modules with a width of 100 mm (3.94 in)                                                           | <b>6SL3163-8LD00-0AA0</b> |
| <b>SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                   | <b>6SL3066-4CA00-0AA0</b> |

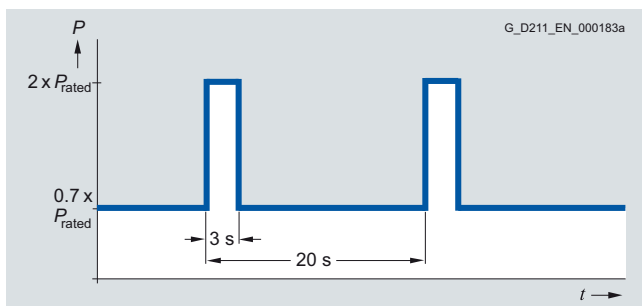


### Characteristic curves

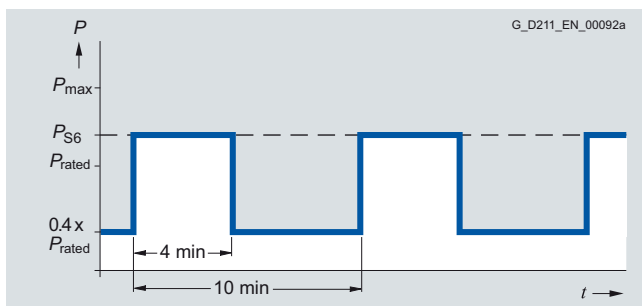
#### Overload capability



Load cycle with previous load

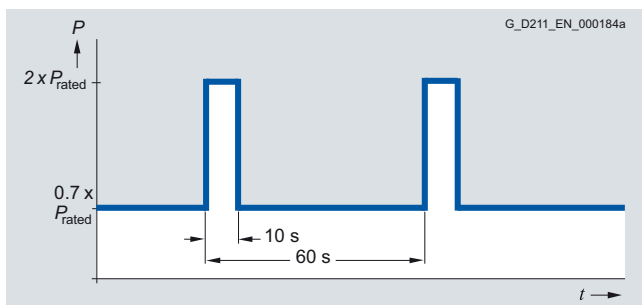


Load cycle with previous load



S6 load cycle with previous load

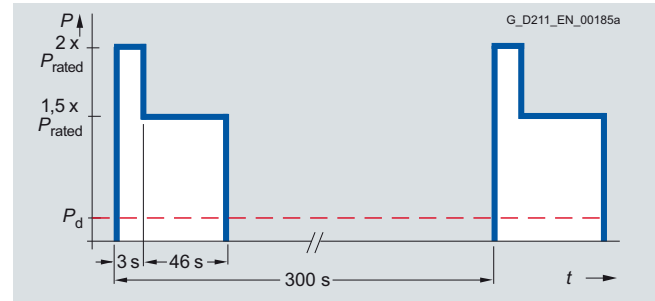
#### 20 kW and 40 kW Basic Line Modules only



Load cycle with previous load

#### Braking power with external brake resistance

The following duty cycles are defined for the braking modules of the 20 kW and 40 kW Basic Line Modules:



The maximum possible braking power  $P_{max}$  is calculated using the following formula:

$$P_{max} = \frac{V^2}{R}$$

$V$  = Activation threshold  
 $R$  = Resistance value of the external braking resistor

The maximum braking power is achieved with the smallest permissible resistance value. The maximum possible braking power falls at larger resistance values.

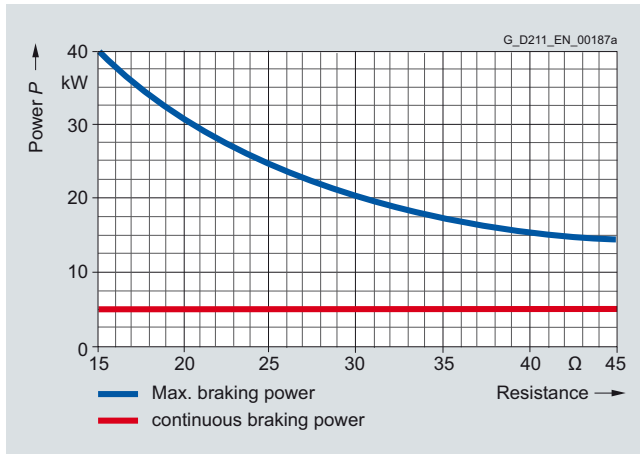
# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Characteristic curves (continued)

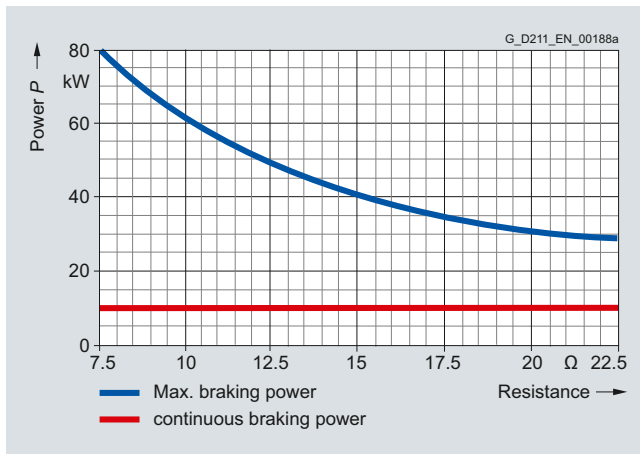
##### Braking power with external brake resistance



Braking power of the 20 kW Basic Line Modules depending on the connected braking resistor

When the recommended braking resistor is used, the following values result for the maximum braking power or continuous braking power:

Braking resistor 6SE7023-2ES87-2DC0  
Resistance value = 20 Ω → max. braking power = 30 kW;  
continuous braking power = 5 kW

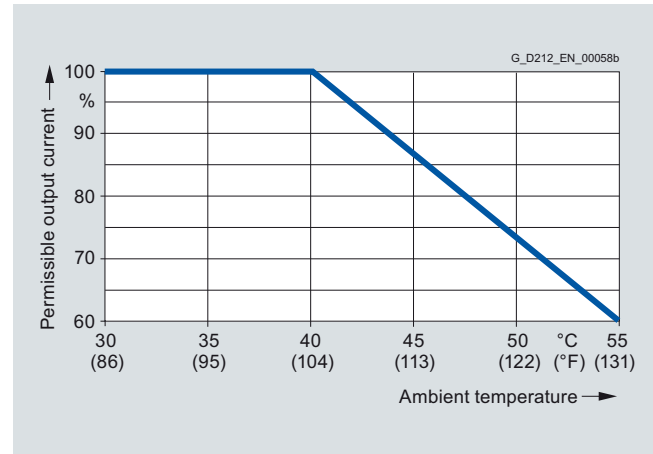


Braking power of the 40 kW Basic Line Modules depending on the connected braking resistor

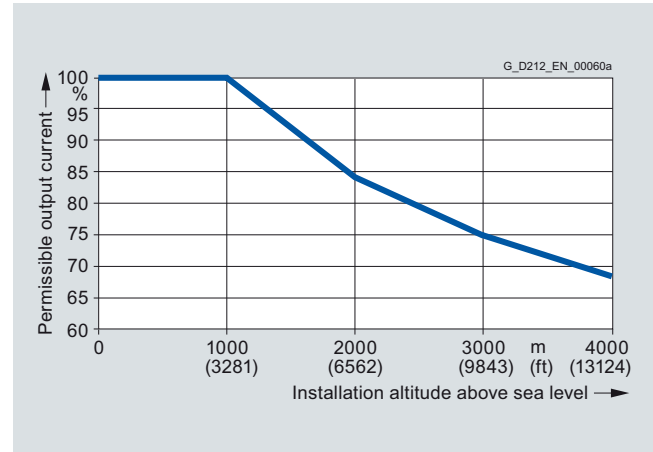
When the recommended braking resistor is used, the following values result for the maximum braking power or continuous braking power:

Braking resistor 6SE7028-0ES87-2DC0  
Resistance value = 8 Ω → max. braking power = 75 kW;  
continuous braking power = 10 kW (limited by braking module)

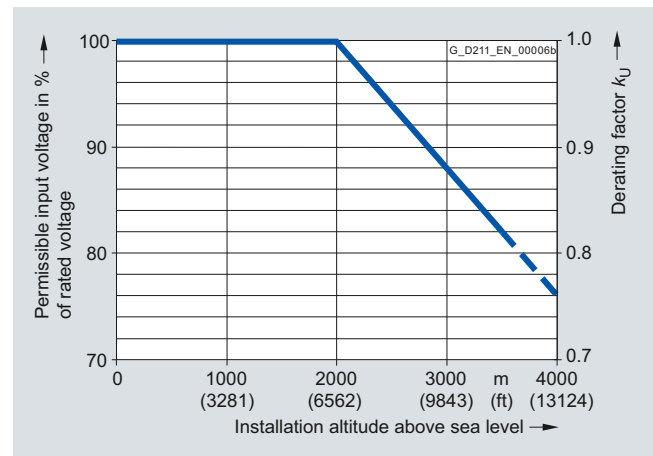
##### Derating characteristics



Output power dependent on ambient temperature



Output power dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules Line reactors

#### Overview



20 kW and 100 kW line reactors

Line reactors reduce low-frequency line harmonic distortions and offload the semiconductors of the Basic Line Module.

#### Selection and ordering data

| Rated power of the Basic Line Module<br>kW (HP) | Suitable for Basic Line Module in booksize format | Line reactor<br>Order No. |
|-------------------------------------------------|---------------------------------------------------|---------------------------|
| 20 (25)                                         | 6SL3130-1TE22-0AA0<br>6SL3136-1TE22-0AA0          | <b>6SL3000-OCE22-0AA0</b> |
| 40 (50)                                         | 6SL3130-1TE24-0AA0<br>6SL3136-1TE24-0AA0          | <b>6SL3000-OCE24-0AA0</b> |
| 100 (125)                                       | 6SL3130-1TE31-0AA0<br>6SL3136-1TE31-0AA0          | <b>6SL3000-OCE31-0AA0</b> |

#### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                | Line reactors   |                                          |                                          |                                          |
|----------------------------------------------------------|-----------------|------------------------------------------|------------------------------------------|------------------------------------------|
|                                                          | 6SL3000-...     | OCE22-0AA0                               | OCE24-0AA0                               | OCE31-0AA0                               |
| <b>Rated current</b>                                     | A               | 37                                       | 74                                       | 185                                      |
| <b>Power loss</b><br>At 50/60 Hz                         | kW              | 0.130/0.154                              | 0.270/0.320                              | 0.480/0.565                              |
| <b>Line/load connection</b>                              |                 | Screw-type terminals                     | Screw-type terminals                     | Flat connector for M8 screw              |
| • Conductor cross-section                                | mm <sup>2</sup> | 0.5 ... 16                               | 2.5 ... 35                               | –                                        |
| <b>Degree of protection</b>                              |                 | IP20                                     | IP20                                     | IP00                                     |
| <b>Dimensions</b>                                        |                 |                                          |                                          |                                          |
| • Width                                                  | mm (in)         | 178 (7.01)                               | 210 (8.27)                               | 261 (10.28)                              |
| • Height                                                 | mm (in)         | 165 (6.50)                               | 245 (9.65)                               | 228 (8.98)                               |
| • Depth                                                  | mm (in)         | 100 (3.94)                               | 93 (3.66)                                | 137 (5.39)                               |
| <b>Weight, approx.</b>                                   | kg (lb)         | 5.2 (11.5)                               | 11.2 (24.7)                              | 21.7 (47.8)                              |
| <b>Approvals according to</b>                            |                 | cURus                                    | cURus                                    | cURus                                    |
| <b>Suitable for Basic Line Module in booksize format</b> | Type            | 6SL3130-1TE22-0AA0<br>6SL3136-1TE22-0AA0 | 6SL3130-1TE24-0AA0<br>6SL3136-1TE24-0AA0 | 6SL3130-1TE31-0AA0<br>6SL3136-1TE31-0AA0 |
| • Rated power of the Basic Line Module                   | kW (HP)         | 20 (25)                                  | 40 (50)                                  | 100 (125)                                |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules

#### Line filters

#### Overview



In plants which have been specifically designed to ensure EMC, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN systems.

#### Selection and ordering data

| Rated power of the Basic Line Module<br>kW (HP) | Suitable for Basic Line Module in booksize format | Line filter<br>Order No.  |
|-------------------------------------------------|---------------------------------------------------|---------------------------|
| 20 (25)                                         | 6SL3130-1TE22-0AA0<br>6SL3136-1TE22-0AA0          | <b>6SL3000-0BE21-6DA0</b> |
| 40 (50)                                         | 6SL3130-1TE24-0AA0<br>6SL3136-1TE24-0AA0          | <b>6SL3000-0BE23-6DA1</b> |
| 100 (125)                                       | 6SL3130-1TE31-0AA0<br>6SL3136-1TE31-0AA0          | <b>6SL3000-0BE31-2DA0</b> |

#### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                | Line filter     |                                          |                                          |                                          |
|----------------------------------------------------------|-----------------|------------------------------------------|------------------------------------------|------------------------------------------|
|                                                          | 6SL3000-...     | 0BE21-6DA0                               | 0BE23-6DA1                               | 0BE31-2DA0                               |
| <b>Rated current</b>                                     | A               | 36                                       | 74                                       | 192                                      |
| <b>Power loss</b>                                        | kW              | 0.016                                    | 0.02                                     | 0.09                                     |
| <b>Line/load connection</b><br>L1, L2, L3 / U, V, W      |                 | Screw-type terminals                     | Screw-type terminals                     | Screw-type terminals                     |
| • Conductor cross-section                                | mm <sup>2</sup> | 10                                       | 35                                       | 95                                       |
| <b>PE connection</b>                                     |                 | M6 screw stud                            | M6 screw stud                            | M10 screw stud                           |
| <b>Degree of protection</b>                              |                 | IP20                                     | IP20                                     | IP20                                     |
| <b>Dimensions</b>                                        |                 |                                          |                                          |                                          |
| • Width                                                  | mm (in)         | 50 (1.97)                                | 75 (2.95)                                | 150 (5.91)                               |
| • Height                                                 | mm (in)         | 429 (16.89)                              | 433 (17.05)                              | 479 (18.86)                              |
| • Depth                                                  | mm (in)         | 226 (8.90)                               | 226 (8.90)                               | 226 (8.90)                               |
| <b>Weight, approx.</b>                                   | kg (lb)         | 5 (11.0)                                 | 7.5 (16.5)                               | 18.8 (41.5)                              |
| <b>Approvals according to</b>                            |                 | cURus                                    | cURus                                    | cURus                                    |
| <b>Suitable for Basic Line Module in booksize format</b> | Type            | 6SL3130-1TE22-0AA0<br>6SL3136-1TE22-0AA0 | 6SL3130-1TE24-0AA0<br>6SL3136-1TE24-0AA0 | 6SL3130-1TE31-0AA0<br>6SL3136-1TE31-0AA0 |
| • Rated power of the Basic Line Module                   | kW (HP)         | 20 (25)                                  | 40 (50)                                  | 100 (125)                                |

# SINAMICS S120 drive system

## Booksize format – Line Modules

### Basic Line Modules Recommended line-side components

#### Overview

Suitable line-side power components are assigned depending on the power rating of the Basic Line Module.

The tables below list recommended components.

Additional information about the line contactors, switch disconnectors, circuit breakers and fuses specified in the table can be found in Catalog IC 10.

#### Assignment of line-side power components to Basic Line Modules in booksize format

| Rated power | Assignment to Basic Line Module in booksize format | Line contactor     | Output coupling device for line contactor | Main circuit breaker |
|-------------|----------------------------------------------------|--------------------|-------------------------------------------|----------------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3136-                       | Type               | Order No.                                 | Order No.            |
| 20 (25)     | 1TE22-0AA0                                         | <b>3RT1035-...</b> | <b>3TX7004-1LB00</b>                      | <b>3LD2504-0TK51</b> |
| 40 (50)     | 1TE24-0AA0                                         | <b>3RT1045-...</b> | <b>3TX7004-1LB00</b>                      | <b>3LD2704-0TK51</b> |
| 100 (125)   | 1TE31-0AA0                                         | <b>3RT1056-...</b> | <b>3TX7004-1LB00</b>                      | <b>3KA5530-1GE01</b> |

| Rated power | Assignment to Basic Line Module in booksize format | Circuit breaker IEC 60947 | Circuit breaker UL489/CSA C22.2 No. 5-02 | Fuse switch disconnecter |
|-------------|----------------------------------------------------|---------------------------|------------------------------------------|--------------------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3136-                       | Order No.                 | Order No.                                | Order No.                |
| 20 (25)     | 1TE22-0AA0                                         | <b>3RV1041-4JA10</b>      | <b>3VL2106-2KN30-....</b>                | <b>3NP1123-1CA20</b>     |
| 40 (50)     | 1TE24-0AA0                                         | <b>3VL2710-1DC33-....</b> | <b>3VL2110-2KN30-....</b>                | <b>3NP1123-1CA20</b>     |
| 100 (125)   | 1TE31-0AA0                                         | <b>3VL3725-1DC36-....</b> | <b>3VL3125-2KN30-....</b>                | <b>3NP1123-1DA20</b>     |

| Rated power | Assignment to Basic Line Module in booksize format | Switch disconnecter with fuse holders | NH fuse (gL/gG) |      |                | UL/CSA fuse, Class J <sup>1)</sup><br>Available from:<br>Mersen<br><a href="http://www.ep.mersen.com">www.ep.mersen.com</a> |          |               |
|-------------|----------------------------------------------------|---------------------------------------|-----------------|------|----------------|-----------------------------------------------------------------------------------------------------------------------------|----------|---------------|
| kW (HP)     | Type<br>6SL3130-<br>6SL3136-                       | Order No.                             | Rated current   | Size | Order No.      | Rated current                                                                                                               | Size     | Reference No. |
| 20 (25)     | 1TE22-0AA0                                         | <b>3KL5230-1GB01</b>                  | 63 A            | 000  | <b>3NA3822</b> | 60 A                                                                                                                        | 29 × 117 | AJT60         |
| 40 (50)     | 1TE24-0AA0                                         | <b>3KL5230-1GB01</b>                  | 100 A           | 000  | <b>3NA3830</b> | 100 A                                                                                                                       | 29 × 117 | AJT100        |
| 100 (125)   | 1TE31-0AA0                                         | <b>3KL5730-1GB01</b>                  | 250 A           | 1    | <b>3NA3144</b> | 250 A                                                                                                                       | 54 × 181 | AJT250        |

<sup>1)</sup> Not suitable for 3NP and 3KL switch disconnectors.

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Overview



A wide range of single-axis and two-axis Motor Modules with graded current/power ratings can be supplied:

- Single Motor Modules: Single-axis variant in booksize format with rated output currents of 3 A to 200 A
- Double Motor Modules: Two-axis variant in booksize format with rated output currents of 3 A to 18 A

In principle, all Single and Double Motor Modules can be operated on Basic Line Modules, Smart Line Modules or Active Line Modules for the appropriate voltage range.

#### Design

The Single Motor Modules in booksize format feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 x electronic power supply connection via integrated 24 V DC bars
- 3 DRIVE-CLiQ sockets
- 1 motor connection, plug-in (not included in scope of supply) or screw-stud depending on rated output current
- 1 safe standstill input (enable pulses)
- 1 safe motor brake controller
- 1 temperature sensor input (KTY84-130 or PTC)
- 2 PE/protective conductor connections

The status of the Motor Modules is indicated via two multi-color LEDs.

The motor cable shield is inside the connector on 50 mm (1.97 in) and 100 mm (3.94 in) wide modules. A shield connection plate can be supplied for 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide modules. On these modules, the motor cable shield can be connected using a hose clip.

The signal cable shield can be connected to the Motor Module by means of a terminal element, type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable appropriate to the width of the Motor Module for connection to the adjacent Motor Module, length = width of Motor Module + 0.06 m (2.36 in)
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connector X21
- Connector X11 for the motor brake connection (for Motor Modules with a rated output current of 45 A to 200 A)
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- Fan insert for the 132 A and 200 A Motor Modules (the voltage for the fan insert is supplied by the Motor Module)
- 1 set of warning signs in 30 languages
- 1 heat conducting foil (for Motor Modules with cold plate cooling only)

#### Integration

The Single Motor Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
  - Numeric Control Extensions NX10.3/NX15.3

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Technical specifications

|                                                                                                                                   |                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                               | Single Motor Module in booksize format<br>6SL312...-1TE...                                                                                          |
| <b>DC link voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                                  | 510 ... 720 V DC<br>(line voltage 380 ... 480 V 3 AC) <sup>1)</sup>                                                                                 |
| <b>Output frequency</b>                                                                                                           | 0 ... 650 Hz <sup>2)</sup>                                                                                                                          |
| <b>Electronic power supply</b>                                                                                                    | 24 V DC -15 %/+20 %                                                                                                                                 |
| <b>Cooling method</b>                                                                                                             | Internal air cooling,<br>external air cooling<br>Power units with increased<br>air cooling by built-in fans<br>Cold plate cooling<br>Liquid cooling |
| <b>Permissible ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                       |

|                                   |                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>               | Single Motor Module in booksize format<br>6SL312...-1TE...                                                                                      |
| <b>Installation altitude</b>      | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics |
| <b>Declarations of conformity</b> | CE (Low Voltage and EMC Directives)                                                                                                             |
| <b>Approvals according to</b>     | cULus                                                                                                                                           |
| <b>Safety Integrated</b>          | Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1<br>Control category 3 acc. to ISO 13849-1     |

|                                                                                                                                                                                                                                                                      |                                        |                   |                   |                   |                   |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>DC link voltage</b><br><b>510 ... 720 V DC</b>                                                                                                                                                                                                                    | Single Motor Module in booksize format |                   |                   |                   |                   |                   |
| <b>Internal air cooling</b>                                                                                                                                                                                                                                          | 6SL3120-...                            | 1TE13-0AA3        | 1TE15-0AA3        | 1TE21-0AA3        | 1TE21-8AA3        | 1TE23-0AA3        |
| <b>External air cooling</b>                                                                                                                                                                                                                                          | 6SL3121-...                            | 1TE13-0AA3        | 1TE15-0AA3        | 1TE21-0AA3        | 1TE21-8AA3        | 1TE23-0AA3        |
| <b>Cold plate cooling</b>                                                                                                                                                                                                                                            | 6SL3126-...                            | 1TE13-0AA3        | 1TE15-0AA3        | 1TE21-0AA3        | 1TE21-8AA3        | 1TE23-0AA3        |
| <b>Liquid cooling</b>                                                                                                                                                                                                                                                | 6SL3125-...                            | –                 | –                 | –                 | –                 | –                 |
| <b>Output current</b>                                                                                                                                                                                                                                                |                                        |                   |                   |                   |                   |                   |
| • Rated current $I_{rated}$                                                                                                                                                                                                                                          | A                                      | <b>3</b>          | <b>5</b>          | <b>9</b>          | <b>18</b>         | <b>30</b>         |
| • Base-load current $I_H$                                                                                                                                                                                                                                            | A                                      | 2.6               | 4.3               | 7.7               | 15.3              | 25.5              |
| • For S6 duty $I_{S6}$ (40 %)                                                                                                                                                                                                                                        | A                                      | 3.5               | 6                 | 10                | 24                | 40                |
| • $I_{max}$                                                                                                                                                                                                                                                          | A                                      | 6                 | 10                | 18                | 36                | 56                |
| <b>Type rating<sup>3)</sup></b>                                                                                                                                                                                                                                      |                                        |                   |                   |                   |                   |                   |
| • Based on $I_{rated}$                                                                                                                                                                                                                                               | kW (HP)                                | 1.6 (1.5)         | 2.7 (3)           | 4.8 (5)           | 9.7 (10)          | 16.0 (20)         |
| • Based on $I_H$                                                                                                                                                                                                                                                     | kW (HP)                                | 1.4 (1)           | 2.3 (2.5)         | 4.1 (5)           | 8.2 (10)          | 13.7 (18)         |
| <b>Rated pulse frequency</b>                                                                                                                                                                                                                                         | kHz                                    | 4                 | 4                 | 4                 | 4                 | 4                 |
| <b>DC link current <math>I_d</math><sup>4)</sup></b>                                                                                                                                                                                                                 | A                                      | 3.6               | 6                 | 11                | 22                | 36                |
| <b>Current carrying capacity</b>                                                                                                                                                                                                                                     |                                        |                   |                   |                   |                   |                   |
| • DC link busbars                                                                                                                                                                                                                                                    | A                                      | 100 <sup>5)</sup> | 100 <sup>5)</sup> | 100 <sup>5)</sup> | 100 <sup>5)</sup> | 100 <sup>5)</sup> |
| • 24 V DC busbars                                                                                                                                                                                                                                                    | A                                      | 20                | 20                | 20                | 20                | 20                |
| If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24 V DC connection using a 24 V terminal adapter is required (max. cross-section 6 mm <sup>2</sup> , max. fuse protection 20 A). |                                        |                   |                   |                   |                   |                   |
| <b>DC link capacitance</b>                                                                                                                                                                                                                                           | μF                                     | 110               | 110               | 110               | 220               | 710               |
| <b>Current requirement</b><br>At 24 V DC, max.                                                                                                                                                                                                                       | A                                      | 0.85              | 0.85              | 0.85              | 0.85              | 0.9               |

<sup>1)</sup> 3 A ... 85 A Single Motor Modules with firmware version V2.5 and higher with appropriate parameterization and reduced output also operable on 200 ... 240 V 3 AC networks in accordance with a DC-link voltage of 270 ... 360 V DC.

<sup>2)</sup> At rated output current (max. output frequency 1300 Hz for 62.5 μs current control cycle, 8 kHz pulse frequency, 60 % permissible output current). Note the correlation between max. output frequency, pulse frequency and current derating

<sup>3)</sup> Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

<sup>4)</sup> Rated DC link current for dimensioning an external DC connection.

<sup>5)</sup> With reinforced DC link busbar set, 150 A is possible (accessories).



# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Technical specifications (continued)

|                                                                             |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
|-----------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| <b>DC link voltage</b><br>510 ... 720 V DC                                  | Single Motor Module in booksize format |                                                                |                                                                |                                                                |                                                                |                                                                |
| <b>Internal air cooling</b>                                                 | 6SL3120-...                            | 1TE13-0AA3                                                     | 1TE15-0AA3                                                     | 1TE21-0AA3                                                     | 1TE21-8AA3                                                     | 1TE23-0AA3                                                     |
| <b>External air cooling</b>                                                 | 6SL3121-...                            | 1TE13-0AA3                                                     | 1TE15-0AA3                                                     | 1TE21-0AA3                                                     | 1TE21-8AA3                                                     | 1TE23-0AA3                                                     |
| <b>Cold plate cooling</b>                                                   | 6SL3126-...                            | 1TE13-0AA3                                                     | 1TE15-0AA3                                                     | 1TE21-0AA3                                                     | 1TE21-8AA3                                                     | 1TE23-0AA3                                                     |
| <b>Liquid cooling</b>                                                       | 6SL3125-...                            | –                                                              | –                                                              | –                                                              | –                                                              | –                                                              |
| <b>Internal/external air cooling</b>                                        |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| • Power loss <sup>1)</sup>                                                  |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| - Maximum losses with internal air cooling in control cabinet               | kW                                     | 0.05                                                           | 0.07                                                           | 0.1                                                            | 0.19                                                           | 0.31                                                           |
| - Typical losses with internal air cooling in control cabinet <sup>2)</sup> | kW                                     | 0.03                                                           | 0.04                                                           | 0.06                                                           | 0.14                                                           | 0.26                                                           |
| - With external air cooling, int./ext. <sup>1)</sup>                        | kW                                     | 0.035/0.015                                                    | 0.04/0.03                                                      | 0.055/0.045                                                    | 0.1/0.09                                                       | 0.1/0.21                                                       |
| • Cooling air requirement                                                   | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.008 (0.3)                                                    | 0.008 (0.3)                                                    | 0.008 (0.3)                                                    | 0.008 (0.3)                                                    | 0.016 (0.6)                                                    |
| • Sound pressure level $L_{pA}$ (1 m)                                       | dB                                     | < 60                                                           | < 60                                                           | < 60                                                           | < 60                                                           | < 60                                                           |
| <b>Cold plate cooling</b>                                                   |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| • Power loss, int./ext. <sup>1)</sup>                                       | kW                                     | 0.025/0.02                                                     | 0.035/0.035                                                    | 0.045/0.05                                                     | 0.08/0.1                                                       | 0.085/0.22                                                     |
| • Thermal resistance $R_{th}$                                               | K/W                                    | 0.175                                                          | 0.175                                                          | 0.175                                                          | 0.175                                                          | 0.075                                                          |
| <b>Motor connection</b><br>U2, V2, W2                                       |                                        | Connector (X1) <sup>3)</sup> , max. 30 A                       | Connector (X1) <sup>3)</sup> , max. 30 A                       | Connector (X1) <sup>3)</sup> , max. 30 A                       | Connector (X1) <sup>3)</sup> , max. 30 A                       | Connector (X1) <sup>3)</sup> , max. 30 A                       |
| <b>Shield connection</b>                                                    |                                        | Integrated in connector (X1)                                   | Integrated in connector (X1)                                   | Integrated in connector (X1)                                   | Integrated in connector (X1)                                   | Integrated in connector (X1)                                   |
| <b>PE connection</b>                                                        |                                        | M5 screw                                                       | M5 screw                                                       | M5 screw                                                       | M5 screw                                                       | M5 screw                                                       |
| <b>Motor brake connection</b>                                               |                                        | Integrated into the plug-in motor connector (X1), 24 V DC, 2 A | Integrated into the plug-in motor connector (X1), 24 V DC, 2 A | Integrated into the plug-in motor connector (X1), 24 V DC, 2 A | Integrated into the plug-in motor connector (X1), 24 V DC, 2 A | Integrated into the plug-in motor connector (X1), 24 V DC, 2 A |
| <b>Motor cable length, max.</b>                                             |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| • Shielded                                                                  | m (ft)                                 | 50 (164)                                                       | 50 (164)                                                       | 50 (164)                                                       | 70 (230)                                                       | 100 (328)                                                      |
| • Unshielded                                                                | m (ft)                                 | 75 (246)                                                       | 75 (246)                                                       | 75 (246)                                                       | 100 (328)                                                      | 150 (492)                                                      |
| <b>Degree of protection</b>                                                 |                                        | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                           | IP20                                                           |
| <b>Dimensions</b>                                                           |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| • Width                                                                     | mm (in)                                | 50 (1.97)                                                      | 50 (1.97)                                                      | 50 (1.97)                                                      | 50 (1.97)                                                      | 100 (3.94)                                                     |
| • Height                                                                    | mm (in)                                | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                    | 380 (14.96)                                                    |
| • Depth                                                                     |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| - With internal air cooling                                                 | mm (in)                                | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                    | 270 (10.63)                                                    |
| - With external air cooling, on/behind mounting surface                     | mm (in)                                | 226/66.5 (8.90/2.62)                                           | 226/66.5 (8.90/2.62)                                           | 226/66.5 (8.90/2.62)                                           | 226/66.5 (8.90/2.62)                                           | 226/66.5 (8.90/2.62)                                           |
| - With cold plate cooling                                                   | mm (in)                                | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                     | 226 (8.90)                                                     |
| <b>Weight, approx.</b>                                                      |                                        |                                                                |                                                                |                                                                |                                                                |                                                                |
| • With internal air cooling                                                 | kg (lb)                                | 5.0 (11.0)                                                     | 5.0 (11.0)                                                     | 5.0 (11.0)                                                     | 5.0 (11.0)                                                     | 6.9 (15.2)                                                     |
| • With external air cooling                                                 | kg (lb)                                | 5.7 (12.6)                                                     | 5.7 (12.6)                                                     | 5.7 (12.6)                                                     | 5.7 (12.6)                                                     | 8.5 (18.7)                                                     |
| • With cold plate cooling                                                   | kg (lb)                                | 4.2 (9.26)                                                     | 4.2 (9.26)                                                     | 4.5 (9.92)                                                     | 4.5 (9.92)                                                     | 6.1 (13.5)                                                     |

<sup>1)</sup> Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

<sup>2)</sup> At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

<sup>3)</sup> Connector not included in scope of supply, see Accessories.

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Technical specifications (continued)

|                                                                                                                                                                                                                                                                      |                                        |             |             |             |                               |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------|-------------|-------------|-------------------------------|-------------------------------|
| <b>DC link voltage</b><br>510 ... 720 V DC                                                                                                                                                                                                                           | Single Motor Module in booksize format |             |             |             |                               |                               |
| <b>Internal air cooling</b>                                                                                                                                                                                                                                          | 6SL3120-...                            | 1TE24-5AA3  | 1TE26-0AA3  | 1TE28-5AA3  | 1TE31-3AA3                    | 1TE32-0AA4                    |
| <b>External air cooling</b>                                                                                                                                                                                                                                          | 6SL3121-...                            | 1TE24-5AA3  | 1TE26-0AA3  | 1TE28-5AA3  | 1TE31-3AA3                    | 1TE32-0AA4                    |
| <b>Cold plate cooling</b>                                                                                                                                                                                                                                            | 6SL3126-...                            | 1TE24-5AA3  | 1TE26-0AA3  | 1TE28-5AA3  | 1TE31-3AA3                    | 1TE32-0AA4                    |
| <b>Liquid cooling</b>                                                                                                                                                                                                                                                | 6SL3125-...                            | –           | –           | –           | –                             | 1TE32-0AA4                    |
| <b>Output current</b>                                                                                                                                                                                                                                                |                                        |             |             |             |                               |                               |
| • Rated current $I_{\text{rated}}$                                                                                                                                                                                                                                   | A                                      | <b>45</b>   | <b>60</b>   | <b>85</b>   | <b>132 (105<sup>1)</sup>)</b> | <b>200 (140<sup>1)</sup>)</b> |
| • Base-load current $I_H$                                                                                                                                                                                                                                            | A                                      | 38          | 52          | 68          | 105 (84)                      | 141 (99)                      |
| • For S6 duty $I_{S6}$ (40 %)                                                                                                                                                                                                                                        | A                                      | 60          | 80          | 110         | 150 (120)                     | 230 (161)                     |
| • $I_{\text{max}}$                                                                                                                                                                                                                                                   | A                                      | 85          | 113         | 141         | 210                           | 282                           |
| <b>Rated pulse frequency</b>                                                                                                                                                                                                                                         | kHz                                    | 4           | 4           | 4           | 4                             | 4                             |
| <b>• Power<sup>2)</sup></b><br>At 600 V DC link voltage                                                                                                                                                                                                              |                                        |             |             |             |                               |                               |
| • Rated power                                                                                                                                                                                                                                                        | kW                                     | 24          | 32          | 46          | 71 (57)                       | 107 (75)                      |
| • Based on $I_H$                                                                                                                                                                                                                                                     | kW                                     | 21          | 28          | 37          | 57                            | 76                            |
| <b>DC link current <math>I_d</math><sup>3)</sup></b>                                                                                                                                                                                                                 | A                                      | 54          | 72          | 102         | 158                           | 200                           |
| <b>Current carrying capacity</b>                                                                                                                                                                                                                                     |                                        |             |             |             |                               |                               |
| • DC link busbars                                                                                                                                                                                                                                                    | A                                      | 200         | 200         | 200         | 200                           | 200                           |
| • 24 V DC busbars                                                                                                                                                                                                                                                    | A                                      | 20          | 20          | 20          | 20                            | 20                            |
| If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24 V DC connection using a 24 V terminal adapter is required (max. cross-section 6 mm <sup>2</sup> , max. fuse protection 20 A). |                                        |             |             |             |                               |                               |
| <b>DC link capacitance</b>                                                                                                                                                                                                                                           | μF                                     | 1175        | 1410        | 1880        | 2820                          | 3995                          |
| <b>Current requirement</b><br>At 24 V DC, max.                                                                                                                                                                                                                       | A                                      | 1.2         | 1.2         | 1.5         | 1.5                           | 1.5                           |
| <b>Internal/external air cooling</b>                                                                                                                                                                                                                                 |                                        |             |             |             |                               |                               |
| • Power loss <sup>4)</sup>                                                                                                                                                                                                                                           |                                        |             |             |             |                               |                               |
| - Maximum power loss with internal air cooling in control cabinet                                                                                                                                                                                                    | kW                                     | 0.46        | 0.62        | 0.79        | 1.29                          | 2.09                          |
| - Typical losses with internal air cooling in control cabinet <sup>5)</sup>                                                                                                                                                                                          | kW                                     | 0.38        | 0.55        | 0.77        | 1.26                          | 2.03                          |
| - With external air cooling, int./ext. <sup>4)</sup>                                                                                                                                                                                                                 | kW                                     | 0.14/0.32   | 0.16/0.46   | 0.2/0.59    | 0.29/1.0                      | 0.47/1.62                     |
| • Cooling air requirement                                                                                                                                                                                                                                            | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.031 (1.1) | 0.031 (1.1) | 0.044 (1.6) | 0.144 (5.1)                   | 0.144 (5.1)                   |
| • Sound pressure level $L_{pA}$ (1 m)                                                                                                                                                                                                                                | dB                                     | < 65        | < 65        | < 60        | < 73                          | < 73                          |
| <b>Cold plate cooling</b>                                                                                                                                                                                                                                            |                                        |             |             |             |                               |                               |
| • Power loss, int./ext. <sup>4)</sup>                                                                                                                                                                                                                                | kW                                     | 0.11/0.34   | 0.13/0.48   | 0.15/0.62   | 0.24/1.05                     | 0.39/1.7                      |
| • Thermal resistance $R_{th}$                                                                                                                                                                                                                                        | K/W                                    | 0.055       | 0.055       | 0.05        | 0.028                         | 0.028                         |

<sup>1)</sup> In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

<sup>2)</sup> Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

<sup>3)</sup> Rated DC link current for dimensioning an external DC connection.

<sup>4)</sup> Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

<sup>5)</sup> At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Technical specifications (continued)

| DC link voltage<br>510 ... 720 V DC                                     | Single Motor Module in booksize format |                                          |                                          |                                          |                                          |                                          |
|-------------------------------------------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| <b>Internal air cooling</b>                                             | 6SL3120-...                            | 1TE24-5AA3                               | 1TE26-0AA3                               | 1TE28-5AA3                               | 1TE31-3AA3                               | 1TE32-0AA4                               |
| <b>External air cooling</b>                                             | 6SL3121-...                            | 1TE24-5AA3                               | 1TE26-0AA3                               | 1TE28-5AA3                               | 1TE31-3AA3                               | 1TE32-0AA4                               |
| <b>Cold plate cooling</b>                                               | 6SL3126-...                            | 1TE24-5AA3                               | 1TE26-0AA3                               | 1TE28-5AA3                               | 1TE31-3AA3                               | 1TE32-0AA4                               |
| <b>Liquid cooling</b>                                                   | 6SL3125-...                            | –                                        | –                                        | –                                        | –                                        | 1TE32-0AA4                               |
| <b>Liquid cooling<sup>1)</sup></b>                                      |                                        |                                          |                                          |                                          |                                          |                                          |
| • Power loss, int./ext.                                                 | kW                                     | –                                        | –                                        | –                                        | –                                        | 0.39/1.7                                 |
| - Rated volumetric flow for water at 70 kPa pressure drop <sup>3)</sup> | l/min<br>(US gal/min)                  | –                                        | –                                        | –                                        | –                                        | 8<br>(2.11)                              |
| - Volume of liquid, internal                                            | ml                                     | –                                        | –                                        | –                                        | –                                        | 100                                      |
| - Coolant temperature, max.                                             |                                        |                                          |                                          |                                          |                                          |                                          |
| - Without derating                                                      | °C (°F)                                | –                                        | –                                        | –                                        | –                                        | 45 (113)                                 |
| - With derating                                                         | °C (°F)                                | –                                        | –                                        | –                                        | –                                        | 50 (122)                                 |
| - Sound pressure level $L_{pA}$ (1 m)                                   | dB                                     | –                                        | –                                        | –                                        | –                                        | < 73                                     |
| <b>Motor connection</b><br>U2, V2, W2                                   |                                        | M6 screw studs<br>(X1)                   | M6 screw studs<br>(X1)                   | M8 screw studs<br>(X1)                   | M8 screw studs<br>(X1)                   | M8 screw studs<br>(X1)                   |
| • Conductor cross-section, max.                                         | mm <sup>2</sup>                        | 2.5 ... 50                               | 2.5 ... 50                               | 2.5 ... 95, 2 × 35                       | 2.5 ... 120, 2 × 50                      | 2.5 ... 120, 2 × 50                      |
| <b>Shield connection</b>                                                |                                        | See Accessories                          | See Accessories                          | See Accessories                          | See Accessories                          | See Accessories                          |
| <b>PE connection</b>                                                    |                                        | M6 screw                                 | M6 screw                                 | M6 screw                                 | M8 screw                                 | M8 screw                                 |
| <b>Motor brake connection</b>                                           |                                        | Plug-in connector<br>(X11), 24 V DC, 2 A | Plug-in connector<br>(X11), 24 V DC, 2 A | Plug-in connector<br>(X11), 24 V DC, 2 A | Plug-in connector<br>(X11), 24 V DC, 2 A | Plug-in connector<br>(X11), 24 V DC, 2 A |
| <b>Motor cable length, max.</b>                                         |                                        |                                          |                                          |                                          |                                          |                                          |
| • Shielded                                                              | m (ft)                                 | 100 (328)                                | 100 (328)                                | 100 (328)                                | 100 (328)                                | 100 (328)                                |
| • Unshielded                                                            | m (ft)                                 | 150 (492)                                | 150 (492)                                | 150 (492)                                | 150 (492)                                | 150 (492)                                |
| <b>Degree of protection</b>                                             |                                        | IP20                                     | IP20                                     | IP20                                     | IP20                                     | IP20                                     |
| <b>Dimensions</b>                                                       |                                        |                                          |                                          |                                          |                                          |                                          |
| • Width                                                                 | mm (in)                                | 150 (5.91)                               | 150 (5.91)                               | 200 (7.87)                               | 300 (11.81)                              | 300 (11.81)                              |
| • Height                                                                | mm (in)                                | 380 (14.96)                              | 380 (14.96)                              | 380 (14.96)                              | 380 (14.96)                              | 380 (14.96)                              |
| - With fan <sup>2)</sup>                                                | mm (in)                                | –                                        | –                                        | –                                        | 629 (24.76)                              | 629 (24.76)                              |
| - With screwed fitting                                                  | mm (in)                                | –                                        | –                                        | –                                        | –                                        | 553 (21.77) <sup>1)</sup>                |
| • Depth                                                                 |                                        |                                          |                                          |                                          |                                          |                                          |
| - With internal air cooling                                             | mm (in)                                | 270 (10.63)                              | 270 (10.63)                              | 270 (10.63)                              | 270 (10.63)                              | 270 (10.63)                              |
| - With external air cooling, on/behind mounting surface                 | mm (in)                                | 226/71 (8.90/2.80)                       | 226/71 (8.90/2.80)                       | 226/92 (8.90/3.62)                       | 226/82 (8.90/3.23)                       | 226/82 (8.90/3.23)                       |
| - With cold plate cooling                                               | mm (in)                                | 226 (8.90)                               | 226 (8.90)                               | 226 (8.90)                               | 226 (8.90)                               | 226 (8.90)                               |
| - With liquid cooling                                                   | mm (in)                                | –                                        | –                                        | –                                        | –                                        | 226 (8.90)                               |
| <b>Weight, approx.</b>                                                  |                                        |                                          |                                          |                                          |                                          |                                          |
| • With internal air cooling                                             | kg (lb)                                | 9 (19.8)                                 | 9 (19.8)                                 | 15 (33.1)                                | 21 (46.3)                                | 21 (46.3)                                |
| • With external air cooling                                             | kg (lb)                                | 13.2 (29.1)                              | 13.4 (29.5)                              | 17.2 (37.9)                              | 27.2 (60.0)                              | 30 (66.2)                                |
| • With cold plate cooling                                               | kg (lb)                                | 9.1 (20.1)                               | 9.1 (20.1)                               | 12.5 (27.6)                              | 18 (39.7)                                | 18 (39.7)                                |
| • With liquid cooling                                                   | kg (lb)                                | –                                        | –                                        | –                                        | –                                        | 21 (46.3)                                |

<sup>1)</sup> The coolant connections are located on the lower side of the components. All connection elements can be accessed using an appropriate tool.  
Thread type of water connections: Pipe thread ISO 228 G ½ B.

<sup>2)</sup> The fan is supplied with the Motor Module and must be installed before the Motor Module is commissioned.

<sup>3)</sup> This value applies to water as coolant; for other coolants, refer to the 01/2012 Manual.

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Single Motor Modules

#### Selection and ordering data

| Rated output current                    | Type rating           | Single Motor Module in booksize format |                      |                    |                    |
|-----------------------------------------|-----------------------|----------------------------------------|----------------------|--------------------|--------------------|
|                                         |                       | Internal air cooling                   | External air cooling | Cold plate cooling | Liquid cooling     |
| A                                       | kW (HP) <sup>1)</sup> | Order No.                              | Order No.            | Order No.          | Order No.          |
| <b>DC link voltage 510 ... 720 V DC</b> |                       |                                        |                      |                    |                    |
| 3                                       | 1.6 (1.5)             | 6SL3120-1TE13-0AA3                     | 6SL3121-1TE13-0AA3   | 6SL3126-1TE13-0AA3 | –                  |
| 5                                       | 2.7 (3)               | 6SL3120-1TE15-0AA3                     | 6SL3121-1TE15-0AA3   | 6SL3126-1TE15-0AA3 | –                  |
| 9                                       | 4.8 (5)               | 6SL3120-1TE21-0AA3                     | 6SL3121-1TE21-0AA3   | 6SL3126-1TE21-0AA3 | –                  |
| 18                                      | 9.7 (10)              | 6SL3120-1TE21-8AA3                     | 6SL3121-1TE21-8AA3   | 6SL3126-1TE21-8AA3 | –                  |
| 30                                      | 16 (20)               | 6SL3120-1TE23-0AA3                     | 6SL3121-1TE23-0AA3   | 6SL3126-1TE23-0AA3 | –                  |
| 45                                      | 24 (30)               | 6SL3120-1TE24-5AA3                     | 6SL3121-1TE24-5AA3   | 6SL3126-1TE24-5AA3 | –                  |
| 60                                      | 32 (40)               | 6SL3120-1TE26-0AA3                     | 6SL3121-1TE26-0AA3   | 6SL3126-1TE26-0AA3 | –                  |
| 85                                      | 46 (60)               | 6SL3120-1TE28-5AA3                     | 6SL3121-1TE28-5AA3   | 6SL3126-1TE28-5AA3 | –                  |
| 132                                     | 71 (100)              | 6SL3120-1TE31-3AA3                     | 6SL3121-1TE31-3AA3   | 6SL3126-1TE31-3AA3 | –                  |
| 200                                     | 107 (150)             | 6SL3120-1TE32-0AA4                     | 6SL3121-1TE32-0AA4   | 6SL3126-1TE32-0AA4 | 6SL3125-1TE32-0AA4 |

| Description                                                                                                                                                                 | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories</b>                                                                                                                                                          |                           |
| <b>Power connector (X1)</b><br>At Motor Module end, with screw-type terminals 1.5 ... 10 mm <sup>2</sup> ,<br>For Motor Modules with rated output current of 3 ... 30 A     | <b>6SL3162-2MA00-0AA0</b> |
| <b>Shield connection plate</b><br>For Line/Motor Modules in booksize format                                                                                                 |                           |
| • 150 mm (5.91 in) wide for internal air cooling                                                                                                                            | <b>6SL3162-1AF00-0AA1</b> |
| • 150 mm (5.91 in) wide for external air cooling and cold plate cooling                                                                                                     | <b>6SL3162-1AF00-0BA1</b> |
| • 200 mm (7.87 in) wide for internal air cooling                                                                                                                            | <b>6SL3162-1AH01-0AA0</b> |
| • 200 mm (7.87 in) wide for external air cooling and cold plate cooling                                                                                                     | <b>6SL3162-1AH01-0BA0</b> |
| • 300 mm (11.81 in) wide for all cooling types                                                                                                                              | <b>6SL3162-1AH00-0AA0</b> |
| <b>DC link rectifier adapter</b><br>For direct infeed of DC link voltage                                                                                                    |                           |
| • Screw-type terminals 0.5 ... 10 mm <sup>2</sup> for Line/Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)                             | <b>6SL3162-2BD00-0AA0</b> |
| • Screw-type terminals 35 ... 95 mm <sup>2</sup> for Line/Motor Modules in booksize format with a width of 150 mm, 200 mm and 300 mm (5.91 in, 7.87 in and 11.81 in)        | <b>6SL3162-2BM00-0AA0</b> |
| <b>DC link adapter (2 units)</b><br>For multi-tier configuration<br>Screw-type terminals 35 ... 95 mm <sup>2</sup><br>For all Line Modules/Motor Modules in booksize format | <b>6SL3162-2BM01-0AA0</b> |
| <b>24 V terminal adapter</b><br>For all Line Modules/Motor Modules in booksize format                                                                                       | <b>6SL3162-2AA00-0AA0</b> |
| <b>24 V jumper</b><br>For connection of the 24 V busbars (for booksize format)                                                                                              | <b>6SL3162-2AA01-0AA0</b> |

| Description                                                                                                                                                                                                                                                                                                                                                                                | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Reinforced DC link busbar set</b><br>For replacement of DC link busbars for 5 modules in booksize format                                                                                                                                                                                                                                                                                |                           |
| • 50 mm (1.97 in) wide                                                                                                                                                                                                                                                                                                                                                                     | <b>6SL3162-2DB00-0AA0</b> |
| • 100 mm (3.94 in) wide                                                                                                                                                                                                                                                                                                                                                                    | <b>6SL3162-2DD00-0AA0</b> |
| <b>Warning labels in 30 languages</b><br>This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices.<br>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                                                                         |                           |
| <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs)<br>For DRIVE-CLiQ port                                                                                                                                                                                                                                                                        |                           |
| • For Motor Modules 50 mm (1.97 in) wide, int./ext. air cooling                                                                                                                                                                                                                                                                                                                            | <b>6SL3162-8AB00-0AA0</b> |
| • For Motor Modules 100 mm (3.94 in) wide, int./ext. air cooling                                                                                                                                                                                                                                                                                                                           | <b>6SL3162-8BD00-0AA0</b> |
| • For Motor Modules 150 mm (5.91 in) wide, int./ext. air cooling                                                                                                                                                                                                                                                                                                                           | <b>6SL3162-8CF00-0AA0</b> |
| • For Motor Modules 200 mm (7.87 in) wide, int./ext. air cooling                                                                                                                                                                                                                                                                                                                           | <b>6SL3162-8DH00-0AA0</b> |
| • For Motor Modules 300 mm (11.81 in) wide, int./ext. air cooling                                                                                                                                                                                                                                                                                                                          | <b>6SL3162-8EM00-0AA0</b> |
| <b>SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                                                                                                                                                                                                                                                                                          | <b>6SL3066-4CA00-0AA0</b> |

<sup>1)</sup> Nominal HP based on asynchronous motors (induction motors).  
Match the motor nameplate current for specific sizing.

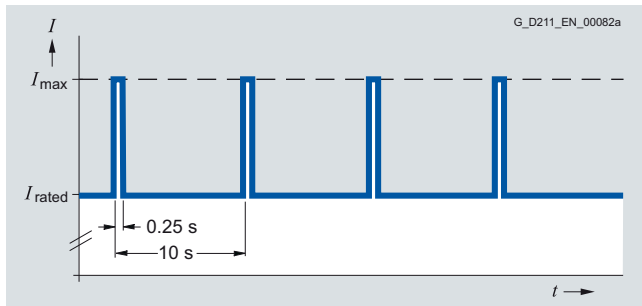
# SINAMICS S120 drive system

## Booksize format – Motor Modules

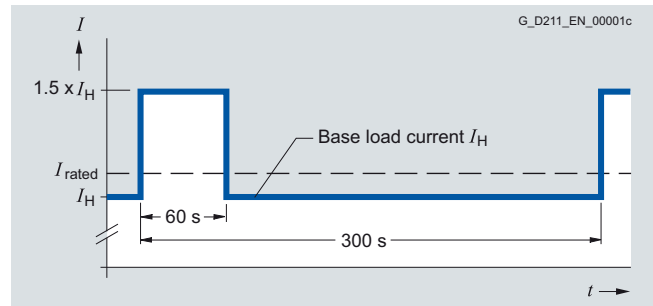
### Single Motor Modules

#### Characteristic curves

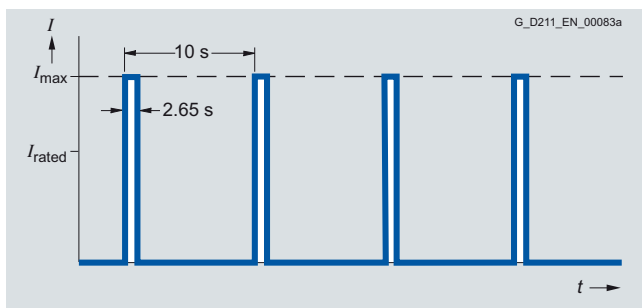
##### Overload capability



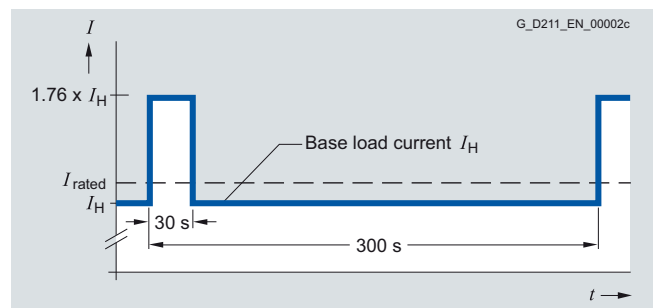
Load cycle with previous load



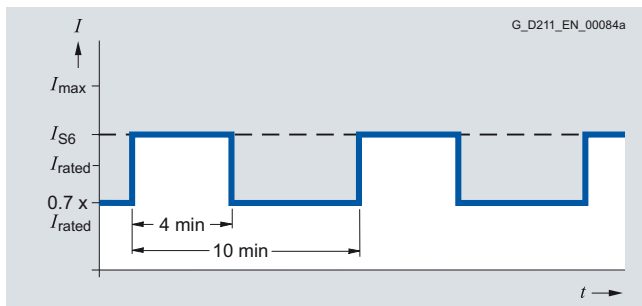
Duty cycle with 60 s overload with a duty cycle duration of 300 s



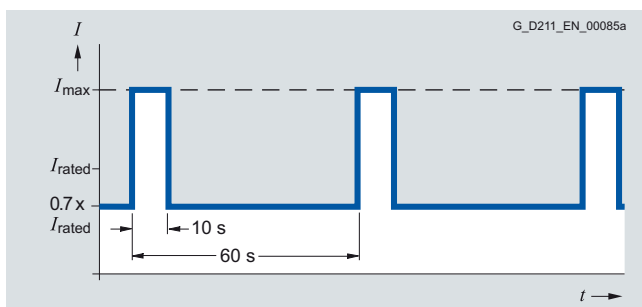
Duty cycle without initial load



Duty cycle with 30 s overload with a duty cycle duration of 300 s



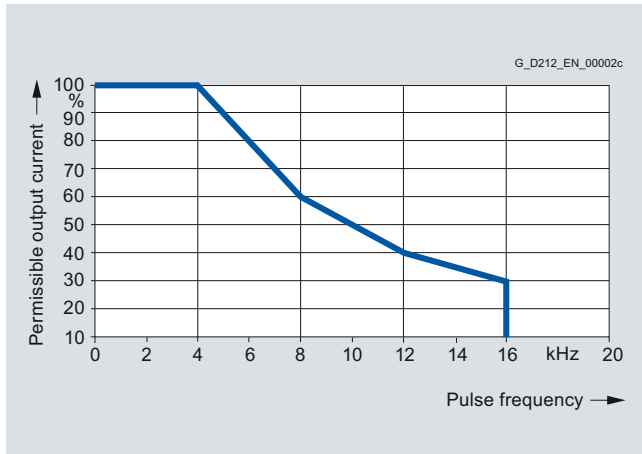
S6 load cycle with previous load with a load cycle period of 600 s



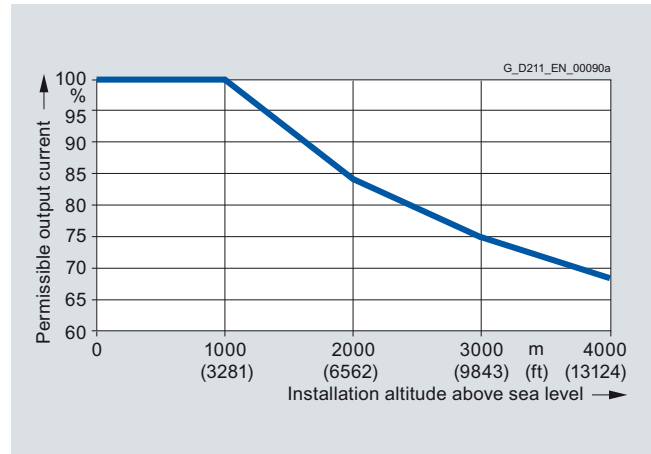
S6 load cycle with previous load with a load cycle period of 60 s

### Characteristic curves (continued)

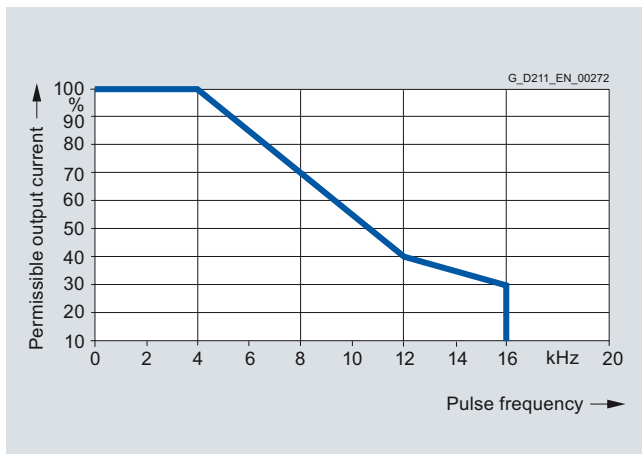
#### Derating characteristics



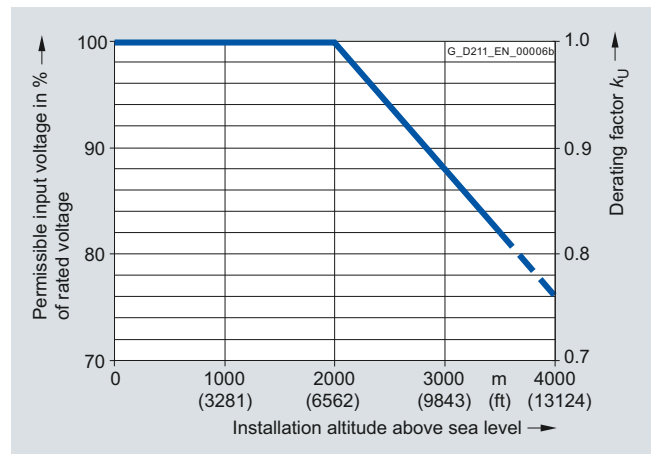
Output current dependent on pulse frequency  
(rated current up to 132 A for Single Motor Modules in booksize format)



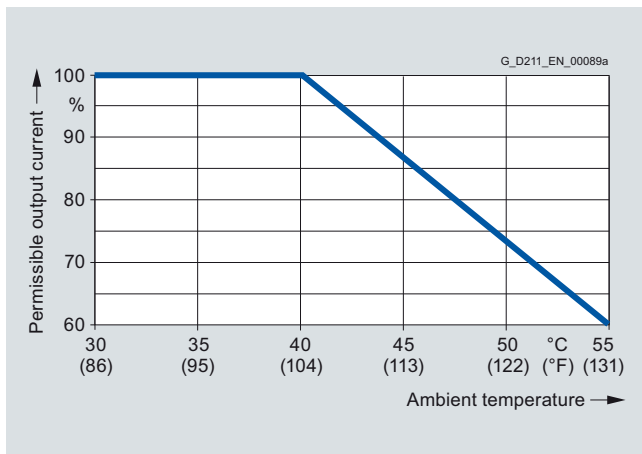
Output current as a function of installation altitude



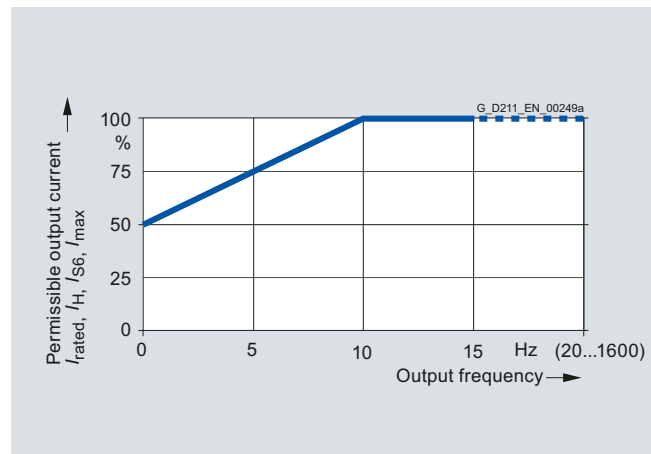
Output current dependent on pulse frequency  
(rated current up to 200 A for Single Motor Modules in booksize format)



Voltage derating dependent on installation altitude



Output current as a function of ambient temperature



Current derating dependent on output frequency

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Double Motor Modules

#### Design



Double Motor Modules feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 × electronic power supply connections via integrated 24 V DC bars
- 4 DRIVE-CLiQ sockets

- 2 plug-in motor connections (not included in scope of supply)
- 2 safe standstill inputs (1 input per axis)
- 2 safe motor brake controller
- 2 temperature sensor inputs (KTY84-130 or PTC)
- 3 PE/protective conductor connections

The status of the Motor Modules is indicated via two multi-color LEDs.

On Double Motor Modules, the motor cable shield can be connected in the connector.

The signal cable shield can be connected to the Motor Module by means of a terminal element, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on motor module width) to connect Motor Module to the adjacent Motor Module
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connectors X21 and X22
- Device fans for cooling power units on modules with internal and external air cooling supplied from the internal voltage levels
- 1 set of warning signs in 30 languages
- 1 heat conducting foil (for Double Motor Modules with cold plate cooling only)

#### Integration

The Double Motor Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
  - Numeric Control Extensions NX10.3/NX15.3

#### Technical specifications

|                                                                                                                                   |                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                               | Double Motor Modules in booksize format<br>6SL312...-2TE...                                                                                                                            |
| <b>DC link voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                                  | 510 ... 720 V DC (line connection voltage 380 ... 480 V 3 AC) <sup>1)</sup>                                                                                                            |
| <b>Output frequency</b>                                                                                                           | 0 ... 650 Hz <sup>2)</sup>                                                                                                                                                             |
| <b>Electronic power supply</b>                                                                                                    | 24 V DC -15 %/+20 %                                                                                                                                                                    |
| <b>Cooling method</b>                                                                                                             | <ul style="list-style-type: none"> <li>• Internal air cooling, external air cooling, power units with forced air cooling through built-in fan</li> <li>• Cold plate cooling</li> </ul> |
| <b>Permissible ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                                                          |

|                                   |                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>               | Double Motor Modules in booksize format<br>6SL312...-2TE...                                                                                     |
| <b>Installation altitude</b>      | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics |
| <b>Declarations of conformity</b> | CE (Low Voltage and EMC Directives)                                                                                                             |
| <b>Approvals according to</b>     | cULus                                                                                                                                           |
| <b>Safety Integrated</b>          | Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1<br>Control category 3 acc. to ISO 13849-1     |

<sup>1)</sup> With firmware version V2.5 and higher with appropriate parameterization and reduced output also operable on 200 ... 240 V 3 AC networks in accordance with a DC-link voltage of 270 ... 360 V DC.

<sup>2)</sup> At rated output current (max. output frequency 1300 Hz for 62.5 µs current control cycle, 8 kHz pulse frequency, 60 % permissible output current). Note the correlation between max. output frequency, pulse frequency and current derating.



# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Double Motor Modules

#### Technical specifications (continued)

| DC link voltage<br>510 ... 720 V DC                                                                                                                                                                                                                                  | Double Motor Module in booksize format |                                                                                                         |                                  |                                  |                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Internal air cooling                                                                                                                                                                                                                                                 | 6SL3120-...                            | 2TE13-0AA3                                                                                              | 2TE15-0AA3                       | 2TE21-0AA3                       | 2TE21-8AA3                       |
| External air cooling                                                                                                                                                                                                                                                 | 6SL3121-...                            | 2TE13-0AA3                                                                                              | 2TE15-0AA3                       | 2TE21-0AA3                       | 2TE21-8AA3                       |
| Cold plate cooling                                                                                                                                                                                                                                                   | 6SL3126-...                            | 2TE13-0AA3                                                                                              | 2TE15-0AA3                       | 2TE21-0AA3                       | 2TE21-8AA3                       |
| <b>Output current</b>                                                                                                                                                                                                                                                |                                        |                                                                                                         |                                  |                                  |                                  |
| • Rated current $I_{rated}$                                                                                                                                                                                                                                          | A                                      | 2 × 3                                                                                                   | 2 × 5                            | 2 × 9                            | 2 × 18                           |
| • For S6 duty $I_{S6}$ (40 %)                                                                                                                                                                                                                                        | A                                      | 2 × 3.5                                                                                                 | 2 × 6                            | 2 × 10                           | 2 × 24                           |
| • Base-load current $I_H$                                                                                                                                                                                                                                            | A                                      | 2 × 2.6                                                                                                 | 2 × 4.3                          | 2 × 7.7                          | 2 × 15.3                         |
| • $I_{max}$                                                                                                                                                                                                                                                          | A                                      | 2 × 6                                                                                                   | 2 × 10                           | 2 × 18                           | 2 × 36                           |
| <b>Type rating<sup>1)</sup></b>                                                                                                                                                                                                                                      |                                        |                                                                                                         |                                  |                                  |                                  |
| • Based on $I_{rated}$                                                                                                                                                                                                                                               | kW (HP)                                | 2 × 1.6 (1.5)                                                                                           | 2 × 2.7 (3)                      | 2 × 4.8 (5)                      | 2 × 9.7 (10)                     |
| • Based on $I_H$                                                                                                                                                                                                                                                     | kW (HP)                                | 2 × 1.4 (1)                                                                                             | 2 × 2.3 (2.5)                    | 2 × 4.1 (5)                      | 2 × 8.2 (10)                     |
| <b>DC link current <math>I_d</math><sup>2)</sup></b>                                                                                                                                                                                                                 | A                                      | 7.2                                                                                                     | 12                               | 22                               | 43                               |
| <b>Current carrying capacity</b>                                                                                                                                                                                                                                     |                                        |                                                                                                         |                                  |                                  |                                  |
| • DC link busbars                                                                                                                                                                                                                                                    | A                                      | 100                                                                                                     | 100                              | 100                              | 100                              |
| • 24 V DC busbars                                                                                                                                                                                                                                                    | A                                      | 20                                                                                                      | 20                               | 20                               | 20                               |
| If, due to a number of Line and Motor Modules being mounted side-by-side, the current carrying capacity exceeds 20 A, an additional 24 V DC connection using a 24 V terminal adapter is required (max. cross-section 6 mm <sup>2</sup> , max. fuse protection 20 A). |                                        |                                                                                                         |                                  |                                  |                                  |
| <b>DC link capacitance</b>                                                                                                                                                                                                                                           | μF                                     | 110                                                                                                     | 220                              | 220                              | 705                              |
| <b>Current requirement</b><br>At 24 V DC, max.                                                                                                                                                                                                                       | A                                      | 1.0                                                                                                     | 1.0                              | 1.0                              | 1.0                              |
| <b>Internal/external air cooling</b>                                                                                                                                                                                                                                 |                                        |                                                                                                         |                                  |                                  |                                  |
| • Power loss <sup>3)</sup>                                                                                                                                                                                                                                           |                                        |                                                                                                         |                                  |                                  |                                  |
| - Maximum losses with internal air cooling in control cabinet                                                                                                                                                                                                        | kW                                     | 0.10                                                                                                    | 0.13                             | 0.19                             | 0.35                             |
| - Typical losses with internal air cooling in control cabinet <sup>4)</sup>                                                                                                                                                                                          |                                        | 0.05                                                                                                    | 0.08                             | 0.15                             | 0.28                             |
| - With external air cooling, int./ext. <sup>3)</sup>                                                                                                                                                                                                                 | kW                                     | 0.06/0.035                                                                                              | 0.07/0.06                        | 0.09/0.095                       | 0.105/0.24                       |
| • Cooling air requirement                                                                                                                                                                                                                                            | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.008 (0.3)                                                                                             | 0.008 (0.3)                      | 0.008 (0.3)                      | 0.016 (0.6)                      |
| • Sound pressure level<br>$L_{pA}$ (1 m)                                                                                                                                                                                                                             | dB                                     | < 60                                                                                                    | < 60                             | < 60                             | < 60                             |
| <b>Cold plate cooling</b>                                                                                                                                                                                                                                            |                                        |                                                                                                         |                                  |                                  |                                  |
| • Power loss, int./ext. <sup>3)</sup>                                                                                                                                                                                                                                | kW                                     | 0.055/0.035                                                                                             | 0.06/0.065                       | 0.08/0.1                         | 0.095/0.25                       |
| • Thermal resistance $R_{th}$                                                                                                                                                                                                                                        | K/W                                    | 0.185                                                                                                   | 0.185                            | 0.185                            | 0.075                            |
| <b>Motor connection</b><br>U2, V2, W2                                                                                                                                                                                                                                |                                        | 2 × connectors (X1, X2) <sup>5)</sup> ,<br>max. 30 A (not included in scope of supply, see Accessories) |                                  |                                  |                                  |
| <b>Shield connection</b>                                                                                                                                                                                                                                             |                                        | Integrated in connector (X1, X2)                                                                        | Integrated in connector (X1, X2) | Integrated in connector (X1, X2) | Integrated in connector (X1, X2) |
| <b>PE connection</b>                                                                                                                                                                                                                                                 |                                        | M5 screw                                                                                                | M5 screw                         | M5 screw                         | M5 screw                         |
| <b>Motor brake connection</b>                                                                                                                                                                                                                                        |                                        | Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A                                      |                                  |                                  |                                  |
| <b>Motor cable length, max.</b>                                                                                                                                                                                                                                      |                                        |                                                                                                         |                                  |                                  |                                  |
| • Shielded                                                                                                                                                                                                                                                           | m (ft)                                 | 50 (164)                                                                                                | 50 (164)                         | 50 (164)                         | 70 (230)                         |
| • Unshielded                                                                                                                                                                                                                                                         | m (ft)                                 | 75 (246)                                                                                                | 75 (246)                         | 75 (246)                         | 100 (328)                        |
| <b>Degree of protection</b>                                                                                                                                                                                                                                          |                                        | IP20                                                                                                    | IP20                             | IP20                             | IP20                             |
| <b>Dimensions</b>                                                                                                                                                                                                                                                    |                                        |                                                                                                         |                                  |                                  |                                  |
| • Width                                                                                                                                                                                                                                                              | mm (in)                                | 50 (1.97)                                                                                               | 50 (1.97)                        | 50 (1.97)                        | 100 (3.94)                       |
| • Height                                                                                                                                                                                                                                                             | mm (in)                                | 380 (14.96)                                                                                             | 380 (14.96)                      | 380 (14.96)                      | 380 (14.96)                      |
| • Depth                                                                                                                                                                                                                                                              |                                        |                                                                                                         |                                  |                                  |                                  |
| - With internal air cooling                                                                                                                                                                                                                                          | mm (in)                                | 270 (10.63)                                                                                             | 270 (10.63)                      | 270 (10.63)                      | 270 (10.63)                      |
| - With external air cooling, on/behind mounting surface                                                                                                                                                                                                              | mm (in)                                | 226/66.5 (8.90/2.62)                                                                                    | 226/66.5 (8.90/2.62)             | 226/66.5 (8.90/2.62)             | 226/66.5 (8.90/2.62)             |
| - With cold plate cooling                                                                                                                                                                                                                                            | mm (in)                                | 226 (8.90)                                                                                              | 226 (8.90)                       | 226 (8.90)                       | 226 (8.90)                       |
| <b>Weight, approx.</b>                                                                                                                                                                                                                                               |                                        |                                                                                                         |                                  |                                  |                                  |
| • With internal air cooling                                                                                                                                                                                                                                          | kg (lb)                                | 5.3 (11.7)                                                                                              | 5.3 (11.7)                       | 5.3 (11.7)                       | 6.8 (15)                         |
| • With external air cooling                                                                                                                                                                                                                                          | kg (lb)                                | 5.8 (12.8)                                                                                              | 5.8 (12.8)                       | 5.8 (12.8)                       | 8.6 (19)                         |
| • With cold plate cooling                                                                                                                                                                                                                                            | kg (lb)                                | 4.5 (9.92)                                                                                              | 4.5 (9.92)                       | 4.5 (9.92)                       | 5.9 (13)                         |

<sup>1)</sup> Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

<sup>2)</sup> Rated DC link current for dimensioning an external DC connection.

<sup>3)</sup> Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

<sup>4)</sup> At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

<sup>5)</sup> Connector not included in scope of supply, see Accessories.

# SINAMICS S120 drive system

## Booksized format – Motor Modules

### Double Motor Modules

#### Selection and ordering data

| Rated output current<br>A | Type rating<br>kW (HP) <sup>1)</sup> | Double Motor Module in booksized format |                                   |                                 |
|---------------------------|--------------------------------------|-----------------------------------------|-----------------------------------|---------------------------------|
|                           |                                      | Internal air cooling<br>Order No.       | External air cooling<br>Order No. | Cold plate cooling<br>Order No. |
| 2 × 3                     | 2 × 1.6 (2 × 1.5)                    | <b>6SL3120-2TE13-0AA3</b>               | <b>6SL3121-2TE13-0AA3</b>         | <b>6SL3126-2TE13-0AA3</b>       |
| 2 × 5                     | 2 × 2.7 (2 × 3)                      | <b>6SL3120-2TE15-0AA3</b>               | <b>6SL3121-2TE15-0AA3</b>         | <b>6SL3126-2TE15-0AA3</b>       |
| 2 × 9                     | 2 × 4.8 (2 × 5)                      | <b>6SL3120-2TE21-0AA3</b>               | <b>6SL3121-2TE21-0AA3</b>         | <b>6SL3126-2TE21-0AA3</b>       |
| 2 × 18                    | 2 × 9.7 9.7 (2 × 10)                 | <b>6SL3120-2TE21-8AA3</b>               | <b>6SL3121-2TE21-8AA3</b>         | <b>6SL3126-2TE21-8AA3</b>       |

| Description                                                                                                                                                                                                                                                                                                                                                                                   | Order No.                                              | Description                                                                                                                                                                             | Order No.                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>Accessories</b>                                                                                                                                                                                                                                                                                                                                                                            |                                                        | <b>Accessories for re-ordering</b>                                                                                                                                                      |                                                            |
| <b>Power connector (X1/X2)</b><br>At Motor Module end, with screw-type terminals 1.5 ... 10 mm <sup>2</sup> .<br>For Motor Modules with rated output current of 3 ... 30 A                                                                                                                                                                                                                    | <b>6SL3162-2MA00-0AA0</b>                              | <b>Accessories pack</b><br>(plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs)<br>For DRIVE-CLiQ port                                                                     |                                                            |
| <b>DC link rectifier adapter</b><br>For direct supply of the DC link voltage<br>Screw-type terminals<br>0.5 ... 10 mm <sup>2</sup><br>For Line/Motor Modules in book-size format with a width of 50 mm (1.97 in) and 100 mm (3.94 in)                                                                                                                                                         | <b>6SL3162-2BD00-0AA0</b>                              | <ul style="list-style-type: none"> <li>For Motor Modules 50 mm (1.97 in) wide, int./ext. air cooling</li> <li>For Motor Modules 100 mm (3.94 in) wide, int./ext. air cooling</li> </ul> | <b>6SL3162-8AB00-0AA0</b><br><br><b>6SL3162-8BD00-0AA0</b> |
| <b>DC link adapter (2 units)</b><br>For multi-tier configuration<br>Screw-type terminals<br>35 ... 95 mm <sup>2</sup><br>For all Line Modules/Motor Modules in booksized format                                                                                                                                                                                                               | <b>6SL3162-2BM01-0AA0</b>                              | <b>SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                                                                                       | <b>6SL3066-4CA00-0AA0</b>                                  |
| <b>24 V terminal adapter</b><br>For all Line Modules/Motor Modules in booksized format                                                                                                                                                                                                                                                                                                        | <b>6SL3162-2AA00-0AA0</b>                              |                                                                                                                                                                                         |                                                            |
| <b>24 V jumper</b><br>For connection of the 24 V busbars (for booksized format)                                                                                                                                                                                                                                                                                                               | <b>6SL3162-2AA01-0AA0</b>                              |                                                                                                                                                                                         |                                                            |
| <b>Reinforced DC link busbar set</b><br>For replacement of DC link bus-bars for 5 modules in booksized format                                                                                                                                                                                                                                                                                 |                                                        |                                                                                                                                                                                         |                                                            |
| <ul style="list-style-type: none"> <li>50 mm (1.97 in) wide</li> <li>100 mm (3.94 in) wide</li> </ul>                                                                                                                                                                                                                                                                                         | <b>6SL3162-2DB00-0AA0</b><br><b>6SL3162-2DD00-0AA0</b> |                                                                                                                                                                                         |                                                            |
| <b>Warning labels in 30 languages</b><br>This label set can be glued over the standard German or English labels to provide warnings in other languages.<br>One set of labels is supplied with the devices.<br>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b>                              |                                                                                                                                                                                         |                                                            |

#### Characteristic curves

See Single Motor Modules in booksized format (page 5/64).

<sup>1)</sup> Nominal HP based on asynchronous motors (induction motors).  
Match the motor nameplate current for specific sizing.

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Series motor reactors

#### Overview



A series reactor in the form of a three-limb iron-cored reactor may be required in the case of special motors with minimal leakage inductance (for which the controller settings are insufficient). Motors with a low leakage inductance are, from experience, motors that can achieve high stator frequencies > 300 Hz or motors with a high rated current > 85 A.

The series motor reactors are designed for a pulse frequency of 4 kHz or 8 kHz output from the Motor Module. Higher pulse frequencies are not permissible.

The series motor reactor must be installed as close as possible to the Motor Module.

The voltage drop across a series reactor depends on the motor current and the motor frequency. If an unregulated infeed is used, the maximum rated motor voltage depends on the line supply voltage available. If these guide values are observed, lower reductions in power in the upper speed range of the motor can be achieved.

The surface temperature of the series motor reactor can reach up to 100 °C (212 °F). This additional heat source must be taken into account in the system.

The notes in the Configuration Manual for the motors used must be observed.

#### Selection and ordering data

| Rated current<br>A | Rated inductance<br>mH | Series motor reactor<br>Order No. |
|--------------------|------------------------|-----------------------------------|
| 22.5               | 0.1                    | <b>4EU2452-0EG00-4BA0</b>         |
| 22.5               | 0.3                    | <b>4EU2552-0EF00-4BA0</b>         |
| 54                 | 0.2                    | <b>4EU3052-0EB00-4BA0</b>         |
| 54                 | 0.3                    | <b>4EU3652-0EC00-4BA0</b>         |
| 108                | 0.1                    | <b>4EU3951-0AR00-4B</b>           |
| 108                | 0.2                    | <b>4EU4521-0BS00-4B</b>           |
| 61                 | 0.32                   | <b>6SE7026-0HS87-1FE0</b>         |
| 79                 | 0.23                   | <b>6SE7028-2HS87-1FE0</b>         |

5

#### Technical specifications

| Input voltage 380 ... 480 V 3 AC<br>(DC link voltage 510 ... 720 V DC)              |         | Series motor reactor                                     |                                                          |
|-------------------------------------------------------------------------------------|---------|----------------------------------------------------------|----------------------------------------------------------|
|                                                                                     |         | 4EU2452-0EG00-4BA0                                       | 4EU2552-0EF00-4BA0                                       |
| Rated current                                                                       | A       | 22.5                                                     | 22.5                                                     |
| Rated inductance                                                                    | mH      | 0.1                                                      | 0.3                                                      |
| Power loss                                                                          | kW      | 0.123                                                    | 0.146                                                    |
| Continuous current $I_{thmax}$ , therm. perm.                                       | A       | 25                                                       | 25                                                       |
| Continuous frequency, therm. perm.                                                  | Hz      | 1400                                                     | 1400                                                     |
| Pulse frequency, max.                                                               | kHz     | 8                                                        | 8                                                        |
| Relative voltage drop at the series motor reactor<br>At $I_{thmax}$ and $V_{rated}$ | %       | 7.9                                                      | 23                                                       |
| Ambient temperature                                                                 | °C (°F) | 40 (104)                                                 | 40 (104)                                                 |
| Connection to Motor Module/motor                                                    |         | Flat-type terminal                                       | Flat-type terminal                                       |
| PE connection                                                                       |         | M6 screw                                                 | M6 screw                                                 |
| Degree of protection                                                                |         | IP00                                                     | IP00                                                     |
| Dimensions                                                                          |         |                                                          |                                                          |
| • Width                                                                             | mm (in) | 225 (8.86)                                               | 225 (8.86)                                               |
| • Height                                                                            | mm (in) | 210 (8.27)                                               | 210 (8.27)                                               |
| • Depth                                                                             | mm (in) | 91 (3.58)                                                | 115 (4.53)                                               |
| Weight, approx.                                                                     | kg (lb) | 11 (24.3)                                                | 16 (35.3)                                                |
| Approvals according to                                                              |         | cURus                                                    | cURus                                                    |
| Suitable for Motor Module in booksize format                                        | Type    | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... |

# SINAMICS S120 drive system

## Booksize format – Motor Modules

### Series motor reactors

#### Technical specifications (continued)

| Input voltage 380 ... 480 V 3 AC<br>(DC link voltage 510 ... 720 V DC)                     |         | Series motor reactor                                     |                                                          |                                                          |                                                          |
|--------------------------------------------------------------------------------------------|---------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
|                                                                                            |         | 4EU3052-0EB00-4BA0                                       | 4EU3652-0EC00-4BA0                                       | 4EU3951-0AR00-4B                                         | 4EU4521-0BS00-4B                                         |
| <b>Rated current</b>                                                                       | A       | 54                                                       | 54                                                       | 108                                                      | 108                                                      |
| <b>Rated inductance</b>                                                                    | mH      | 0.2                                                      | 0.3                                                      | 0.1                                                      | 0.2                                                      |
| <b>Power loss</b>                                                                          | kW      | 0.27                                                     | 0.319                                                    | 0.454                                                    | 0.629                                                    |
| <b>Continuous current<br/><math>I_{thmax}</math>, therm. perm.</b>                         | A       | 60                                                       | 60                                                       | 120                                                      | 120                                                      |
| <b>Continuous frequency, therm. perm.</b>                                                  | Hz      | 1400                                                     | 1400                                                     | 1400                                                     | 1400                                                     |
| <b>Pulse frequency, max.</b>                                                               | kHz     | 8                                                        | 8                                                        | 8                                                        | 8                                                        |
| <b>Relative voltage drop at the series motor reactor</b><br>At $I_{thmax}$ and $V_{rated}$ | %       | 38                                                       | 66                                                       | 38                                                       | 76                                                       |
| <b>Ambient temperature</b>                                                                 | °C (°F) | 40 (104)                                                 | 40 (104)                                                 | 40 (104)                                                 | 40 (104)                                                 |
| <b>Connection to Motor Module/motor</b>                                                    |         | Flat-type terminal                                       | Flat-type terminal                                       | Flat-type terminal                                       | Flat-type terminal                                       |
| <b>PE connection</b>                                                                       |         | M6 screw                                                 | M8 screw                                                 | M8 screw                                                 | M8 screw                                                 |
| <b>Degree of protection</b>                                                                |         | IP00                                                     | IP00                                                     | IP00                                                     | IP00                                                     |
| <b>Dimensions</b>                                                                          |         |                                                          |                                                          |                                                          |                                                          |
| • Width                                                                                    | mm (in) | 295 (11.61)                                              | 357 (14.06)                                              | 410 (16.14)                                              | 460 (18.11)                                              |
| • Height                                                                                   | mm (in) | 269 (10.59)                                              | 321 (12.64)                                              | 385 (15.16)                                              | 435 (17.13)                                              |
| • Depth                                                                                    | mm (in) | 148 (5.83)                                               | 169 (6.65)                                               | 174 (6.85)                                               | 221 (8.70)                                               |
| <b>Weight, approx.</b>                                                                     | kg (lb) | 70 (154)                                                 | 70 (154)                                                 | 68 (150)                                                 | 130 (287)                                                |
| <b>Approvals according to</b>                                                              |         | cURus                                                    | cURus                                                    | cURus                                                    | cURus                                                    |
| <b>Suitable for Motor Module in booksize format</b>                                        | Type    | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... |

| Input voltage 380 ... 480 V 3 AC<br>(DC link voltage 510 ... 720 V DC) |         | Series motor reactor                                     |                                                          |
|------------------------------------------------------------------------|---------|----------------------------------------------------------|----------------------------------------------------------|
|                                                                        |         | 6SE7028-2HS87-1FE0                                       | 6SE7026-0HS87-1FE0                                       |
| <b>Rated current</b>                                                   | A       | 79                                                       | 61                                                       |
| <b>Rated inductance</b>                                                | mH      | 0.23                                                     | 0.32                                                     |
| <b>Power loss</b>                                                      | kW      | 0.37                                                     | 0.3                                                      |
| <b>Connection to Motor Module/motor</b>                                |         | Flat-type terminal                                       | Flat-type terminal                                       |
| <b>PE connection</b>                                                   |         | Screw studs                                              | Screw studs                                              |
| <b>Degree of protection</b>                                            |         | IP00                                                     | IP00                                                     |
| <b>Dimensions</b>                                                      |         |                                                          |                                                          |
| • Width                                                                | mm (in) | 264 (10.39)                                              | 235 (9.25)                                               |
| • Height                                                               | mm (in) | 280 (11.02)                                              | 250 (9.84)                                               |
| • Depth                                                                | mm (in) | 155 (6.10)                                               | 136 (5.35)                                               |
| <b>Weight, approx.</b>                                                 | kg (lb) | 42.3 (93.3)                                              | 30 (66.2)                                                |
| <b>Approvals according to</b>                                          |         | cURus                                                    | cURus                                                    |
| <b>Suitable for Motor Module in booksize format</b>                    | Type    | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... | 6SL3120-...<br>6SL3121-...<br>6SL3126-...<br>6SL3125-... |
| <b>Suitable for motors</b>                                             | Type    | 1FE1052-4HD.0<br>1FE1052-4HG.0                           | 1FE1053-4HH.1                                            |

# SINAMICS S120 drive system

## Booksize format – DC link components

### Braking Module

#### Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP category 1) or limit the DC link voltage for brief periods of generator operation, e.g. when the regenerative feedback capability of the Line Module is deactivated. The Braking Module includes the power electronics and the associated control circuit. During operation, the DC link power is converted into heat loss in an external braking resistor.

Braking Modules in booksize format can also be used for rapid discharge of the DC link.

#### Design

The Braking Module in booksize format features the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 x electronic power supply connections via integrated 24 V DC bars
- Terminals for connecting the braking resistor
- 2 digital inputs (disable Braking Module/acknowledge faults and rapid discharge of DC link)
- 2 digital outputs (Braking Module disabled and prewarning – *Ixt* monitoring)
- 2 PE/protective conductor connections

The status of the Braking Module is indicated via two 2-color LEDs.

#### Technical specifications

|                                                                   |                                                             |
|-------------------------------------------------------------------|-------------------------------------------------------------|
| <b>Product name</b>                                               | Braking Module in booksize format<br>(Internal air cooling) |
| <b>DC link voltage 510 ... 720 V DC</b>                           | 6SL3100-1AE31-0AB0                                          |
| <b>Rated power <math>P_{DB}</math></b>                            | 1.5 kW <sup>1)</sup>                                        |
| <b>Peak power <math>P_{max}</math></b>                            | 100 kW <sup>1)</sup>                                        |
| <b>Activation threshold</b>                                       | 770 V                                                       |
| <b>Cable length</b><br>to braking resistor, max.                  | 10 m (32.8 ft)                                              |
| <b>DC link capacitance</b>                                        | 110 µF                                                      |
| <b>Current requirement</b><br>at 24 V DC, max.                    | 0.5 A                                                       |
| <b>Digital inputs</b><br>in accordance with IEC 61131-2 Type 1    |                                                             |
| • Voltage                                                         | -3 V ... +30 V                                              |
| • Low level<br>(an open digital input is interpreted as "low")    | -3 V ... +5 V                                               |
| • High level                                                      | 15 ... 30 V                                                 |
| • Current consumption at 24 V DC, typ.                            | 10 mA                                                       |
| • Conductor cross-section, max.                                   | 1.5 mm <sup>2</sup>                                         |
| <b>Digital outputs</b><br>(resistant to sustained short circuits) |                                                             |
| • Voltage                                                         | 24 V DC                                                     |
| • Load current per digital output, max.                           | 100 mA                                                      |
| • Conductor cross-section, max.                                   | 1.5 mm <sup>2</sup>                                         |
| <b>Current carrying capacity</b>                                  |                                                             |
| • 24 V DC busbars                                                 | 20 A                                                        |
| • DC link busbars                                                 | 100 A                                                       |
| <b>PE connection</b>                                              | M5 screw                                                    |
| <b>Dimensions</b>                                                 |                                                             |
| • Width                                                           | 50 mm (1.97 in)                                             |
| • Height                                                          | 380 mm (14.96 in)                                           |
| • Depth, with spacer<br>(included in scope of supply)             | 270 mm (10.63 in)                                           |
| <b>Weight, approx.</b>                                            | 4.1 kg (9 lb)                                               |
| <b>Approvals according to</b>                                     | cURus                                                       |

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                  | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Braking Module in booksize format</b>                                                                                                                                                                                                                                                                                                                     | <b>6SL3100-1AE31-0AB0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                                           |                           |
| <b>Warning labels in 30 languages</b>                                                                                                                                                                                                                                                                                                                        | <b>6SL3166-3AB00-0AA0</b> |
| <p>This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices.</p> <p>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR</p> |                           |

<sup>1)</sup> Several Braking Modules can be operated in parallel, typically up to 4 Modules

# SINAMICS S120 drive system

## Booksize format – DC link components

### Braking resistors

#### Overview



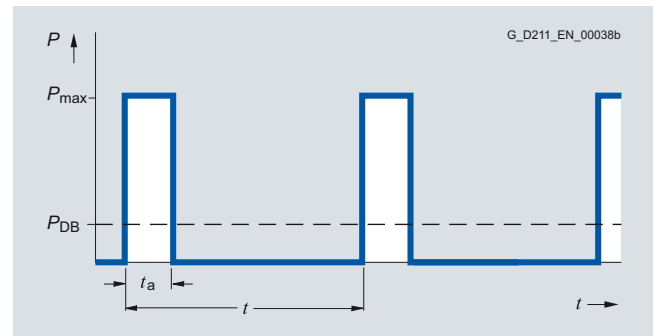
Excess energy in the DC link is dissipated in the braking resistor.

The corresponding braking resistor is connected to a Braking Module or Basic Line Module. Positioning the braking resistor outside the control cabinet or switchgear room enables the resulting heat loss to be routed away. The level of air conditioning required is therefore reduced.

#### Selection and ordering data

| DC link voltage 510 ... 720 V DC |                                               | Braking resistor          |
|----------------------------------|-----------------------------------------------|---------------------------|
| kW                               | Suitable for                                  | Order No.                 |
| 0.3 kW / 25 kW                   | Braking Module<br>6SL3100-1AE31-0AB0          | <b>6SN1113-1AA00-0DA0</b> |
| 1.5 kW / 100 kW                  | Braking Module<br>6SL3100-1AE31-0AB0          | <b>6SL3100-1BE31-0AA0</b> |
| 5 kW / 30 kW                     | Basic Line Module 20 kW<br>6SL3130-1TE22-0AA0 | <b>6SE7023-2ES87-2DC0</b> |
| 12.5 kW / 75 kW                  | Basic Line Module 40 kW<br>6SL3130-1TE24-0AA0 | <b>6SE7028-0ES87-2DC0</b> |

#### Characteristic curves



Load diagram for Braking Module in booksize format and braking resistors for booksize format

# SINAMICS S120 drive system

## Booksize format – DC link components

### Braking resistors

#### Technical specifications

| DC link voltage 510 V ... 720 V DC       |         | Braking resistor for Braking Module in booksize and booksize compact formats                     |     |                    |     |
|------------------------------------------|---------|--------------------------------------------------------------------------------------------------|-----|--------------------|-----|
|                                          |         | 6SN1113-1AA00-0DA0                                                                               |     | 6SL3100-1BE31-0AA0 |     |
| Resistance                               | Ω       | 17                                                                                               |     | 5.7                |     |
| Rated power $P_{DB}$                     | kW      | 0.3                                                                                              |     | 1.5                |     |
| Peak power $P_{max}$                     | kW      | 25                                                                                               |     | 100                |     |
| Load duration for peak output $t_a$      | s       | 0.1                                                                                              | 0.4 | 1                  | 2   |
| Cycle duration of braking duty cycle $t$ | s       | 11.5                                                                                             | 210 | 68                 | 460 |
| Degree of protection                     |         | IP54<br>Braking resistor with connected 1.5 mm <sup>2</sup> cable (shielded), 3 m (9.84 ft) long |     | IP20               |     |
| Dimensions                               |         |                                                                                                  |     |                    |     |
| • Width                                  | mm (in) | 80 (3.15)                                                                                        |     | 193 (7.60)         |     |
| • Height                                 | mm (in) | 210 (8.27)                                                                                       |     | 410 (16.14)        |     |
| • Depth                                  | mm (in) | 53 (2.09)                                                                                        |     | 240 (9.45)         |     |
| Weight, approx.                          | kg (lb) | 3.4 (7.50)                                                                                       |     | 5.6 (12.4)         |     |
| Approvals according to                   |         | cULus                                                                                            |     | –                  |     |

| DC link voltage 510 V ... 720 V DC        |                 | Braking resistor                    |  |                                     |  |
|-------------------------------------------|-----------------|-------------------------------------|--|-------------------------------------|--|
|                                           |                 | 6SE7023-2ES87-2DC0                  |  | 6SE7028-0ES87-2DC0                  |  |
| Resistance                                | Ω               | 20                                  |  | 8                                   |  |
| Rated power $P_{DB}$                      | kW              | 5                                   |  | 12.5                                |  |
| Peak power $P_{max}$                      | kW              | 30                                  |  | 75                                  |  |
| Load duration for peak output $t_a$       | s               | 15                                  |  | 15                                  |  |
| Cycle duration of braking duty cycle $t$  | s               | 90                                  |  | 90                                  |  |
| Degree of protection                      |                 | IP20                                |  | IP20                                |  |
| Power connections                         |                 | M6 screw stud                       |  | M6 screw stud                       |  |
| PE connection                             |                 | M6 screw stud                       |  | M8 screw stud                       |  |
| Thermostatic switch (NC contact)          |                 | Screw-type terminals                |  | Screw-type terminals                |  |
| • Switching capacity                      |                 | 250 V AC/max. 10 A<br>42 V DC/0.2 A |  | 250 V AC/max. 10 A<br>42 V DC/0.2 A |  |
| • Conductor cross-section                 | mm <sup>2</sup> | 2.5                                 |  | 2.5                                 |  |
| Dimensions                                |                 |                                     |  |                                     |  |
| • Width                                   | mm (in)         | 430 (16.93)                         |  | 740 (29.13)                         |  |
| • Height                                  | mm (in)         | 485 (19.09)                         |  | 485 (19.09)                         |  |
| • Depth                                   | mm (in)         | 305 (12.01)                         |  | 305 (12.01)                         |  |
| Weight, approx.                           | kg (lb)         | 14 (30.9)                           |  | 22 (48.5)                           |  |
| Approvals according to                    |                 | cULus, CSA                          |  | cULus, CSA                          |  |
| Suitable for                              |                 |                                     |  |                                     |  |
| Basic Line Module in booksize format      | Type            | 6SL3130-1TE22-0AA0                  |  | 6SL3130-1TE24-0AA0                  |  |
| Braking Module in booksize compact format | Type            | 6SL3400-1AE31-0AA0                  |  | –                                   |  |



# SINAMICS S120 drive system

## Booksize format – DC link components

### Capacitor Module

#### Overview



The Capacitor Module is used to increase the DC link capacitance to bridge momentary power losses.

The Capacitor Module is connected to the DC link voltage via the integrated DC link busbars. The Capacitor Module functions autonomously.

Several Capacitor Modules can be operated in parallel.

#### Design

The capacitor Module features the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 PE/protective conductor connections

#### Technical specifications

|                                                       |                                            |
|-------------------------------------------------------|--------------------------------------------|
| <b>Product name</b>                                   | Capacitor Module<br>(Internal air cooling) |
| <b>DC link voltage 510 ... 720 V DC</b>               | 6SL3100-1CE14-0AA0                         |
| <b>Capacitance</b>                                    | 4000 µF                                    |
| <b>Current carrying capacity</b>                      |                                            |
| • 24 V DC busbars                                     | 20 A                                       |
| • DC link busbars                                     | 100 A                                      |
| <b>PE connection</b>                                  | M5 screw                                   |
| <b>Dimensions</b>                                     |                                            |
| • Width                                               | 100 mm (3.94 in)                           |
| • Height                                              | 380 mm (14.96 in)                          |
| • Depth, with spacer<br>(included in scope of supply) | 270 mm (10.63 in)                          |
| <b>Weight, approx.</b>                                | 7.2 kg (16 lb)                             |
| <b>Approvals according to</b>                         | cULus                                      |

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                         | Order No.                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Capacitor Module</b>                                                                                                                                                                                                                                                                                                                                             | <b>6SL3100-1CE14-0AA0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                                                  |                           |
| <b>Warning labels in 30 languages</b>                                                                                                                                                                                                                                                                                                                               | <b>6SL3166-3AB00-0AA0</b> |
| <p>This label set can be glued over the standard German or English labels to provide warnings in other languages.</p> <p>One set of labels is supplied with the devices.</p> <p>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR</p> |                           |

# SINAMICS S120 drive system

## Booksize format – DC link components

### Control Supply Module

#### Overview



The Control Supply Module in booksize format provides a 24 V to 28.8 V DC power supply that can be set using an integrated potentiometer via the line or DC link. The Control Supply Module can either be operated individually or in a parallel connection with a maximum of 10 devices.

A DIP switch on the top of the module is used to change over in the deenergized state (details of connection for parallel operation are given in the Manual for booksize modules).

Using the Control Supply Module, it is possible, for example, to make emergency retraction movements in the event of a supply failure, provided that the DC link voltage is available.

#### Design

The Control Supply Module features the following interfaces as standard:

- 1 line connection
- 2 DC link connections via integrated DC link busbars
- 2 x electronic power supply connections via integrated 24 V DC bars
- 1 connection for the electronic power supply for Control Units, Terminal Modules, Sensor Modules, etc., via the 24 V terminal adapter provided in the scope of supply (max. cross-section 6 mm<sup>2</sup>, max. fuse protection 20 A)
- 1 integrated potentiometer for setting the output voltage
- 1 digital output to signal the error-free state
- 1 DIP switch to change over between single and parallel mode
- 2 PE/protective conductor connections

The status of the Control Supply Modules is indicated via two multi-color LEDs.

#### Technical specifications

|                                                                                   |                                                                                             |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                               | Control Supply Module in booksize format (Internal air cooling)<br>6SL3100-1DE22-0AA1       |
| <b>DC link voltage 510 ... 720 V DC</b><br><b>Line voltage 380 ... 480 V 3 AC</b> |                                                                                             |
| <b>Rated input current</b>                                                        |                                                                                             |
| • At 400 V 3 AC                                                                   | ≤ 2 A                                                                                       |
| • At 600 V DC                                                                     | 1.1 A                                                                                       |
| <b>DC link voltage range</b>                                                      | 300 ... 882 V DC (operation in 300 ... 430 V DC range is permitted temporarily for < 1 min) |
| <b>Radio interference suppression (standard)</b>                                  | Category C2 according to EN 61800-3                                                         |
| <b>Rated output voltage</b>                                                       | 24 V ... 28.8 V DC (adjustable via potentiometer)                                           |
| <b>Rated output current</b>                                                       | 20 A                                                                                        |
| <b>Current carrying capacity</b>                                                  |                                                                                             |
| • 24 V DC busbars                                                                 | 20 A                                                                                        |
| • DC link busbars                                                                 | 100 A                                                                                       |
| <b>Line connection</b><br>L1, L2, L3 (X1)                                         | Screw-type terminals                                                                        |
| • Conductor cross-section                                                         | 0.2 ... 4.0 mm <sup>2</sup>                                                                 |
| <b>PE connection</b>                                                              | M5 screw                                                                                    |
| <b>Dimensions</b>                                                                 |                                                                                             |
| • Width                                                                           | 50 mm (1.97 in)                                                                             |
| • Height                                                                          | 380 mm (14.96 in)                                                                           |
| • Depth, with spacer (included in scope of supply)                                | 270 mm (10.63 in)                                                                           |
| <b>Weight, approx.</b>                                                            | 4.8 kg (10.6 lb)                                                                            |
| <b>Approvals according to</b>                                                     | cULus                                                                                       |

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                    | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Control Supply Module in booksize format</b>                                                                                                                                                                                                                                                                                                | <b>6SL3100-1DE22-0AA1</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                             |                           |
| <b>Warning labels in 30 languages</b>                                                                                                                                                                                                                                                                                                          | <b>6SL3166-3AB00-0AA0</b> |
| This label set can be glued over the standard German or English labels to provide warnings in other languages. One set of labels is supplied with the devices. The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR |                           |

# SINAMICS S120 drive system

## Booksize format – DC link components

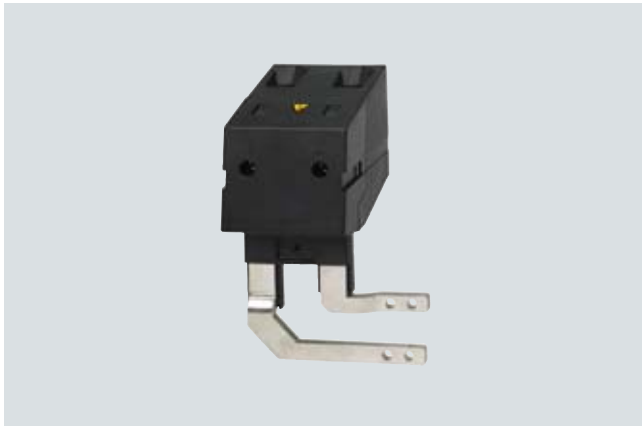
### DC link adapter

#### Overview

##### DC link rectifier adapter



DC link rectifier adapter for unit widths of 50 mm ... 100 mm (1.97 in ... 3.94 in)



DC link rectifier adapter for unit widths of 150 mm ... 300 mm (5.91 in ... 11.8 in)

If the internal DC link busbars of the Motor Modules are not used, the DC link voltage must be supplied externally through a DC link rectifier adapter, e.g. when devices of booksize format are coupled with devices of chassis format over an external DC busbar. The DC link rectifier adapter is mounted on the DC link busbars of the Motor Module. The DC link cables are routed from above.

##### DC link adapter



DC link adapter (multi-tier) for all unit widths

If a multi-tier Motor Module configuration is used, a DC link adapter can be provided for linking the DC links of two drive line-ups. The DC link adapter is mounted sideways on the DC link busbars of the Motor Module. Installation is possible on the right or left side of the Motor Module. The marking of the poles (DCN and DCP) at the DC link adapter match the side chosen for installation. The DC link cables are routed from behind. DC link adapters are supplied in sets of 2 units.

#### Selection and ordering data

| Description                                                                                                                                               | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>DC link rectifier adapter</b><br>For direct infeed of DC link voltage<br>For Line Modules and Motor Modules in booksize and booksize compact format    |                           |
| <ul style="list-style-type: none"> <li>50 mm (1.97 in), 75 mm (2.95 in) and 100 mm (3.94 in) wide</li> </ul>                                              | <b>6SL3162-2BD00-0AA0</b> |
| <ul style="list-style-type: none"> <li>150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.8 in) wide</li> </ul>                                            | <b>6SL3162-2BM00-0AA0</b> |
| <b>DC link adapter set</b><br>(2 units)<br>For multi-tier configuration<br>For all Line Modules and Motor Modules in booksize and booksize compact format | <b>6SL3162-2BM01-0AA0</b> |

#### Technical specifications

|                                                    |                 | DC link rectifier adapter<br>6SL3162-2BD00-0AA0 | DC link adapter<br>6SL3162-2BM00-0AA0 | DC link adapter<br>6SL3162-2BM01-0AA0 |
|----------------------------------------------------|-----------------|-------------------------------------------------|---------------------------------------|---------------------------------------|
| <b>Connection</b>                                  |                 | Screw-type terminals                            | Screw-type terminals                  | Screw-type terminals                  |
| • Conductor cross-section                          | mm <sup>2</sup> | 0.5 ... 10                                      | 35 ... 95                             | 35 ... 95                             |
| <b>Current carrying capacity</b>                   | A               | 43                                              | 240                                   | 240                                   |
| <b>Weight, approx.</b>                             | kg (lb)         | 0.06 (0.13)                                     | 0.48 (1.06)                           | 0.76 (1.68)                           |
| <b>Approvals according to</b>                      |                 | cURus                                           | cURus                                 | cURus                                 |
| <b>Suitable for Line Modules and Motor Modules</b> | Formats         | Booksize and booksize compact                   | Booksize and booksize compact         | Booksize and booksize compact         |

# SINAMICS S120 drive system

## Chassis format – Line Modules

### Active Line Modules

#### Overview



A wide range of single-axis Line Modules and Motor Modules with graded current/power ratings can be supplied:

- Active Line Modules: Single-axis version in chassis format with rated power from 132 kW to 300 kW
- Single Motor Modules: Single-axis version in chassis format with rated output currents of 210 A to 490 A

In principle, all Single Motor Modules can operate on Active Line Modules for the corresponding voltage range.

The self-commutated infeed/regenerative feedback units (with IGBTs in infeed and regenerative feedback directions) generate a regulated DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage.

If required, the Active Line Modules can also provide reactive power compensation.

Active Line Modules are designed for connection to grounded, star (TN, TT) and non-grounded, symmetrical IT supply systems.

In order to operate an Active Line Module, it is absolutely essential to use the appropriate Active Interface Module.

#### Design

The Active Line Modules in chassis format feature the following interfaces as standard:

- 1 line connection
- 1 connection for the 24 V DC electronic power supply
- 1 DC link connection (DCP, DCN) for supplying the connected Motor Modules
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 3 DRIVE-CLiQ sockets
- 2 PE/protective conductor connections

The status of the Active Line Modules is indicated via two multi-color LEDs.

The scope of supply of the Active Line Modules includes:

- Frame sizes FX and GX:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection to the CU320 Control Unit or SINUMERIK NCU

#### Integration

The Active Line Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
- Numeric Control Extensions NX10.3/NX15.3

#### Selection and ordering data

| Description                                 | Order No.                 |
|---------------------------------------------|---------------------------|
| <b>Active Line Module in chassis format</b> |                           |
| Rated power:                                |                           |
| • 132 kW (200 HP)                           | <b>6SL3330-7TE32-1AA3</b> |
| • 160 kW (225 HP)                           | <b>6SL3330-7TE32-6AA3</b> |
| • 235 kW (350 HP)                           | <b>6SL3330-7TE33-8AA3</b> |
| • 300 kW (450 HP)                           | <b>6SL3330-7TE35-0AA3</b> |

#### Technical specifications

|                                                                                                                       |                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                   | Active Line Modules in chassis format<br>6SL3330-7TE3...                                                                                                                      |
| <b>Line supply voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                  | 380 ... 480 V 3 AC $\pm 10\%$<br>(-15 % < 1 min)                                                                                                                              |
| <b>Line frequency</b>                                                                                                 | 47 ... 63 Hz                                                                                                                                                                  |
| <b>Line power factor</b>                                                                                              | <ul style="list-style-type: none"> <li>• Fundamental (<math>\cos \varphi_1</math>)</li> </ul> 1.0 (factory setting)<br>can be altered by entering a reactive current setpoint |
| <ul style="list-style-type: none"> <li>• Total (<math>\lambda</math>)</li> </ul>                                      | 1.0 (factory setting)                                                                                                                                                         |
| <b>Overvoltage category</b><br>In accordance with EN 60664-1                                                          | Class III                                                                                                                                                                     |
| <b>DC link voltage <math>V_d</math></b>                                                                               | The DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage.<br>Factory setting for DC link voltage: 1.5 x line voltage                 |
| <b>Electronic power supply</b>                                                                                        | 24 V DC, -15 %/+20 %                                                                                                                                                          |
| <b>Radio interference suppression</b>                                                                                 | <ul style="list-style-type: none"> <li>• Standard</li> <li>With Active Interface Module</li> </ul> Category C3 according to EN 61800-3                                        |
| <b>Cooling method</b>                                                                                                 | Forced air cooling by means of built-in fan                                                                                                                                   |
| <b>Ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                                                 |
| <b>Installation altitude</b>                                                                                          | Up to 2000 m (6562 ft) above sea level without derating,<br>> 2000 ... 4000 m (6562 ... 13124 ft) above sea level, see derating characteristics                               |
| <b>Declarations of conformity</b>                                                                                     | CE (Low Voltage and EMC Directives)                                                                                                                                           |
| <b>Approvals according to</b>                                                                                         | cULus                                                                                                                                                                         |

# SINAMICS S120 drive system

## Chassis format – Line Modules

### Active Line Modules

#### Technical specifications (continued)

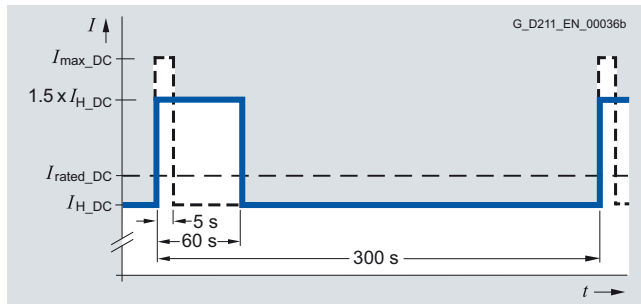
| Line supply voltage<br>380 ... 480 V 3 AC                                  |  | Active Line Module in chassis format   |                              |                              |                              |                              |
|----------------------------------------------------------------------------|--|----------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|                                                                            |  | 6SL3330-...                            | 7TE32-1AA3                   | 7TE32-6AA3                   | 7TE33-8AA3                   | 7TE35-0AA3                   |
| <b>Infeed/regenerative feedback power</b>                                  |  |                                        |                              |                              |                              |                              |
| • Rated power $P_{rated}$                                                  |  |                                        |                              |                              |                              |                              |
| - at 400 V 3 AC                                                            |  | kW                                     | 132                          | 160                          | 235                          | 300                          |
| - at 460 V 3 AC <sup>2)</sup>                                              |  | (HP)                                   | (200)                        | (225)                        | (350)                        | (450)                        |
| • $P_{max}$                                                                |  | kW                                     | 198                          | 240                          | 352.5                        | 450                          |
| <b>DC link current</b>                                                     |  |                                        |                              |                              |                              |                              |
| • Rated current $I_{rated\_DC}$                                            |  | A                                      | 235                          | 291                          | 425                          | 549                          |
| • $I_{H\_DC}$                                                              |  | A                                      | 209                          | 259                          | 378                          | 489                          |
| • $I_{max\_DC}$                                                            |  | A                                      | 352                          | 436                          | 637                          | 823                          |
| <b>Input current</b>                                                       |  |                                        |                              |                              |                              |                              |
| • Rated current at 400 V 3 AC                                              |  | A                                      | 210                          | 260                          | 380                          | 490                          |
| • Maximum                                                                  |  | A                                      | 315                          | 390                          | 570                          | 735                          |
| <b>Current requirement</b>                                                 |  |                                        |                              |                              |                              |                              |
| • 24 V DC electronic power supply, max.                                    |  | A                                      | 1.1                          | 1.1                          | 1.35                         | 1.35                         |
| • Fan supply with 400 V 2 AC, 50/60 Hz, max.                               |  | A                                      | 0.63/0.95                    | 1.13/1.7                     | 1.8/2.7                      | 1.8/2.7                      |
| <b>DC link capacitance</b>                                                 |  | μF                                     | 4200                         | 5200                         | 7800                         | 9600                         |
| <b>Power loss, max.</b>                                                    |  | kW                                     | 2.3                          | 2.9                          | 4.2                          | 5.1                          |
| <b>Cooling air requirement</b>                                             |  | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.17 (6.0)                   | 0.23 (8.1)                   | 0.36 (12.7)                  | 0.36 (12.7)                  |
| <b>Sound pressure level</b><br>$L_{pA}$ (1 m) <sup>1)</sup><br>at 50/60 Hz |  | dB                                     | 74/76                        | 75/77                        | 76/78                        | 76/78                        |
| <b>Line connection</b><br>U1, V1, W1                                       |  |                                        | Flat connector for M10 screw | Flat connector for M10 screw | Flat connector for M10 screw | Flat connector for M10 screw |
| • Conductor cross-section, max.                                            |  | mm <sup>2</sup>                        | 2 × 185                      | 2 × 185                      | 2 × 185                      | 2 × 185                      |
| <b>DC link connection</b><br>DCP, DCN                                      |  |                                        | Flat connector for M10 screw | Flat connector for M10 screw | Flat connector for M10 screw | Flat connector for M10 screw |
| • Conductor cross-section, max.                                            |  | mm <sup>2</sup>                        | 2 × 185                      | 2 × 185                      | 2 × 185                      | 2 × 185                      |
| <b>PE connection</b>                                                       |  |                                        | M10 screw                    | M10 screw                    | M10 screw                    | M10 screw                    |
| • Conductor cross-section, max.                                            |  |                                        |                              |                              |                              |                              |
| - PE1/GND                                                                  |  | mm <sup>2</sup>                        | 1 × 185                      | 1 × 185                      | 1 × 185                      | 1 × 185                      |
| - PE2/GND                                                                  |  | mm <sup>2</sup>                        | 2 × 185                      | 2 × 185                      | 2 × 185                      | 2 × 185                      |
| <b>Cable length, max.</b><br>Total of all motor cables and DC link         |  |                                        |                              |                              |                              |                              |
| • Shielded                                                                 |  | m (ft)                                 | 2700 (8859)                  | 2700 (8859)                  | 2700 (8859)                  | 2700 (8859)                  |
| • Unshielded                                                               |  | m (ft)                                 | 4050 (13288)                 | 4050 (13288)                 | 4050 (13288)                 | 4050 (13288)                 |
| <b>Degree of protection</b>                                                |  |                                        | IP20                         | IP20                         | IP20                         | IP20                         |
| <b>Dimensions</b>                                                          |  |                                        |                              |                              |                              |                              |
| • Width                                                                    |  | mm (in)                                | 326 (12.83)                  | 326 (12.83)                  | 326 (12.83)                  | 326 (12.83)                  |
| • Height                                                                   |  | mm (in)                                | 1400 (55.12)                 | 1400 (55.12)                 | 1533 (60.35)                 | 1533 (60.35)                 |
| • Depth                                                                    |  | mm (in)                                | 356 (14.02)                  | 356 (14.02)                  | 543 (21.38)                  | 543 (21.38)                  |
| <b>Frame size</b>                                                          |  |                                        | FX                           | FX                           | GX                           | GX                           |
| <b>Weight, approx.</b>                                                     |  | kg (lb)                                | 88 (194)                     | 88 (194)                     | 152 (335)                    | 152 (335)                    |

<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module

<sup>2)</sup> Nominal HP ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

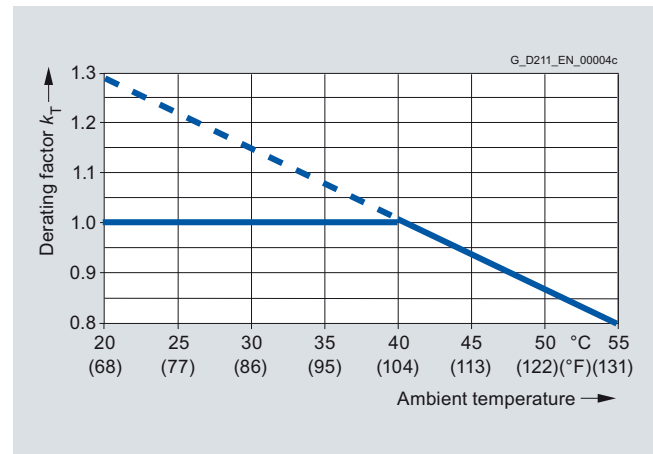
### Characteristic curves

#### Overload capability



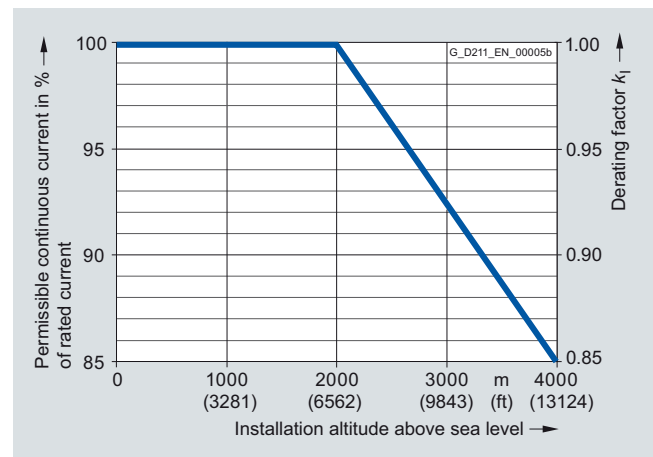
High overload

#### Derating characteristics

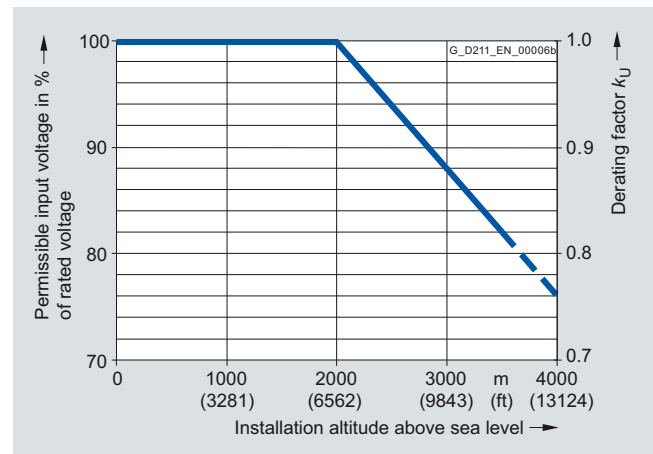


Current derating dependent on the ambient temperature

Note: A derating factor  $k_T > 1.0$  can be used only in conjunction with "current derating dependent on installation altitude". The rated current data must not be exceeded.



Current derating dependent on installation altitude



Voltage derating dependent on installation altitude

# SINAMICS S120 drive system

## Chassis format – Line Modules

### Active Line Modules Active Interface Modules

#### Overview



Active Interface Modules are used in combination with Active Line Modules in chassis format. Active Interface Modules contain a Clean Power Filter with basic interference suppression, the pre-charging circuit for the Active Line Module, the line supply voltage sensing circuit and monitoring sensors. The bypass contactor is an integral component in frame sizes FI and GI, which ensures a highly compact design.

The vast majority of line harmonics are suppressed by the Clean Power Filter.

The scope of supply of the Active Interface Modules includes:

- Frame size FI:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module
  - 1.45 m (4.76 ft) DRIVE-CLiQ cable for connection between Control Unit or SINUMERIK NCU and first Motor Module
- Frame size GI:
  - 0.95 m (3.12 ft) DRIVE-CLiQ cable for connection between Active Interface Module and Active Line Module
  - 1.45 m (4.76 ft) DRIVE-CLiQ cable for connection between Control Unit or SINUMERIK NCU and first Motor Module

#### Selection and ordering data

##### Line supply voltage 380 ... 480 V 3 AC

| Rated power of the Active Line Module<br>kW (HP) | Suitable for Active Line Module in chassis format | Active Interface Module<br><br>Order No. |
|--------------------------------------------------|---------------------------------------------------|------------------------------------------|
| 132 (200)<br>160 (225)                           | 6SL3330-7TE32-1AA3<br>6SL3330-7TE32-6AA3          | <b>6SL3300-7TE32-6AA0</b>                |
| 235 (350)                                        | 6SL3330-7TE33-8AA3                                | <b>6SL3300-7TE33-8AA0</b>                |
| 300 (450)                                        | 6SL3330-7TE35-0AA3                                | <b>6SL3300-7TE35-0AA0</b>                |



# SINAMICS S120 drive system

## Chassis format – Line Modules

Active Line Modules  
Active Interface Modules

### Technical specifications

| Line supply voltage<br>380 ... 480 V 3 AC                                           |                                        | Active Interface Module in chassis format |                              |                              |                              |
|-------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------|------------------------------|------------------------------|------------------------------|
|                                                                                     |                                        | 6SL3300-7TE32-6AA0                        | 6SL3300-7TE32-8AA0           | 6SL3300-7TE33-8AA0           | 6SL3300-7TE35-0AA0           |
| <b>Rated current</b>                                                                | A                                      | 210                                       | 260                          | 380                          | 490                          |
| <b>Bypass contactor</b>                                                             |                                        | Included                                  | Included                     | Included                     | Included                     |
| <b>DC link capacitance</b><br>Of the drive line-up, max.                            | μF                                     | 41600                                     | 41600                        | 76800                        | 76800                        |
| <b>Current requirement</b>                                                          |                                        |                                           |                              |                              |                              |
| • 24 V DC electronic power supply, max.                                             | A                                      | 0.17                                      | 0.17                         | 0.17                         | 0.17                         |
| • Fan supply with 230 V 2 AC, 50/60 Hz, max.                                        | A                                      | 0.45/0.6                                  | 0.45/0.6                     | 0.9/1.2                      | 0.9/1.2                      |
| <b>Power loss</b>                                                                   | kW                                     | 2.1                                       | 2.2                          | 3.0                          | 3.9                          |
| <b>Cooling air requirement</b>                                                      | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.24 (8.5)                                | 0.24 (8.5)                   | 0.47 (16.6)                  | 0.47 (16.6)                  |
| <b>Sound pressure level<sup>1)</sup></b><br><i>L<sub>pA</sub></i> (1 m) at 50/60 Hz | dB                                     | 74/76                                     | 75/77                        | 76/78                        | 76/78                        |
| <b>Line/load connection</b><br>L1, L2, L3/U2, V2, W2                                |                                        | Flat connector for M10 screw              | Flat connector for M10 screw | Flat connector for M10 screw | Flat connector for M10 screw |
| • Conductor cross-section, max.                                                     | mm <sup>2</sup>                        | 2 × 185                                   | 2 × 185                      | 2 × 185                      | 2 × 185                      |
| <b>PE connection</b>                                                                |                                        | M10 screw                                 | M10 screw                    | M10 screw                    | M10 screw                    |
| • Conductor cross-section, max.                                                     | mm <sup>2</sup>                        | 2 × 185                                   | 2 × 185                      | 2 × 185                      | 2 × 185                      |
| <b>Degree of protection</b>                                                         |                                        | IP20                                      | IP20                         | IP20                         | IP20                         |
| <b>Dimensions</b>                                                                   |                                        |                                           |                              |                              |                              |
| • Width                                                                             | mm (in)                                | 325 (12.8)                                | 325 (12.8)                   | 325 (12.8)                   | 325 (12.8)                   |
| • Height                                                                            | mm (in)                                | 1400 (55.12)                              | 1400 (55.12)                 | 1533 (60.35)                 | 1533 (60.35)                 |
| • Depth                                                                             | mm (in)                                | 355 (13.98)                               | 355 (13.98)                  | 544 (21.42)                  | 544 (21.42)                  |
| <b>Frame size</b>                                                                   |                                        | FI                                        | FI                           | GI                           | GI                           |
| <b>Weight, approx.</b>                                                              | kg (lb)                                | 135 (298)                                 | 135 (298)                    | 190 (419)                    | 190 (419)                    |
| <b>Approvals according to</b>                                                       |                                        | cURus                                     | cURus                        | cURus                        | cURus                        |
| <b>Suitable for Active Line Module in chassis format</b>                            | Type                                   | 6SL3330-7TE32-1AA3                        | 6SL3330-7TE32-6AA3           | 6SL3330-7TE33-8AA3           | 6SL3330-7TE35-0AA3           |
| • Rated power of the Active Line Module                                             | kW                                     | 132                                       | 160                          | 235                          | 300                          |

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<sup>1)</sup> Total sound pressure level of Active Interface Module and Active Line Module.

# SINAMICS S120 drive system

## Chassis format – Line Modules

### Active Line Modules Recommended line-side components

#### Overview

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

The tables below list recommended components.

Additional information about the line contactors, switch disconnectors, circuit breakers and fuses specified in the table can be found in Catalog IC 10.

#### Assignment of line-side power components to Active Line Modules in chassis format

| Rated power | Input current | Assignment to Active Interface Module | Assignment to Active Line Module | Bypass contactor                    |
|-------------|---------------|---------------------------------------|----------------------------------|-------------------------------------|
| kW (HP)     | A             | 6SL3300-...                           | 6SL3330-...                      |                                     |
| 132 (200)   | 210           | 7TE32-6AA0                            | 7TE32-1AA3                       | Included in Active Interface Module |
| 160 (225)   | 260           | 7TE32-6AA0                            | 7TE32-6AA3                       | Included in Active Interface Module |
| 235 (350)   | 380           | 7TE33-8AA0                            | 7TE33-8AA3                       | Included in Active Interface Module |
| 300 (450)   | 490           | 7TE35-0AA0                            | 7TE35-0AA3                       | Included in Active Interface Module |

| Rated power | Input current | Assignment to Active Interface Module | Switch disconnector without handle and shaft | Switch disconnector with handle and shaft | Cable protection fuse |                             | Cable protection fuse incl. semiconductor protection |                  |
|-------------|---------------|---------------------------------------|----------------------------------------------|-------------------------------------------|-----------------------|-----------------------------|------------------------------------------------------|------------------|
| kW (HP)     | A             | 6SL3300-...                           | Order No.                                    | Order No.                                 | Rated current         | Order No.                   | Rated current                                        | Order No.        |
| 132 (200)   | 210           | 7TE32-6AA0                            | <b>3KL5530-1AB01</b>                         | <b>3KL5530-1GB01</b>                      | 250 A                 | <b>3NA3144</b>              | 315 A                                                | <b>3NE1230-2</b> |
| 160 (225)   | 260           | 7TE32-6AA0                            | <b>3KL5730-1AB01</b>                         | <b>3KL5730-1GB01</b>                      | 315 A                 | <b>3NA3252</b>              | 350 A                                                | <b>3NE1331-2</b> |
| 235 (350)   | 380           | 7TE33-8AA0                            | <b>3KL5730-1AB01</b>                         | <b>3KL5730-1GB01</b>                      | 500 A                 | <b>3NA3365<sup>*)</sup></b> | 500 A                                                | <b>3NE1334-2</b> |
| 300 (450)   | 490           | 7TE35-0AA0                            | <b>3KL6130-1AB02</b>                         | <b>3KL6130-1GB02</b>                      | 630 A                 | <b>3NA3372</b>              | 630 A                                                | <b>3NE1436-2</b> |

<sup>\*)</sup> Fuse suitable only for 3KL6130...

# SINAMICS S120 drive system

## Chassis format – Motor Modules

### Single Motor Modules

#### Design



The Single Motor Modules in chassis format feature the following interfaces as standard:

- 1 DC link connection (DCP, DCN) for connecting to the supply DC busbar
- 1 DC link connection (DCPA, DCNA) for connecting a Braking Module
- 1 electronic power supply connection
- 3 DRIVE-CLiQ sockets
- 1 motor connection
- 1 safe standstill input (enable pulses)
- 1 temperature sensor input (KTY84-130, PT100 two-wire or PTC)
- 1 PE/protective conductor connection connection

The status of the Motor Modules is indicated via two multi-color LEDs.

The scope of supply of the Motor Modules includes:

- Frame sizes FX and GX:
  - 0.60 m (1.97 ft) DRIVE-CLiQ cable for connection to the adjacent Motor Module

#### Integration

The Single Motor Module receives its control information via DRIVE-CLiQ from:

- CU320-2 Control Unit
- SINUMERIK 840D sl with
  - NCU 710.3 PN
  - NCU 720.3 PN
  - NCU 730.3 PN
  - Numeric Control Extensions NX10.3/NX15.3

#### Selection and ordering data

| Description                                  | Order No.                 |
|----------------------------------------------|---------------------------|
| <b>Single Motor Module in chassis format</b> |                           |
| Rated output current:                        |                           |
| • 210 A                                      | <b>6SL3320-1TE32-1AA3</b> |
| • 260 A                                      | <b>6SL3320-1TE32-6AA3</b> |
| • 310 A                                      | <b>6SL3320-1TE33-1AA3</b> |
| • 380 A                                      | <b>6SL3320-1TE33-8AA3</b> |
| • 490 A                                      | <b>6SL3320-1TE35-0AA3</b> |

#### Technical specifications

|                                                                                                                                   |                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                               | Single Motor Modules in chassis format<br>6SL3320-...                                                                                           |
| <b>DC link voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                                  | 510 ... 720 V DC<br>(line connection voltage<br>380 ... 480 V 3 AC)                                                                             |
| <b>Output frequency</b>                                                                                                           | 0 ... 300 Hz <sup>1)</sup>                                                                                                                      |
| <b>Electronic power supply</b>                                                                                                    | 24 V DC -15 %/+20 %                                                                                                                             |
| <b>Cooling method</b>                                                                                                             | Internal air cooling, power units with forced air cooling using an integrated fan                                                               |
| <b>Permissible ambient or coolant temperature (air)</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) see derating characteristics                                   |
| <b>Installation altitude</b>                                                                                                      | Up to 2000 m (6562 ft) above sea level without derating,<br>> 2000 ... 4000 m (6562 ... 13124 ft) above sea level, see derating characteristics |
| <b>Declarations of conformity</b>                                                                                                 | CE (Low Voltage and EMC Directives)                                                                                                             |
| <b>Approvals according to</b><br>510 ... 720 V DC Motor Modules only                                                              | cULus                                                                                                                                           |
| <b>Safety Integrated</b>                                                                                                          | Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1 and Control Category 3 acc. to ISO 13849-1    |

<sup>1)</sup> Note correlation between max. output frequency, pulse frequency, and current derating (250 µs current controller cycle; 4 kHz pulse frequency, see characteristics for derating).

# SINAMICS S120 drive system

## Chassis format – Motor Modules

### Single Motor Modules

#### Technical specifications (continued)

| DC link voltage<br>510 ... 720 V DC                                             |                                        | Single Motor Module in chassis format |                                         |                                         |                                         |                                         |                                         |
|---------------------------------------------------------------------------------|----------------------------------------|---------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
|                                                                                 |                                        | 6SL3320-...                           | 1TE32-1AA3                              | 1TE32-6AA3                              | 1TE33-1AA3                              | 1TE33-8AA3                              | 1TE35-0AA3                              |
| <b>Output current</b>                                                           |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Rated current $I_{rated}$                                                     | A                                      |                                       | <b>210</b>                              | <b>260</b>                              | <b>310</b>                              | <b>380</b>                              | <b>490</b>                              |
| • Base-load current $I_L$                                                       | A                                      |                                       | 205                                     | 250                                     | 302                                     | 370                                     | 477                                     |
| • Base-load current $I_H$                                                       | A                                      |                                       | 178                                     | 233                                     | 277                                     | 340                                     | 438                                     |
| • For S6 duty $I_{S6}$ (40 %)                                                   | A                                      |                                       | 230                                     | 285                                     | 340                                     | 430                                     | 540                                     |
| • $I_{max}$                                                                     | A                                      |                                       | 307                                     | 375                                     | 453                                     | 555                                     | 715                                     |
| <b>Type rating<sup>1)</sup></b>                                                 |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Based on $I_{rated}$                                                          | kW (HP)                                |                                       | 110 (150)                               | 132 (200)                               | 160 (250)                               | 200 (300)                               | 250 (400)                               |
| • Based on $I_H$                                                                | kW (HP)                                |                                       | 90 (125)                                | 110 (150)                               | 132 (200)                               | 160 (250)                               | 200 (350)                               |
| <b>Rated pulse frequency</b>                                                    | kHz                                    |                                       | 2                                       | 2                                       | 2                                       | 2                                       | 2                                       |
| <b>Rated DC link current <math>I_d</math><sup>2)</sup></b><br>When supplied via |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Active Line Module                                                            | A                                      |                                       | 227                                     | 281                                     | 335                                     | 411                                     | 530                                     |
| <b>DC link capacitance</b>                                                      | µF                                     |                                       | 4200                                    | 5200                                    | 6300                                    | 7800                                    | 9600                                    |
| <b>Current requirement</b>                                                      |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • At 24 V DC, max.                                                              | A                                      |                                       | 0.9                                     | 0.9                                     | 1.2                                     | 1.2                                     | 1.2                                     |
| • Fan supply with 400 V 2 AC, 50/60 Hz, max.                                    | A                                      |                                       | 0.63/0.95                               | 1.13/1.7                                | 1.8/2.7                                 | 1.8/2.7                                 | 1.8/2.7                                 |
| <b>Power loss, max.</b>                                                         | kW                                     |                                       | 1.94                                    | 2.6                                     | 3.1                                     | 3.8                                     | 4.5                                     |
| <b>Cooling air requirement</b>                                                  | m <sup>3</sup> /s (ft <sup>3</sup> /s) |                                       | 0.17 (6.0)                              | 0.23 (8.1)                              | 0.36 (12.7)                             | 0.36 (12.7)                             | 0.36 (12.7)                             |
| <b>Sound pressure level</b><br>$L_{pA}$ (1 m)                                   | dB                                     |                                       | < 67                                    | < 69                                    | < 69                                    | < 69                                    | < 69                                    |
| <b>DC link connection</b><br>DCP, DCN                                           |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Conductor cross-section, max.                                                 | mm <sup>2</sup>                        |                                       | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 |
| <b>Motor connection</b><br>U2, V2, W2                                           |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Conductor cross-section, max.                                                 | mm <sup>2</sup>                        |                                       | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 | Flat connector for M10 screw<br>2 × 185 |
| <b>PE connection</b>                                                            |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Conductor cross-section, max.                                                 | mm <sup>2</sup>                        |                                       | M10 screw<br>2 × 185                    | M10 screw<br>2 × 185                    | M10 screw<br>2 × 185                    | M10 screw<br>2 × 185                    | M10 screw<br>2 × 185                    |
| <b>Motor brake connection</b>                                                   |                                        |                                       | –                                       | –                                       | –                                       | –                                       | –                                       |
| <b>Motor cable length, max.</b><br>Without external options                     |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Shielded                                                                      | m (ft)                                 |                                       | 300 (984)                               | 300 (984)                               | 300 (984)                               | 300 (984)                               | 300 (984)                               |
| • Unshielded                                                                    | m (ft)                                 |                                       | 450 (1476)                              | 450 (1476)                              | 450 (1476)                              | 450 (1476)                              | 450 (1476)                              |
| <b>Degree of protection</b>                                                     |                                        |                                       | IP20                                    | IP20                                    | IP20                                    | IP20                                    | IP20                                    |
| <b>Dimensions</b>                                                               |                                        |                                       |                                         |                                         |                                         |                                         |                                         |
| • Width                                                                         | mm (in)                                |                                       | 326 (12.83)                             | 326 (12.83)                             | 326 (12.83)                             | 326 (12.83)                             | 326 (12.83)                             |
| • Height                                                                        | mm (in)                                |                                       | 1400 (55.12)                            | 1400 (55.12)                            | 1533 (60.35)                            | 1533 (60.35)                            | 1533 (60.35)                            |
| • Depth                                                                         | mm (in)                                |                                       | 356 (14.02)                             | 356 (14.02)                             | 545 (21.46)                             | 545 (21.46)                             | 545 (21.46)                             |
| <b>Frame size</b>                                                               |                                        |                                       | FX                                      | FX                                      | GX                                      | GX                                      | GX                                      |
| <b>Weight, approx.</b>                                                          | kg (lb)                                |                                       | 88 (194)                                | 88 (194)                                | 152 (335)                               | 152 (335)                               | 152 (335)                               |

<sup>1)</sup> Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

<sup>2)</sup> Rated DC link current for dimensioning an external DC connection.

# SINAMICS S120 drive system

## Chassis format – Motor Modules

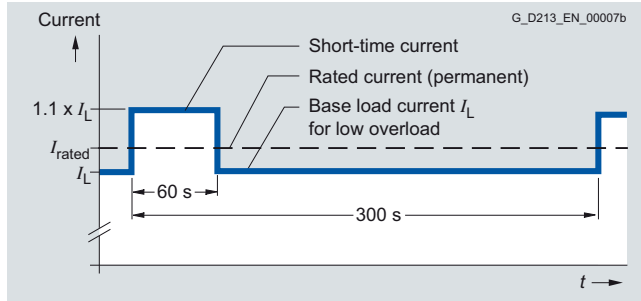
### Single Motor Modules

#### Characteristic curves

##### Overload capability

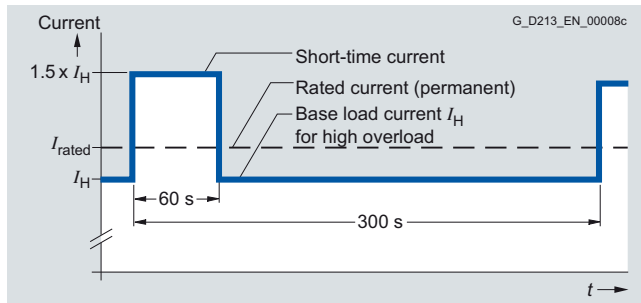
Load cycle data for Single Motor Modules in chassis format

The base-load current  $I_L$  is based on a duty cycle of 110 % for 60 s or 150 % for 10 s with a duty cycle duration of 300 s.



Low overload

The base-load current  $I_H$  is based on a duty cycle of 150 % for 60 s or 160 % for 10 s with a duty cycle duration of 300 s.



High overload

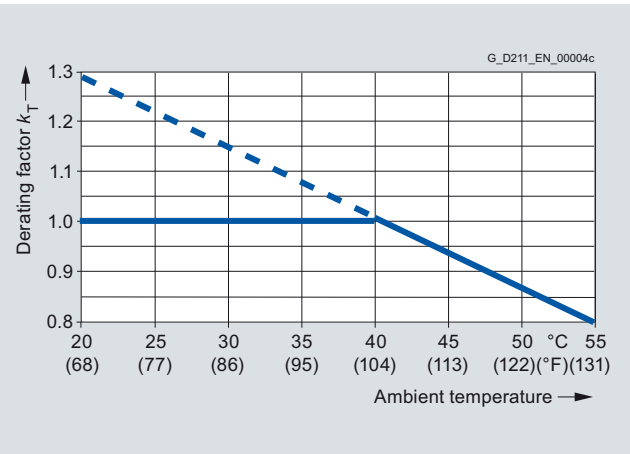
##### Derating factors

When the pulse frequency is increased, the derating factor of the output current must be taken into account.

This derating factor must be applied to the currents specified in the technical specifications.

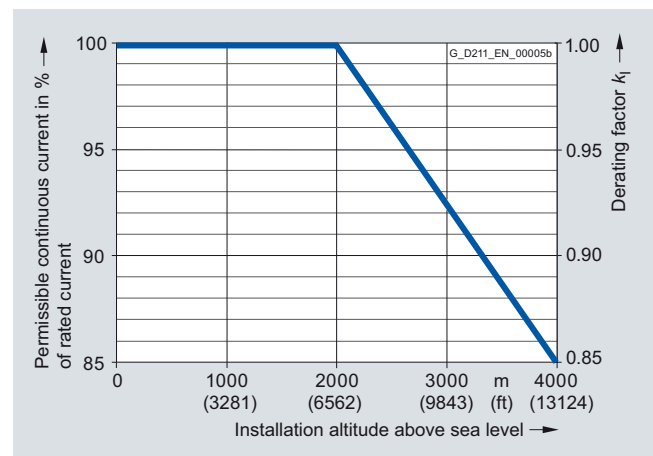
**Derating factor of the output current as a function of the pulse frequency for devices with a rated pulse frequency of 2 kHz**

| Single Motor Module in chassis format | Type rating | Output current                 | Derating factor                |
|---------------------------------------|-------------|--------------------------------|--------------------------------|
| Type                                  |             | for a pulse frequency of 2 kHz | for a pulse frequency of 4 kHz |
| 6SL3320-...                           | kW (HP)     | A                              |                                |
| 1TE32-1AA3                            | 110 (150)   | 210                            | <b>0.82</b>                    |
| 1TE32-6AA3                            | 132 (200)   | 260                            | <b>0.83</b>                    |
| 1TE33-1AA3                            | 160 (250)   | 310                            | <b>0.88</b>                    |
| 1TE33-8AA3                            | 200 (300)   | 380                            | <b>0.87</b>                    |
| 1TE33-0AA3                            | 250 (400)   | 490                            | <b>0.78</b>                    |

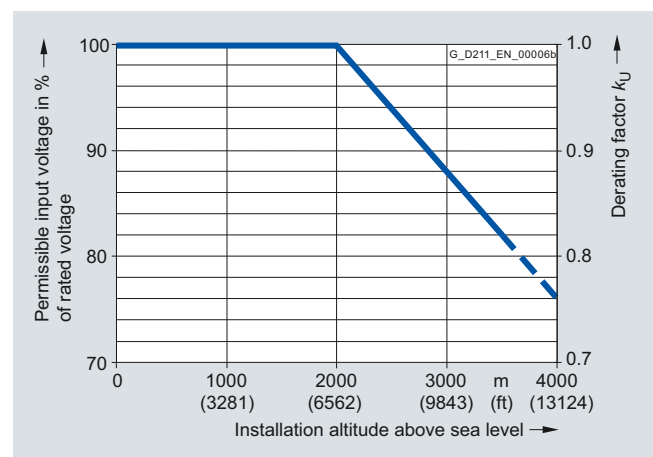


Current derating dependent on the ambient temperature

Note: A derating factor  $k_T > 1.0$  can be used only in conjunction with "current derating dependent on installation altitude". The rated current data must not be exceeded.



Current derating dependent on installation altitude



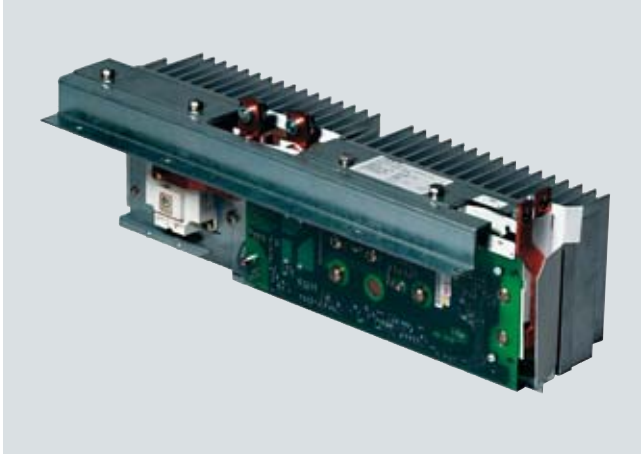
Voltage derating dependent on installation altitude

# SINAMICS S120 drive system

## Chassis format – DC link components

### Braking Modules

#### Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP category 1) or limit the DC link voltage for brief periods of generator operation, e.g. when the regenerative feedback capability of the Line Module is deactivated. The Braking Module includes the power electronics and the associated control circuit. During operation, the DC link power is converted into heat loss in an external braking resistor. The Braking Module functions autonomously. A number of Braking Modules can be operated in parallel. In this case, each Braking Module must have its own braking resistor.

Braking Modules are designed to be built into Motor Modules, Line Modules or Power Modules in chassis format and are cooled by the fans on these modules. The supply voltage for the electronics is taken from the DC link. The Braking Modules are connected to the DC link by means of the busbar sets included in the scope of supply or flexible cables and, in the case of the Basic Line Module of frame size GB, by means of a separate molded cable set (see Accessories).

The activation threshold of the Braking Module can be adjusted by means of a DIP switch. The braking power values specified in the technical specifications apply to the upper activation threshold.

#### Design

The Braking Modules in chassis format feature the following interfaces as standard:

- 1 DC link connection
- 1 braking resistor connection
- 1 digital input (inhibit Braking Module/acknowledge fault)
- 1 digital output (Braking Module inhibited)
- 1 DIP switch for adjusting the activation threshold

#### Integration

Braking Modules in chassis format are designed for mounting in air-cooled units in chassis format. The fan of the Line Module, Motor Module or Power Module in which the Braking Module is mounted also cools the Braking Module. Braking Modules cannot operate autonomously because they are not equipped with cooling fans.

# SINAMICS S120 drive system

## Chassis format – DC link components

### Braking Modules

#### Technical specifications

| DC link voltage 510 ... 720 V DC                                                                                    |                 | Braking Module in chassis format |                              |
|---------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------|------------------------------|
|                                                                                                                     |                 | 6SL3300-1AE31-3AA0               | 6SL3300-1AE32-5AA0           |
| <b>Power</b>                                                                                                        |                 |                                  |                              |
| • Rated power $P_{DB}$                                                                                              | kW              | 25                               | 50                           |
| • Peak power $P_{15}$                                                                                               | kW              | 125                              | 250                          |
| • Power $P_{20}$                                                                                                    | kW              | 100                              | 200                          |
| • Power $P_{40}$                                                                                                    | kW              | 50                               | 100                          |
| <b>Activation thresholds</b><br>(adjustable via DIP switch)                                                         | V               | 774 (factory setting) or 673     | 774 (factory setting) or 673 |
| <b>Cable length</b><br>to braking resistor, max.                                                                    | m (ft)          | 100 (328)                        | 100 (328)                    |
| <b>Digital inputs</b><br>in accordance with IEC 61131-2 Type 1                                                      |                 |                                  |                              |
| • Voltage                                                                                                           | V               | -3 ... +30                       | -3 ... +30                   |
| • Low level (an open digital input is interpreted as "low")                                                         | V               | -3 ... +5                        | -3 ... +5                    |
| • High level                                                                                                        | V               | 15 ... 30                        | 15 ... 30                    |
| • Current consumption at 24 V DC, typ.                                                                              | mA              | 10                               | 10                           |
| • Conductor cross-section, max.                                                                                     | mm <sup>2</sup> | 1.5                              | 1.5                          |
| <b>Digital outputs</b><br>(resistant to sustained short circuits)                                                   |                 |                                  |                              |
| • Voltage                                                                                                           | V               | DC 24                            | DC 24                        |
| • Load current per digital output, max.                                                                             | mA              | 500                              | 500                          |
| • Conductor cross-section, max.                                                                                     | mm <sup>2</sup> | 1.5                              | 1.5                          |
| <b>Connection</b><br>R1/R2                                                                                          |                 | M8 screw                         | M8 screw                     |
| • Conductor cross-section, max.                                                                                     | mm <sup>2</sup> | 35                               | 50                           |
| <b>Weight, approx.</b>                                                                                              | kg (lb)         | 3.6 (8)                          | 7.3 (16)                     |
| <b>Approvals according to</b>                                                                                       |                 | cURus                            | cURus                        |
| <b>Suitable for installation in an air-cooled Motor Module, Power Module, Active Line Module, Basic Line Module</b> | Frame size      | FX/FB                            | GX/GB <sup>1)</sup>          |

#### Selection and ordering data

| Description                             | Braking Module in chassis format |
|-----------------------------------------|----------------------------------|
|                                         | Order No.                        |
| <b>DC link voltage 510 ... 720 V DC</b> |                                  |
| Frame size FX, 25 kW/125 kW             | <b>6SL3300-1AE31-3AA0</b>        |
| Frame size GX, 50 kW/250 kW             | <b>6SL3300-1AE32-5AA0</b>        |

| Description                                                                                                                                                                                                                                                                                                                                                                                   | Order No.                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Accessories</b>                                                                                                                                                                                                                                                                                                                                                                            |                           |
| <b>Cable harness set</b><br>For mounting a Braking Module of frame size GX into a Basic Line Module of frame size GB                                                                                                                                                                                                                                                                          | <b>6SL3366-2NG00-0AA0</b> |
| <b>Accessories for re-ordering</b>                                                                                                                                                                                                                                                                                                                                                            |                           |
| <b>Warning labels in 30 languages</b><br>This label set can be glued over the standard German or English labels to provide warnings in other languages.<br>One set of labels is supplied with the devices.<br>The following languages are available in each label set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR | <b>6SL3166-3AB00-0AA0</b> |

<sup>1)</sup> Cable harness set 6SL3366-2NG00-0AA0 is required to connect the Braking Module to a Basic Line Module of frame size GB.



# SINAMICS S120 drive system

## Chassis format – DC link components

### Braking resistors

#### Overview



Excess energy in the DC link is dissipated via the braking resistor.

The braking resistor is connected to a Braking Module. Positioning the braking resistor outside the control cabinet or switchgear room enables the resulting heat loss to be routed away. The level of air conditioning required is therefore reduced.

2 braking resistors with different rated and peak power values are available for chassis format units.

The braking resistor is monitored on the basis of the mark-space ratio. A temperature switch (NC contact) is also fitted. This responds when the maximum permissible temperature is exceeded and can be evaluated by a controller.

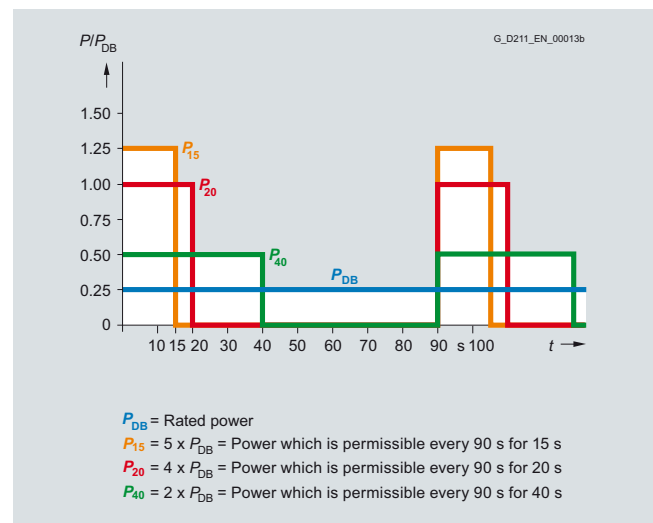
#### Technical specifications

| DC link voltage 510 V ... 720 V DC            |                 | Braking resistor    |                      |
|-----------------------------------------------|-----------------|---------------------|----------------------|
|                                               |                 | 6SL3000-1BE31-3AA0  | 6SL3000-1BE32-5AA0   |
| Resistance                                    | $\Omega$        | 4.4                 | 2.2                  |
| Rated power $P_{DB}$                          | kW              | 25                  | 50                   |
| Peak power $P_{max}$                          | kW              | 125                 | 250                  |
| Load duration for peak output                 | s               | 15                  | 15                   |
| Cycle duration of braking duty cycle          | s               | 90                  | 90                   |
| Current, max.                                 | A               | 189                 | 378                  |
| Cable entry                                   |                 | Via cable gland M50 | Via cable gland M50  |
| Power connection                              |                 | Via stud M10        | Via stud M10         |
| • Conductor cross-section, max.               | mm <sup>2</sup> | 50                  | 70                   |
| Degree of protection                          |                 | IP20                | IP20                 |
| Dimensions                                    |                 |                     |                      |
| • Width                                       | mm (in)         | 740 (29.13)         | 810 (31.89)          |
| • Height                                      | mm (in)         | 605 (23.82)         | 1325 (52.17)         |
| • Depth                                       | mm (in)         | 485 (19.09)         | 485 (19.09)          |
| Weight, approx.                               | kg (lb)         | 50 (110)            | 120 (265)            |
| Approvals according to                        |                 | cURus               | cURus                |
| Suitable for Braking Module in chassis format | Type            | 6SL3300-1AE31-3AA0  | 6SL3300-1AE32-5 . A0 |

#### Selection and ordering data

| Description                      | Suitable for Braking Module in chassis format | Braking resistor          |
|----------------------------------|-----------------------------------------------|---------------------------|
|                                  |                                               | Order No.                 |
| DC link voltage 510 ... 720 V DC |                                               |                           |
| 25 kW/125 kW                     | 6SL3300-1AE31-3AA0                            | <b>6SL3000-1BE31-3AA0</b> |
| 50 kW/250 kW                     | 6SL3300-1AE32-5 . A0                          | <b>6SL3000-1BE32-5AA0</b> |

#### Characteristic



Load diagram for Braking Module and braking resistor in chassis format

### Design



PM340 Power Modules in blocksize format, frame sizes FSA to FSF

The PM340 Power Modules in blocksize format feature the following connections and interfaces as standard:

- Line connection
- DCP/R1 and DCN DC link terminals
- PM-IF interface for connection of the PM340 Power Module and CU310-2 Control Unit or CUA31 Control Unit Adapter. The PM340 Power Module also supplies power to the CU310-2 Control Unit or CUA31 Control Unit Adapter by means of an integrated power pack
- Terminals DCP/R1 and R2 for connection of an external braking resistor
- Motor connection made with screw-type terminals or screw studs
- Control circuit for the Safe Brake Relay for controlling a holding brake
- 2 PE/protective conductor connections

Power Modules without integrated line filter can be connected to grounded star (TN, TT) and non-grounded symmetrical IT systems. Power Modules with integrated line filter are suitable only for connection to TN systems with grounded star points.

The integrated Braking Module (Braking Chopper) is rated such that it can connect the external braking resistor continuously. The temperature of the external braking resistor must be monitored to provide protection against thermal overloading.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Integration

The PM340 Power Modules in blocksize format communicate with the CU310-2 Control Unit or the CUA31 Control Unit Adapter via the PM-IF interface.



PM340 Power Module in blocksize format with CU310-2 PN Control Unit



PM340 Power Module in blocksize format with CUA31 Control Unit Adapter

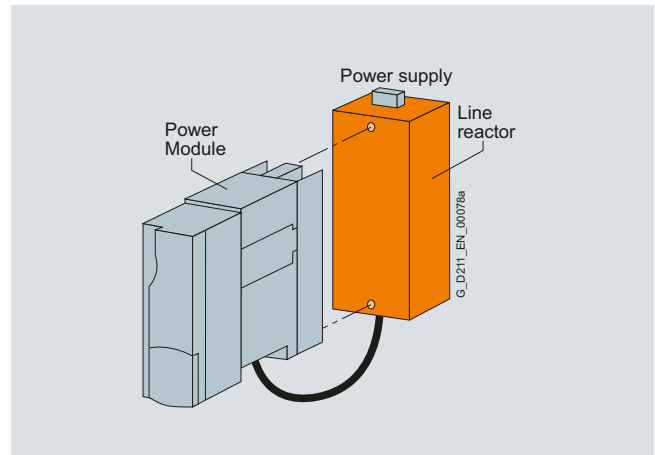
Many system components for PM340 Power Modules are designed as base components, i.e. the component is mounted on the baseplate and the PM340 Power Module in front of them in a space-saving construction. Up to two base components can be mounted in front of one another.

|                  | FSA | FSB | FSC | FSD | FSE | FSF |
|------------------|-----|-----|-----|-----|-----|-----|
| Line filter      | ✓   | –   | –   | –   | –   | –   |
| Line reactor     | ✓   | ✓   | ✓   | ✓   | ✓   | ○   |
| Braking resistor | ✓   | ✓   | ○   | ○   | ○   | ○   |

✓ = suitable as base-type

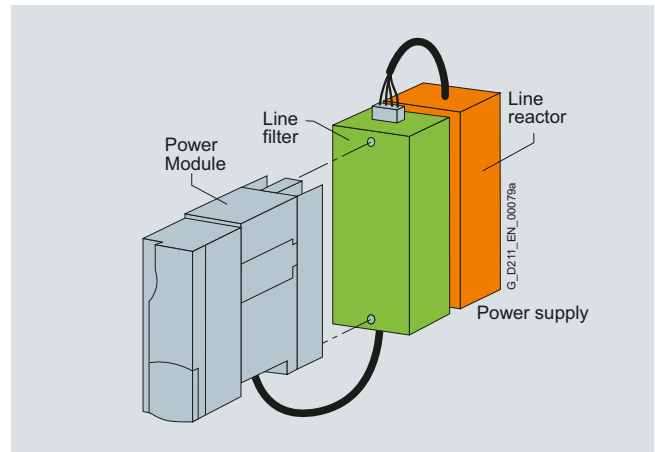
○ = not suitable as base-type

– = not available (use Power Modules with integrated line filter)



Basic layout of a PM340 Power Module with line reactor as base component

The line-side reactors are equipped with terminals and the reactors at the Power Module end with a pre-assembled cable. When installed, the mains terminals are at the top on frame sizes FSA to FSC, and at the bottom on frame sizes FSD and FSE.



PM340 Power Module in frame size FSA with line reactor and line filter

If a line filter is installed in addition to the line reactor on frame size FSA, the components must be arranged as shown in the figure above. In this case, the line connection is below.

Power Modules of frame size FSB and higher are available with integrated line filters, alleviating the need for an external line filter.

For configurations involving more than two base-type system components, individual components must be mounted to the side of the Power Module. In this instance, the line reactor must be installed behind the Power Module and the braking resistor to the side.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications

|                                                                                                                 |                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                             | Power Modules<br>in blocksize format<br>6SL3210-...                                                                                                |
| <b>Line supply voltage</b><br>Up to 2000 m (6562 ft) above sea level                                            | 200 V ... 240 V 1 AC $\pm 10\%$<br>(-15 % < 1 min) or<br>380 ... 480 V 3 AC $\pm 10\%$<br>(-15 % < 1 min)                                          |
| <b>Line frequency</b>                                                                                           | 47 ... 63 Hz                                                                                                                                       |
| <b>Line power factor</b><br>At rated power                                                                      |                                                                                                                                                    |
| • Fundamental ( $\cos \varphi_1$ )                                                                              | > 0.96                                                                                                                                             |
| • Total ( $\lambda$ )                                                                                           |                                                                                                                                                    |
| - 200 ... 240 V 1 AC                                                                                            | 0.45 ... 0.7                                                                                                                                       |
| - 380 ... 480 V 3 AC                                                                                            | 0.65 ... 0.95                                                                                                                                      |
| <b>Overvoltage category</b><br>In accordance with EN 60664-1                                                    | Class III                                                                                                                                          |
| <b>Precharging frequency</b><br>Of the DC link, max.                                                            | 1× every 30 s                                                                                                                                      |
| <b>DC link voltage, approx.</b>                                                                                 | 1.35 x line voltage                                                                                                                                |
| <b>Output frequency</b>                                                                                         | 0 ... 650 Hz <sup>1)</sup>                                                                                                                         |
| <b>Electronic power supply</b>                                                                                  | 24 V DC -15 %/+20 %                                                                                                                                |
| <b>Radio interference suppression</b>                                                                           |                                                                                                                                                    |
| • Standard                                                                                                      | No radio interference suppression                                                                                                                  |
| • With integrated line filter                                                                                   | Category C2 according to EN 61800-3                                                                                                                |
| <b>Cooling method</b>                                                                                           | Forced air cooling by means of built-in fan                                                                                                        |
| <b>Permissible ambient or coolant temperature (air)</b><br>In operation for line-side components, Power Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F)<br>see derating characteristics                                   |
| <b>Installation altitude</b>                                                                                    | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level,<br>see derating characteristics |
| <b>Declarations of conformity</b>                                                                               | CE (Low Voltage and EMC Directives)                                                                                                                |
| <b>Approvals according to</b>                                                                                   | cULus                                                                                                                                              |
| <b>Safety Integrated</b>                                                                                        | Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1 and Control Category 3 acc. to ISO 13849-1       |

<sup>1)</sup> Note the correlation between max. output frequency, pulse frequency and current derating.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications (continued)

| Line supply voltage<br>200 ... 240 V 1 AC                                         |              | PM340 Power Module in blocksize format |                      |                      |
|-----------------------------------------------------------------------------------|--------------|----------------------------------------|----------------------|----------------------|
|                                                                                   | 6SL3210-...  | 1SB11-0...                             | 1SB12-3...           | 1SB14-0...           |
| <b>Output current</b>                                                             |              |                                        |                      |                      |
| • Rated current $I_{rated}$                                                       | A            | <b>0.9</b>                             | <b>2.3</b>           | <b>3.9</b>           |
| • Base-load current $I_H$                                                         | A            | 0.8                                    | 2.0                  | 3.4                  |
| • For S6 duty $I_{S6}$ (40 %)                                                     | A            | 1.4                                    | 3.3                  | 5.5                  |
| • $I_{max}$                                                                       | A            | 2.0                                    | 4.6                  | 7.8                  |
| <b>Type rating<sup>1)</sup></b><br>Based on $I_{rated}$                           | kW (HP)      | 0.12 (0.2)                             | 0.37 (0.5)           | 0.75 (0.75)          |
| <b>Rated pulse frequency</b>                                                      | kHz          | 4                                      | 4                    | 4                    |
| <b>Power loss</b>                                                                 | kW           | 0.06                                   | 0.075                | 0.11                 |
| <b>Cooling air requirement</b>                                                    | m³/s (ft³/s) | 0.005                                  | 0.005                | 0.005                |
| <b>Sound pressure level</b><br><b>L<sub>pA</sub> (1 m)</b>                        | dB           | < 45                                   | < 45                 | < 45                 |
| <b>24 V DC power supply</b><br>For Control Unit                                   | A            | 1.0                                    | 1.0                  | 1.0                  |
| <b>Rated input current<sup>2)</sup></b><br>With/without line reactor              | A            | 1.4/2.2                                | 4/6                  | 6.5/10               |
| <b>Resistance value</b><br>External braking resistor                              | Ω            | ≥ 180                                  | ≥ 180                | ≥ 180                |
| <b>Cable length</b><br>To braking resistor, max.                                  | m (ft)       | 15 (49)                                | 15 (49)              | 15 (49)              |
| <b>Line connection</b><br>L, N                                                    |              | Screw-type terminals                   | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm²          | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>Motor connection</b><br>U2, V2, W2                                             |              | Screw-type terminals                   | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm²          | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>DC link connection,<br/>connection for braking resistor</b><br>DCP/R1, DCN, R2 |              | Screw-type terminals                   | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm²          | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>PE connection</b>                                                              |              | M4 screw                               | M4 screw             | M4 screw             |
| <b>Motor cable length<sup>3)</sup>, max.</b><br>Without external options          |              |                                        |                      |                      |
| • Shielded                                                                        | m (ft)       | 50 (164)                               | 50 (164)             | 50 (164)             |
| • Unshielded                                                                      | m (ft)       | 75 (246)                               | 75 (246)             | 75 (246)             |
| <b>Degree of protection</b>                                                       |              | IP20                                   | IP20                 | IP20                 |
| <b>Dimensions</b>                                                                 |              |                                        |                      |                      |
| • Width                                                                           | mm (in)      | 73 (2.87)                              | 73 (2.87)            | 73 (2.87)            |
| • Height                                                                          | mm (in)      | 173 (6.81)                             | 173 (6.81)           | 173 (6.81)           |
| • Depth                                                                           |              |                                        |                      |                      |
| - PM340                                                                           | mm (in)      | 145 (5.71)                             | 145 (5.71)           | 145 (5.71)           |
| - PM340 with CU310                                                                | mm (in)      | 234.6 (9.24)                           | 234.6 (9.24)         | 234.6 (9.24)         |
| - PM340 with CUA31                                                                | mm (in)      | 175.3 (6.90)                           | 175.3 (6.90)         | 175.3 (6.90)         |
| <b>Frame size</b>                                                                 |              | FSA                                    | FSA                  | FSA                  |
| <b>Weight, approx.</b>                                                            | kg (lb)      | 1.2 (2.65)                             | 1.3 (3)              | 1.3 (3)              |

<sup>1)</sup> Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

<sup>2)</sup> The input current depends on the motor load and line impedance.

The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>3)</sup> Max. motor cable length 15 m (49 ft) (shielded) for PM340 Power Modules with integrated line filter to comply with the limit values of EN 61800-3 Category C2.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications (continued)

| Line supply voltage<br>380 ... 480 V 3 AC                                         |                                        | PM340 Power Module in blocksize format |                      |                      |                      |                      |
|-----------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                                                                   | 6SL3210-...                            | 1SE11-3UA0                             | 1SE11-7UA0           | 1SE12-2UA0           | 1SE13-1UA0           | 1SE14-1UA0           |
| <b>Output current</b>                                                             |                                        |                                        |                      |                      |                      |                      |
| • Rated current $I_{rated}$                                                       | A                                      | <b>1.3</b>                             | <b>1.7</b>           | <b>2.2</b>           | <b>3.1</b>           | <b>4.1</b>           |
| • Base-load current $I_H$                                                         | A                                      | 1.1                                    | 1.5                  | 1.9                  | 2.7                  | 3.6                  |
| • For S6 duty $I_{S6}$ (40 %)                                                     | A                                      | 1.3                                    | 2.0                  | 2.5                  | 3.5                  | 4.5                  |
| • $I_{max}$                                                                       | A                                      | 2.6                                    | 3.4                  | 4.4                  | 6.2                  | 8.2                  |
| <b>Type rating<sup>1)</sup></b>                                                   |                                        |                                        |                      |                      |                      |                      |
| • Based on $I_{rated}$                                                            | kW (HP)                                | 0.37 (0.5)                             | 0.55 (0.75)          | 0.75 (1)             | 1.1 (1.5)            | 1.5 (2)              |
| • Based on $I_H$                                                                  | kW (HP)                                | 0.37 (0.5)                             | 0.55 (0.5)           | 0.75 (0.75)          | 1.1 (1)              | 1.5 (2)              |
| <b>Rated pulse frequency</b>                                                      | kHz                                    | 4                                      | 4                    | 4                    | 4                    | 4                    |
| <b>Power loss</b>                                                                 | kW                                     | 0.10                                   | 0.10                 | 0.10                 | 0.11                 | 0.11                 |
| <b>Cooling air requirement</b>                                                    | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.005 (0.2)                            | 0.005 (0.2)          | 0.005 (0.2)          | 0.005 (0.2)          | 0.005 (0.2)          |
| <b>Sound pressure level<br/><math>L_{pA}</math> (1 m)</b>                         | dB                                     | < 45                                   | < 45                 | < 45                 | < 45                 | < 45                 |
| <b>24 V DC power supply</b><br>For Control Unit                                   | A                                      | 1.0                                    | 1.0                  | 1.0                  | 1.0                  | 1.0                  |
| <b>Rated input current<sup>2)</sup></b><br>With/without line reactor              | A                                      | 1.3/1.7                                | 1.7/2.2              | 2.2/2.6              | 3.1/3.9              | 4.1/4.8              |
| <b>Resistance value</b><br>External braking resistor                              | Ω                                      | ≥ 390                                  | ≥ 390                | ≥ 390                | ≥ 390                | ≥ 390                |
| <b>Cable length</b><br>To braking resistor, max.                                  | m (ft)                                 | 15 (49)                                | 15 (49)              | 15 (49)              | 15 (49)              | 15 (49)              |
| <b>Line connection</b><br>U1/L1, V1/L2, W1/L3                                     |                                        | Screw-type terminals                   | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup>                        | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>Motor connection</b><br>U2, V2, W2                                             |                                        | Screw-type terminals                   | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup>                        | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>DC link connection, connection for the braking resistor</b><br>DCP/R1, DCN, R2 |                                        | Screw-type terminals                   | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup>                        | 1.0 ... 2.5                            | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          | 1.0 ... 2.5          |
| <b>PE connection</b>                                                              |                                        | M4 screw                               | M4 screw             | M4 screw             | M4 screw             | M4 screw             |
| <b>Motor cable length<sup>3)</sup>, max.</b>                                      |                                        |                                        |                      |                      |                      |                      |
| • Shielded                                                                        | m (ft)                                 | 50 (164)                               | 50 (164)             | 50 (164)             | 50 (164)             | 50 (164)             |
| • Unshielded                                                                      | m (ft)                                 | 75 (246)                               | 75 (246)             | 75 (246)             | 75 (246)             | 75 (246)             |
| <b>Degree of protection</b>                                                       |                                        | IP20                                   | IP20                 | IP20                 | IP20                 | IP20                 |
| <b>Dimensions</b>                                                                 |                                        |                                        |                      |                      |                      |                      |
| • Width                                                                           | mm (in)                                | 73 (2.87)                              | 73 (2.87)            | 73 (2.87)            | 73 (2.87)            | 73 (2.87)            |
| • Height                                                                          | mm (in)                                | 173 (6.81)                             | 173 (6.81)           | 173 (6.81)           | 173 (6.81)           | 173 (6.81)           |
| • Depth                                                                           |                                        |                                        |                      |                      |                      |                      |
| - PM340                                                                           | mm (in)                                | 145 (5.71)                             | 145 (5.71)           | 145 (5.71)           | 145 (5.71)           | 145 (5.71)           |
| - PM340 with CU310                                                                | mm (in)                                | 234.6 (9.24)                           | 234.6 (9.24)         | 234.6 (9.24)         | 234.6 (9.24)         | 234.6 (9.24)         |
| - PM340 with CUA31                                                                | mm (in)                                | 175.3 (6.90)                           | 175.3 (6.90)         | 175.3 (6.90)         | 175.3 (6.90)         | 175.3 (6.90)         |
| <b>Frame size</b>                                                                 |                                        | FSA                                    | FSA                  | FSA                  | FSA                  | FSA                  |
| <b>Weight, approx.</b>                                                            | kg (lb)                                | 1.2 (3)                                | 1.2 (3)              | 1.2 (3)              | 1.2 (3)              | 1.2 (3)              |

<sup>1)</sup> Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

<sup>2)</sup> The input current depends on the motor load and line impedance.

The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>3)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to comply with the limit values of EN 61800-3 Category C2.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications (continued)

| Line supply voltage<br>380 ... 480 V 3 AC                                         |                 | PM340 Power Module in blocksize format |                      |                      |                      |                      |                      |
|-----------------------------------------------------------------------------------|-----------------|----------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                                                                   | 6SL3210-...     | 1SE16-0...                             | 1SE17-7...           | 1SE21-0...           | 1SE21-8...           | 1SE22-5...           | 1SE23-2...           |
| <b>Output current</b>                                                             |                 |                                        |                      |                      |                      |                      |                      |
| • Rated current $I_{rated}$                                                       | A               | <b>5.9</b>                             | <b>7.7</b>           | <b>10.2</b>          | <b>18</b>            | <b>25</b>            | <b>32</b>            |
| • Base-load current $I_H$                                                         | A               | 5.2                                    | 6.8                  | 9.1                  | 14                   | 21                   | 27                   |
| • For S6 duty $I_{S6}$ (40 %)                                                     | A               | 6.4                                    | 8.3                  | 10.8                 | 19.6                 | 27.8                 | 37.1                 |
| • $I_{max}$                                                                       | A               | 11.8                                   | 15.4                 | 20.4                 | 26.4                 | 38                   | 52                   |
| <b>Type rating<sup>1)</sup></b>                                                   |                 |                                        |                      |                      |                      |                      |                      |
| • Based on $I_{rated}$                                                            | kW (HP)         | 2.2 (3)                                | 3 (5)                | 4 (5)                | 7.5 (10)             | 11 (15)              | 15 (20)              |
| • Based on $I_H$                                                                  | kW (HP)         | 2.2 (3)                                | 3 (4)                | 4 (5)                | 5.5 (10)             | 7.5 (15)             | 11 (20)              |
| <b>Rated pulse frequency</b>                                                      |                 | kHz                                    | 4                    | 4                    | 4                    | 4                    | 4                    |
| <b>Power loss</b>                                                                 |                 | kW                                     | 0.14                 | 0.16                 | 0.18                 | 0.24                 | 0.40                 |
| <b>Cooling air requirement</b>                                                    |                 | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.009 (0.3)          | 0.009 (0.3)          | 0.009 (0.3)          | 0.038 (1.3)          | 0.038 (1.3)          |
| <b>Sound pressure level<br/><math>L_{pA}</math> (1 m)</b>                         |                 | dB                                     | < 50                 | < 50                 | < 50                 | < 60                 | < 60                 |
| <b>24 V DC power supply</b><br>For Control Unit                                   |                 | A                                      | 1.0                  | 1.0                  | 1.0                  | 1.0                  | 1.0                  |
| <b>Rated input current<sup>2)</sup></b><br>With/without line reactor              |                 | A                                      | 5.6/6.7              | 7.5/8.9              | 9.8/12.4             | 17.1/23.1            | 24.6/32.6            |
| <b>Resistance value</b><br>External braking resistor                              |                 | Ω                                      | ≥ 160                | ≥ 160                | ≥ 160                | ≥ 56                 | ≥ 56                 |
| <b>Cable length</b><br>To braking resistor, max.                                  |                 | m (ft)                                 | 15 (49)              | 15 (49)              | 15 (49)              | 15 (49)              | 15 (49)              |
| <b>Line connection</b><br>U1/L1, V1/L2, W1/L3                                     |                 |                                        | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup> |                                        | 1.0 ... 6            | 1.0 ... 6            | 1.0 ... 6            | 2.5 ... 10           | 2.5 ... 10           |
| <b>Motor connection</b><br>U2, V2, W2                                             |                 |                                        | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup> |                                        | 1.0 ... 6            | 1.0 ... 6            | 1.0 ... 6            | 2.5 ... 10           | 2.5 ... 10           |
| <b>DC link connection,<br/>connection for braking resistor</b><br>DCP/R1, DCN, R2 |                 |                                        | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                                         | mm <sup>2</sup> |                                        | 1.0 ... 6            | 1.0 ... 6            | 1.0 ... 6            | 2.5 ... 10           | 2.5 ... 10           |
| <b>PE connection</b>                                                              |                 |                                        | M5 screw             | M5 screw             | M5 screw             | M5 screw             | M5 screw             |
| <b>Motor cable length<sup>3)</sup>, max.</b>                                      |                 |                                        |                      |                      |                      |                      |                      |
| • Shielded                                                                        | m (ft)          |                                        | 50 (164)             | 50 (164)             | 50 (164)             | 50 (164)             | 50 (164)             |
| • Unshielded                                                                      | m (ft)          |                                        | 75 (246)             | 75 (246)             | 75 (246)             | 75 (246)             | 75 (246)             |
| <b>Degree of protection</b>                                                       |                 |                                        | IP20                 | IP20                 | IP20                 | IP20                 | IP20                 |
| <b>Dimensions</b>                                                                 |                 |                                        |                      |                      |                      |                      |                      |
| • Width                                                                           | mm (in)         |                                        | 153 (6.02)           | 153 (6.02)           | 153 (6.02)           | 188.4 (7.42)         | 188.4 (7.42)         |
| • Height                                                                          | mm (in)         |                                        | 270 (10.63)          | 270 (10.63)          | 270 (10.63)          | 333.4 (13.13)        | 333.4 (13.13)        |
| • Depth                                                                           |                 |                                        |                      |                      |                      |                      |                      |
| - PM340                                                                           | mm (in)         |                                        | 165 (6.50)           | 165 (6.50)           | 165 (6.50)           | 185 (7.28)           | 185 (7.28)           |
| - PM340 with CU310                                                                | mm (in)         |                                        | 254.6 (10.02)        | 254.6 (10.02)        | 254.6 (10.02)        | 274.6 (10.81)        | 274.6 (10.81)        |
| - PM340 with CUA31                                                                | mm (in)         |                                        | 195.3 (7.69)         | 195.3 (7.69)         | 195.3 (7.69)         | 215.3 (8.48)         | 215.3 (8.48)         |
| <b>Frame size</b>                                                                 |                 |                                        | FSB                  | FSB                  | FSB                  | FSC                  | FSC                  |
| <b>Weight, approx.</b>                                                            |                 | kg (lb)                                | 4.0 (9)              | 4.0 (9)              | 4.0 (9)              | 6.5 (14.3)           | 6.5 (14.3)           |

<sup>1)</sup> Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

<sup>2)</sup> The input current depends on the motor load and line impedance.

The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>3)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to comply with the limit values of EN 61800-3 Category C2.



# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications (continued)

| Line supply voltage<br>380 ... 480 V 3 AC                                          |                                        | PM340 Power Module in blocksize format |                            |                            |                            |                            |
|------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|                                                                                    | 6SL3210-...                            | 1SE23-8...                             | 1SE24-5...                 | 1SE26-0...                 | 1SE27-5...                 | 1SE31-0...                 |
| <b>Output current</b>                                                              |                                        |                                        |                            |                            |                            |                            |
| • Rated current $I_{rated}$                                                        | A                                      | <b>38</b>                              | <b>45</b>                  | <b>60</b>                  | <b>75</b>                  | <b>90</b>                  |
| • Base-load current $I_H$                                                          | A                                      | 33                                     | 40                         | 48                         | 65                         | 80                         |
| • For S6 duty $I_{S6}$ (40 %)                                                      | A                                      | 49                                     | 58                         | 78                         | 98                         | 117                        |
| • $I_{max}$                                                                        | A                                      | 64                                     | 76                         | 90                         | 124                        | 150                        |
| <b>Type rating<sup>1)</sup></b>                                                    |                                        |                                        |                            |                            |                            |                            |
| • Based on $I_{rated}$                                                             | kW (HP)                                | 18.5 (25)                              | 22 (30)                    | 30 (40)                    | 37 (50)                    | 45 (60)                    |
| • Based on $I_H$                                                                   | kW (HP)                                | 15 (20)                                | 18.5 (30)                  | 22 (30)                    | 30 (50)                    | 37 (60)                    |
| <b>Rated pulse frequency</b>                                                       | kHz                                    | 4                                      | 4                          | 4                          | 4                          | 4                          |
| <b>Power loss</b>                                                                  | kW                                     | 0.38                                   | 0.51                       | 0.69                       | 0.99                       | 1.21                       |
| <b>Cooling air requirement</b>                                                     | m <sup>3</sup> /s (ft <sup>3</sup> /s) | 0.022 (0.8)                            | 0.022 (0.8)                | 0.039 (1.4)                | 0.022 (0.8)                | 0.039 (1.4)                |
| <b>Sound pressure level<br/><math>L_{pA}</math> (1 m)</b>                          | dB                                     | < 60                                   | < 60                       | < 61                       | < 60                       | 62                         |
| <b>24 V DC power supply<br/>for Control Unit</b>                                   | A                                      | 1.0                                    | 1.0                        | 1.0                        | 1.0                        | 1.0                        |
| <b>Rated input current<sup>2)</sup><br/>With/without line reactor</b>              | A                                      | 40/46                                  | 47/53                      | 63/72                      | 78/88                      | 94/105                     |
| <b>Resistance value<br/>External braking resistor</b>                              | Ω                                      | ≥ 27                                   | ≥ 27                       | ≥ 27                       | ≥ 15                       | ≥ 15                       |
| <b>Cable length<br/>To braking resistor, max.</b>                                  | m (ft)                                 | 15 (49)                                | 15 (49)                    | 15 (49)                    | 15 (49)                    | 15 (49)                    |
| <b>Line connection<br/>U1/L1, V1/L2, W1/L3</b>                                     |                                        | M6 screw stud                          | M6 screw stud              | M6 screw stud              | M6 screw stud              | M6 screw stud              |
| • Conductor cross-section                                                          | mm <sup>2</sup>                        | 10 ... 35                              | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  |
| <b>Motor connection<br/>U2, V2, W2</b>                                             |                                        | M6 screw stud                          | M6 screw stud              | M6 screw stud              | M6 screw stud              | M6 screw stud              |
| • Conductor cross-section                                                          | mm <sup>2</sup>                        | 10 ... 35                              | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  |
| <b>DC link connection,<br/>connection for braking resistor<br/>DCP/R1, DCN, R2</b> |                                        | M6 screw stud                          | M6 screw stud              | M6 screw stud              | M6 screw stud              | M6 screw stud              |
| • Conductor cross-section                                                          | mm <sup>2</sup>                        | 10 ... 35                              | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  | 10 ... 35                  |
| <b>PE connection</b>                                                               |                                        | M6 screw                               | M6 screw                   | M6 screw                   | M6 screw                   | M6 screw                   |
| <b>Motor cable length<sup>3)</sup>, max.</b>                                       |                                        |                                        |                            |                            |                            |                            |
| • Shielded                                                                         | m (ft)                                 | 70 (230)                               | 70 (230)                   | 70 (230)                   | 70 (230)                   | 70 (230)                   |
| • Unshielded                                                                       | m (ft)                                 | 100 (328)                              | 100 (328)                  | 100 (328)                  | 100 (328)                  | 100 (328)                  |
| <b>Degree of protection</b>                                                        |                                        | IP20                                   | IP20                       | IP20                       | IP20                       | IP20                       |
| <b>Dimensions</b>                                                                  |                                        |                                        |                            |                            |                            |                            |
| • Width                                                                            | mm (in)                                | 275 (10.83)                            | 275 (10.83)                | 275 (10.83)                | 275 (10.83)                | 275 (10.83)                |
| • Height<br>PM340 without/with int. filter                                         | mm (in)                                | 418.3/511<br>(16.47/20.12)             | 418.3/511<br>(16.47/20.12) | 418.3/511<br>(16.47/20.12) | 498.3/633<br>(19.62/24.92) | 498.3/633<br>(19.62/24.92) |
| • Depth                                                                            |                                        |                                        |                            |                            |                            |                            |
| - PM340                                                                            | mm (in)                                | 203.5 (8.01)                           | 203.5 (8.01)               | 203.5 (8.01)               | 203.5 (8.01)               | 203.5 (8.01)               |
| - PM340 with CU310                                                                 | mm (in)                                | 293.1 (11.54)                          | 293.1 (11.54)              | 293.1 (11.54)              | 293.1 (11.54)              | 293.1 (11.54)              |
| - PM340 with CUA31                                                                 | mm (in)                                | 233.8 (9.20)                           | 233.8 (9.20)               | 233.8 (9.20)               | 233.8 (9.20)               | 233.8 (9.20)               |
| <b>Frame size</b>                                                                  |                                        | FSD                                    | FSD                        | FSD                        | FSE                        | FSE                        |
| <b>Weight, approx.<br/>PM340 without/with int. filter</b>                          | kg (lb)                                | 15.9/19.3 (35/43)                      | 15.9/19.3 (35/43)          | 15.9/19.3 (35/43)          | 19.8/27.1 (44/60)          | 19.8/27.1 (44/60)          |

<sup>1)</sup> Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

<sup>2)</sup> The input current depends on the motor load and line impedance. The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>3)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to comply with the limit values of EN 61800-3 Category C2.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Power Modules

#### Technical specifications (continued)

| Line supply voltage<br>380 ... 480 V 3 AC                                 |              | PM340 Power Module in blocksize format |                       |                       |
|---------------------------------------------------------------------------|--------------|----------------------------------------|-----------------------|-----------------------|
|                                                                           | 6SL3210-...  | 1SE31-1...                             | 1SE31-5...            | 1SE31-8...            |
| Output current                                                            |              |                                        |                       |                       |
| • Rated current $I_{rated}$                                               | A            | 110                                    | 145                   | 178                   |
| • Base-load current $I_H$                                                 | A            | 95                                     | 115                   | 155                   |
| • For S6 duty $I_{S6}$ (40 %)                                             | A            | 143                                    | 188                   | 231                   |
| • $I_{max}$                                                               | A            | 180                                    | 220                   | 290                   |
| Type rating <sup>1)</sup>                                                 |              |                                        |                       |                       |
| • Based on $I_{rated}$                                                    | kW (HP)      | 55 (75)                                | 75 (100)              | 90 (125)              |
| • Based on $I_H$                                                          | kW (HP)      | 45 (60)                                | 55 (75)               | 75 (100)              |
| Rated pulse frequency                                                     | kHz          | 4                                      | 4                     | 4                     |
| Power loss                                                                | kW           | 1.42                                   | 1.93                  | 2.31                  |
| Cooling air requirement                                                   | m³/s (ft³/s) | 0.094 (3.3)                            | 0.094 (3.3)           | 0.117 (4.1)           |
| Sound pressure level $L_{pA}$ (1 m)                                       | dB           | < 60                                   | < 60                  | 65                    |
| 24 V DC power supply<br>For Control Unit                                  | A            | 1.0                                    | 1.0                   | 1.0                   |
| Rated input current <sup>2)</sup><br>with/without line reactor            | A            | 115/129                                | 151/168               | 186/204               |
| Resistance value<br>External braking resistor                             | Ω            | ≥ 8.2                                  | ≥ 8.2                 | ≥ 8.2                 |
| Cable length<br>To braking resistor, max.                                 | m (ft)       | 15 (49)                                | 15 (49)               | 15 (49)               |
| Line connection<br>U1/L1, V1/L2, W1/L3                                    |              | M8 screw stud                          | M8 screw stud         | M8 screw stud         |
| • Conductor cross-section, max.                                           | mm²          | 120                                    | 120                   | 120                   |
| Motor connection<br>U2, V2, W2                                            |              | M8 screw stud                          | M8 screw stud         | M8 screw stud         |
| • Conductor cross-section, max.                                           | mm²          | 120                                    | 120                   | 120                   |
| DC link connection,<br>connection for braking resistor<br>DCP/R1, DCN, R2 |              | M8 screw stud                          | M8 screw stud         | M8 screw stud         |
| • Conductor cross-section, max.                                           | mm²          | 120                                    | 120                   | 120                   |
| PE connection                                                             |              | M8 screw                               | M8 screw              | M8 screw              |
| Motor cable length <sup>3)</sup> , max.                                   |              |                                        |                       |                       |
| • Shielded                                                                | m (ft)       | 70 (230)                               | 70 (230)              | 70 (230)              |
| • Unshielded                                                              | m (ft)       | 100 (328)                              | 100 (328)             | 100 (328)             |
| Degree of protection                                                      |              | IP20                                   | IP20                  | IP20                  |
| Dimensions                                                                |              |                                        |                       |                       |
| • Width                                                                   | mm (in)      | 350 (13.78)                            | 350 (13.78)           | 350 (13.78)           |
| • Height<br>PM340 without/with int. filter                                | mm (in)      | 634/934 (24.96/33.77)                  | 634/934 (24.96/33.77) | 634/934 (24.96/33.77) |
| • Depth                                                                   |              |                                        |                       |                       |
| - PM340                                                                   | mm (in)      | 315.5 (12.42)                          | 315.5 (12.42)         | 315.5 (12.42)         |
| - PM340 with CU310                                                        | mm (in)      | 405.1 (15.95)                          | 405.1 (15.95)         | 405.1 (15.95)         |
| - PM340 with CUA31                                                        | mm (in)      | 345.8 (13.61)                          | 345.8 (13.61)         | 345.8 (13.61)         |
| Frame size                                                                |              | FSF                                    | FSF                   | FSF                   |
| Weight, approx.<br>PM340 without/with int. filter                         | kg (lb)      | 50.7/66.7 (112/147)                    | 50.7/66.7 (112/147)   | 50.7/66.7 (112/147)   |

<sup>1)</sup> Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

<sup>2)</sup> The input current depends on the motor load and line impedance.

The input currents apply for rated power loading (based on  $I_{rated}$ ) for a line impedance corresponding to  $u_k = 1\%$ .

<sup>3)</sup> Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to comply with the limit values of EN 61800-3 Category C2.

# SINAMICS S120 drive system

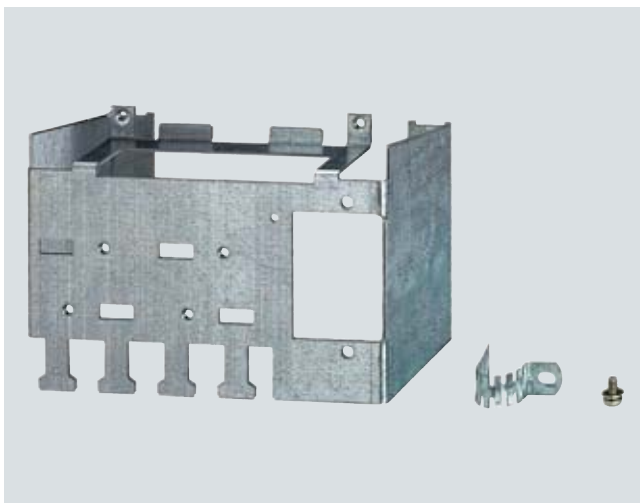
## Blocksize format – Power Modules

### Power Modules

#### Selection and ordering data

| Rated output current<br>A                     | Type rating<br>kW (HP) | Frame size | PM340 Power Module<br>in blocksize format<br><u>without</u> line filter<br>Order No. | PM340 Power Module<br>in blocksize format<br><u>with</u> integrated line filter<br>Order No. |
|-----------------------------------------------|------------------------|------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Line supply voltage 200 ... 240 V 1 AC</b> |                        |            |                                                                                      |                                                                                              |
| 0.9                                           | 0.12 (0.2)             | FSA        | <b>6SL3210-1SB11-0UA0</b>                                                            | <b>6SL3210-1SB11-0AA0</b>                                                                    |
| 2.3                                           | 0.37 (0.5)             | FSA        | <b>6SL3210-1SB12-3UA0</b>                                                            | <b>6SL3210-1SB12-3AA0</b>                                                                    |
| 3.9                                           | 0.75 (0.75)            | FSA        | <b>6SL3210-1SB14-0UA0</b>                                                            | <b>6SL3210-1SB14-0AA0</b>                                                                    |
| <b>Line supply voltage 380 ... 480 V 3 AC</b> |                        |            |                                                                                      |                                                                                              |
| 1.3                                           | 0.37 (0.5)             | FSA        | <b>6SL3210-1SE11-3UA0</b>                                                            | –                                                                                            |
| 1.7                                           | 0.55 (0.75)            | FSA        | <b>6SL3210-1SE11-7UA0</b>                                                            | –                                                                                            |
| 2.2                                           | 0.75 (1)               | FSA        | <b>6SL3210-1SE12-2UA0</b>                                                            | –                                                                                            |
| 3.1                                           | 1.1 (1.5)              | FSA        | <b>6SL3210-1SE13-1UA0</b>                                                            | –                                                                                            |
| 4.1                                           | 1.5 (2)                | FSA        | <b>6SL3210-1SE14-1UA0</b>                                                            | –                                                                                            |
| 5.9                                           | 2.2 (3)                | FSB        | <b>6SL3210-1SE16-0UA0</b>                                                            | <b>6SL3210-1SE16-0AA0</b>                                                                    |
| 7.7                                           | 3 (5)                  | FSB        | <b>6SL3210-1SE17-7UA0</b>                                                            | <b>6SL3210-1SE17-7AA0</b>                                                                    |
| 10.2                                          | 4 (5)                  | FSB        | <b>6SL3210-1SE21-0UA0</b>                                                            | <b>6SL3210-1SE21-0AA0</b>                                                                    |
| 18                                            | 7.5 (10)               | FSC        | <b>6SL3210-1SE21-8UA0</b>                                                            | <b>6SL3210-1SE21-8AA0</b>                                                                    |
| 25                                            | 11 (15)                | FSC        | <b>6SL3210-1SE22-5UA0</b>                                                            | <b>6SL3210-1SE22-5AA0</b>                                                                    |
| 32                                            | 15 (20)                | FSC        | <b>6SL3210-1SE23-2UA0</b>                                                            | <b>6SL3210-1SE23-2AA0</b>                                                                    |
| 38                                            | 18.5 (25)              | FSD        | <b>6SL3210-1SE23-8UA0</b>                                                            | <b>6SL3210-1SE23-8AA0</b>                                                                    |
| 45                                            | 22 (30)                | FSD        | <b>6SL3210-1SE24-5UA0</b>                                                            | <b>6SL3210-1SE24-5AA0</b>                                                                    |
| 60                                            | 30 (40)                | FSD        | <b>6SL3210-1SE26-0UA0</b>                                                            | <b>6SL3210-1SE26-0AA0</b>                                                                    |
| 75                                            | 37 (50)                | FSE        | <b>6SL3210-1SE27-5UA0</b>                                                            | <b>6SL3210-1SE27-5AA0</b>                                                                    |
| 90                                            | 45 (60)                | FSE        | <b>6SL3210-1SE31-0UA0</b>                                                            | <b>6SL3210-1SE31-0AA0</b>                                                                    |
| 110                                           | 55 (75)                | FSF        | <b>6SL3210-1SE31-1UA0</b>                                                            | <b>6SL3210-1SE31-1AA0</b>                                                                    |
| 145                                           | 75 (100)               | FSF        | <b>6SL3210-1SE31-5UA0</b>                                                            | <b>6SL3210-1SE31-5AA0</b>                                                                    |
| 178                                           | 90 (125)               | FSF        | <b>6SL3210-1SE31-8UA0</b>                                                            | <b>6SL3210-1SE31-8AA0</b>                                                                    |

#### Accessories



Example of shield connection kit for PM340 frame size FSB

| Description                               | Order No.                 |
|-------------------------------------------|---------------------------|
| <b>Shield connection kit</b><br>For PM340 |                           |
| • Frame size FSA                          | <b>6SL3262-1AA00-0BA0</b> |
| • Frame size FSB                          | <b>6SL3262-1AB00-0DA0</b> |
| • Frame size FSC                          | <b>6SL3262-1AC00-0DA0</b> |
| • Frame sizes FSD and FSE                 | <b>6SL3262-1AD00-0DA0</b> |
| • Frame size FSF                          | <b>6SL3262-1AF00-0DA0</b> |

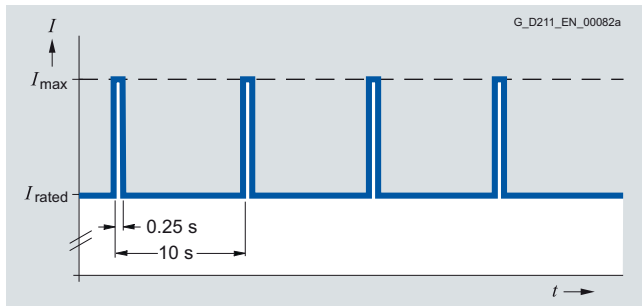
# SINAMICS S120 drive system

## Blocksize format – Power Modules

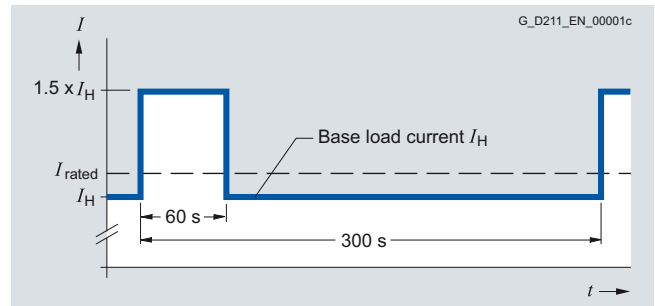
### Power Modules

#### Characteristic curves

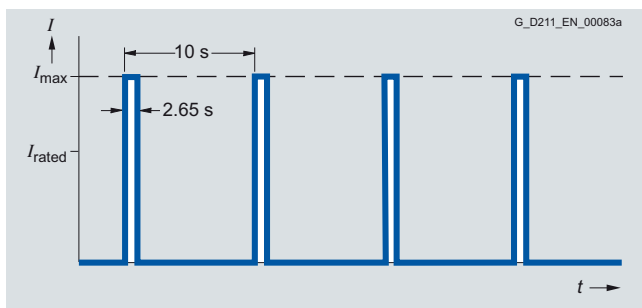
##### Overload capability



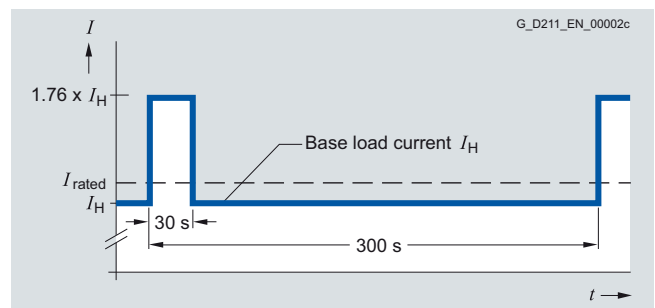
Load cycle with previous load



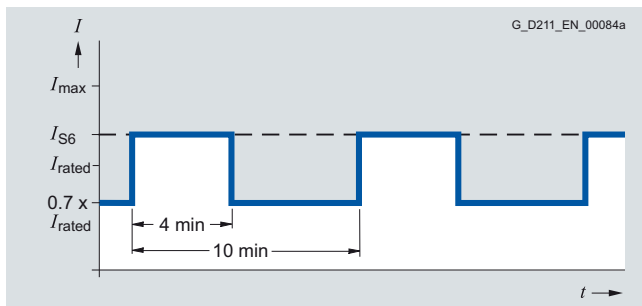
Duty cycle with 60 s overload with a duty cycle duration of 300 s



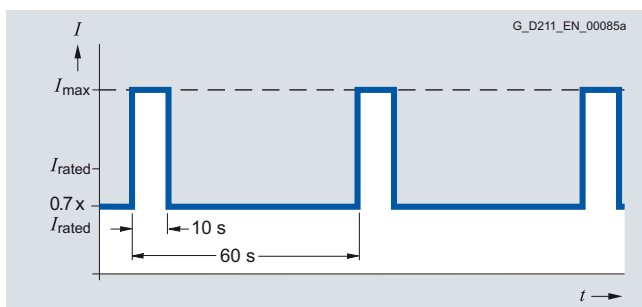
Duty cycle without initial load



Duty cycle with 30 s overload with a duty cycle duration of 300 s



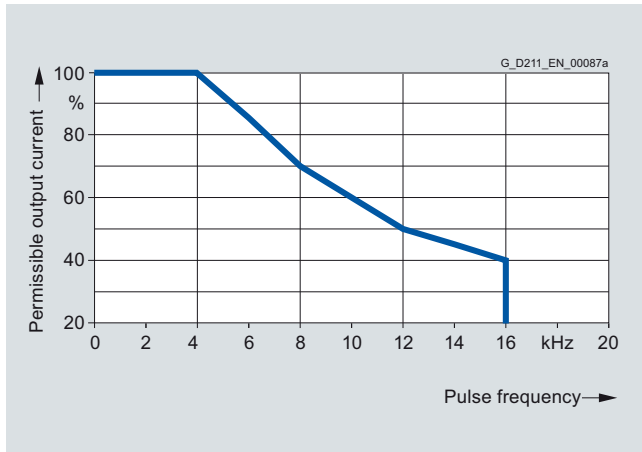
S6 load cycle with previous load with a load cycle period of 600 s



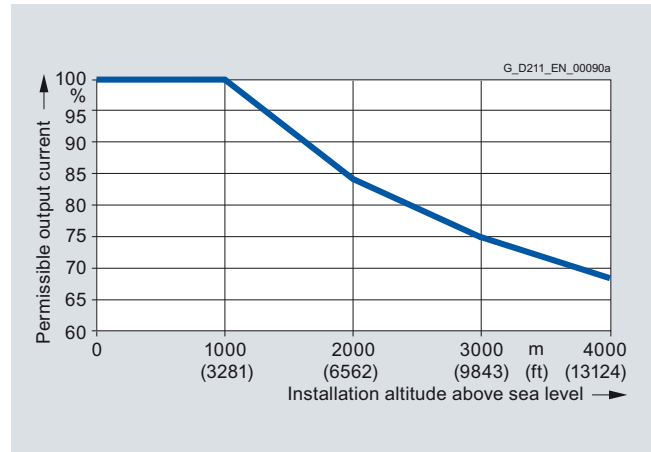
S6 load cycle with previous load with a load cycle period of 60 s

### Characteristic curves (continued)

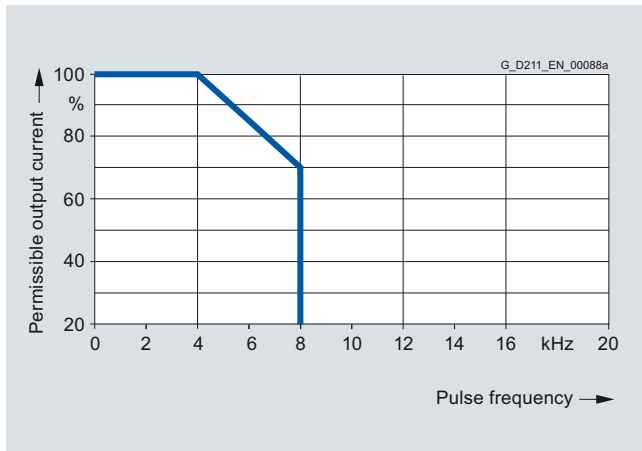
#### Derating characteristics



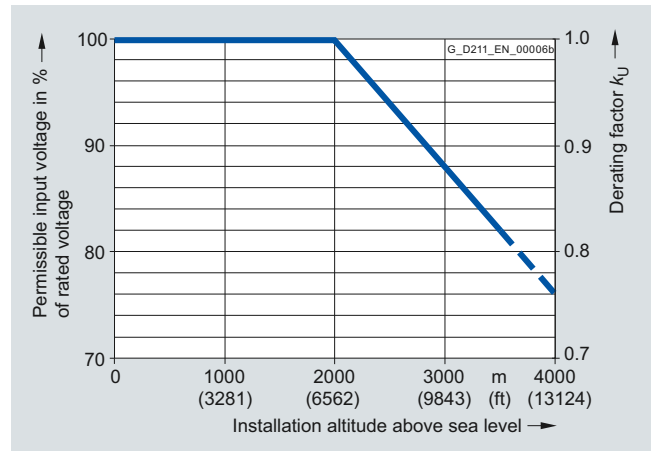
Output current as a function of pulse frequency, frame sizes FSA to FSE



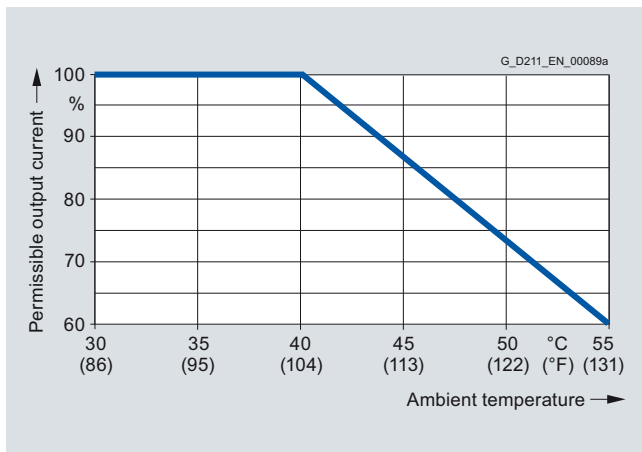
Output current as a function of installation altitude, frame size FSF



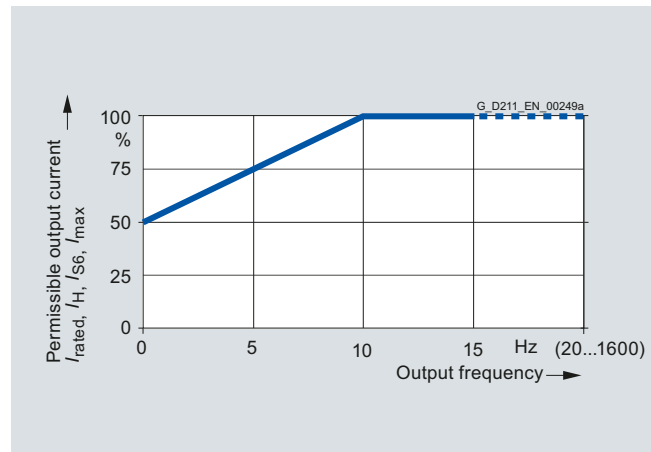
Output current as a function of pulse frequency, frame size FSF



Voltage derating as a function of installation altitude, frame size FSF



Output current as a function of ambient temperature, frame size FSF



Output current as a function of output frequency, frame size FSF

# SINAMICS S120 drive system

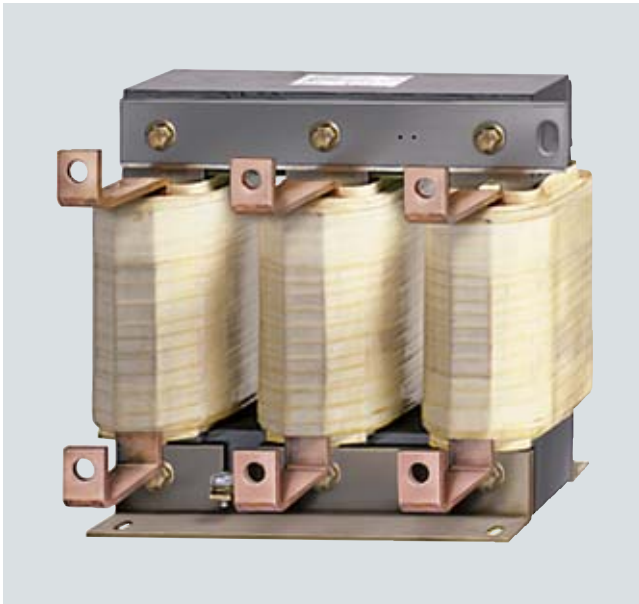
## Blocksize format – Power Modules

### Line reactors

#### Overview



Line reactors for PM340 Power Modules frame sizes FSA to FSE



Line reactor for PM340 Power Modules frame size FSF

Line reactors limit the low-frequency harmonic effects and reduce the load on the other loads in the same supply system. In addition, the line reactors limit the current spikes at the converter input, e.g. for commutation notches. It is recommended to use the line reactors in combination with unfiltered PM340 units and line voltages with a high harmonic content (industrial networks).

#### Integration

The line reactors for the PM340 Power Modules in frame sizes FSA to FSE are designed as base components. The line reactor is attached to the mounting surface and the Power Module is mounted directly on the line reactor. The cables to the Power Modules are already connected at the line reactor.

The line reactor is connected to the line supply through terminals.



PM340 Power Module frame size FSB with base line reactor and shield connection kit

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Line reactors

#### Technical specifications

| Line supply voltage<br>200 ... 240 V 1 AC            |                                | Line reactor                                               |                                  |
|------------------------------------------------------|--------------------------------|------------------------------------------------------------|----------------------------------|
|                                                      | 6SE6400-...                    | 3CC00-4AB3                                                 | 3CC01-0AB3                       |
| <b>Rated current</b>                                 | A                              | 3.4                                                        | 8.1                              |
| <b>Power loss, approx.</b><br>At 50/60 Hz            | W                              | 12.5/15                                                    | 11.5/14.5                        |
| <b>Line connection</b><br>U1, V1, W1                 |                                | Screw-type terminals                                       | Screw-type terminals             |
| • Conductor cross-section                            | mm <sup>2</sup>                | 6                                                          | 6                                |
| <b>Load connection</b>                               |                                | Cable                                                      | Cable                            |
| • Conductor cross-section                            |                                | 3 × AWG16 (1.5 mm <sup>2</sup> )                           | 3 × AWG16 (1.5 mm <sup>2</sup> ) |
| • Length, approx.                                    | m (ft)                         | 0.38 (1.25) m                                              | 0.38 (1.25) m                    |
| <b>PE connection</b>                                 |                                | M5 screw studs                                             | M5 screw studs                   |
| <b>Degree of protection</b> <sup>1)</sup>            |                                | IP20                                                       | IP20                             |
| <b>Dimensions</b>                                    |                                |                                                            |                                  |
| • Width                                              | mm (in)                        | 75.5 (2.97)                                                | 75.5 (2.97)                      |
| • Height                                             | mm (in)                        | 201 (7.91)                                                 | 201 (7.91)                       |
| • Depth                                              | mm (in)                        | 50 (1.97)                                                  | 50 (1.97)                        |
| <b>Weight, approx.</b>                               | kg (lb)                        | 1.3 (3)                                                    | 1.3 (3)                          |
| <b>Approvals according to</b>                        |                                | cURus                                                      | cURus                            |
| <b>Suitable for Power Module in blocksize format</b> | Type<br>(rated output current) | 6SL3210-1SB11--0... (0.9 A)<br>6SL3210-1SB12--3... (2.3 A) | 6SL3210-1SB14--0... (3.9 A)      |

| Line supply voltage<br>380 ... 480 V 3 AC            |                                | Line reactor                                             |                                                          |                                  |                                                          |                                  |                                                        |
|------------------------------------------------------|--------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------|----------------------------------------------------------|----------------------------------|--------------------------------------------------------|
|                                                      |                                | 6SE6400-3CC00-2AD3                                       | 6SE6400-3CC00-4AD3                                       | 6SE6400-3CC00-6AD3               | 6SL3203-0CD21-0AA0                                       | 6SL3203-0CD21-4AA0               | 6SL3203-0CD22-2AA0                                     |
| <b>Rated current</b>                                 | A                              | 1.9                                                      | 3.5                                                      | 4.8                              | 9                                                        | 11.6                             | 25                                                     |
| <b>Power loss</b><br>At 50/60 Hz                     | W                              | 6/7                                                      | 12.5/15                                                  | 7.5/9                            | 9/11                                                     | 27/32                            | 98/118                                                 |
| <b>Line connection</b><br>U1, V1, W1                 |                                | Screw-type terminals                                     | Screw-type terminals                                     | Screw-type terminals             | Screw-type terminals                                     | Screw-type terminals             | Screw-type terminals                                   |
| • Conductor cross-section                            | mm <sup>2</sup>                | 6                                                        | 6                                                        | 6                                | 6                                                        | 6                                | 6                                                      |
| <b>Load connection</b>                               |                                | Cable                                                    | Cable                                                    | Cable                            | Cable                                                    | Cable                            | Cable                                                  |
| • Conductor cross-section                            |                                | 3 × AWG16 (1.5 mm <sup>2</sup> )                         | 3 × AWG16 (1.5 mm <sup>2</sup> )                         | 3 × AWG16 (1.5 mm <sup>2</sup> ) | 3 × AWG16 (1.5 mm <sup>2</sup> )                         | 3 × AWG16 (1.5 mm <sup>2</sup> ) | 4 × AGW10 (2.5 mm <sup>2</sup> )                       |
| • Length, approx.                                    | m (ft)                         | 0.38 (1.25)                                              | 0.38 (1.25)                                              | 0.38 (1.25)                      | 0.46 (1.51)                                              | 0.46 (1.51)                      | 0.49 (1.61)                                            |
| <b>PE connection</b>                                 |                                | M5 screw studs                                           | M5 screw studs                                           | M5 screw studs                   | M5 screw studs                                           | M5 screw studs                   | M5 screw studs                                         |
| <b>Degree of protection</b> <sup>1)</sup>            |                                | IP20                                                     | IP20                                                     | IP20                             | IP20                                                     | IP20                             | IP20                                                   |
| <b>Dimensions</b>                                    |                                |                                                          |                                                          |                                  |                                                          |                                  |                                                        |
| • Width                                              | mm (in)                        | 75.5 (2.97)                                              | 75.5 (2.97)                                              | 75.5 (2.97)                      | 153 (6.02)                                               | 153 (6.02)                       | 190 (7.48)                                             |
| • Height                                             | mm (in)                        | 201 (7.91)                                               | 201 (7.91)                                               | 201 (7.91)                       | 290 (11.42)                                              | 290 (11.42)                      | 370 (14.57)                                            |
| • Depth                                              | mm (in)                        | 50 (1.97)                                                | 50 (1.97)                                                | 50 (1.97)                        | 70 (2.76)                                                | 70 (2.76)                        | 50 (1.97)                                              |
| <b>Weight, approx.</b>                               | kg (lb)                        | 1.2 (3)                                                  | 1.3 (3)                                                  | 1.3 (3)                          | 3.4 (7.50)                                               | 3.4 (7.50)                       | 6.3 (14)                                               |
| <b>Approvals according to</b>                        |                                | cURus                                                    | cURus                                                    | cURus                            | cURus                                                    | cURus                            | cURus                                                  |
| <b>Suitable for Power Module in blocksize format</b> | Type<br>(rated output current) | 6SL3210-1SE11-3... (1.3 A)<br>6SL3210-1SE11-7... (1.7 A) | 6SL3210-1SE12-2... (2.2 A)<br>6SL3210-1SE13-1... (3.1 A) | 6SL3210-1SE14-1... (4.1 A)       | 6SL3210-1SE16-0... (5.9 A)<br>6SL3210-1SE17-7... (7.7 A) | 6SL3210-1SE21-0... (10 A)        | 6SL3210-1SE21-8... (18 A)<br>6SL3210-1SE22-5... (25 A) |

<sup>1)</sup> With correctly connected load connection cable.



# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Line reactors

#### Technical specifications (continued)

| Line supply voltage<br>380 ... 480 V 3 AC                    |                                     | Line reactor                        |                                                                |                               |                                                                |                                                                  |                                 |
|--------------------------------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------------------------------|-------------------------------|----------------------------------------------------------------|------------------------------------------------------------------|---------------------------------|
|                                                              |                                     | 6SL3203-<br>OCD23-5AA0              | 6SL3203-<br>OCJ24-5AA0                                         | 6SL3203-<br>OCD25-3AA0        | 6SL3203-<br>OCJ28-6AA0                                         | 6SE6400-<br>3CC11-2FD0                                           | 6SE6400-<br>3CC11-7FD0          |
| <b>Rated current</b>                                         | A                                   | 31.3                                | 47                                                             | 63                            | 94                                                             | 151                                                              | 186                             |
| <b>Power loss</b><br>At 50/60 Hz                             | W                                   | 37/44                               | 90/115                                                         | 90/115                        | 170/215                                                        | 280/360                                                          | 280/360                         |
| <b>Line connection</b><br>U1, V1, W1                         |                                     | Screw-type<br>terminals             | Screw-type<br>terminals                                        | Screw-type<br>terminals       | Screw-type<br>terminals                                        | Flat connector for<br>M10 screw                                  | Flat connector for<br>M10 screw |
| • Conductor cross-<br>section                                | mm <sup>2</sup>                     | 16                                  | 16                                                             | 16                            | 50                                                             | –                                                                | –                               |
| <b>Load connection</b>                                       |                                     | Cable                               | Cable                                                          | Cable                         | Cable                                                          | Flat connector for<br>M10 screw                                  | Flat connector for<br>M10 screw |
| • Conductor cross-<br>section                                |                                     | 4 × AWG10<br>(2.5 mm <sup>2</sup> ) | 4 × 16 mm <sup>2</sup>                                         | 4 × 16 mm <sup>2</sup>        | 4 × 35 mm <sup>2</sup>                                         | –                                                                | –                               |
| • Length, approx.                                            | m (ft)                              | 0.49 (1.61)                         | 0.7 (2.3)                                                      | 0.7 (2.3)                     | 0.7 (2.3)                                                      |                                                                  |                                 |
| <b>PE connection</b>                                         |                                     | M5 screw studs                      | M8 screw                                                       | M8 screw                      | M8 screw                                                       | M8 screw stud                                                    | M8 screw stud                   |
| <b>Degree of protection</b> <sup>1)</sup>                    |                                     | IP20                                | IP20                                                           | IP20                          | IP20                                                           | IP00                                                             | IP00                            |
| <b>Dimensions</b>                                            |                                     |                                     |                                                                |                               |                                                                |                                                                  |                                 |
| • Width                                                      | mm (in)                             | 190 (7.48)                          | 275 (10.83)                                                    | 275 (10.83)                   | 275 (10.83)                                                    | 240 (9.45)                                                       | 240 (9.45)                      |
| • Height                                                     | mm (in)                             | 370 (14.57)                         | 455 (17.91)                                                    | 455 (17.91)                   | 577 (22.72)                                                    | 228 (8.98)                                                       | 228 (8.98)                      |
| • Depth                                                      | mm (in)                             | 50 (1.97)                           | 83.5 (3.29)                                                    | 83.5 (3.29)                   | 93.5 (3.68)                                                    | 141 (5.55)                                                       | 141 (5.55)                      |
| <b>Weight, approx.</b>                                       | kg (lb)                             | 6.4 (14)                            | 13 (29)                                                        | 13 (29)                       | 19 (42)                                                        | 25 (55)                                                          | 25 (55)                         |
| <b>Approvals according<br/>to</b>                            |                                     | cURus                               | cURus                                                          | cURus                         | cURus                                                          | cURus                                                            | cURus                           |
| <b>Suitable for<br/>Power Module in<br/>blocksize format</b> | Type<br>(rated out-<br>put current) | 6SL3210-<br>1SE23-2... (32 A)       | 6SL3210-<br>1SE23-8... (38 A)<br>6SL3210-<br>1SE24-5... (45 A) | 6SL3210-<br>1SE26-0... (60 A) | 6SL3210-<br>1SE27-5... (75 A)<br>6SL3210-<br>1SE31-0... (90 A) | 6SL3210-<br>1SE31-1... (110 A)<br>6SL3210-<br>1SE31-5... (145 A) | 6SL3210-<br>1SE31-8... (178 A)  |

<sup>1)</sup> With correctly connected load connection cable.

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Line reactors

#### Selection and ordering data

| Rated output current<br>A                     | Type rating | Suitable for Power Module in blocksize format |            | Line reactor              |
|-----------------------------------------------|-------------|-----------------------------------------------|------------|---------------------------|
|                                               | kW (HP)     | Type                                          | Frame size | Order No.                 |
| <b>Line supply voltage 200 ... 240 V 1 AC</b> |             |                                               |            |                           |
| 0.9                                           | 0.12 (0.2)  | 6SL3210-1SB11-0...                            | FSA        | <b>6SE6400-3CC00-4AB3</b> |
| 2.3                                           | 0.37 (0.5)  | 6SL3210-1SB12-3...                            |            |                           |
| 3.9                                           | 0.75 (0.75) | 6SL3210-1SB14-0...                            | FSA        | <b>6SE6400-3CC01-0AB3</b> |
| <b>Line supply voltage 380 ... 480 V 3 AC</b> |             |                                               |            |                           |
| 1.3                                           | 0.37 (0.5)  | 6SL3210-1SE11-3UA0                            | FSA        | <b>6SE6400-3CC00-2AD3</b> |
| 1.7                                           | 0.55 (0.75) | 6SL3210-1SE11-7UA0                            |            |                           |
| 2.2                                           | 0.75 (1)    | 6SL3210-1SE12-2UA0                            | FSA        | <b>6SE6400-3CC00-4AD3</b> |
| 3.1                                           | 1.1 (1.5)   | 6SL3210-1SE13-1UA0                            |            |                           |
| 4.1                                           | 1.5 (2)     | 6SL3210-1SE14-1UA0                            | FSA        | <b>6SE6400-3CC00-6AD3</b> |
| 5.9                                           | 2.2 (3)     | 6SL3210-1SE16-0...                            | FSB        | <b>6SL3203-0CD21-0AA0</b> |
| 7.7                                           | 3 (5)       | 6SL3210-1SE17-7...                            |            |                           |
| 10                                            | 4 (5)       | 6SL3210-1SE21-0...                            | FSB        | <b>6SL3203-0CD21-4AA0</b> |
| 18                                            | 7.5 (10)    | 6SL3210-1SE21-8...                            | FSC        | <b>6SL3203-0CD22-2AA0</b> |
| 25                                            | 11 (15)     | 6SL3210-1SE22-5...                            |            |                           |
| 32                                            | 15 (20)     | 6SL3210-1SE23-2...                            | FSC        | <b>6SL3203-0CD23-5AA0</b> |
| 38                                            | 18.5 (25)   | 6SL3210-1SE23-8...                            | FSD        | <b>6SL3203-0CJ24-5AA0</b> |
| 45                                            | 22 (30)     | 6SL3210-1SE24-5...                            |            |                           |
| 60                                            | 30 (40)     | 6SL3210-1SE26-0...                            | FSD        | <b>6SL3203-0CD25-3AA0</b> |
| 75                                            | 37 (50)     | 6SL3210-1SE27-5...                            | FSE        | <b>6SL3203-0CJ28-6AA0</b> |
| 90                                            | 45 (60)     | 6SL3210-1SE31-0...                            |            |                           |
| 110                                           | 55 (75)     | 6SL3210-1SE31-1...                            | FSF        | <b>6SE6400-3CC11-2FD0</b> |
| 145                                           | 75 (100)    | 6SL3210-1SE31-5...                            |            |                           |
| 178                                           | 90 (125)    | 6SL3210-1SE31-8...                            | FSF        | <b>6SE6400-3CC11-7FD0</b> |

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Line filters

#### Overview

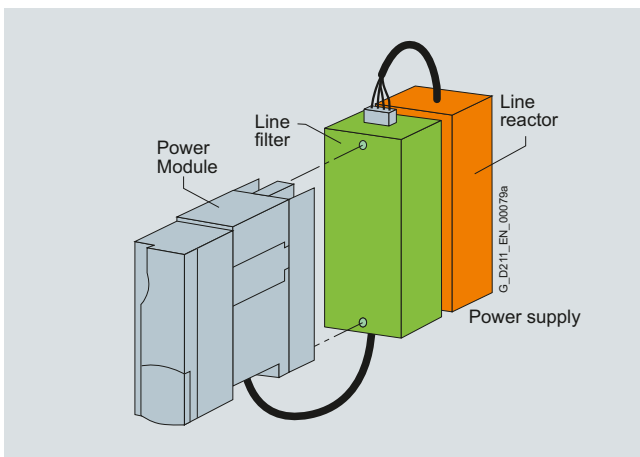


In plants with strict EMC requirements, the line filter for frame size FSA restricts the conducted interference emanating from the PM340 Power Module to the limit values of Class C2 as defined in EN 61800-3. The line filter is suited only for direct connection to TN (grounded) systems.

**Note:** The line filter is designed only for PM340 Power Modules of frame size FSA and a line voltage of 380 V to 480 V 3 AC. All other PM340 Power Modules are available with integrated line filter.

#### Integration

Line filter, line reactor and Power Module can be mounted in front of one another.



#### Technical specifications

|                                                                                     |                                                                                                                            |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                 | Line filter                                                                                                                |
| <b>Line supply voltage</b><br>380 ... 480 V 3 AC                                    | 6SE6400-2FA00-6AD0                                                                                                         |
| <b>Rated current</b>                                                                | 6 A                                                                                                                        |
| <b>Power loss</b>                                                                   | < 5 W                                                                                                                      |
| <b>Line connection</b><br>L1, L2, L3                                                | Screw-type terminals                                                                                                       |
| • Conductor cross-section                                                           | 1 ... 2.5 mm <sup>2</sup>                                                                                                  |
| <b>PE connection</b>                                                                | M4 screw stud                                                                                                              |
| <b>Load connection</b><br>U, V, W                                                   | Shielded cable                                                                                                             |
| • Conductor cross-section                                                           | 4 × 1.5 mm <sup>2</sup>                                                                                                    |
| • Length, approx.                                                                   | 0.24 m (0.79 ft)                                                                                                           |
| <b>Degree of protection</b>                                                         | IP20 (with correctly connected load connection cable)                                                                      |
| <b>Dimensions</b>                                                                   |                                                                                                                            |
| • Width                                                                             | 73.5 mm (2.89 in)                                                                                                          |
| • Height                                                                            | 200 mm (7.87 in)                                                                                                           |
| • Depth                                                                             | 44 mm (1.73 in)                                                                                                            |
| <b>Weight, approx.</b>                                                              | 0.5 kg (1 lb)                                                                                                              |
| <b>Approvals according to</b>                                                       | cURus                                                                                                                      |
| <b>Suitable for Power Module in blocksize format</b><br>Type (rated output current) | 6SL3210-1SE11-... (1.3 A and 1.7 A)<br>6SL3210-1SE12-... (2.2 A)<br>6SL3210-1SE13-... (3.1 A)<br>6SL3210-1SE14-... (4.1 A) |

#### Selection and ordering data

|                                                                                  |                           |
|----------------------------------------------------------------------------------|---------------------------|
| Suitable for Power Modules in blocksize format<br>Frame size FSA                 | Line filter               |
| Type                                                                             | Order No.                 |
| 6SL3210-1SE11-...<br>6SL3210-1SE12-...<br>6SL3210-1SE13-...<br>6SL3210-1SE14-... | <b>6SE6400-2FA00-6AD0</b> |

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Recommended line-side components

#### Overview

Suitable line-side power components are assigned depending on the power rating of the Power Modules.

The following tables list recommended components and apply for ambient temperatures up to 40 °C (104 °F).

Additional information about the line contactors, switch disconnectors, circuit breakers and fuses specified in the table can be found in Catalog IC 10.

#### Assignment of line-side power components to Power Modules in blocksize format

| Rated output current | Type rating | Assignment to Power Module in blocksize format | Line contactor | Circuit breaker IEC 60947 and UL489/ CSA C22.2 No. 5-02 | UL/CSA fuse, Class J<br>Available from: Mersen<br><a href="http://www.ep.mersen.com">www.ep.mersen.com</a> |      |               |
|----------------------|-------------|------------------------------------------------|----------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------|---------------|
| A                    | kW (HP)     | Type 6SL3210-                                  | Type           | Order No.                                               | Rated current                                                                                              | Size | Reference No. |

#### Line supply voltage 200 ... 240 V 1 AC

|     |             |            |          |               |      |         |       |
|-----|-------------|------------|----------|---------------|------|---------|-------|
| 0.9 | 0.12 (0.2)  | 1SB11-0... | 5TT57... | 5SJ4206-7HG41 | 6 A  | 21 × 57 | AJT6  |
| 2.3 | 0.37 (0.5)  | 1SB12-3... | 5TT57... | 5SJ4210-7HG41 | 10 A | 21 × 57 | AJT10 |
| 3.9 | 0.75 (0.75) | 1SB14-0... | 5TT57... | 5SJ4216-7HG41 | 15 A | 21 × 57 | AJT15 |

| Rated output current | Type rating | Assignment to Power Module in blocksize format | Line contactor | Circuit breaker IEC 60947 | Circuit breaker UL489/ CSA C22.2 No. 5-02 | Main circuit breaker |
|----------------------|-------------|------------------------------------------------|----------------|---------------------------|-------------------------------------------|----------------------|
| A                    | kW (HP)     | Type 6SL3210-                                  | Type           | Order No.                 | Order No.                                 | Order No.            |

#### Line supply voltage 380 ... 480 V 3 AC

|     |             |            |             |                    |                    |               |
|-----|-------------|------------|-------------|--------------------|--------------------|---------------|
| 1.3 | 0.37 (0.5)  | 1SE11-3UA0 | 3RT1015-... | 3RV1021-1DA10      | –                  | 3LD2003-1TP51 |
| 1.7 | 0.55 (0.75) | 1SE11-7UA0 | 3RT1015-... | 3RV1021-1DA10      | –                  | 3LD2003-1TP51 |
| 2.2 | 0.75 (1)    | 1SE12-2UA0 | 3RT1015-... | 3RV1021-1FA10      | –                  | 3LD2003-1TP51 |
| 3.1 | 1.1 (1.5)   | 1SE13-1UA0 | 3RT1015-... | 3RV1021-1GA10      | –                  | 3LD2003-1TP51 |
| 4.1 | 1.5 (2)     | 1SE14-1UA0 | 3RT1015-... | 3RV1021-1HA10      | –                  | 3LD2003-1TP51 |
| 5.9 | 2.2 (3)     | 1SE16-0... | 3RT1015-... | 3RV1021-1KA10      | –                  | 3LD2003-1TP51 |
| 7.7 | 3 (5)       | 1SE17-7... | 3RT1015-... | 3RV1021-4AA10      | –                  | 3LD2003-1TP51 |
| 10  | 4 (5)       | 1SE21-0... | 3RT1016-... | 3RV1021-4BA10      | –                  | 3LD2103-1TP51 |
| 18  | 7.5 (10)    | 1SE21-8... | 3RT1025-... | 3RV1031-4EA10      | –                  | 3LD2203-0TK51 |
| 25  | 11 (15)     | 1SE22-5... | 3RT1026-... | 3RV1031-4FA10      | –                  | 3LD2504-0TK51 |
| 32  | 15 (20)     | 1SE23-2... | 3RT1034-... | 3RV1031-4HA10      | –                  | 3LD2504-0TK51 |
| 38  | 18.5 (25)   | 1SE23-8... | 3RT1035-... | 3RV1042-4JA10      | –                  | 3LD2504-0TK51 |
| 45  | 22 (30)     | 1SE24-5... | 3RT1036-... | 3RV1042-4KA10      | –                  | 3LD2504-0TK51 |
| 60  | 30 (40)     | 1SE26-0... | 3RT1044-... | 3RV1042-4MA10      | 3VL2191-3KN30-.... | 3LD2704-0TK51 |
| 75  | 37 (50)     | 1SE27-5... | 3RT1045-... | 3VL1712-1DD33-.... | 3VL2110-3KN30-.... | 3LD2704-0TK51 |
| 90  | 45 (60)     | 1SE31-0... | 3RT1046-... | 3VL1716-1DD33-.... | 3VL2112-3KN30-.... | 3LD2804-0TK51 |
| 110 | 55 (75)     | 1SE31-1... | 3RT1054-... | 3VL3720-1DC36-.... | 3VL2115-3KN30-.... | 3KA5330-1GE01 |
| 145 | 75 (100)    | 1SE31-5... | 3RT1056-... | 3VL3720-1DC36-.... | 3VL3120-3KN30-.... | 3KA5530-1GE01 |
| 178 | 90 (125)    | 1SE31-8... | 3RT1064-... | 3VL4725-1DC36-.... | 3VL3125-3KN30-.... | 3KA5530-1GE01 |

# SINAMICS S120 drive system

## Blocksize format – Power Modules

### Recommended line-side components

#### Overview (continued)

| Rated output current                   | Type rating | Assignment to Power Module in blocksize format | Fuse switch disconnect | Switch disconnect with fuse holders | Fuse      | UL/CSA fuse, Class J <sup>1)</sup>                                                 |          |               |
|----------------------------------------|-------------|------------------------------------------------|------------------------|-------------------------------------|-----------|------------------------------------------------------------------------------------|----------|---------------|
|                                        |             |                                                |                        |                                     |           | Available from: Mersen<br><a href="http://www.ep.mersen.com">www.ep.mersen.com</a> |          |               |
| A                                      | kW (HP)     | Type 6SL3210-                                  | Order No.              | Order No.                           | Order No. | Rated current                                                                      | Size     | Reference No. |
| Line supply voltage 380 ... 480 V 3 AC |             |                                                |                        |                                     |           |                                                                                    |          |               |
| 1.3                                    | 0.37 (0.5)  | 1SE11-3UA0                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3804   | 4 A                                                                                | 21 × 57  | AJT4          |
| 1.7                                    | 0.55 (0.75) | 1SE11-7UA0                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3804   | 4 A                                                                                | 21 × 57  | AJT4          |
| 2.2                                    | 0.75 (1)    | 1SE12-2UA0                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3801   | 6 A                                                                                | 21 × 57  | AJT6          |
| 3.1                                    | 1.1 (1.5)   | 1SE13-1UA0                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3803   | 8 A                                                                                | 21 × 57  | AJT8          |
| 4.1                                    | 1.5 (2)     | 1SE14-1UA0                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3803   | 10 A                                                                               | 21 × 57  | AJT10         |
| 5.9                                    | 2.2 (3)     | 1SE16-0...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3803   | 10 A                                                                               | 21 × 57  | AJT10         |
| 7.7                                    | 3 (5)       | 1SE17-7...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3805   | 12 A                                                                               | 21 × 57  | AJT12         |
| 10                                     | 4 (5)       | 1SE21-0...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3805   | 15 A                                                                               | 21 × 57  | AJT15         |
| 18                                     | 7.5 (10)    | 1SE21-8...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3810   | 25 A                                                                               | 21 × 57  | AJT25         |
| 25                                     | 11 (15)     | 1SE22-5...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3814   | 35 A                                                                               | 27 × 60  | AJT35         |
| 32                                     | 15 (20)     | 1SE23-2...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3817   | 45 A                                                                               | 27 × 60  | AJT45         |
| 38                                     | 18.5 (25)   | 1SE23-8...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3820   | 50 A                                                                               | 27 × 60  | AJT50         |
| 45                                     | 22 (30)     | 1SE24-5...                                     | 3NP4010-0CH01          | 3KL5030-1GB01                       | 3NA3822   | 60 A                                                                               | 27 × 60  | AJT60         |
| 60                                     | 30 (40)     | 1SE26-0...                                     | 3NP4010-0CH01          | 3KL5230-1GB01                       | 3NA3824   | 90 A                                                                               | 29 × 117 | AJT90         |
| 75                                     | 37 (50)     | 1SE27-5...                                     | 3NP4010-0CH01          | 3KL5230-1GB01                       | 3NA3830   | 100 A                                                                              | 29 × 117 | AJT100        |
| 90                                     | 45 (60)     | 1SE31-0...                                     | 3NP4070-0CH01          | 3KL5230-1GB01                       | 3NA3832   | 125 A                                                                              | 41 × 146 | AJT125        |
| 110                                    | 55 (75)     | 1SE31-1...                                     | 3NP4070-0CH01          | 3KL5330-1GB01                       | 3NA3836   | 150 A                                                                              | 41 × 146 | AJT150        |
| 145                                    | 75 (100)    | 1SE31-5...                                     | 3NP4270-0CA01          | 3KL5530-1GB01                       | 3NA3140   | 200 A                                                                              | 41 × 146 | AJT200        |
| 178                                    | 90 (125)    | 1SE31-8...                                     | 3NP4270-0CA01          | 3KL5530-1GB01                       | 3NA3144   | 250 A                                                                              | 54 × 181 | AJT250        |

<sup>1)</sup> Not suitable for 3NP and 3KL switch disconnectors.

# SINAMICS S120 drive system

## Blocksize format – DC link components

### Braking resistors

#### Overview



Braking resistor for blocksize format, frame sizes FSA and FSC

The PM340 Power Modules cannot regenerate into the line supply. For regenerative operation, e.g. the braking of a rotating mass, a braking resistor must be connected to convert the resulting energy into heat.

The braking resistor is connected at terminals DCP/R1 and R2.

The braking resistors can be installed at the side next to the PM340 Power Modules. The braking resistors for the FSA and FSB frame sizes are designed as base components. If the PM340 Power Modules of the FSA or FSB frame size are operated without line reactor, the braking resistors can also be installed under the Power Modules.

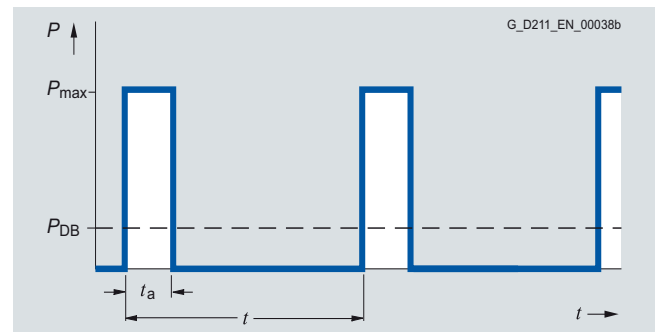
The braking resistors for the Power Modules of the FSC to FSF frame sizes should be placed outside the control cabinet or outside the switchgear room in order to lead the resulting heat loss from the area of the Power Modules. The level of air conditioning required is therefore reduced.

The braking resistors are designed with a temperature switch. The temperature switch must be evaluated to prevent consequential damage if the braking resistor overheats.

#### Selection and ordering data

| Description                                                                   | Suitable for Power Module in blocksize format | Order No.                 |
|-------------------------------------------------------------------------------|-----------------------------------------------|---------------------------|
| <b>DC link voltage 240 ... 360 V DC<br/>(line voltage 200 ... 240 V 1 AC)</b> |                                               |                           |
| <b>Braking resistor</b>                                                       |                                               |                           |
| • 180 Ω                                                                       | Frame size FSA                                | <b>6SE6400-4BC05-0AA0</b> |
| <b>DC link voltage 510 ... 720 V DC<br/>(line voltage 380 ... 480 V 3 AC)</b> |                                               |                           |
| <b>Braking resistor</b>                                                       |                                               |                           |
| • 390 Ω                                                                       | Frame size FSA                                | <b>6SE6400-4BD11-0AA0</b> |
| • 160 Ω                                                                       | Frame size FSB                                | <b>6SL3201-0BE12-0AA0</b> |
| • 56 Ω                                                                        | Frame size FSC                                | <b>6SE6400-4BD16-5CA0</b> |
| • 27 Ω                                                                        | Frame size FSD                                | <b>6SE6400-4BD21-2DA0</b> |
| • 15 Ω                                                                        | Frame size FSE                                | <b>6SE6400-4BD22-2EA1</b> |
| • 8.2 Ω                                                                       | Frame size FSF                                | <b>6SE6400-4BD24-0FA0</b> |

#### Characteristic curves



Load diagram for braking resistors in blocksize format

$$t_a = 12 \text{ s}$$

$$t = 240 \text{ s}$$

# SINAMICS S120 drive system

## Blocksize format – DC link components

### Braking resistors

#### Technical specifications

|                                                       |                                    |
|-------------------------------------------------------|------------------------------------|
| <b>Product name</b>                                   | Braking resistor                   |
| <b>DC link voltage 240 ... 360 V DC</b>               | 6SE6400-4BC05-0AA0                 |
| <b>Resistance</b>                                     | 180 Ω                              |
| <b>Rated power <math>P_{DB}</math></b>                | 0.05 kW                            |
| <b>Peak power <math>P_{max}</math></b>                | 1 kW                               |
| <b>Degree of protection<sup>1)</sup></b>              | IP20                               |
| <b>Power connections</b>                              | 3 × 1.5 mm <sup>2</sup> (shielded) |
| • Length                                              | 0.5 m (1.64 ft)                    |
| <b>Thermostatic switch (NC contact)</b>               |                                    |
| • Switching capacity                                  | 250 V AC/max. 2.5 A                |
| • Conductor cross-section                             | 0.5 ... 2.5 mm <sup>2</sup>        |
| <b>Dimensions</b>                                     |                                    |
| • Width                                               | 72 mm (2.83 in)                    |
| • Height                                              | 230 mm (9.06 in)                   |
| • Depth                                               | 43.5 mm (1.71 in)                  |
| <b>Weight, approx.</b>                                | 1.0 kg (2.21 lb)                   |
| <b>Approvals according to</b>                         | cURus                              |
| <b>Suitable for Power Modules in blocksize format</b> | FSA                                |

| <b>DC link voltage 510 V ... 720 V DC</b>             |                 | Braking resistor                   |                                    |                                    |                      |                      |                      |
|-------------------------------------------------------|-----------------|------------------------------------|------------------------------------|------------------------------------|----------------------|----------------------|----------------------|
|                                                       |                 | 6SE6400-4BD11-0AA0                 | 6SL3201-0BE12-0AA0                 | 6SE6400-4BD16-5CA0                 | 6SE6400-4BD21-2DA0   | 6SE6400-4BD22-2EA1   | 6SE6400-4BD24-0FA0   |
| <b>Resistance</b>                                     | Ω               | 390                                | 160                                | 56                                 | 27                   | 15                   | 8.2                  |
| <b>Rated power <math>P_{DB}</math></b>                | kW              | 0.1                                | 0.2                                | 0.65                               | 1.2                  | 2.2                  | 4.0                  |
| <b>Peak power <math>P_{max}</math></b>                | kW              | 1.7                                | 4.1                                | 12                                 | 24                   | 44                   | 80                   |
| <b>Degree of protection<sup>1)</sup></b>              |                 | IP20                               | IP20                               | IP20                               | IP20                 | IP20                 | IP20                 |
| <b>Power connections</b>                              |                 | 3 × 1.5 mm <sup>2</sup> (shielded) | 3 × 1.5 mm <sup>2</sup> (shielded) | 3 × 1.5 mm <sup>2</sup> (shielded) | M6 screw stud        | M6 screw stud        | M6 screw stud        |
| • Length                                              | m (ft)          | 0.5 (1.64)                         | 0.5 (1.64)                         | 0.9 (2.95)                         | –                    | –                    | –                    |
| <b>Thermostatic switch (NC contact)</b>               |                 |                                    |                                    |                                    |                      |                      |                      |
| • Switching capacity                                  |                 | 250 V AC/ max. 2.5 A               | 250 V AC/ max. 2.5 A               | 250 V AC/ max. 2.5 A               | 250 V AC/ max. 2.5 A | 250 V AC/ max. 2.5 A | 250 V AC/ max. 2.5 A |
| • Conductor cross-section                             | mm <sup>2</sup> | 0.5 ... 2.5                        | 0.5 ... 2.5                        | 0.5 ... 2.5                        | 0.5 ... 2.5          | 0.5 ... 2.5          | 0.5 ... 2.5          |
| <b>Dimensions</b>                                     |                 |                                    |                                    |                                    |                      |                      |                      |
| • Width                                               | mm (in)         | 72 (2.83)                          | 153 (6.02)                         | 185 (7.28)                         | 270 (10.63)          | 270 (10.63)          | 400 (15.75)          |
| • Height                                              | mm (in)         | 230 (9.06)                         | 329 (12.95)                        | 285 (11.22)                        | 515 (20.28)          | 645 (25.39)          | 650 (25.59)          |
| • Depth                                               | mm (in)         | 43.5 (1.71)                        | 43.5 (1.71)                        | 150 (5.91)                         | 175 (6.89)           | 175 (6.89)           | 315 (12.4)           |
| <b>Weight, approx.</b>                                | kg (lb)         | 1.0 (2.21)                         | 1.6 (3.53)                         | 3.8 (8.38)                         | 7.4 (16.3)           | 10.6 (23.4)          | 16.7 (36.8)          |
| <b>Approvals according to</b>                         |                 | cURus                              | cURus                              | cURus                              | cURus                | cURus                | cURus                |
| <b>Suitable for Power Modules in blocksize format</b> |                 | FSA                                | FSB                                | FSC                                | FSD                  | FSE                  | FSF                  |

<sup>1)</sup> With correctly connected load connection cable.



# SINAMICS S120 drive system

## SINAMICS S120 Combi

### Power Modules

#### Overview



SINAMICS S120 Combi Power Module

SINAMICS S120 Combi is a very compact and rugged drive concept tailored for compact turning and milling machines. SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability, power units for spindle and feed motors as well as a TTL encoder interface into a single Power Module.

#### Benefits

- Compact multi-axis module with line infeed with regenerative feedback capability and power units for 3 or 4 axes
- Customized drive system for compact standard turning and milling machines
- Requires very little mounting space in control cabinet (incl. fan module, shield terminals and ventilation clearances)
- Optimized for weak supply networks with frequent undervoltage, network imbalances and large frequency fluctuations
- Optimized for harsh operating conditions with increased cabinet temperature and increased humidity
- Rugged Power Modules resistant to short circuits, overvoltage and ground faults
- Rugged and easy-to-fit screw-type terminals with integrated shield connection for the power cables
- Perfect expendability using additional Motor Modules in book-size compact format
- Low energy consumption thanks to state-of-the-art 400-V technology
- Excellent dynamic response and machining precision thanks to Dynamic Servo Control (DSC)
- Simple cabling thanks to intelligent DRIVE-CLiQ interface
- Very simple commissioning thanks to predefined topologies

#### Function

- Power Module with 3 or 4 integrated power units
- Integrated line infeed with regenerative feedback capability
- Integrated TTL encoder interface
- Integrated motor brake control for one axis
- Integrated fan power supply
- Line connection voltage 380 to 480 V 3 AC
- Supply types TT, TN and IT
- Integrated shield terminals
- Heat dissipation concept with an external heat sink for extremely low power loss in the control cabinet
- Easy-to-mount fan module optimized for harsh environments
- Increased availability thanks to fan monitoring
- Derating only from 45 °C cabinet temperature
- Power cables are connected by means of screw-type terminals

#### Integration

The following components can be connected to the SINAMICS S120 Combi drive system:

- SINUMERIK 828D BASIC T
- SINUMERIK 828D BASIC M
- SINUMERIK 828D
- 3 or 4 spindles/feed motors
- 3 or 4 motor encoders
- 3 or 4 direct encoders via DMC20
- Direct spindle encoder directly via TTL (5 V only) or sin/cos via SMC20
- External fan module
- Up to two additional SINAMICS S120 Motor Modules in booksize compact format via DC link connection and 24 V DC busbars
- Braking Module with braking resistor via DC link connection<sup>1)</sup>
- Control Supply Module via DC link connection and 24 V DC busbars
- One safe motor brake control
- 5 or 6 DRIVE-CLiQ sockets
- 24 V electronic power supply via connector
- 1 safe standstill input for the infeed (Enable Pulses)
- 1 safe standstill input for the spindle and feeds (Enable Pulses)
- 1 temperature sensor input for the spindle (KTY84-130 or PTC)
- PE/protective earth connections

The scope of supply of the SINAMICS S120 Combi Power Modules includes:

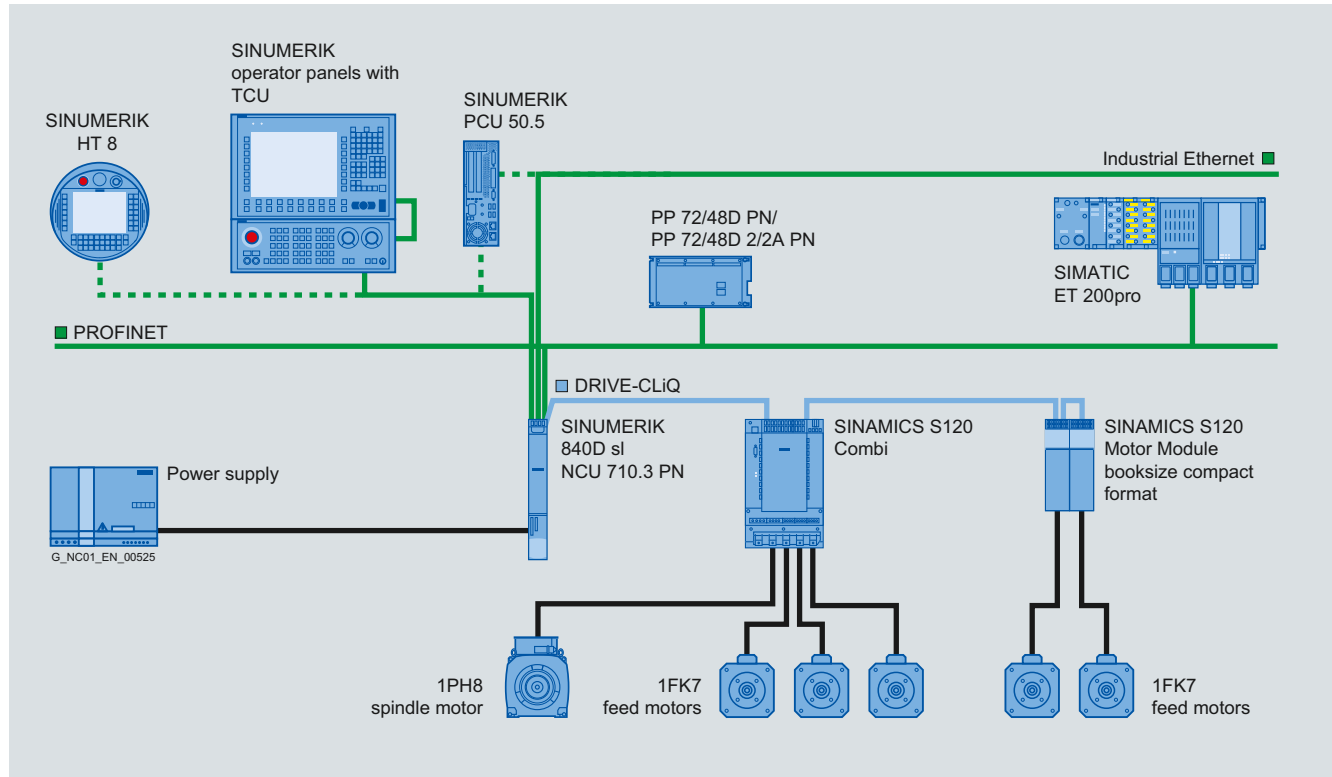
- SINAMICS S120 Combi Power Module
- Accessories pack consisting of:
  - 4 DRIVE-CLiQ dust-proof blanking plugs
  - Connector X224 for the electronic power supply
  - Connector X11 for motor brake control
  - Connector X21 Enable Pulses infeed
  - Connector X22 Enable Pulses drives/temp.
  - 5 shield terminals for power cables
  - Shield terminal for signal cable

# SINAMICS S120 drive system

## SINAMICS S120 Combi

### Power Modules

#### Integration (continued)



#### Selection and ordering data

| Rated power<br>Infeed<br>kW                              | Rated output<br>current<br>Spindle<br>A | Rated output<br>current<br>Feedrate 1<br>A | Rated output<br>current<br>Feedrate 2<br>A | Rated output<br>current<br>Feedrate 3<br>A | Order No.                 |
|----------------------------------------------------------|-----------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|---------------------------|
| <b>SINAMICS S120 Combi Power Modules (3 power units)</b> |                                         |                                            |                                            |                                            |                           |
| 16                                                       | 18                                      | 5                                          | 5                                          | —                                          | <b>6SL3111-3VE21-6FA0</b> |
| 16                                                       | 24                                      | 9                                          | 9                                          | —                                          | <b>6SL3111-3VE21-6EA0</b> |
| 20                                                       | 30                                      | 9                                          | 9                                          | —                                          | <b>6SL3111-3VE22-0HA0</b> |
| <b>SINAMICS S120 Combi Power Modules (4 power units)</b> |                                         |                                            |                                            |                                            |                           |
| 16                                                       | 18                                      | 9                                          | 5                                          | 5                                          | <b>6SL3111-4VE21-6FA0</b> |
| 16                                                       | 24                                      | 9                                          | 9                                          | 9                                          | <b>6SL3111-4VE21-6EA0</b> |
| 20                                                       | 30                                      | 12                                         | 9                                          | 9                                          | <b>6SL3111-4VE22-0HA0</b> |

#### Accessories

| Description                                      | Order No.                 |
|--------------------------------------------------|---------------------------|
| <b>SINAMICS S120 Combi accessories pack</b>      | <b>6SL3161-8AP00-0AA0</b> |
| Comprising:                                      |                           |
| • 4 × DRIVE-CLiQ dust-proof blanking plugs       |                           |
| • Connector X224 for the electronic power supply |                           |
| • Connector X11 for motor brake control          |                           |
| • Connector X21 Enable Pulses infeed             |                           |
| • Connector X22 Enable Pulses drives/temp.       |                           |
| • 5 × shield terminals for power cables          |                           |
| • Shield terminal for signal cable               |                           |

### Technical specifications

|                                              |                                                                                                                                                            |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                          | SINAMICS S120 Combi Power Modules<br>6SL3111-...                                                                                                           |
| <b>DC link voltage</b>                       | 1.35 × line voltage <sup>1)</sup>                                                                                                                          |
| <b>Output voltage</b>                        | 0 ... 0.7 × DC link voltage <sup>1)</sup>                                                                                                                  |
| <b>Line power factor at rated power</b>      | <ul style="list-style-type: none"> <li>Fundamental (<math>\cos \varphi_1</math>) &gt; 0.96</li> <li>Total (<math>\lambda</math>) 0.65 ... 0.90</li> </ul>  |
| <b>Radio interference suppression</b>        | <ul style="list-style-type: none"> <li>Standard No radio interference suppression</li> <li>With line filter Category C2 according to EN 61800-3</li> </ul> |
| <b>Degree of protection</b>                  | IP20                                                                                                                                                       |
| <b>Site altitude (installation altitude)</b> | Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) with derating                                               |
| <b>Declarations of conformity</b>            | CE (Low Voltage and EMC Directives)                                                                                                                        |
| <b>Approvals according to</b>                | cURus                                                                                                                                                      |
| <b>Safety Integrated</b>                     | Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to ISO 13849-1 or EN 954-1                                           |

| <b>Product name</b>                                    |     | 3-axis Power Module                                                                |                                                                                    |                                                                                    |  |
|--------------------------------------------------------|-----|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--|
| External air cooling                                   |     | 6SL3111-3VE21-6FA0                                                                 | 6SL3111-3VE21-6EA0                                                                 | 6SL3111-3VE22-0HA0                                                                 |  |
| <b>Infeed</b>                                          | kW  | <b>16</b>                                                                          | <b>16</b>                                                                          | <b>20</b>                                                                          |  |
| • Rated power $P_{rated}$ (S1)                         | kW  | 16                                                                                 | 16                                                                                 | 20                                                                                 |  |
| • Infeed power $P_{S6}$ (S6-40 %)                      | kW  | 21                                                                                 | 21                                                                                 | 26.5                                                                               |  |
| • Peak infeed power $P_{max}$                          | kW  | 35                                                                                 | 35                                                                                 | 40                                                                                 |  |
| <b>Regenerative feedback</b>                           |     |                                                                                    |                                                                                    |                                                                                    |  |
| • Rated power $P_{rated}$ (S1)                         | kW  | 16                                                                                 | 16                                                                                 | 20                                                                                 |  |
| • Peak regenerative feedback power $P_{max}$           | kW  | 35                                                                                 | 35                                                                                 | 40                                                                                 |  |
| <b>Supply voltages</b>                                 |     |                                                                                    |                                                                                    |                                                                                    |  |
| • Line voltage                                         | V   | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level |  |
| • Line frequency                                       | Hz  | 45 ... 66                                                                          | 45 ... 66                                                                          | 45 ... 66                                                                          |  |
| • Electronic power supply                              | V   | 24 DC (20.4 ... 28.8 DC)                                                           | 24 DC (20.4 ... 28.8 DC)                                                           | 24 DC (20.4 ... 28.8 DC)                                                           |  |
| <b>Rated input current</b>                             |     |                                                                                    |                                                                                    |                                                                                    |  |
| • At 400 V 3 AC                                        | A   | 28                                                                                 | 28                                                                                 | 34                                                                                 |  |
| • At 380 V/480 V 3 AC                                  | A   | 29/25                                                                              | 29/25                                                                              | 35/30                                                                              |  |
| • At 400 V 3 AC (S6-40%)                               | A   | 35.5                                                                               | 35.5                                                                               | 44                                                                                 |  |
| • At 400 V 3 AC peak current                           | A   | 56                                                                                 | 56                                                                                 | 63.5                                                                               |  |
| <b>Pulse frequency</b>                                 | kHz | 4                                                                                  | 4                                                                                  | 4                                                                                  |  |
| <b>Output voltage AC</b>                               | V   | 0 ... 0.7 × DC link<br>voltage                                                     | 0 ... 0.7 × DC link<br>voltage                                                     | 0 ... 0.7 × DC link<br>voltage                                                     |  |
| <b>Spindle</b>                                         | A   | <b>18</b>                                                                          | <b>24</b>                                                                          | <b>30</b>                                                                          |  |
| • Rated output current AC $I_{rated}$                  | A   | 18                                                                                 | 24                                                                                 | 30                                                                                 |  |
| • Intermittent-duty operating current AC $I_{S6-40\%}$ | A   | 24                                                                                 | 32                                                                                 | 40                                                                                 |  |
| • Peak current AC $I_{rmax}$                           | A   | 36                                                                                 | 48                                                                                 | 56                                                                                 |  |
| <b>Rated power</b>                                     |     |                                                                                    |                                                                                    |                                                                                    |  |
| • At 540 V DC link voltage                             | kW  | 8.7                                                                                | 11.7                                                                               | 14.4                                                                               |  |
| • At 600 V DC link voltage                             | kW  | 9.7                                                                                | 13                                                                                 | 16                                                                                 |  |
| <b>Feedrate 1/Feedrate 2</b>                           | A   | <b>5</b>                                                                           | <b>9</b>                                                                           | <b>9</b>                                                                           |  |
| • Rated output current AC $I_{rated}$                  | A   | 5                                                                                  | 9                                                                                  | 9                                                                                  |  |
| • Intermittent-duty operating current AC $I_{S6-40\%}$ | A   | 6.5                                                                                | 12                                                                                 | 12                                                                                 |  |
| • Peak current AC $I_{rmax}$                           | A   | 10                                                                                 | 18                                                                                 | 18                                                                                 |  |

<sup>1)</sup> The DC link voltage adjusts itself to the mean value of the rectified line voltage.

# SINAMICS S120 drive system

## SINAMICS S120 Combi

### Power Modules

#### Technical specifications (continued)

| External air cooling                                        |         | 3-axis Power Module (continued)           |                    |                    |
|-------------------------------------------------------------|---------|-------------------------------------------|--------------------|--------------------|
|                                                             |         | 6SL3111-3VE21-6FA0                        | 6SL3111-3VE21-6EA0 | 6SL3111-3VE22-0HA0 |
| <b>Rated power</b>                                          |         |                                           |                    |                    |
| • At 540 V DC link voltage                                  | kW      | 2.4                                       | 4.3                | 4.3                |
| • At 600 V DC link voltage                                  | kW      | 2.7                                       | 4.8                | 4.8                |
| <b>Output for expansion axis</b>                            |         |                                           |                    |                    |
| • DC link output current DC $I_{rated}$                     | A       | 40                                        | 40                 | 40                 |
| • DC link voltage                                           | V       | 460 ... 720                               | 460 ... 720        | 460 ... 720        |
| • Electronics output current for an expansion axis 24 V DC  | A       | 20                                        | 20                 | 20                 |
| <b>Electronics current consumption at 24 V DC</b>           |         |                                           |                    |                    |
| • Without external fan module                               | A       | 1.5                                       | 1.5                | 1.5                |
| • With external fan module                                  | A       | 2.3                                       | 2.3                | 2.3                |
| <b>Total power loss</b><br>(incl. electronics losses)       |         |                                           |                    |                    |
| • Internal                                                  | kW      | 0.08                                      | 0.09               | 0.1                |
| • External                                                  | kW      | 0.345                                     | 0.445              | 0.53               |
| <b>Ambient temperature, max.</b>                            |         |                                           |                    |                    |
| • Without derating                                          | °C (°F) | 45 (104)                                  | 45 (104)           | 45 (104)           |
| • With derating                                             | °C (°F) | 55 (131)                                  | 55 (131)           | 55 (131)           |
| <b>DC link voltage</b>                                      |         |                                           |                    |                    |
| • Overvoltage trip DC                                       | V       | 820 ± 2 %                                 | 820 ± 2 %          | 820 ± 2 %          |
| • Undervoltage trip DC                                      | V       | 380 ± 2 %                                 | 380 ± 2 %          | 380 ± 2 %          |
| <b>DC link capacitance</b>                                  |         | μF                                        | 1645               | 1880               |
| <b>Circuit breaker (UL)</b>                                 |         |                                           |                    |                    |
| • Type                                                      |         | 3VL2105-2KN30-....                        | 3VL2105-2KN30-.... | 3VL2106-2KN30-.... |
| • Rated current                                             | A       | 50                                        | 50                 | 60                 |
| • Rated short-circuit current SCCR at 480 V 3 AC, resulting | kA      | 65                                        | 65                 | 65                 |
| <b>Safety fuses (UL)</b>                                    |         |                                           |                    |                    |
| • Type                                                      |         | AJT 35                                    | AJT 35             | AJT 60             |
| • Rated current                                             | A       | 35                                        | 35                 | 60                 |
| • Rated short-circuit current SCCR, resulting               |         |                                           |                    |                    |
| - At 480 V 3 AC                                             | kA      | 65                                        | 65                 | 65                 |
| - At 600 V 3 AC                                             | kA      | 200                                       | 200                | 200                |
| <b>Cooling air requirement</b>                              |         | m <sup>3</sup> /h<br>(ft <sup>3</sup> /s) | 160<br>(5650)      | 160<br>(5650)      |
| <b>Dimensions</b>                                           |         |                                           |                    |                    |
| • Width                                                     | mm (in) | 260 (10.23)                               | 260 (10.23)        | 260 (10.23)        |
| • Height                                                    | mm (in) | 380 (14.96)                               | 380 (14.96)        | 380 (14.96)        |
| • Depth                                                     | mm (in) | 304 (11.97)                               | 304 (11.97)        | 304 (11.97)        |
| <b>Weight, approx.</b>                                      |         | kg (lb)                                   | 18.35 (40.45)      | 18.4 (40.56)       |

### Technical specifications (continued)

| External air cooling                                       |     | 4-axis Power Module                                                                |                                                                                    |                                                                                    |
|------------------------------------------------------------|-----|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                            |     | 6SL3111-4VE21-6FA0                                                                 | 6SL3111-4VE21-6EA0                                                                 | 6SL3111-4VE22-0HA0                                                                 |
| <b>Infeed</b>                                              | kW  | <b>16</b>                                                                          | <b>16</b>                                                                          | <b>20</b>                                                                          |
| • Rated power $P_{rated}$ (S1)                             | kW  | 16                                                                                 | 16                                                                                 | 20                                                                                 |
| • Infeed power $P_{S6}$ (S6-40 %)                          | kW  | 21                                                                                 | 21                                                                                 | 26.5                                                                               |
| • Peak infeed power $P_{max}$                              | kW  | 35                                                                                 | 35                                                                                 | 40                                                                                 |
| <b>Regenerative feedback</b>                               |     |                                                                                    |                                                                                    |                                                                                    |
| • Rated power $P_{rated}$ (S1)                             | kW  | 16                                                                                 | 16                                                                                 | 20                                                                                 |
| • Peak regenerative feedback power $P_{max}$               | kW  | 35                                                                                 | 35                                                                                 | 40                                                                                 |
| <b>Supply voltages</b>                                     |     |                                                                                    |                                                                                    |                                                                                    |
| • Line voltage                                             | V   | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level | 380 V 3 AC<br>- 10 % ... 480 V + 10 %<br>up to 2000 m (6562 ft)<br>above sea level |
| • Line frequency                                           | Hz  | 45 ... 66                                                                          | 45 ... 66                                                                          | 45 ... 66                                                                          |
| • Electronic power supply                                  | V   | 24 DC (20.4 ... 28.8 DC)                                                           | 24 DC (20.4 ... 28.8 DC)                                                           | 24 DC (20.4 ... 28.8 DC)                                                           |
| <b>Rated input current</b>                                 |     |                                                                                    |                                                                                    |                                                                                    |
| • At 400 V 3 AC                                            | A   | 28                                                                                 | 28                                                                                 | 34                                                                                 |
| • At 380 V/480 V 3 AC                                      | A   | 29/25                                                                              | 29/25                                                                              | 35/30                                                                              |
| • At 400 V 3 AC (S6-40 %)                                  | A   | 35.5                                                                               | 35.5                                                                               | 44                                                                                 |
| • At 400 V 3 AC peak current                               | A   | 56                                                                                 | 56                                                                                 | 63.5                                                                               |
| <b>Pulse frequency</b>                                     | kHz | 4                                                                                  | 4                                                                                  | 4                                                                                  |
| <b>Output voltage AC</b>                                   | V   | 0 ... 0.7 × DC link<br>voltage                                                     | 0 ... 0.7 × DC link<br>voltage                                                     | 0 ... 0.7 × DC link<br>voltage                                                     |
| <b>Spindle</b>                                             | A   | <b>18</b>                                                                          | <b>24</b>                                                                          | <b>30</b>                                                                          |
| • Rated output current AC $I_{rated}$                      | A   | 18                                                                                 | 24                                                                                 | 30                                                                                 |
| • Intermittent-duty operating current AC $I_{S6-40\%}$     | A   | 24                                                                                 | 32                                                                                 | 40                                                                                 |
| • Peak current AC $I_{rmax}$                               | A   | 36                                                                                 | 48                                                                                 | 56                                                                                 |
| <b>Rated power</b>                                         |     |                                                                                    |                                                                                    |                                                                                    |
| • At 540 V DC link voltage                                 | kW  | 8.7                                                                                | 11.7                                                                               | 14.4                                                                               |
| • At 600 V DC link voltage                                 | kW  | 9.7                                                                                | 13                                                                                 | 16                                                                                 |
| <b>Feedrate 1</b>                                          | A   | <b>9</b>                                                                           | <b>9</b>                                                                           | <b>12</b>                                                                          |
| • Rated output current AC $I_{rated}$                      | A   | 9                                                                                  | 9                                                                                  | 12                                                                                 |
| • Intermittent-duty operating current AC $I_{S6-40\%}$     | A   | 12                                                                                 | 12                                                                                 | 16                                                                                 |
| • Peak current AC $I_{rmax}$                               | A   | 18                                                                                 | 18                                                                                 | 24                                                                                 |
| <b>Rated power</b>                                         |     |                                                                                    |                                                                                    |                                                                                    |
| • At 540 V DC link voltage                                 | kW  | 4.3                                                                                | 4.3                                                                                | 5.8                                                                                |
| • At 600 V DC link voltage                                 | kW  | 4.8                                                                                | 4.8                                                                                | 6.5                                                                                |
| <b>Feedrate 2/Feedrate 3</b>                               | A   | <b>5</b>                                                                           | <b>9</b>                                                                           | <b>9</b>                                                                           |
| • Rated output current AC $I_{rated}$                      | A   | 5                                                                                  | 9                                                                                  | 9                                                                                  |
| • Intermittent-duty operating current AC $I_{S6-40\%}$     | A   | 6.5                                                                                | 12                                                                                 | 12                                                                                 |
| • Peak current AC $I_{rmax}$                               | A   | 10                                                                                 | 18                                                                                 | 18                                                                                 |
| <b>Rated power</b>                                         |     |                                                                                    |                                                                                    |                                                                                    |
| • At 540 V DC link voltage                                 | kW  | 2.4                                                                                | 4.3                                                                                | 4.3                                                                                |
| • At 600 V DC link voltage                                 | kW  | 2.7                                                                                | 4.8                                                                                | 4.8                                                                                |
| <b>Output for expansion axis</b>                           |     |                                                                                    |                                                                                    |                                                                                    |
| • DC link output current DC $I_{rated}$                    | A   | 40                                                                                 | 40                                                                                 | 40                                                                                 |
| • DC link voltage                                          | V   | 460 ... 720                                                                        | 460 ... 720                                                                        | 460 ... 720                                                                        |
| • Electronics output current for an expansion axis 24 V DC | A   | 20                                                                                 | 20                                                                                 | 20                                                                                 |

# SINAMICS S120 drive system

## SINAMICS S120 Combi

### Power Modules

#### Technical specifications (continued)

|                                                             |         | 4-axis Power Module (continued)           |                    |                    |
|-------------------------------------------------------------|---------|-------------------------------------------|--------------------|--------------------|
| External air cooling                                        |         | 6SL3111-4VE21-6FA0                        | 6SL3111-4VE21-6EA0 | 6SL3111-4VE22-0HA0 |
| <b>Electronics current consumption at 24 V DC</b>           |         |                                           |                    |                    |
| • Without external fan module                               | A       | 1.6                                       | 1.6                | 1.6                |
| • With external fan module                                  | A       | 2.4                                       | 2.4                | 2.4                |
| <b>Total power loss</b><br>(incl. electronics losses)       |         |                                           |                    |                    |
| • Internal                                                  | kW      | 0.085                                     | 0.1                | 0.115              |
| • External                                                  | kW      | 0.405                                     | 0.505              | 0.62               |
| <b>Ambient temperature, max.</b>                            |         |                                           |                    |                    |
| • Without derating                                          | °C (°F) | 45 (104)                                  | 45 (104)           | 45 (104)           |
| • With derating                                             | °C (°F) | 55 (131)                                  | 55 (131)           | 55 (131)           |
| <b>DC link voltage</b>                                      |         |                                           |                    |                    |
| • Overvoltage trip DC                                       | V       | 460 ... 720                               | 460 ... 720        | 460 ... 720        |
| • Undervoltage trip DC                                      | V       | 820 ± 2 %                                 | 820 ± 2 %          | 820 ± 2 %          |
| • Undervoltage trip DC                                      | V       | 380 ± 2 %                                 | 380 ± 2 %          | 380 ± 2 %          |
| <b>DC link capacitance</b>                                  |         | µF                                        | 1645               | 2115               |
| <b>Circuit breaker (UL)</b>                                 |         |                                           |                    |                    |
| • Type                                                      |         | 3VL2105-2KN30-....                        | 3VL2105-2KN30-.... | 3VL2106-2KN30-.... |
| • Rated current                                             | A       | 50                                        | 50                 | 60                 |
| • Rated short-circuit current SCCR at 480 V 3 AC, resulting | kA      | 65                                        | 65                 | 65                 |
| <b>Safety fuses (UL)</b>                                    |         |                                           |                    |                    |
| • Type                                                      |         | AJT 35                                    | AJT 35             | AJT 60             |
| • Rated current                                             | A       | 35                                        | 35                 | 60                 |
| • Rated short-circuit current SCCR, resulting               |         |                                           |                    |                    |
| - At 480 V 3 AC                                             | kA      | 65                                        | 65                 | 65                 |
| - At 600 V 3 AC                                             | kA      | 200                                       | 200                | 200                |
| <b>Cooling air requirement</b>                              |         | m <sup>3</sup> /h<br>(ft <sup>3</sup> /s) | 160<br>(5650)      | 160<br>(5650)      |
| <b>Dimensions</b>                                           |         |                                           |                    |                    |
| • Width                                                     | mm (in) | 260 (10.23)                               | 260 (10.23)        | 260 (10.23)        |
| • Height                                                    | mm (in) | 380 (14.96)                               | 380 (14.96)        | 380 (14.96)        |
| • Depth                                                     | mm (in) | 304 (11.97)                               | 304 (11.97)        | 304 (11.97)        |
| <b>Weight, approx.</b>                                      |         | kg (lb)                                   | 18.9 (41.66)       | 18.95 (41.79)      |
|                                                             |         |                                           |                    | 19.05 (42.00)      |

# SINAMICS S120 drive system

## SINAMICS S120 Combi

**Power Modules**  
**External fan module, reinforcement plates**

### Overview

#### External fan module



The external fan module combined with the reinforcement plates is employed to provide perfect cooling of a SINAMICS S120 Combi Power Module.

To cool the SINAMICS S120 Combi Power Modules, a volumetric flow of air through the heat sink of at least 160 m<sup>3</sup>/h is required.

The external fan module supplies a maximum volumetric flow of 290 m<sup>3</sup>/h. This dimensioning ensures an adequate air flow rate, even with a lower supply voltage or with a slightly soiled heat-sink.

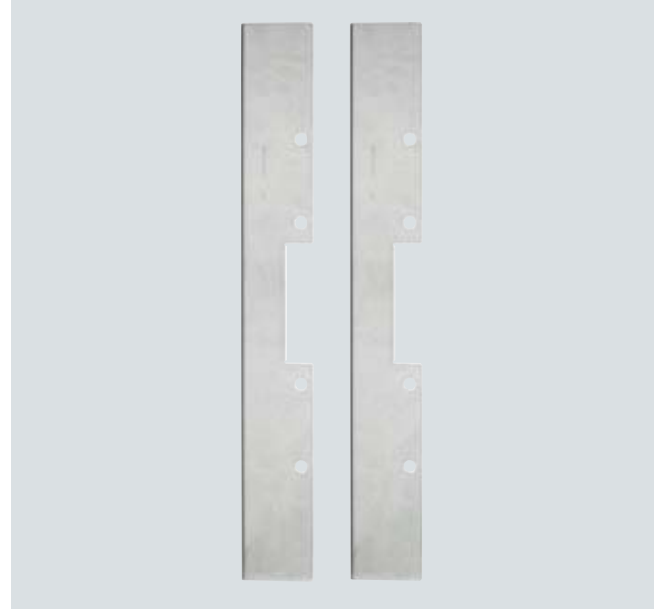
Due to the encapsulated electronics and the ball-bearing-mounted closed rotor, the fan module can be used even under exacting environmental conditions. The fans are equipped with electronic reverse-polarity, blocking and overload protection systems. To ensure maximum machine availability, the fan speed is monitored. A user alarm is displayed if the fan stops.

### Technical specifications

|                                         |                                                                                                                                           |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                     | External fan module<br>6SL3161-0EP00-0AA0                                                                                                 |
| <b>Rated voltage</b>                    | 24 V DC                                                                                                                                   |
| <b>Voltage range</b>                    | 20.4 ... 28.8 V DC                                                                                                                        |
| <b>Volumetric flow, max.</b>            | 290 m <sup>3</sup> /h (10241 ft <sup>3</sup> /h)                                                                                          |
| <b>Current consumption</b>              | 0.8 A                                                                                                                                     |
| <b>Power consumption</b>                | 18 W                                                                                                                                      |
| <b>Ambient temperature, permissible</b> | -20 ... +70 °C (-4 ... +58 °F)                                                                                                            |
| <b>Service life</b>                     | <ul style="list-style-type: none"> <li>At 55 °C (131 °F) 50000 h</li> <li>At 70 °C (158 °F) 20000 h</li> </ul>                            |
| <b>Degree of protection</b>             | IP54                                                                                                                                      |
| <b>Dimensions</b>                       | <ul style="list-style-type: none"> <li>Height 258 mm (10.16 in)</li> <li>Width 104 mm (4.09 in)</li> <li>Depth 86 mm (3.38 in)</li> </ul> |
| <b>Weight, approx.</b>                  | 1.5 kg (3.3 lb)                                                                                                                           |
| <b>Approvals according to</b>           | VDE, CSA, UL                                                                                                                              |

### Overview

#### Reinforcement plates



It is essential to ensure that the air actually flows through the heat sink. The gap between the fan module and heatsink must therefore be closed. The reinforcement plates must be used for this purpose where possible.

The reinforcement plates

- close the gap between the fan module and heatsink
- reinforce the rear wall of the control cabinet for sealed installation
- guarantee ideal ventilation spaces

### Technical specifications

|                        |                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>    | Reinforcement plates<br>6SL3161-1LP00-0AA0                                                                                               |
| <b>Dimensions</b>      | <ul style="list-style-type: none"> <li>Height 575 mm (22.63 in)</li> <li>Width 15 mm (0.59 in)</li> <li>Depth 75 mm (2.95 in)</li> </ul> |
| <b>Weight, approx.</b> | 0.75 kg (1.65 lb)                                                                                                                        |

### Selection and ordering data

| Description                                               | Order No.                 |
|-----------------------------------------------------------|---------------------------|
| <b>SINAMICS S120 Combi External fan module</b>            | <b>6SL3161-0EP00-0AA0</b> |
| <b>Accessories</b>                                        |                           |
| <b>SINAMICS S120 Combi Reinforcement plates (2 units)</b> | <b>6SL3161-1LP00-0AA0</b> |

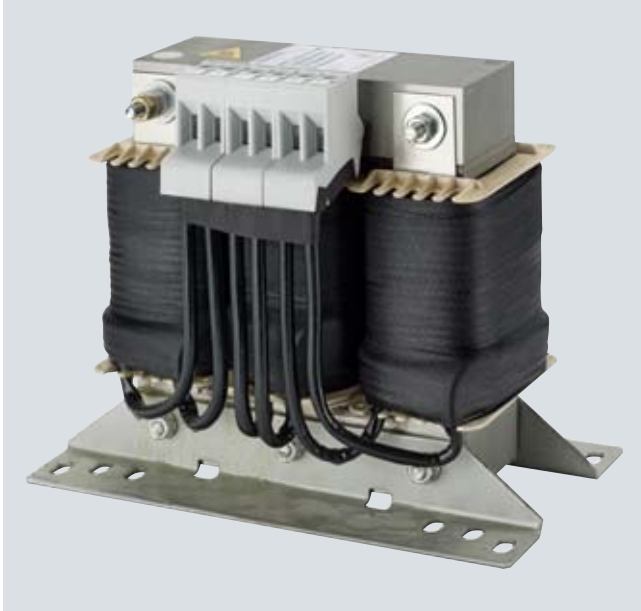


# SINAMICS S120 drive system

## SINAMICS S120 Combi

### Power Modules Line reactors

#### Overview



Line reactor

SINAMICS S120 Combi Power Modules cannot operate without line reactors. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

#### Selection and ordering data

| Rated power<br>Infeed<br>kW | Suitable for<br>SINAMICS S120 Combi<br>Power Module<br><br>Type                      | Line reactor<br><br>Order No. |
|-----------------------------|--------------------------------------------------------------------------------------|-------------------------------|
| 16                          | 6SL3111-3VE21-6FA0<br>6SL3111-3VE21-6EA0<br>6SL3111-4VE21-6FA0<br>6SL3111-4VE21-6EA0 | <b>6SL3100-0EE21-6AA0</b>     |
| 20                          | 6SL3111-3VE22-0HA0<br>6SL3111-4VE22-0HA0                                             | <b>6SL3100-0EE22-0AA0</b>     |

#### Technical specifications

|                                                            |                 | Line reactor         |                      |
|------------------------------------------------------------|-----------------|----------------------|----------------------|
|                                                            |                 | 6SL3100-0EE21-6AA0   | 6SL3100-0EE22-0AA0   |
| <b>Rated power</b>                                         | kW              | 16                   | 20                   |
| <b>Rated current</b>                                       | A               | 28                   | 33                   |
| <b>Power loss</b>                                          | W               | 75                   | 98                   |
| <b>Line/load connection</b><br>1U1, 1V1, 1W1/1U2, 1V2, 1W2 |                 | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                  | mm <sup>2</sup> | 4                    | 10                   |
| <b>PE connection</b>                                       |                 | Screw-type terminals | Screw-type terminals |
| • Conductor cross-section                                  | mm <sup>2</sup> | 4                    | 10                   |
| <b>Degree of protection</b>                                |                 | IP20                 | IP20                 |
| <b>Dimensions</b>                                          |                 |                      |                      |
| • Width                                                    | mm (in)         | 219 (8.62)           | 219 (8.62)           |
| • Height                                                   | mm (in)         | 176 (6.93)           | 176 (6.93)           |
| • Depth                                                    | mm (in)         | 120 (4.72)           | 130 (5.12)           |
| <b>Weight, approx.</b>                                     | kg (lb)         | 10.7 (23.6)          | 10.9 (24.0)          |
| <b>Approvals according to</b>                              |                 | cURus                | cURus                |

# SINAMICS S120 drive system

## SINAMICS S120 Combi

Power Modules  
Line filters

### Overview



Line filters

In plants which have been specifically designed to ensure EMC, line filters work together with line reactors to restrict the conducted interference emanating from the Power Modules to the limit values of Class A1 as defined in EN 55011 and Category C2 as defined in EN 61800-3. Line filters are suited only for direct connection to TN systems.

### Technical specifications

|                                                     |                                   |
|-----------------------------------------------------|-----------------------------------|
| <b>Product name</b>                                 | Line filter<br>6SL3000-0BE21-6DA0 |
| <b>Rated current</b>                                | 36 A                              |
| <b>Power loss</b>                                   | 6 W                               |
| <b>Line/load connection</b><br>L1, L2, L3 / U, V, W | Screw-type terminals              |
| • Conductor cross-section                           | 10 mm <sup>2</sup>                |
| <b>PE connection</b>                                | M6 screw stud                     |
| <b>Degree of protection</b>                         | IP20                              |
| <b>Dimensions</b>                                   |                                   |
| • Width                                             | 50 mm (1.97 in)                   |
| • Height                                            | 429 mm (16.89 in)                 |
| • Depth                                             | 226 mm (8.90 in)                  |
| <b>Weight, approx.</b>                              | 5 kg (11 lb)                      |
| <b>Approvals according to</b>                       | cURus                             |

### Selection and ordering data

| Rated power<br>Infeed | Suitable for<br>SINAMICS S120 Combi<br>Power Module            | Line filter               |
|-----------------------|----------------------------------------------------------------|---------------------------|
| kW                    | Type                                                           | Order No.                 |
| 16                    | 6SL3111-3VE21-6FA0<br>6SL3111-3VE21-6EA0<br>6SL3111-3VE22-0HA0 | <b>6SL3000-0BE21-6DA0</b> |
| 20                    | 6SL3111-4VE21-6FA0<br>6SL3111-4VE21-6EA0<br>6SL3111-4VE22-0HA0 |                           |

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# SINAMICS S120 drive system

## SINAMICS S120 Combi

### SINAMICS S120 booksize compact format

#### Overview

The SINAMICS S120 Combi Power Module can be extended by the SINAMICS S120 Motor Modules in booksize compact format.

#### Benefits

- Simple addition of supplementary machine components when using the SINAMICS S120 Combi drive system
- Expansion axes can interpolate freely with the SINAMICS S120 Combi axes
- Connection of the Motor Modules by simple connection of DC link busbars and 24 V busbars
- Motor Modules are supplied via the infeed integrated in the SINAMICS S120 Combi
- Energy exchange between Motor Modules and the SINAMICS S120 Combi Power Module through a common DC link
- Simple connection to the DRIVE-CLiQ interface

#### Function

Connection of up to two SINAMICS S120 Motor Modules in booksize compact format to the integrated line infeed of the SINAMICS S120 Combi Power Modules<sup>1)</sup>

#### Technical specifications

|                                                                                                                               |                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                           | SINAMICS S120<br>Single Motor Module<br>in booksize compact format<br>6SL3420-1TE..<br><br>SINAMICS S120<br>Double Motor Module<br>in booksize compact format<br>6SL3420-2TE.. |
| <b>DC link voltage</b><br>Up to 2000 m (6562 ft) above sea level                                                              | 510 ... 720 V DC<br>(line voltage 380 ... 480 V 3 AC)                                                                                                                          |
| <b>Electronic power supply</b>                                                                                                | 24 V DC -15 %/+20 %                                                                                                                                                            |
| <b>Cooling method</b>                                                                                                         | Internal air cooling (power units with increased air cooling by built-in fans)                                                                                                 |
| <b>Ambient and coolant temperature (air), perm.</b><br>In operation for line-side components, Line Modules, and Motor Modules | 0 ... 40 °C (32 ... 104 °F) without derating,<br>> 40 ... 55 °C (104 ... 131 °F) with derating                                                                                 |
| <b>Installation altitude</b>                                                                                                  | Up to 1000 m (3281 ft) above sea level without derating,<br>> 1000 ... 4000 m (3281 ... 13124 ft) above sea level with derating                                                |
| <b>Degree of protection</b>                                                                                                   | IP20                                                                                                                                                                           |
| <b>Declarations of conformity</b>                                                                                             | CE (Low Voltage and EMC Directives)                                                                                                                                            |
| <b>Approvals according to</b>                                                                                                 | cURus                                                                                                                                                                          |
| <b>Safety Integrated</b>                                                                                                      | Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to ISO 13849-1 or EN 954-1                                                               |

<sup>1)</sup> Please note the simultaneity factor of the axis grouping for the infeed power of the SINAMICS S120 Combi Power Modules.

# SINAMICS S120 drive system

## SINAMICS S120 Combi

### SINAMICS S120 booksize compact format Single Motor Modules

#### Overview



Single Motor Modules

The Single Motor Modules in booksize compact format feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 x electronic power supply connection via integrated 24 V DC bars
- 3 DRIVE-CLiQ sockets
- 1 motor connection via connector
- 1 safe standstill input (enable pulses)
- 1 safe motor brake controller
- 1 temperature sensor input (KTY84-130 or PTC)
- 2 PE/protective conductor connections

#### Overview

The status of the Motor Modules is indicated via two multi-color LEDs.

The shield of the motor cable is routed over the connector to the motor connection.

The signal cable shield can be connected to the Motor Module by means of a shield terminal, e.g. type KLBÜ 3-8 SC by Weidmüller.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent Motor Module, length 0.11 m (4.33 in) for 50 mm (1.97 in) wide Motor Modules or length 0.16 m (6.3 in) for 75 mm (2.95 in) wide Motor Modules.
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connector X21
- Connector X11 for motor brake connection
- Connector X1 for motor connection
- 1 set of warning signs in 30 languages
- 1 heat conducting foil

#### Selection and ordering data

| Rated output current                    | Type rating           | Single Motor Module in booksize compact format |
|-----------------------------------------|-----------------------|------------------------------------------------|
| A                                       | kW (HP) <sup>3)</sup> | Internal air cooling                           |
|                                         |                       | Order No.                                      |
| <b>DC link voltage 510 ... 720 V DC</b> |                       |                                                |
| 3                                       | 1.6 (1.5)             | <b>6SL3420-1TE13-0AA0</b>                      |
| 5                                       | 2.7 (3)               | <b>6SL3420-1TE15-0AA0</b>                      |
| 9                                       | 4.8 (5)               | <b>6SL3420-1TE21-0AA0</b>                      |
| 18                                      | 9.7 (10)              | <b>6SL3420-1TE21-8AA0</b>                      |

#### Technical specifications

| <b>DC link voltage 510 ... 720 V DC</b>        |         | Single Motor Module in booksize compact format |                    |                    |                    |
|------------------------------------------------|---------|------------------------------------------------|--------------------|--------------------|--------------------|
| <b>Internal air cooling</b>                    |         | 6SL3420-1TE13-0AA0                             | 6SL3420-1TE15-0AA0 | 6SL3420-1TE21-0AA0 | 6SL3420-1TE21-8AA0 |
| <b>Output current</b>                          |         |                                                |                    |                    |                    |
| • Rated current $I_{rated}$                    | A       | 3                                              | 5                  | 9                  | 18                 |
| • $I_{max}$                                    | A       | 9                                              | 15                 | 27                 | 54                 |
| <b>Rated power<sup>3)</sup></b>                | kW (HP) | 1.6 (1.5)                                      | 2.7 (3)            | 4.8 (5)            | 9.7 (10)           |
| <b>DC link current <math>I_d^{1)}</math></b>   | A       | 3.6                                            | 6                  | 11                 | 22                 |
| <b>Current requirement</b><br>At 24 V DC, max. | A       | 0.85                                           | 0.85               | 0.85               | 0.85               |
| <b>Power loss<sup>2)</sup></b>                 |         |                                                |                    |                    |                    |
| • With internal air cooling in control cabinet | kW      | 0.07                                           | 0.1                | 0.1                | 0.18               |
| <b>Dimensions</b>                              |         |                                                |                    |                    |                    |
| • Width                                        | mm (in) | 50 (1.97)                                      | 50 (1.97)          | 50 (1.97)          | 75 (2.95)          |
| • Height                                       | mm (in) | 270 (10.63)                                    | 270 (10.63)        | 270 (10.63)        | 270 (10.63)        |
| • Depth                                        | mm (in) | 226 (8.90)                                     | 226 (8.90)         | 226 (8.90)         | 226 (8.90)         |
| <b>Weight, approx.</b>                         | kg (lb) | 2.7 (5.9)                                      | 2.7 (5.9)          | 2.7 (5.9)          | 3.4 (7.50)         |

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.

<sup>2)</sup> Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

<sup>3)</sup> Nominal HP based on asynchronous motors (induction motors). Match the motor nameplate current for specific sizing.

# SINAMICS S120 drive system

## SINAMICS S120 Combi

### SINAMICS S120 booksize compact format Double Motor Modules

#### Overview



Double Motor Modules

Double Motor Modules feature the following interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 x electronic power supply connections via integrated 24 V DC bars
- 4 DRIVE-CLiQ sockets
- 2 motor connections via connector
- 2 safe standstill inputs (1 input per axis)
- 2 safe motor brake controls
- 2 temperature sensor inputs (KTY84-130 or PTC)
- 3 PE/protective conductor connections

The status of the Motor Modules is indicated via two multi-color LEDs.

#### Overview

The shield of the motor cables is routed over the connectors to the motor connection.

The signal cable shield can be connected to the Motor Module by means of a shield terminal, e.g. type KLBU 3-8 SC by Weidmüller.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable for connecting to the adjacent Motor Module, length 0.16 m (6.3 in)
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connectors X21 and X22
- Connectors X1 and X2 for motor connection
- 1 set of warning signs in 30 languages
- 1 heat conducting foil

#### Selection and ordering data

| Rated output current                    | Type rating           | Double Motor Module in booksize compact format |
|-----------------------------------------|-----------------------|------------------------------------------------|
| A                                       | kW (HP) <sup>3)</sup> | Internal air cooling                           |
|                                         |                       | Order No.                                      |
| <b>DC link voltage 510 ... 720 V DC</b> |                       |                                                |
| 2 x 1.7                                 | 2 x 0.9 (2 x 0.75)    | <b>6SL3420-2TE11-7AA0</b>                      |
| 2 x 3                                   | 2 x 1.6 (2 x 1.5)     | <b>6SL3420-2TE13-0AA0</b>                      |
| 2 x 5                                   | 2 x 2.7 (2 x 3)       | <b>6SL3420-2TE15-0AA0</b>                      |

#### Technical specifications

| <b>DC link voltage 510 ... 720 V DC</b>              |         | Double Motor Module in booksize compact format |                    |                    |
|------------------------------------------------------|---------|------------------------------------------------|--------------------|--------------------|
| <b>Internal air cooling</b>                          |         | 6SL3420-2TE11-7AA0                             | 6SL3420-2TE13-0AA0 | 6SL3420-2TE15-0AA0 |
| <b>Output current</b>                                |         |                                                |                    |                    |
| • Rated current $I_{rated}$                          | A       | 2 x 1.7                                        | 2 x 3              | 2 x 5              |
| • $I_{max}$                                          | A       | 2 x 5.1                                        | 2 x 9              | 2 x 15             |
| <b>Rated power<sup>3)</sup></b>                      | kW (HP) | 2 x 0.9 (2 x 0.75)                             | 2 x 1.6 (2 x 1.5)  | 2 x 2.7 (2 x 3)    |
| <b>DC link current <math>I_d</math><sup>1)</sup></b> | A       | 4.1                                            | 7.2                | 12                 |
| <b>Power loss<sup>2)</sup></b>                       |         |                                                |                    |                    |
| • With internal air cooling in control cabinet       | kW      | 0.11                                           | 0.13               | 0.19               |
| <b>Dimensions</b>                                    |         |                                                |                    |                    |
| • Width                                              | mm (in) | 75 (2.95)                                      | 75 (2.95)          | 75 (2.95)          |
| • Height                                             | mm (in) | 270 (10.63)                                    | 270 (10.63)        | 270 (10.63)        |
| • Depth                                              | mm (in) | 226 (8.90)                                     | 226 (8.90)         | 226 (8.90)         |
| <b>Weight, approx.</b>                               | kg (lb) | 3.4 (7.50)                                     | 3.4 (7.50)         | 3.4 (7.50)         |

<sup>1)</sup> Rated DC link current for dimensioning an external DC connection.

<sup>2)</sup> Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

<sup>3)</sup> Nominal HP based on asynchronous motors (induction motors). Match the motor nameplate current for specific sizing.

# SINAMICS S120 drive system

## Supplementary system components

### CBE20 Communication Board

#### Overview



The CBE20 Communication Board can be used to connect to a PROFINET IO network via a CU320-2 Control Unit.

The SINAMICS S120 then assumes the function of a PROFINET IO device and can perform the following functions:

- PROFINET IO device
- 100 Mbit/s full duplex
- Supports real-time classes of PROFINET IO:
  - RT (Real-Time)
  - IRT (Isochronous Real-Time), minimum send cycle 500 µs
- Connects to controls as PROFINET IO devices using PROFIdrive compliant with Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 4-port switch with four RJ45 sockets based on the PROFINET ASIC ERTEC400. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

#### Integration

The CBE20 Communication Board plugs into the option slot on the CU320-2 Control Unit.

#### Technical specifications

|                                          |                                                 |
|------------------------------------------|-------------------------------------------------|
| <b>Product name</b>                      | CBE20 Communication Board<br>6SL3055-0AA00-2EB0 |
| <b>Current requirement</b><br>At 24 V DC | 0.16 A                                          |
| <b>Ambient temperature, permissible</b>  |                                                 |
| • Storage and transport                  | -40 ... +70 °C (-40 ... +158 °F)                |
| • Operation                              | 0 ... 55 °C (32 ... 131 °F)                     |
| <b>Dimensions</b>                        | 130 mm × 78 mm<br>(5.12 in × 3.07 in)           |
| <b>Weight, approx.</b>                   | 76 g (2.68 oz)                                  |
| <b>Approvals according to</b>            | cULus                                           |

#### Selection and ordering data

| Description                      | Order No.                 |
|----------------------------------|---------------------------|
| <b>CBE20 Communication Board</b> | <b>6SL3055-0AA00-2EB0</b> |
| <b>Accessories</b>               |                           |
| <b>Industrial Ethernet FC</b>    |                           |
| • RJ45 Plug 180 (1 unit)         | <b>6GK1901-1BB30-0AA0</b> |
| • RJ45 Plug 180 (10 units)       | <b>6GK1901-1BB30-0AB0</b> |
| • Stripping tool                 | <b>6GK1901-1GA00</b>      |
| • Standard cable GP 2x2          | <b>6XV1840-2AH10</b>      |
| • Flexible cable GP 2x2          | <b>6XV1870-2B</b>         |
| • Trailing cable GP 2x2          | <b>6XV1870-2D</b>         |
| • Trailing cable 2x2             | <b>6XV1840-3AH10</b>      |
| • Marine cable 2x2               | <b>6XV1840-4AH10</b>      |

For more information on connectors and cables, please refer to Catalog IK PI or the Siemens Industry Mall: [www.siemens.com/industrymall](http://www.siemens.com/industrymall)

# SINAMICS S120 drive system

## Supplementary system components

### CUA31 Control Unit Adapter

#### Overview



CUA31 Control Unit Adapter

The CUA31 Control Unit Adapter converts the PM-IF interface to a DRIVE-CLiQ interface. With the CUA31 Control Unit Adapter, Power Modules in blocksize format can also be operated on a CU320-2 Control Unit or on an NCU 7.x of the SINUMERIK.

#### Design

The CUA31 Control Unit Adapter features the following interfaces:

- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses)

The status of the CUA31 Control Unit Adapter is indicated via multi-color LEDs.

#### Integration

The CUA31 Control Unit Adapter is snapped onto the Power Module in blocksize format and communicates with the CU320-2 Control Unit or an NCU 7.x of the SINUMERIK by means of a DRIVE-CLiQ link.

The Control Unit Adapter's power is supplied by the Power Module via the PM-IF interface. If the Control Unit Adapter needs to communicate when the Power Module is switched off, it must be supplied with 24 V DC from an external source.

Other DRIVE-CLiQ nodes such as Sensor Modules or Terminal Modules can be connected to the Control Unit Adapter.

#### Technical specifications

|                                                                             |                                                            |
|-----------------------------------------------------------------------------|------------------------------------------------------------|
| <b>Product name</b>                                                         | CUA31 Control Unit Adapter<br>6SL3040-0PA00-0AA1           |
| <b>Current requirement, max.</b><br>At 24 V DC without<br>DRIVE-CLiQ supply | 0.15 A for CUA31 +<br>max. 0.5 A for PM340 Power<br>Module |
| <b>Conductor cross-section, max.</b>                                        | 2.5 mm <sup>2</sup>                                        |
| <b>Power loss</b>                                                           | < 4 W                                                      |
| <b>PE connection</b>                                                        | M5 screw                                                   |
| <b>Dimensions</b>                                                           |                                                            |
| • Width                                                                     | 73 mm (2.87 in)                                            |
| • Height                                                                    | 165.8 mm (6.53 in)                                         |
| • Depth                                                                     | 37.3 mm (1.47 in)                                          |
| <b>Weight, approx.</b>                                                      | 0.31 kg (0.68 lb)                                          |
| <b>Approvals according to</b>                                               | cULus                                                      |

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>CUA31 Control Unit Adapter</b><br>Without DRIVE-CLiQ cable                                              | <b>6SL3040-0PA00-0AA1</b> |
| <b>Accessories for re-ordering</b>                                                                         |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port | <b>6SL3066-4CA00-0AA0</b> |



# SINAMICS S120 drive system

## Supplementary system components

### DMC20 DRIVE-CLiQ Hub Module

#### Overview



DMC20 DRIVE-CLiQ Hub Module

The DMC20 DRIVE-CLiQ Hub Module is used to implement a star-shaped configuration of a DRIVE-CLiQ line. Two DMC20 DRIVE-CLiQ Hub Modules can be connected in series (cascaded).

#### Design

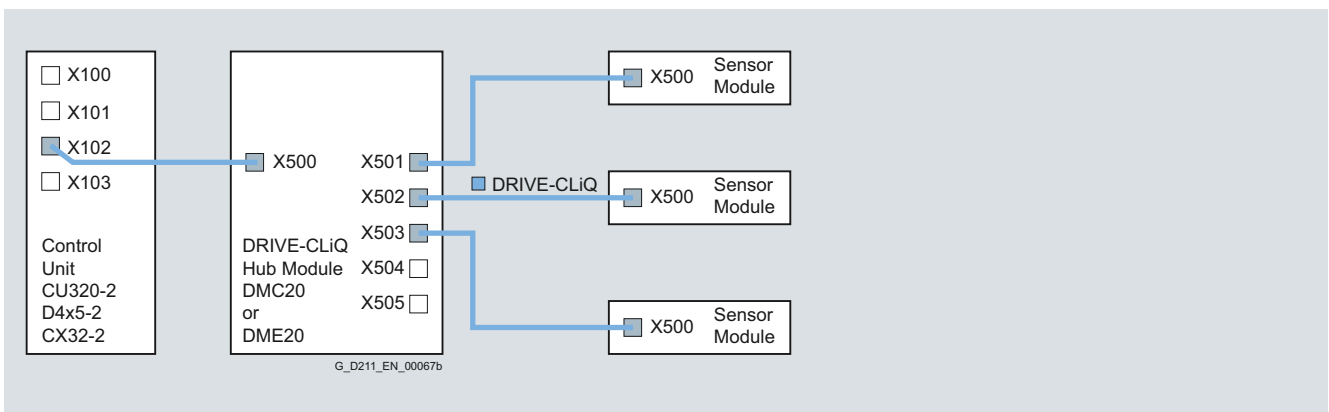
The following are located on the DMC20 DRIVE-CLiQ Hub Module:

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ nodes
- 1 connection for the electronic power supply via the 24 V DC power supply connector

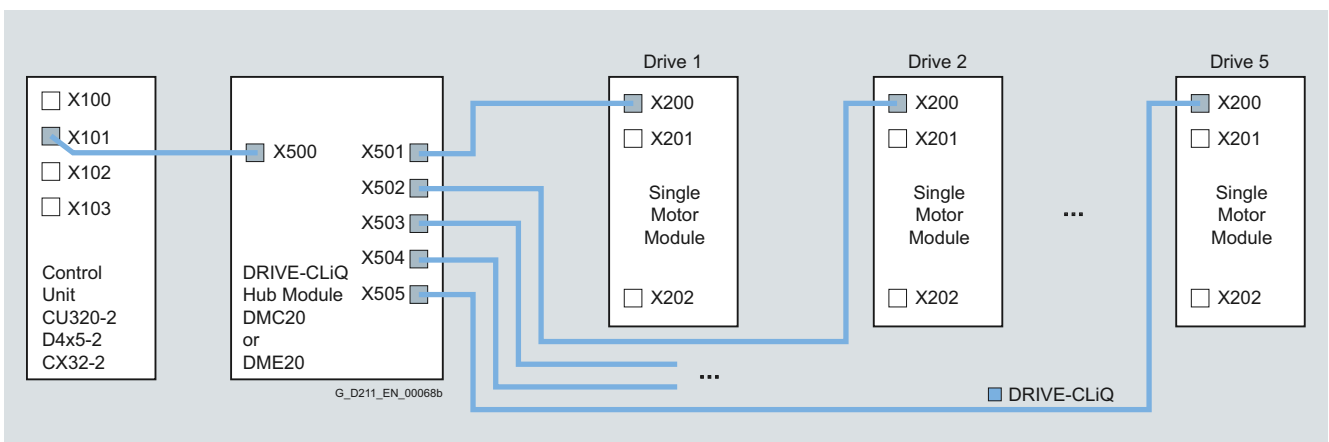
The status of the DMC20 DRIVE-CLiQ Hub Module is indicated via a multi-color LED.

#### Integration

Signals from more than one encoder can be collected with one DRIVE-CLiQ Hub Module and forwarded to the Control Unit through a single DRIVE-CLiQ cable.



With the DRIVE-CLiQ Hub Module, individual DRIVE-CLiQ nodes can be removed without interrupting the data exchange with the remaining devices in the DRIVE-CLiQ line.



# SINAMICS S120 drive system

## Supplementary system components

### DMC20 DRIVE-CLiQ Hub Module

#### Technical specifications

|                                                                             |                                                   |
|-----------------------------------------------------------------------------|---------------------------------------------------|
| <b>Product name</b>                                                         | DMC20 DRIVE-CLiQ Hub Module<br>6SL3055-0AA00-6AA0 |
| <b>Current requirement, max.</b><br>At 24 V DC without<br>DRIVE-CLiQ supply | 0.15 A                                            |
| • Conductor cross-section, max.                                             | 2.5 mm <sup>2</sup>                               |
| <b>Degree of protection</b>                                                 | IP20                                              |
| <b>Dimensions</b>                                                           |                                                   |
| • Width                                                                     | 50 mm (1.97 in)                                   |
| • Height                                                                    | 150 mm (5.91 in)                                  |
| • Depth                                                                     | 111 mm (4.37 in)                                  |
| <b>Weight, approx.</b>                                                      | 0.8 kg (1.76 lb)                                  |
| <b>Approvals according to</b>                                               | cULus                                             |

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>DMC20 DRIVE-CLiQ Hub Module</b><br>Without DRIVE-CLiQ cable                                             | <b>6SL3055-0AA00-6AA0</b> |
| <b>Accessories for re-ordering</b>                                                                         |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port | <b>6SL3066-4CA00-0AA0</b> |

# SINAMICS S120 drive system

## Supplementary system components

### DME20 DRIVE-CLiQ Hub Module

#### Overview



The DME20 DRIVE-CLiQ Hub Module is used to implement a star-shaped topology of a DRIVE-CLiQ line. Two DME20 DRIVE-CLiQ Hub Modules can be connected in series (cascaded).

#### Design

The following are located on the DME20 DRIVE-CLiQ Hub Module:

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ nodes
- 1 connection for the electronic power supply via the 24 V DC circular power supply connector with conductor cross-section  $4 \times 0.75 \text{ mm}^2$  (pins 1+2 internally bridged; pins 3+4 internally bridged)

#### Integration

See DMC20 DRIVE-CLiQ Hub Module (page 5/123).

#### Technical specifications

|                                                                             |                                                   |
|-----------------------------------------------------------------------------|---------------------------------------------------|
| <b>Product name</b>                                                         | DME20 DRIVE-CLiQ Hub Module<br>6SL3055-0AA00-6AB0 |
| <b>Current requirement, max.</b><br>At 24 V DC without<br>DRIVE-CLiQ supply | 0.15 A                                            |
| • Conductor cross-section, max.                                             | $4 \times 0.75 \text{ mm}^2$                      |
| <b>Degree of protection</b>                                                 | IP67                                              |
| <b>Dimensions</b>                                                           |                                                   |
| • Width                                                                     | 99 mm (3.9 in)                                    |
| • Height                                                                    | 149 mm (5.87 in)                                  |
| • Depth                                                                     | 55.7 mm (2.19 in;<br>without connector)           |
| <b>Weight, approx.</b>                                                      | 0.8 kg (1.76 lb)                                  |
| <b>Approvals according to</b>                                               | cULus                                             |

#### Selection and ordering data

| Description                                                                                                                                    | Order No.                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>DME20 DRIVE-CLiQ Hub Module</b><br>Without DRIVE CLiQ cable; without<br>electronic power supply cable and<br>circular connector for 24 V DC | <b>6SL3055-0AA00-6AB0</b>                                                                                   |
| <b>Accessories</b>                                                                                                                             |                                                                                                             |
| <b>24 V DC power supply cable</b>                                                                                                              | Order and delivery<br>Phoenix Contact<br><a href="http://www.phoenixcontact.com">www.phoenixcontact.com</a> |
| • Shielded connector, 5-pole,<br>user-assembled                                                                                                | Part No. 1508365                                                                                            |
| • 4-pole non-shielded connector,<br>user-assembled,<br>Speedcon quick-lock                                                                     | Part No. 1521601                                                                                            |
| <b>Accessories for re-ordering</b>                                                                                                             |                                                                                                             |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port                                     | <b>6SL3066-4CA00-0AA0</b>                                                                                   |

# SINAMICS S120 drive system

## Supplementary system components

### TM15 Terminal Module

#### Overview



The number of available digital inputs and outputs within a drive system can be expanded with the TM15 Terminal Module.

#### Design

The following are located on the TM15 Terminal Module:

- 24 bidirectional digital inputs/outputs (isolation in 3 groups with 8 channels each)
- 24 green status LEDs for indicating the logical signal status of the relevant terminal
- 2 DRIVE-CLiQ sockets
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The TM15 Terminal Module can be snapped onto a TH 35 top-hat rail to EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM15 Terminal Module via a shield terminal, e.g. type SK8 by Phoenix Contact or type KLBÜ CO 1 by Weidmüller. The shield terminal must not be used for strain relief.

The status of the TM15 Terminal Module is indicated via a multi-color LED.

#### Integration

The TM15 Terminal Module communicates with the CU310-2, CU320-2, or a SINUMERIK Control Unit via DRIVE-CLiQ.

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>TM15 Terminal Module</b><br>Without DRIVE-CLiQ cable                                                    | <b>6SL3055-0AA00-3FA0</b> |
| <b>Accessories for re-ordering</b>                                                                         |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port | <b>6SL3066-4CA00-0AA0</b> |

#### Technical specifications

|                                                               |                                                     |
|---------------------------------------------------------------|-----------------------------------------------------|
| <b>Product name</b>                                           | TM15 Terminal Module<br>6SL3055-0AA00-3FA0          |
| <b>Current requirement, max.</b><br>With 24 V DC without load | 0.15 A                                              |
| • Conductor cross-section, max.                               | 2.5 mm <sup>2</sup>                                 |
| • Fuse protection, max.                                       | 20 A                                                |
| <b>Number of DRIVE-CLiQ sockets</b>                           | 2                                                   |
| <b>I/Os</b>                                                   |                                                     |
| • Digital inputs/outputs                                      | Can be parameterized channel-by-channel as DI or DO |
| • Number of digital inputs/outputs                            | 24                                                  |
| • Galvanic isolation                                          | Yes, in groups of 8                                 |
| • Connection method                                           | Plug-in screw-type terminals                        |
| • Conductor cross-section, max.                               | 1.5 mm <sup>2</sup>                                 |
| <b>Digital inputs</b>                                         |                                                     |
| • Voltage                                                     | -3 ... +30 V                                        |
| • Low level (an open digital input is interpreted as low)     | -3 ... +5 V                                         |
| • High level                                                  | 15 ... 30 V                                         |
| • Current consumption at 24 V DC                              | 5 ... 11 mA                                         |
| • Delay times of digital inputs, typ. <sup>1)</sup>           |                                                     |
| - L → H                                                       | 50 μs                                               |
| - H → L                                                       | 100 μs                                              |
| <b>Digital outputs</b>                                        |                                                     |
| Resistant to sustained short circuits                         |                                                     |
| • Voltage                                                     | 24 V DC                                             |
| • Load current per digital output, max.                       | 0.5 A                                               |
| • Delay times (resistive load) <sup>1)</sup>                  |                                                     |
| - L → H, typ.                                                 | 50 μs                                               |
| - L → H, max.                                                 | 100 μs                                              |
| - H → L, typ.                                                 | 150 μs                                              |
| - H → L, max.                                                 | 225 μs                                              |
| • Total current of outputs (per group), max.                  |                                                     |
| - Up to 60 °C (140 °F)                                        | 2 A                                                 |
| - Up to 50 °C (131 °F)                                        | 3 A                                                 |
| - Up to 40 °C (104 °F)                                        | 4 A                                                 |
| <b>Power loss</b>                                             | < 3 W                                               |
| <b>PE connection</b>                                          | M4 screw                                            |
| <b>Dimensions</b>                                             |                                                     |
| • Width                                                       | 50 mm (1.97 in)                                     |
| • Height                                                      | 150 mm (5.91 in)                                    |
| • Depth                                                       | 111 mm (4.37 in)                                    |
| <b>Weight, approx.</b>                                        | 0.86 kg (1.90 lb)                                   |
| <b>Approvals according to</b>                                 | cULus                                               |

<sup>1)</sup> The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input/output is processed.

# SINAMICS S120 drive system

## Supplementary system components

### TM41 Terminal Module

#### Overview



The TM41 Terminal Module supplies TTL signals which emulate an incremental encoder, e.g. to a higher-level control. The encoder interface (incremental encoder emulation) can be linked to an encoder signal from the Control Unit, e.g. incremental encoder sin/cos, by parameter assignment.

The TM41 Terminal Module increases the number of digital inputs/outputs and analog inputs that are available in the drive system.

#### Design

The following are located on the TM41 Terminal Module:

- 4 bidirectional digital inputs/outputs
- 4 digital inputs (with electrical isolation)
- 1 analog input
- 1 interface for emulation of TTL incremental encoder (RS422)
- 1 LED for signaling zero mark detection for encoder interface
- 2 DRIVE-CLiQ sockets
- 1 connection for the 24 V DC supply of the digital outputs
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The TM41 Terminal Module can be snapped onto a TH 35 top-hat rail to EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM41 Terminal Module via a shield terminal, e.g. type SK8 by Phoenix Contact or type KLBÜ CO 1 by Weidmüller. The shield terminal must not be used for strain relief.

The status of the TM41 Terminal Module is indicated via a multi-color LED.

An LED next to the interface for TTL pulse encoder emulation is illuminated as soon as a zero mark is detected.

#### Integration

The TM41 Terminal Module communicates with the CU310-2, CU320-2, or a SINUMERIK Control Unit via DRIVE-CLiQ.

#### Selection and ordering data

| Description                                                                                                | Order No.                 |
|------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>TM41 Terminal Module</b><br>Without DRIVE-CLiQ cable                                                    | <b>6SL3055-0AA00-3PA1</b> |
| <b>Accessories for re-ordering</b>                                                                         |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ port | <b>6SL3066-4CA00-0AA0</b> |

# SINAMICS S120 drive system

## Supplementary system components

### TM41 Terminal Module

#### Technical specifications

|                                                                                                           |                                                                                                            |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                       | TM41 Terminal Module<br>6SL3055-0AA00-3PA1                                                                 |
| <b>Current requirement</b><br>(X524 at 24 V DC) without<br>DRIVE-CLiQ supply or<br>digital outputs (X514) | 0.5 A                                                                                                      |
| • Conductor cross-section, max.                                                                           | 2.5 mm <sup>2</sup>                                                                                        |
| • Fuse protection, max.                                                                                   | 20 A                                                                                                       |
| <b>I/Os</b>                                                                                               |                                                                                                            |
| • Digital inputs/outputs                                                                                  | Individually parameterizable<br>as DI or DO                                                                |
| • Number of digital inputs/<br>outputs                                                                    | 4                                                                                                          |
| • Number of digital inputs/<br>outputs (with electrical isolation)                                        | 4                                                                                                          |
| • Connection method                                                                                       | Plug-in screw-type terminals                                                                               |
| • Conductor cross-section, max.                                                                           | 1.5 mm <sup>2</sup>                                                                                        |
| <b>Digital inputs</b>                                                                                     |                                                                                                            |
| • Voltage                                                                                                 | -3 V ... +30 V<br>(digital inputs without isolation)<br>-30 V ... +30 V<br>(digital inputs with isolation) |
| • Low level (an open digital input is<br>interpreted as low)                                              | -3 V ... +5 V<br>(digital inputs without isolation)<br>-30 V ... +5 V<br>(digital inputs with isolation)   |
| • High level                                                                                              | 15 ... 30 V                                                                                                |
| • Current consumption at 24 V DC,<br>typ.                                                                 | < 9 mA                                                                                                     |
| • Delay times of digital inputs,<br>max. <sup>1)</sup>                                                    |                                                                                                            |
| - L → H                                                                                                   | 3 ms                                                                                                       |
| - H → L                                                                                                   | 3 ms                                                                                                       |
| <b>Digital outputs</b><br>Resistant to sustained short circuits                                           |                                                                                                            |
| • Voltage                                                                                                 | 24 V DC                                                                                                    |
| • Load current per digital output,<br>max.                                                                | 0.5 A                                                                                                      |
| • Delay times (resistive load) <sup>1)</sup>                                                              |                                                                                                            |
| - L → H, typ.                                                                                             | 50 μs                                                                                                      |
| - L → H, max.                                                                                             | 100 μs                                                                                                     |
| - H → L, typ.                                                                                             | 75 μs                                                                                                      |
| - H → L, max.                                                                                             | 150 μs                                                                                                     |
| <b>Analog input</b><br>(Difference)                                                                       |                                                                                                            |
| • Voltage range                                                                                           | -10 ... +10 V                                                                                              |
| • Internal resistance                                                                                     | ≥ 100 kΩ                                                                                                   |
| • Resolution <sup>2)</sup>                                                                                | 12 bit + sign                                                                                              |

|                                                   |                                                       |
|---------------------------------------------------|-------------------------------------------------------|
| <b>Product name</b>                               | TM41 Terminal Module<br>6SL3055-0AA00-3PA1            |
| <b>Pulse encoder emulation</b>                    |                                                       |
| • Level                                           | TTL (RS422), A+, A-, B+, B-,<br>zero track N+, N-     |
| • Limit frequency $f_{\max}$ .                    | 512 kHz                                               |
| • Ratio<br>Encoder pulses: Encoder emula-<br>tion | 1 : 1 with incremental encoder<br>sin/cos and TTL/HTL |
| <b>PE connection</b>                              | M4 screw                                              |
| <b>Dimensions</b>                                 |                                                       |
| • Width                                           | 50 mm (1.97 in)                                       |
| • Height                                          | 150 mm (5.91 in)                                      |
| • Depth                                           | 111 mm (4.37 in)                                      |
| <b>Weight, approx.</b>                            | 0.85 kg (1.87 lb)                                     |
| <b>Approvals according to</b>                     | cULus                                                 |

<sup>1)</sup> The specified delay times refer to the hardware.  
The actual reaction time depends on the time slot in which the digital input/output is processed.

<sup>2)</sup> If the analog input is to be operated as a quasi signal processor with continuously variable input voltage, the sampling frequency  $f_a = 1/t_{\text{time slice}}$  must be at least twice the value of the highest signal frequency  $f_{\max}$ .

# SINAMICS S120 drive system

## Supplementary system components

### TM120 Terminal Module

#### Overview



4 temperature sensors (KTY84-130 or PTC) can be evaluated via the TM120 Terminal Module. The temperature sensor inputs are safely electrically separated from the evaluation electronics in the TM120 Temperature Module and are suitable for evaluating the temperature of special motors, e.g. 1FN linear motors and 1FW6 built-in torque motors.

The TM120 Terminal Module can be operated on a CU320-2 Control Unit from firmware 4.3 and higher.

#### Design

The following are located on the TM120 Terminal Module:

- 4 temperature sensor inputs (KTY84-130 or PTC)
- 2 DRIVE-CLiQ sockets

The status of the TM120 Terminal Module is indicated via a multi-color LED.

The TM120 Terminal Module is designed to be snapped onto a TH35 top-hat rail in accordance with EN 60715.

#### Integration

A TM120 Terminal Module is automatically assigned to an SMCxx Sensor Module by connecting the Sensor Module to the Motor Module via DRIVE-CLiQ via a TM120 Terminal Module. The assignment can also be made manually.

#### Technical specifications

|                                                                                                                                                                                                |                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Product name</b>                                                                                                                                                                            | TM120 Terminal Module<br>6SL3055-0AA00-3KA0             |
| <b>Current requirement, max.</b><br>at 24 V DC                                                                                                                                                 | 0.5 A                                                   |
| <ul style="list-style-type: none"> <li>• Conductor cross-section, max.</li> <li>• Fuse protection, max.</li> </ul>                                                                             | 2.5 mm <sup>2</sup><br>20 A                             |
| <b>Temperature sensor inputs</b><br>The inputs can be parameterized separately for the evaluation of KTY84-130 or PTC sensors or temperature switches.                                         |                                                         |
| <ul style="list-style-type: none"> <li>• Conductor cross-section</li> <li>• Constant current per sensor, approx.</li> <li>• Safe electrical separation up to the line voltage, max.</li> </ul> | 0.2 ... 6 mm <sup>2</sup><br>2 mA<br>480 V AC           |
| <b>PE connection</b>                                                                                                                                                                           | M4 screw                                                |
| <b>Dimensions</b>                                                                                                                                                                              |                                                         |
| <ul style="list-style-type: none"> <li>• Width</li> <li>• Height</li> <li>• Depth</li> </ul>                                                                                                   | 30 mm (1.18 in)<br>150 mm (5.91 in)<br>111 mm (4.37 in) |
| <b>Weight, approx.</b>                                                                                                                                                                         | 0.41 kg (0.90 lb)                                       |

#### Selection and ordering data

|                                                                                                             |                           |
|-------------------------------------------------------------------------------------------------------------|---------------------------|
| Description                                                                                                 | Order No.                 |
| <b>TM120 Terminal Module</b><br>Without DRIVE-CLiQ cable                                                    | <b>6SL3055-0AA00-3KA0</b> |
| <b>Accessories</b>                                                                                          |                           |
| <b>SINAMICS/SINUMERIK/<br/>SIMOTION dust-proof<br/>blanking plugs</b><br>(50 units)<br>For DRIVE-CLiQ ports | <b>6SL3066-4CA00-0AA0</b> |



# SINAMICS S120 drive system

## Supplementary system components

### Safe Brake Relay

#### Overview



In the case of the Safe Brake Relay, the brake is controlled in accordance with ISO 13849-1 or EN 954-1 safety class 3 and IEC 61508 SIL 2.

#### Design

The Safe Brake Relay can be installed below the Power Module on the shield connection plate.

The Safe Brake Relay has the following connections and interfaces:

- 1 two-channel transistor output stage to control the motor brake solenoid
- 1 connection for the cable harness (CTRL) to the Power Module in blocksize format
- 1 connection for the 24 V DC power supply

The connection between the 24 V DC supply and the Safe Brake Relay must be kept as short as possible.

The scope of supply of a Safe Brake Relay includes the following:

- 2 cable harnesses for connecting to the CTRL socket of the PM340 Power Module
  - 0.32 m (1.05 ft) length for frame sizes FSA and FSC
  - 0.55 m (1.8 ft) length for frame sizes FSE and FSF

#### Integration

The 24 V DC solenoid of the motor brake is directly connected to the Safe Brake Relay. External surge suppressors are not required.

#### Technical specifications

|                                                |                                                                                                                                                    |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                            | Safe Brake Relay<br>6SL3252-0BB01-0AA0                                                                                                             |
| <b>Switching capacity</b><br>of the NO contact | –                                                                                                                                                  |
| <b>Supply voltage</b>                          | 20.4 ... 28.8 V DC<br>Recommended rated supply voltage 26 V DC<br>(To compensate for voltage drop in feeder cable to 24 V DC motor brake solenoid) |
| <b>Current requirement, max.</b>               | <ul style="list-style-type: none"> <li>• Motor brake<br/>• 24 V DC</li> </ul>                                                                      |
| <b>Dimensions</b>                              | <ul style="list-style-type: none"> <li>• Width<br/>• Height<br/>• Depth</li> </ul>                                                                 |
| <b>Weight, approx.</b>                         |                                                                                                                                                    |

#### Selection and ordering data

| Description                                                                          | Order No.                 |
|--------------------------------------------------------------------------------------|---------------------------|
| <b>Safe Brake Relay</b><br>Including cable harness<br>for connection to Power Module | <b>6SL3252-0BB01-0AA0</b> |

# SINAMICS S120 drive system

## Encoder system connection

### Encoder system connection

#### Overview

##### Motors with DRIVE-CLiQ interface



DRIVE-CLiQ is the preferred method for connecting the encoder systems to SINAMICS S120.

Motors with DRIVE-CLiQ interface are available for this purpose, e.g.

- 1PH8/1FT6/1FT7/1FK7 synchronous motors
- 1PH8/1PH7 asynchronous motors

Motors with a DRIVE-CLiQ interface can be directly connected to the associated Motor Module via the available MOTION-CONNECT DRIVE-CLiQ cables. The MOTION-CONNECT DRIVE-CLiQ cable is connected to the motor in degree of protection IP67.

The DRIVE-CLiQ interface supplies power to the motor encoder via the integrated 24 VDC supply and transfers the motor encoder and temperature signals and the electronic rating plate data, e.g. a unique identification number, rating data (voltage, current, torque) to the Control Unit. This means that for the various encoder types - e.g. resolver or absolute encoder - different encoder cable types with varying permissible lengths are now no longer required; just one cable type, MOTION-CONNECT DRIVE-CLiQ with varying permissible lengths, can be used for all encoders.

These motors simplify commissioning and diagnostics, as the motor and encoder type are identified automatically.

##### Motors without DRIVE-CLiQ interface

The encoder and temperature signals of motors without DRIVE-CLiQ interfaces, as well as those of external encoders, must be connected via Sensor Modules. Sensor Modules Cabinet-Mounted are available in degree of protection IP20 for control cabinet installation, as well as Sensor Modules External-Mounted (degree of protection IP67).

Only one encoder system can be connected to each Sensor Module.

#### Technical specifications

##### Motors with DRIVE-CLiQ interface

###### Built-in encoder systems

- Incremental encoder 22 bit (resolution 4.194.304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)
- Absolute encoder 22 bit single-turn (resolution 4.194.304, internal 2048 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)
- Absolute encoder 20 bit single-turn (resolution 1.048.576, internal 512 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM20DQ)
- Absolute encoder 16 bit single-turn (resolution 65.536, internal 32 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM16DQ)
- Absolute encoder 15 bit single-turn (resolution 32.768, internal 16 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM15DQ)
- Resolver 15 bit (resolution 32.768, internal, multi-pole) (R15DQ)
- Resolver 14 bit (resolution 16.384, internal, 2-pole) (R14DQ)

**Current requirement at 24 V DC, max.**  
(Supply via MOTION-CONNECT DRIVE-CLiQ cable)

190 mA

###### Cable length, max.

- When using MOTION-CONNECT 500 DRIVE-CLiQ cables
- When using MOTION-CONNECT 800 DRIVE-CLiQ cables

100 m (328 ft)

50 m (164 ft)

#### More information

Motor encoder and temperature signals must be connected when possible to the corresponding Motor Module or Power Module and external encoders to the Control Unit. However, the DRIVE-CLiQ connections can also be bundled via DRIVE-CLiQ Hub Modules.

##### Safety Integrated

The Safety Integrated Extended Functions of the SINAMICS S120 drive system require suitable encoders.

##### Motor driven by belt

Unfavorable material combinations generate frictional electricity between the belt pulley and the belt. Electrostatic charging must be prevented, since this can discharge via the motor shaft and the encoder, thereby causing disturbances in the encoder signals. One remedy is to use an anti-static belt.

# SINAMICS S120 drive system

## Encoder system connection

### SMC10 Sensor Module Cabinet-Mounted

#### Overview



The SMC10 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC10.

The following encoder signals can be evaluated:

- 2-pole resolver
- Multi-pole resolver

#### Design

The SMC10 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connection including motor temperature detection (KTY84-130 or PTC) via SUB-D connector
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The status of the SMC10 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC10 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail according to EN 60715 (IEC 60715).

The signal cable shield is connected via the encoder system connector and can also be connected to the SMC10 Sensor Module Cabinet-Mounted via a shield terminal, e.g. type SK8 by Phoenix Contact or type KLBÜ CO 1 by Weidmüller.

#### Integration

SMC10 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

#### Technical specifications

|                                                                                        |                                                                                                                                                 |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                    | SMC10 Sensor Module Cabinet-Mounted<br>6SL3055-0AA00-5AA3                                                                                       |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking encoder into account | 0.2 A                                                                                                                                           |
| • Conductor cross-section, max.                                                        | 2.5 mm <sup>2</sup>                                                                                                                             |
| • Fuse protection, max.                                                                | 20 A                                                                                                                                            |
| <b>Power loss</b>                                                                      | < 10 W                                                                                                                                          |
| <b>Encoders which can be evaluated</b>                                                 | <ul style="list-style-type: none"> <li>• 2-pole resolver</li> <li>• Multi-pole resolver</li> </ul>                                              |
| • Excitation voltage, rms                                                              | 4.1 V                                                                                                                                           |
| • Excitation frequency                                                                 | 5 ... 10 kHz depending on the current controller clock cycle of the Motor Module or Power Module                                                |
| • Transformation ratio                                                                 | 0.5                                                                                                                                             |
| • Encoder frequency, max.                                                              | 2 kHz (120000 rpm) depending on the pole pair number of the resolver and the current controller clock cycle of the Motor Module or Power Module |
| • Signal subdivision (interpolation), max.                                             | 16384 times (14 bit)                                                                                                                            |
| • Cable length to encoder, max.                                                        | 130 m (427 ft)                                                                                                                                  |
| <b>PE connection</b>                                                                   | M4 screw                                                                                                                                        |
| <b>Dimensions</b>                                                                      |                                                                                                                                                 |
| • Width                                                                                | 30 mm (1.18 in)                                                                                                                                 |
| • Height                                                                               | 150 mm (5.91 in)                                                                                                                                |
| • Depth                                                                                | 111 mm (4.37 in)                                                                                                                                |
| <b>Weight, approx.</b>                                                                 | 0.4 kg (0.88 lb)                                                                                                                                |
| <b>Approvals according to</b>                                                          | cULus                                                                                                                                           |

#### Selection and ordering data

|                                                                        |                           |
|------------------------------------------------------------------------|---------------------------|
| Description                                                            | Order No.                 |
| <b>SMC10 Sensor Module Cabinet-Mounted</b><br>Without DRIVE-CLiQ cable | <b>6SL3055-0AA00-5AA3</b> |

# SINAMICS S120 drive system

## Encoder system connection

### SMC20 Sensor Modules Cabinet-Mounted

#### Overview



The SMC20 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC20.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V<sub>pp</sub>
- Absolute encoder EnDat
- SSI encoder with incremental signals sin/cos 1 V<sub>pp</sub> (firmware V2.4 and later)

The motor temperature can also be detected using KTY84-130 or PTC thermistors.

#### Design

The SMC20 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connection including motor temperature detection (KTY84-130 or PTC) via SUB-D connector
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The status of the SMC20 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC20 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail acc. to EN 60715 (IEC 60715).

The signal cable shield is connected via the encoder system connector and can also be connected to the SMC20 Sensor Module Cabinet-Mounted via a shield terminal, e.g. type SK8 by Phoenix Contact or type KLBÜ CO 1 by Weidmüller.

#### Integration

SMC20 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

#### Technical specifications

|                                                                                     |                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                 | SMC20 Sensor Module Cabinet-Mounted<br>6SL3055-0AA00-5BA3                                                                                                                                                                             |
| <b>Current requirement, max.</b><br>At 24 V DC, without taking encoder into account | 0.2 A                                                                                                                                                                                                                                 |
| • Conductor cross-section, max.                                                     | 2.5 mm <sup>2</sup>                                                                                                                                                                                                                   |
| • Fuse protection, max.                                                             | 20 A                                                                                                                                                                                                                                  |
| <b>Power loss</b>                                                                   | < 10 W                                                                                                                                                                                                                                |
| <b>Encoders which can be evaluated</b>                                              | <ul style="list-style-type: none"> <li>• Incremental encoder sin/cos 1 V<sub>pp</sub></li> <li>• Absolute encoder EnDat</li> <li>• SSI encoder with incremental signals sin/cos 1 V<sub>pp</sub> (firmware V2.4 and later)</li> </ul> |
| • Encoder power supply                                                              | 5 V DC / 0.35 A                                                                                                                                                                                                                       |
| • Encoder frequency incremental signals, max.                                       | 500 kHz                                                                                                                                                                                                                               |
| • Signal subdivision (interpolation), max.                                          | 16384 times (14 bit)                                                                                                                                                                                                                  |
| • SSI baud rate                                                                     | 100 kBaud                                                                                                                                                                                                                             |
| • Cable length to encoder, max.                                                     | 100 m (328 ft)                                                                                                                                                                                                                        |
| <b>PE connection</b>                                                                | M4 screw                                                                                                                                                                                                                              |
| <b>Dimensions</b>                                                                   |                                                                                                                                                                                                                                       |
| • Width                                                                             | 30 mm (1.18 in)                                                                                                                                                                                                                       |
| • Height                                                                            | 150 mm (5.91 in)                                                                                                                                                                                                                      |
| • Depth                                                                             | 111 mm (4.37 in)                                                                                                                                                                                                                      |
| <b>Weight, approx.</b>                                                              | 0.45 kg (1 lb)                                                                                                                                                                                                                        |
| <b>Approvals according to</b>                                                       | cULus                                                                                                                                                                                                                                 |

#### Selection and ordering data

|                                                                        |                           |
|------------------------------------------------------------------------|---------------------------|
| Description                                                            | Order No.                 |
| <b>SMC20 Sensor Module Cabinet-Mounted</b><br>Without DRIVE-CLiQ cable | <b>6SL3055-0AA00-5BA3</b> |

# SINAMICS S120 drive system

## Encoder system connection

### SMC30 Sensor Module Cabinet-Mounted

#### Overview



The SMC30 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC30.

The following encoder signals can be evaluated:

- Incremental encoders TTL/HTL with/without open-circuit detection (open-circuit detection is only available with bipolar signals)
- SSI encoder with TTL/HTL incremental signals
- SSI encoder without incremental signals

The motor temperature can also be detected using KTY84-130 or PTC thermistors.

#### Design

The SMC30 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connection including motor temperature detection (KTY84-130 or PTC) via SUB-D connector or terminals
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The status of the SMC30 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC30 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 top-hat rail according to EN 60715 (IEC 60715).

The maximum encoder cable length between SMC30 modules and encoders is 100 m (328 ft). For HTL encoders, this length can be increased to 300 m (984 ft) if the A+/A- and B+/B- signals are evaluated and the power supply cable has a minimum cross-section of 0.5 mm<sup>2</sup>.

The signal cable shield can be connected to the SMC30 Sensor Module Cabinet-Mounted via a shield terminal, e.g. type SK8 by Phoenix Contact or type KLBÜ CO 1 by Weidmüller.

#### Integration

SMC30 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

#### Technical specifications

|                                                                                        |                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                    | SMC30 Sensor Module Cabinet-Mounted<br>6SL3055-0AA00-5CA2                                                                                                                                  |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking encoder into account | 0.2 A                                                                                                                                                                                      |
| • Conductor cross-section, max.                                                        | 2.5 mm <sup>2</sup>                                                                                                                                                                        |
| • Fuse protection, max.                                                                | 20 A                                                                                                                                                                                       |
| <b>Power loss</b>                                                                      | < 10 W                                                                                                                                                                                     |
| <b>Encoders which can be evaluated</b>                                                 | <ul style="list-style-type: none"> <li>• Incremental encoder TTL/HTL</li> <li>• SSI encoder with TTL/HTL incremental signals</li> <li>• SSI encoder without incremental signals</li> </ul> |
| • Input impedance                                                                      | 570 Ω                                                                                                                                                                                      |
| - TTL                                                                                  | 16 mA                                                                                                                                                                                      |
| - HTL, max.                                                                            |                                                                                                                                                                                            |
| • Encoder power supply                                                                 | 24 V DC/0.35 A or 5 V DC/0.35 A                                                                                                                                                            |
| • Encoder frequency, max.                                                              | 300 kHz                                                                                                                                                                                    |
| • SSI baud rate                                                                        | 100 ... 250 kBaud                                                                                                                                                                          |
| • Limiting frequency                                                                   | 300 kHz                                                                                                                                                                                    |
| • Resolution absolute position SSI                                                     | 30 bit                                                                                                                                                                                     |
| • Cable length, max.                                                                   |                                                                                                                                                                                            |
| - TTL encoder                                                                          | 100 m (328 ft) (only bipolar signals permitted) <sup>1)</sup>                                                                                                                              |
| - HTL encoder                                                                          | 100 m (328 ft) for unipolar signals<br>300 m (984 ft) for bipolar signals <sup>1)</sup>                                                                                                    |
| - SSI encoder                                                                          | 100 m (328 ft)                                                                                                                                                                             |
| <b>PE connection</b>                                                                   | M4 screw                                                                                                                                                                                   |
| <b>Dimensions</b>                                                                      |                                                                                                                                                                                            |
| • Width                                                                                | 30 mm (1.18 in)                                                                                                                                                                            |
| • Height                                                                               | 150 mm (5.91 in)                                                                                                                                                                           |
| • Depth                                                                                | 111 mm (4.37 in)                                                                                                                                                                           |
| <b>Weight, approx.</b>                                                                 | 0.45 kg (1 lb)                                                                                                                                                                             |
| <b>Approvals according to</b>                                                          | cULus                                                                                                                                                                                      |

#### Selection and ordering data

| Description                                | Order No.                 |
|--------------------------------------------|---------------------------|
| <b>SMC30 Sensor Module Cabinet-Mounted</b> | <b>6SL3055-0AA00-5CA2</b> |
| Without DRIVE-CLiQ cable                   |                           |

<sup>1)</sup> Signal cables twisted in pairs and shielded.

# SINAMICS S120 drive system

## Encoder system connection

### SME20/SME25 Sensor Modules External

#### Overview



SME20/SME25 Sensor Modules External are encoder evaluation units for machine encoders (direct measuring systems).

The devices are designed with IP67 degree of protection. This means that the units can be installed outside the control cabinet near the machine encoder.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V<sub>pp</sub> without rotor position track (C and D tracks)
- Absolute encoder EnDat 2.1
- SSI absolute encoder<sup>1)</sup> with incremental signals sin/cos 1 V<sub>pp</sub> (firmware version V2.4 and later)

It is possible to connect a motor with a 17-pole circular encoder connector to the 12-pole circular connector of the SME20 using adapter cable 6FX 8002-2CA88-....

- KTY/PTC temperature sensors can be used only for SME20.
- The Sensor Module is only suitable for motors without absolute track signals (C and D tracks), e.g.:
  - Synchronous motors with pole position identification (1FN, 1FW)
  - Asynchronous motors (1PH)

SME20/SME25 Sensor Modules External evaluate the encoder signals and convert the information obtained to DRIVE-CLiQ. Neither motor nor encoder data are saved in the SME20/SME25.

#### Design

SME20/SME25 Sensor Modules External feature the following connections and interfaces as standard:

- 1 DRIVE-CLiQ interface with integrated 24 V DC electronic power supply from the Control Unit or Motor Module
- 1 encoder connector (circular plug)
- 1 PE/protective conductor connection

#### Selection and ordering data

| Description                                                                                                                              | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SME20 Sensor Module External</b><br>For incremental measuring systems<br>Without DRIVE-CLiQ cable                                     | <b>6SL3055-0AA00-5EA3</b> |
| <b>SME25 Sensor Module External</b><br>For absolute measuring systems<br>Without DRIVE-CLiQ cable                                        | <b>6SL3055-0AA00-5HA3</b> |
| <b>Accessories</b>                                                                                                                       |                           |
| <b>Adapter cable<sup>2)</sup></b><br>For SME20, to connect motors with 17-pole encoder connector, with encoders, without C and D tracks. | <b>6FX8002-2CA88-....</b> |

#### Integration

SME20/SME25 Sensor Modules External communicate with a Control Unit via DRIVE-CLiQ.

<sup>1)</sup> For SME25, only encoders with 5 V supply voltage.

<sup>2)</sup> For length code, see section MOTION-CONNECT connection systems.

# SINAMICS S120 drive system

## Encoder system connection

### SME20/SME25 Sensor Modules External

#### Technical specifications

|                                                                                                                        |                               | Sensor Module External SME20<br>6SL3055-0AA00-5EA3                                                                          | Sensor Module External SME25<br>6SL3055-0AA00-5HA3                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Encoder</b>                                                                                                         |                               | <ul style="list-style-type: none"> <li>Incremental encoder sin/cos 1 V<sub>pp</sub> with 5 V power supply 0.35 A</li> </ul> | <ul style="list-style-type: none"> <li>Absolute encoder EnDat with 5 V power supply 0.35 A</li> <li>Absolute encoder SSI with incremental signals sin/cos 1 V<sub>pp</sub> with 5 V voltage supply 0.35 A</li> </ul> |
| <b>Signal subdivision</b><br>(Interpolation)                                                                           |                               | ≤ 16384 times (14 bit)                                                                                                      | ≤ 16384 times (14 bit)                                                                                                                                                                                               |
| <b>Max. encoder frequency that can be evaluated</b>                                                                    | kHz                           | ≤ 500                                                                                                                       | ≤ 500                                                                                                                                                                                                                |
| <b>SSI/EnDat 2.1 baud rate</b>                                                                                         | kHz                           | –                                                                                                                           | 100                                                                                                                                                                                                                  |
| <b>Measuring system interface</b>                                                                                      |                               | 12-pin M23 circular connector                                                                                               | 17-pin M23 circular connector                                                                                                                                                                                        |
| <b>Output</b>                                                                                                          |                               | IP67 DRIVE-CLiQ connector                                                                                                   | IP67 DRIVE-CLiQ connector                                                                                                                                                                                            |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking encoder into account                                 | A                             | 0.11                                                                                                                        | 0.11                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>Conductor cross-section</li> <li>Protection</li> </ul>                          |                               | Acc. to connector contacts<br>Via DRIVE-CLiQ power supply source                                                            | Acc. to connector contacts<br>Via DRIVE-CLiQ power supply source                                                                                                                                                     |
| <b>Power loss</b>                                                                                                      | W                             | < 4                                                                                                                         | < 4                                                                                                                                                                                                                  |
| <b>PE connection</b>                                                                                                   |                               | M4 screw/1.8 Nm                                                                                                             | M4 screw/1.8 Nm                                                                                                                                                                                                      |
| <b>Cable length, max.</b>                                                                                              |                               |                                                                                                                             |                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"> <li>To measuring system<sup>1)</sup></li> <li>To automatic speed control</li> </ul> | m (ft)<br>m (ft)              | 3 (9.84)<br>100 (328)                                                                                                       | 3 (9.84)<br>100 (328)                                                                                                                                                                                                |
| <b>Degree of protection</b>                                                                                            |                               | IP67                                                                                                                        | IP67                                                                                                                                                                                                                 |
| <b>Dimensions</b>                                                                                                      |                               |                                                                                                                             |                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"> <li>Width</li> <li>Height</li> <li>Depth</li> </ul>                                 | mm (in)<br>mm (in)<br>mm (in) | 58 (2.28)<br>44 (1.73)<br>112 (4.41)                                                                                        | 58 (2.28)<br>44 (1.73)<br>112 (4.41)                                                                                                                                                                                 |
| <b>Weight, approx.</b>                                                                                                 | kg (lb)                       | 0.31 (0.68)                                                                                                                 | 0.31 (0.68)                                                                                                                                                                                                          |
| <b>Approvals according to</b>                                                                                          |                               | cULus                                                                                                                       | cULus                                                                                                                                                                                                                |

<sup>1)</sup> The maximum cable length for the encoder system interface depends on the current consumption of the encoder system and the cross-section of the wires in the cable. However, the maximum length is 10 m (32.8 ft)  
(For detailed information see Manual SINAMICS S120 Control Units and supplementary system components).



# SINAMICS S120 drive system

## Encoder system connection

### SME120/SME125 Sensor Modules External

#### Overview



The SME120/SME125 Sensor Modules External are encoder evaluation units with degree of protection IP67, especially suitable for use in linear and torque motor applications. They can be installed close to the motor systems and encoders in the machine.

Sensor Modules External evaluate the encoder signals and motor temperature sensors specifically and convert the information obtained for DRIVE-CLiQ.

The motor temperature signals are safely electrically separated.

A hall effect sensor box can be connected for the SME120 to determine the commutation position of a linear motor.

Neither motor nor encoder data are saved in the SME120/SME125.

The SME120 and SME125 can be operated on Control Units with firmware release V2.4 and later.

The following encoder signals can be evaluated depending on the type of Sensor Module:

- Incremental encoder sin/cos 1  $V_{pp}$
- Absolute encoder EnDat 2.1
- SSI absolute encoder<sup>1)</sup> with sin/cos 1  $V_{pp}$  incremental signals, but without reference signal

The motor temperature can also be detected using KTY84-130 or PTC thermistors.

#### Design

SME120/SME125 Sensor Modules External feature the following connections and interfaces as standard:

- 1 DRIVE-CLiQ interface with integrated 24 V DC electronic power supply from the Control Unit or Motor Module
- 1 encoder connector (circular plug)
- 1 temperature sensor connection (circular connector)
- 1 hall effect sensor connection (circular connector) (SME120 only)
- 1 PE/protective conductor connection

#### Selection and ordering data

| Description                                                                                           | Order No.                 |
|-------------------------------------------------------------------------------------------------------|---------------------------|
| <b>SME120 Sensor Module External</b><br>For incremental measuring systems<br>Without DRIVE-CLiQ cable | <b>6SL3055-0AA00-5JA3</b> |
| <b>SME125 Sensor Module External</b><br>For absolute measuring systems<br>Without DRIVE-CLiQ cable    | <b>6SL3055-0AA00-5KA3</b> |
| <b>Accessories</b>                                                                                    |                           |
| <b>Connector</b> for temperature sensor input<br>(connector kits, 6+1-pole)                           | <b>6FX2003-0SU07</b>      |
| <b>Connector</b> for hall sensor input<br>(connector kits, 9-pole)                                    | <b>6FX2003-0SU01</b>      |
| <b>Connector</b> for encoder system interface SME120<br>(connector kits, 12-pole)                     | <b>6FX2003-0SA12</b>      |
| <b>Connector</b> for encoder system interface SME125 (connector kits, 17-pole)                        | <b>6FX2003-0SA17</b>      |

<sup>1)</sup> For SME125, only SSI encoders with 5 V supply voltage.

# SINAMICS S120 drive system

## Encoder system connection

### SME120/SME125 Sensor Modules External

#### Technical specifications

|                                                                                                                                                                                            |         | Sensor Module External SME120<br>6SL3055-0AA00-5JA3                                                                  | Sensor Module External SME125<br>6SL3055-0AA00-5KA3                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Encoder</b>                                                                                                                                                                             |         | <ul style="list-style-type: none"> <li>Incremental encoder sin/cos 1 V<sub>pp</sub> with 5 V power supply</li> </ul> | <ul style="list-style-type: none"> <li>Absolute encoder EnDat with 5 V power supply</li> <li>SSI with incremental encoder sin/cos 1 V<sub>pp</sub> with 5 V power supply</li> </ul> |
| <b>Signal subdivision</b><br>(Interpolation)                                                                                                                                               |         | ≤ 16384 times (14 bit)                                                                                               | ≤ 16384 times (14 bit)                                                                                                                                                              |
| <b>Max. encoder frequency that can be evaluated</b>                                                                                                                                        | kHz     | ≤ 500                                                                                                                | ≤ 500                                                                                                                                                                               |
| <b>SSI/EnDat 2.1 baud rate</b>                                                                                                                                                             | kHz     | –                                                                                                                    | 100                                                                                                                                                                                 |
| <b>Measuring system interface</b>                                                                                                                                                          |         | 12-pin M23 circular connector                                                                                        | 17-pin M23 circular connector                                                                                                                                                       |
| <b>Temperature sensor input</b>                                                                                                                                                            |         | 6-pin M17 circular connector                                                                                         | 6-pin M17 circular connector                                                                                                                                                        |
| <b>Hall effect sensor input</b>                                                                                                                                                            |         | 9-pin M23 circular connector                                                                                         | –                                                                                                                                                                                   |
| <b>Output</b>                                                                                                                                                                              |         | IP67 DRIVE-CLiQ connector                                                                                            | IP67 DRIVE-CLiQ connector                                                                                                                                                           |
| <b>Current requirement, max.</b><br>At 24 V DC,<br>without taking encoder into account                                                                                                     | A       | 0.16                                                                                                                 | 0.16                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>Current carrying capacity of the encoder supply for measuring system (at 5 V DC) and, where applicable, including hall effect sensor box</li> </ul> | A       | 0.35                                                                                                                 | 0.35                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>Conductor cross-section</li> <li>Protection</li> </ul>                                                                                              |         | Acc. to connector contacts<br>Via DRIVE-CLiQ power supply source                                                     | Acc. to connector contacts<br>Via DRIVE-CLiQ power supply source                                                                                                                    |
| <b>Power loss</b>                                                                                                                                                                          | W       | ≤ 4.5                                                                                                                | ≤ 4.5                                                                                                                                                                               |
| <b>PE connection</b>                                                                                                                                                                       |         | M4 screw/1.8 Nm                                                                                                      | M4 screw/1.8 Nm                                                                                                                                                                     |
| <b>Cable length, max.</b>                                                                                                                                                                  |         |                                                                                                                      |                                                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>To measuring system<sup>1)</sup>/ temperature sensor</li> </ul>                                                                                     | m (ft)  | 3 (9.84)                                                                                                             | 3 (9.84)                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>To automatic speed control</li> </ul>                                                                                                               | m (ft)  | 100 (328)                                                                                                            | 100 (328)                                                                                                                                                                           |
| <b>Degree of protection</b>                                                                                                                                                                |         | IP67                                                                                                                 | IP67                                                                                                                                                                                |
| <b>Dimensions</b>                                                                                                                                                                          |         |                                                                                                                      |                                                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>Width</li> <li>Height</li> <li>Depth</li> </ul>                                                                                                     | mm (in) | 117.6 (4.63)<br>44 (1.73)<br>127 (5.00)                                                                              | 117.6 (4.63)<br>44 (1.73)<br>127 (5.00)                                                                                                                                             |
| <b>Weight, approx.</b>                                                                                                                                                                     | kg (lb) | 0.7 (1.54)                                                                                                           | 0.7 (1.54)                                                                                                                                                                          |
| <b>Approvals according to</b>                                                                                                                                                              |         | cULus                                                                                                                | cULus                                                                                                                                                                               |

<sup>1)</sup> The maximum cable length for the encoder system interface depends on the current consumption of the encoder system and the cross-section of the wires in the cable. However, the maximum length is 10 m (32.8 ft)  
(For detailed information see Manual SINAMICS S120 Control Units and supplementary system components).

# SINAMICS S120 drive system

## Measuring systems

### Overview

| Encoder type                                                                                                     | Interface                 | Safety Integrated <sup>1)</sup> | Accuracy in angular seconds    | Resolution                                                                                        | Degree of protection without/with shaft input |
|------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <b>Incremental encoders</b><br> | sin/cos 1 V <sub>pp</sub> | Yes                             | ± 18 mech. × 3600/PPR count z  | 2500 S/R                                                                                          | IP67/IP64                                     |
|                                                                                                                  | RS422 (TTL)               | <sup>2)</sup>                   | ± 18 mech. × 3600/PPR count z  | 5000 S/R                                                                                          | IP67/IP64                                     |
|                                                                                                                  | HTL                       | <sup>2)</sup>                   | ± 18 mech. × 3600/PPR count z  | 2500 S/R                                                                                          | IP67/IP64                                     |
|                                                                                                                  | RS422 (TTL) double track  | <sup>2)</sup>                   | Track 1: ± 63<br>Track 2: ± 12 | Track 1: 1024 S/R<br>Track 2: 9000 S/R                                                            | IP67/IP64                                     |
| <b>Absolute encoders</b><br>    | DRIVE-CLiQ                | <sup>2)</sup>                   | ± 36                           | Single-turn<br>22 bit<br>Multi-turn<br>34 bit<br>(22 bit single-turn + 12 bit multi-turn)         | IP67/IP64                                     |
|                                 | SSI                       | <sup>2)</sup>                   | ± 79<br>(with 8192 steps)      | Single-turn<br>13 bit (8192 steps)<br>Multi-turn<br>25 bits<br>(8192 steps × 4096 revolutions)    | IP67/IP64                                     |
|                                                                                                                  | EnDat                     | Yes                             | ± 60<br>(incremental track)    | Single-turn<br>13 bit (8192 steps)<br>Multi-turn<br>25 bits<br>(8192 steps × 4096 revolutions)    | IP67/IP64                                     |
|                               | PROFIBUS DP               | <sup>2)</sup>                   | ± 79<br>(with 8192 steps)      | Single-turn<br>13 bit<br>(8192 steps)<br>Multi-turn<br>27 bit<br>(8192 steps × 16384 revolutions) | IP67/IP64                                     |
|                               | PROFINET IO               | <sup>2)</sup>                   | ± 79<br>(with 8192 steps)      | Single-turn<br>13 bit<br>(8192 steps)<br>Multi-turn<br>27 bit<br>(8192 steps × 16384 revolutions) | IP67/IP64                                     |

S/R = signals/revolution

<sup>1)</sup> Built-on rotary encoders can be used for Safety Integrated.

<sup>2)</sup> If you require information about the usability of built-on rotary encoders for Safety Integrated, please contact your local Siemens office.

# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Introduction

#### Overview



Absolute encoders, incremental encoders and mounting accessories

The built-on optoelectronic rotary encoders sense distances, angles of rotation or speeds in machines. They can be used in conjunction with numerical control systems, programmable logic controllers, drives and position displays, e.g. for:

- SINUMERIK CNC controls
- SIMOTION Motion Control Systems
- SIMATIC programmable logic controllers
- SINAMICS drive systems
- SIMODRIVE drive systems

#### Application

A distinction is made between incremental and absolute measuring procedures:

- In the case of incremental encoders, the machine must travel to a reference point after each power-off state, as the position is not usually stored in the controller, and movements of the machine while the power is off are not recorded.
- Absolute encoders, on the other hand, also record these movements while the power is off and return the actual position with power On. Travel to a reference point is not necessary.

#### Design

All encoders are available in Synchro flange and clamp flange versions. Encoders with a Synchro flange can be attached to the machine with 3 clamps or mounted with axial screws. The encoder is driven by means of a plug-in coupling or a spring disk coupling. Alternatively, pulleys can also be used.

The encoder supply voltage is 5 V DC or alternatively 10 V to 30 V DC. The 10 V to 30 V DC version supports longer cable lengths. Most control systems apply the supply voltage directly on the measuring circuit connector. With SINAMICS, the power supply for the measuring systems is provided via the Sensor Modules.

For rotary encoders with cables, the cable length including the connector is 1 m (3.28 ft).

The following bending radii for the cables at the encoder must be observed:

- One-time bending:  $\geq 20$  mm (0.79 in)
- Continuous bending:  $\geq 75$  mm (2.95 in)

# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Incremental encoders

#### Function



Incremental encoder (sin/cos 1 V<sub>pp</sub>/RS422/HTL) with cable and connector, clamp flange or Synchro flange

Incremental encoders deliver a defined number of electrical pulses per revolution, which represent the measurement of the traveled distance or angle.

Incremental encoders operate on the principle of optoelectronic scanning of dividing discs with the transmitted light principle. The light source is a light emitting diode (LED). The light-dark modulation generated as the encoder shaft rotates is picked up by photoelectronic elements. With an appropriate arrangement of the line pattern on the dividing disk connected to the shaft and the fixed aperture, the photoelectronic elements provide two trace signals A and B at 90° to one another, as well as a reference signal R. The encoder electronics amplify these signals and convert them into different output levels.

The following output levels are available:

- Analog signals sin/cos with 1 V<sub>pp</sub> level  
Better resolution can be achieved for encoders with sinusoidal signals by interpolating them in the higher-level controller.
- RS422 difference signals (TTL)  
In the case of RS422 incremental encoders (TTL), the resolution can be improved by a factor of four by means of edge evaluation.
- HTL (High Voltage Transistor Logic)  
Encoders with HTL interfaces are designed for applications with digital inputs with 24 V levels.

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#### Technical specifications

| Product name                                                                                                                             |         | Incremental encoder with sin/cos 1 V <sub>pp</sub> | Incremental encoder with RS422 (TTL) | Incremental encoder with HTL                                                                                              | Double-track incremental encoder with RS422 (TTL) |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
|                                                                                                                                          |         | 6FX2001-3....                                      | 6FX2001-2....                        | 6FX2001-4...0                                                                                                             | 6FX2001-2UK00                                     |
| Operating voltage DC V <sub>p</sub> on encoder                                                                                           | V       | 5<br>± 10 %                                        | 5<br>± 10 %<br>or<br>10 ... 30       | 10 ... 30                                                                                                                 | 5<br>± 5 %                                        |
| Limit frequency, typ.                                                                                                                    | kHz     | ≥ 180 (-3 dB)<br>≥ 450 (-6 dB)                     | –                                    | –                                                                                                                         | –                                                 |
| Scanning frequency, max.                                                                                                                 | kHz     | –                                                  | 300                                  | 300                                                                                                                       | Track 1: 160<br>Track 2: 1000                     |
| No-load current consumption, max.                                                                                                        | mA      | 150                                                | 150                                  | 150                                                                                                                       | Track 1: 150<br>Track 2: 150                      |
| Signal level                                                                                                                             |         | Sinusoidal 1 V <sub>pp</sub>                       | RS422 (TTL)                          | V <sub>H</sub> ≥ 21 V<br>at I <sub>H</sub> = 20 mA at 24 V<br>V <sub>L</sub> ≤ 2.8 V<br>at I <sub>L</sub> = 20 mA at 24 V | RS422 (TTL)                                       |
| Outputs protected against short circuit to 0 V                                                                                           |         | Yes                                                | Yes                                  | Yes                                                                                                                       | Yes                                               |
| Switching time (10 ... 90 %)<br>rise/fall time t <sub>r</sub> /t <sub>f</sub><br>(for 1 m (3.28 ft) cable and recommended input circuit) | ns      | –                                                  | ≤ 50                                 | ≤ 200                                                                                                                     | ≤ 100                                             |
| Phase angle, signal A to B<br>Edge spacing, min.                                                                                         | Degrees | 90 ± 10                                            | 90                                   | 90                                                                                                                        | 90                                                |
| • At 160 kHz                                                                                                                             | μs      | –                                                  | –                                    | –                                                                                                                         | Track 1: ≥ 0.8                                    |
| • At 300 kHz                                                                                                                             | μs      | –                                                  | ≥ 0.45                               | ≥ 0.45                                                                                                                    | –                                                 |
| • At 1 MHz                                                                                                                               | μs      | –                                                  | –                                    | –                                                                                                                         | Track 2: ≥ 0.125                                  |

# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Incremental encoders

#### Technical specifications (continued)

| Product name                                                     |                                                        | Incremental encoder with sin/cos 1 V <sub>pp</sub>                                                                                                  | Incremental encoder with RS422 (TTL)               | Incremental encoder with HTL                       | Double-track incremental encoder with RS422 (TTL) |
|------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|---------------------------------------------------|
|                                                                  |                                                        | 6FX2001-3....                                                                                                                                       | 6FX2001-2....                                      | 6FX2001-4...0                                      | 6FX2001-2UK00                                     |
| <b>Cable length to downstream electronics, max.<sup>1)</sup></b> | m (ft)                                                 | 150 (492)                                                                                                                                           | 100 (328)                                          | 300 (984)                                          | Up to 500 kHz: 100 (328)<br>Up to 1 MHz: 50 (164) |
| <b>LED failure monitoring</b>                                    |                                                        | –                                                                                                                                                   | High-resistance driver                             | High-resistance driver                             | –                                                 |
| <b>Resolution, max.</b>                                          | S/R                                                    | 2500                                                                                                                                                | 5000                                               | 2500                                               | Track 1: 1024<br>Track 2: 9000                    |
| <b>Accuracy</b>                                                  | arcsec                                                 | ± 18 mech. × 3600/PPR count z                                                                                                                       | ± 18 mech. × 3600/PPR count z                      | ± 18 mech. × 3600/PPR count z                      | Track 1: ± 63<br>Track 2: ± 12                    |
| <b>Speed, max.</b>                                               |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • Electrical                                                     | rpm                                                    | (27 × 10 <sup>6</sup> rpm) / PPR count (at -6 dB)                                                                                                   | (18 × 10 <sup>6</sup> rpm) / PPR count             | (18 × 10 <sup>6</sup> rpm) / PPR count             | Track 1: 9000<br>Track 2: 6500                    |
| • Mechanical                                                     | rpm                                                    | 12000                                                                                                                                               | 12000                                              | 12000                                              | 12000                                             |
| <b>Friction torque (at 20 °C) (68 °F)</b>                        | Nm (lb <sub>f</sub> -in)                               | ≤ 0.01 (0.09)                                                                                                                                       | ≤ 0.01 (0.09)                                      | ≤ 0.01 (0.09)                                      | ≤ 0.01 (0.09)                                     |
| <b>Starting torque (at 20 °C) (68 °F)</b>                        | Nm (lb <sub>f</sub> -in)                               | ≤ 0.01 (0.09)                                                                                                                                       | ≤ 0.01 (0.09)                                      | ≤ 0.01 (0.09)                                      | ≤ 0.01 (0.09)                                     |
| <b>Shaft load capability</b>                                     |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • n ≤ 6000 rpm                                                   |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| - Axial                                                          | N (lb <sub>f</sub> )                                   | 40 (8.99)                                                                                                                                           | 40 (8.99)                                          | 40 (8.99)                                          | 10 (2.25)                                         |
| - Radial at shaft extension                                      | N (lb <sub>f</sub> )                                   | 60 (13.5)                                                                                                                                           | 60 (13.5)                                          | 60 (13.5)                                          | 20 (4.50)                                         |
| • n > 6000 rpm                                                   |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| - Axial                                                          | N (lb <sub>f</sub> )                                   | 10 (2.25)                                                                                                                                           | 10 (2.25)                                          | 10 (2.25)                                          | –                                                 |
| - Radial at shaft extension                                      | N (lb <sub>f</sub> )                                   | 20 (4.50)                                                                                                                                           | 20 (4.50)                                          | 20 (4.50)                                          | –                                                 |
| <b>Shaft diameter</b>                                            |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • Synchro flange                                                 | mm (in)                                                | 6 (0.24)                                                                                                                                            | 6 (0.24)                                           | 6 (0.24)                                           | 6 (0.24)                                          |
| • Clamp flange                                                   | mm (in)                                                | 10 (0.39)                                                                                                                                           | 10 (0.39)                                          | 10 (0.39)                                          | –                                                 |
| <b>Shaft length</b>                                              |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • Synchro flange                                                 | mm (in)                                                | 10 (0.39)                                                                                                                                           | 10 (0.39)                                          | 10 (0.39)                                          | 15 (0.59)                                         |
| • Clamp flange                                                   | mm (in)                                                | 20 (0.79)                                                                                                                                           | 20 (0.79)                                          | 20 (0.79)                                          | –                                                 |
| <b>Angular acceleration, max.</b>                                | rad/s <sup>2</sup>                                     | 10 <sup>5</sup>                                                                                                                                     | 10 <sup>5</sup>                                    | 10 <sup>5</sup>                                    | 10 <sup>5</sup>                                   |
| <b>Moment of inertia of rotor</b>                                | kgm <sup>2</sup> (lb <sub>f</sub> -in-s <sup>2</sup> ) | 1.45 × 10 <sup>-6</sup> (12.8 × 10 <sup>-6</sup> )                                                                                                  | 1.45 × 10 <sup>-6</sup> (12.8 × 10 <sup>-6</sup> ) | 1.45 × 10 <sup>-6</sup> (12.8 × 10 <sup>-6</sup> ) | 20 × 10 <sup>-6</sup> (177 × 10 <sup>-6</sup> )   |
| <b>Vibration (55 ... 2000 Hz) acc. to EN 60068-2-6</b>           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                  | ≤ 300 (984)                                                                                                                                         | ≤ 300 (984)                                        | ≤ 300 (984)                                        | ≤ 100 (328)                                       |
| <b>Shock acc. to EN 60068-2-27</b>                               |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • 2 ms                                                           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                  | ≤ 2000 (6562)                                                                                                                                       | ≤ 2000 (6562)                                      | ≤ 2000 (6562)                                      | –                                                 |
| • 6 ms                                                           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                  | ≤ 1000 (3281)                                                                                                                                       | ≤ 1000 (3281)                                      | ≤ 1000 (3281)                                      | ≤ 1000 (3281)                                     |
| <b>Degree of protection acc. to DIN EN 60529 (IEC 60529)</b>     |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • Without shaft input                                            |                                                        | IP67                                                                                                                                                | IP67                                               | IP67                                               | IP67                                              |
| • With shaft input                                               |                                                        | IP64                                                                                                                                                | IP64                                               | IP64                                               | IP64                                              |
| <b>Ambient temperature</b>                                       |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| <u>Operation</u>                                                 |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| • Flange outlet or fixed cable                                   |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| - At V <sub>p</sub> = 5 V ± 10 %                                 | °C (°F)                                                | -40 ... +100 (-40 ... +212)                                                                                                                         | -40 ... +100 (-40 ... +212)                        | -40 ... +100 (-40 ... +212)                        | -10 ... +70 (+14 ... +158)                        |
| - At V <sub>p</sub> = 10 ... 30 V                                | °C (°F)                                                | –                                                                                                                                                   | -40 ... +70 (-40 ... +158)                         | –                                                  | –                                                 |
| • Flexible cable                                                 |                                                        |                                                                                                                                                     |                                                    |                                                    |                                                   |
| - At V <sub>p</sub> = 5 V ± 10 %                                 | °C (°F)                                                | -10 ... +100 (+14 ... +212)                                                                                                                         | -10 ... +100 (+14 ... +212)                        | -10 ... +100 (+14 ... +212)                        | -10 ... +70 (+14 ... +158)                        |
| - At V <sub>p</sub> = 10 ... 30 V                                | °C (°F)                                                | –                                                                                                                                                   | -10 ... +70 (+14 ... +158)                         | –                                                  | –                                                 |
| <b>Weight, approx.</b>                                           | kg (lb)                                                | 0.3 (0.66)                                                                                                                                          | 0.3 (0.66)                                         | 0.3 (0.66)                                         | 0.7 (1.54)                                        |
| <b>EMC</b>                                                       |                                                        | Tested in accordance with the guidelines for electromagnetic compatibility 89/336/EEC and the regulations of the EMC guidelines (generic standards) |                                                    |                                                    |                                                   |
| <b>Approvals according to</b>                                    |                                                        | CE, cULus                                                                                                                                           | CE, cULus                                          | CE, cULus                                          | CE, cULus                                         |

S/R = signals/revolution

<sup>1)</sup> With recommended cable and input circuitry of the downstream electronics, observe max. permissible cable length of module to be evaluated.

# SINAMICS S120 drive system

## Measuring systems

**Built-on optoelectronic rotary encoders**  
**Incremental encoders**

### Selection and ordering data

| Description                                                         | Order No.               |
|---------------------------------------------------------------------|-------------------------|
| <b>Incremental encoders with sin/cos</b><br><b>1 V<sub>pp</sub></b> |                         |
| 5 V DC supply voltage                                               |                         |
| <u>Synchro flange and connection via</u>                            |                         |
| • Axial flange outlet                                               | <b>6FX2001-3G</b> ■ ■ ■ |
| • Radial flange outlet                                              | <b>6FX2001-3E</b> ■ ■ ■ |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>                  | <b>6FX2001-3C</b> ■ ■ ■ |
| <u>Resolution</u>                                                   |                         |
| 1000 S/R                                                            | <b>B 0 0</b>            |
| 1024 S/R                                                            | <b>B 0 2</b>            |
| 2500 S/R                                                            | <b>C 5 0</b>            |
| <b>Incremental encoders with RS422 (TTL)</b>                        |                         |
| 5 V DC supply voltage                                               |                         |
| <u>Synchro flange and connection via</u>                            |                         |
| • Axial flange outlet                                               | <b>6FX2001-2G</b> ■ ■ ■ |
| • Radial flange outlet                                              | <b>6FX2001-2E</b> ■ ■ ■ |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>                  | <b>6FX2001-2C</b> ■ ■ ■ |
| <u>Clamp flange and connection via</u>                              |                         |
| • Axial flange outlet                                               | <b>6FX2001-2R</b> ■ ■ ■ |
| • Radial flange outlet                                              | <b>6FX2001-2P</b> ■ ■ ■ |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>                  | <b>6FX2001-2M</b> ■ ■ ■ |
| 10 ... 30 V DC supply voltage                                       |                         |
| <u>Synchro flange and connection via</u>                            |                         |
| • Axial flange outlet                                               | <b>6FX2001-2H</b> ■ ■ ■ |
| • Radial flange outlet                                              | <b>6FX2001-2F</b> ■ ■ ■ |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>                  | <b>6FX2001-2D</b> ■ ■ ■ |
| <u>Clamp flange and connection via</u>                              |                         |
| • Axial flange outlet                                               | <b>6FX2001-2S</b> ■ ■ ■ |
| • Radial flange outlet                                              | <b>6FX2001-2Q</b> ■ ■ ■ |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>                  | <b>6FX2001-2N</b> ■ ■ ■ |
| <u>Resolution</u>                                                   |                         |
| 500 S/R                                                             | <b>A 5 0</b>            |
| 1000 S/R                                                            | <b>B 0 0</b>            |
| 1024 S/R                                                            | <b>B 0 2</b>            |
| 1250 S/R                                                            | <b>B 2 5</b>            |
| 1500 S/R                                                            | <b>B 5 0</b>            |
| 2000 S/R                                                            | <b>C 0 0</b>            |
| 2048 S/R                                                            | <b>C 0 4</b>            |
| 2500 S/R                                                            | <b>C 5 0</b>            |
| 3600 S/R                                                            | <b>D 6 0</b>            |
| 5000 S/R                                                            | <b>F 0 0</b>            |

| Description                                              | Order No.               |
|----------------------------------------------------------|-------------------------|
| <b>Incremental encoders with HTL</b>                     |                         |
| 10 ... 30 V DC supply voltage                            |                         |
| <u>Synchro flange and connection via</u>                 |                         |
| • Axial flange outlet                                    | <b>6FX2001-4H</b> ■ ■ 0 |
| • Radial flange outlet                                   | <b>6FX2001-4F</b> ■ ■ 0 |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>       | <b>6FX2001-4D</b> ■ ■ 0 |
| <u>Clamp flange and connection via</u>                   |                         |
| • Axial flange outlet                                    | <b>6FX2001-4S</b> ■ ■ 0 |
| • Radial flange outlet                                   | <b>6FX2001-4Q</b> ■ ■ 0 |
| • Cable 1 m (3.28 ft) with connector <sup>1)</sup>       | <b>6FX2001-4N</b> ■ ■ 0 |
| <u>Resolution</u>                                        |                         |
| 100 S/R                                                  | <b>A 1</b>              |
| 500 S/R                                                  | <b>A 5</b>              |
| 1000 S/R                                                 | <b>B 0</b>              |
| 2500 S/R                                                 | <b>C 5</b>              |
| <b>Double-track incremental encoder with RS422 (TTL)</b> |                         |
| 5 V DC supply voltage                                    |                         |
| <u>Synchro flange and connection via</u>                 |                         |
| • Cable 1 m (3.28 ft) with axial connector               | <b>6FX2001-2UK00</b>    |
| 2 types of resolution: 9000/1024 S/R                     |                         |

S/R = signals/revolution

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<sup>1)</sup> Universal integrated cable outlet for axial and radial outlet direction.



# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Absolute encoders

#### Function



Absolute encoders with SSI/EnDat and PROFIBUS DP at the top, and DRIVE-CLiQ and PROFINET IO at the bottom

Absolute encoders (absolute shaft encoders) are designed on the same scanning principle as incremental encoders, but have a greater number of tracks. For example, if there are 13 tracks, then  $2^{13} = 8192$  steps are coded in the case of single-turn encoders. The code used is a one-step code (gray code) which prevents any scanning errors from occurring.

After switching on the machine, the position value is transferred immediately to the controller. There is no need for homing.

DRIVE-CLiQ, SSI and EnDat absolute encoders are of advantage in time-critical applications.

In plants with a large number of encoders, encoders with PROFIBUS DP or PROFINET IO are more advantageous due to the reduced wiring overhead. PROFIBUS DP encoders are programmable and support isochronous mode with direct data exchange. The encoders with PROFINET IO are also parameterizable, additionally have two ports and support the RT and IRT operating modes.

#### Single-turn encoders

Single-turn encoders divide one revolution (360 degrees mechanical) into a specific number of steps, e.g. 8192. A unique code word is assigned to each position. After 360 degrees the position values are repeated.

#### Multi-turn encoders

Multi-turn encoders also record the number of revolutions, in addition to the absolute position within one revolution. To do this, further code discs which are coupled via gear steps with the encoder shaft are scanned. When evaluating 12 additional tracks, this means that  $2^{12} = 4096$  revolutions can be coded.

#### Technical specifications

| Product name                                               |             | Absolute encoder with DRIVE-CLiQ<br>6FX2001-5.D...-0AA1 | Absolute encoder with SSI<br>6FX2001-5.S..              | Absolute encoder with EnDat<br>6FX2001-5.E..            |
|------------------------------------------------------------|-------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Operating voltage DC $V_p$ on encoder                      | V           | 24<br>- 15 % + 20 %                                     | 10 ... 30                                               | 5<br>± 5 %                                              |
| Current consumption, approx.                               |             |                                                         |                                                         |                                                         |
| • Single-turn                                              | mA          | 245                                                     | 160                                                     | 160                                                     |
| • Multi-turn                                               | mA          | 325                                                     | 200                                                     | 200                                                     |
| Interface                                                  |             | DRIVE-CLiQ                                              | SSI                                                     | EnDat                                                   |
| Clock input                                                |             | –                                                       | Differential cable receiver acc. to EIA standard RS 485 | Differential cable receiver acc. to EIA standard RS 485 |
| Data output                                                |             | DRIVE-CLiQ                                              | Differential cable driver acc. to EIA standard RS 485   | Differential cable driver acc. to EIA standard RS 485   |
| Short-circuit strength                                     |             | Yes                                                     | Yes                                                     | Yes                                                     |
| Transmission rate                                          | Mbit<br>kHz | 100<br>–                                                | –<br>100 ... 1000                                       | –<br>100 ... 2000                                       |
| Speed, max.                                                |             |                                                         |                                                         |                                                         |
| • Electrical                                               | rpm         | 14000                                                   | –                                                       | –                                                       |
| - At ± 1 bit accuracy                                      | rpm         | –                                                       | 5000                                                    | 5000                                                    |
| - At ± 100 bit accuracy                                    | rpm         | –                                                       | 10000                                                   | 10000                                                   |
| • Mechanical                                               |             |                                                         |                                                         |                                                         |
| - Single-turn                                              | rpm         | 12000                                                   | 12000                                                   | 12000                                                   |
| - Multi-turn                                               | rpm         | 10000                                                   | 10000                                                   | 10000                                                   |
| Cable length to downstream electronics, max. <sup>1)</sup> | m (ft)      | 100 (328)                                               | –                                                       | –                                                       |
| • Up to 100-kHz-cycle                                      | m (ft)      | –                                                       | 400 (1312)                                              | –                                                       |
| • Up to 300-kHz-cycle                                      | m (ft)      | –                                                       | 100 (328)                                               | 150 (492)                                               |
| • Up to 1-MHz-cycle                                        | m (ft)      | –                                                       | 50 (164)                                                | 50 (164)                                                |
| Connection                                                 |             | DRIVE-CLiQ connector, radial                            | Flange outlet, axial/radial                             | Flange outlet, axial/radial                             |

<sup>1)</sup> Observe the max. permissible cable length of the connected module.

# SINAMICS S120 drive system

## Measuring systems

Built-on optoelectronic rotary encoders  
Absolute encoders

### Technical specifications (continued)

| Product name                                                     |                                                           | Absolute encoder with DRIVE-CLiQ<br>6FX2001-5.D...0AA1 | Absolute encoder with SSI<br>6FX2001-5.S...           | Absolute encoder with EnDat<br>6FX2001-5.E...         |
|------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| <b>Resolution</b>                                                |                                                           |                                                        |                                                       |                                                       |
| • Single-turn                                                    | bit                                                       | 22                                                     | 13<br>(8192 steps)                                    | 13<br>(8192 steps)                                    |
| • Multi-turn                                                     | bit                                                       | 34<br>(22 bit single-turn+12 bit multi-turn)           | 25<br>(8192 steps × 4096 revolutions)                 | 25<br>(8192 steps × 4096 revolutions)                 |
| <b>Frame</b>                                                     |                                                           |                                                        |                                                       |                                                       |
| • Single-turn                                                    | bit                                                       | –                                                      | 13<br>without parity                                  | According to EnDat specification                      |
| • Multi-turn                                                     | bit                                                       | –                                                      | 25<br>without parity                                  | According to EnDat specification                      |
| <b>Incremental track</b>                                         | S/R                                                       | 2048, 1 V <sub>pp</sub> (internal only)                | –                                                     | 512, 1 V <sub>pp</sub>                                |
| <b>Code type</b>                                                 |                                                           |                                                        |                                                       |                                                       |
| • Sampling                                                       |                                                           | Gray                                                   | Gray                                                  | Gray                                                  |
| • Transfer                                                       |                                                           | DRIVE-CLiQ                                             | Gray, fir tree format                                 | Binary                                                |
| <b>Parameterization capability</b>                               |                                                           |                                                        |                                                       |                                                       |
| • Preset                                                         |                                                           | –                                                      | Set to zero                                           | –                                                     |
| • Counting direction                                             |                                                           | Yes                                                    | Yes                                                   | –                                                     |
| <b>Accuracy</b>                                                  | arcsec                                                    | ± 36                                                   | ± 79<br>(with 8192 steps)                             | ± 60<br>(incremental track)                           |
| <b>Friction torque</b><br>(at 20 °C) (68 °F)                     | Nm (lb <sub>f</sub> -in)                                  | ≤ 0.01 (0.09)                                          | ≤ 0.01 (0.09)                                         | ≤ 0.01 (0.09)                                         |
| <b>Starting torque</b><br>(at 20 °C) (68 °F)                     | Nm (lb <sub>f</sub> -in)                                  | ≤ 0.01 (0.09)                                          | ≤ 0.01 (0.09)                                         | ≤ 0.01 (0.09)                                         |
| <b>Shaft load capability</b>                                     |                                                           |                                                        |                                                       |                                                       |
| • n ≤ 6000 rpm                                                   |                                                           |                                                        |                                                       |                                                       |
| - Axial                                                          | N (lb <sub>f</sub> )                                      | 40 (8.99)                                              | 40 (8.99)                                             | 40 (8.99)                                             |
| - Radial at shaft extension                                      | N (lb <sub>f</sub> )                                      | 60 (13.5)                                              | 60 (13.5)                                             | 60 (13.5)                                             |
| • n > 6000 rpm                                                   |                                                           |                                                        |                                                       |                                                       |
| - Axial                                                          | N (lb <sub>f</sub> )                                      | 10 (2.25)                                              | 10 (2.25)                                             | 10 (2.25)                                             |
| - Radial at shaft extension                                      | N (lb <sub>f</sub> )                                      | 20 (4.50)                                              | 20 (4.50)                                             | 20 (4.50)                                             |
| <b>Shaft diameter</b>                                            |                                                           |                                                        |                                                       |                                                       |
| • Synchro flange                                                 | mm (in)                                                   | 6 (0.24)                                               | 6 (0.24)                                              | 6 (0.24)                                              |
| • Clamp flange                                                   | mm (in)                                                   | 10 (0.39)                                              | 10 (0.39)                                             | 10 (0.39)                                             |
| • Torque arm<br>Hollow shaft                                     | mm (in)                                                   | 10/12 (0.39/0.47)                                      | –                                                     | –                                                     |
| <b>Angular acceleration, max.</b>                                | rad/s <sup>2</sup>                                        | 10 <sup>5</sup>                                        | 10 <sup>5</sup>                                       | 10 <sup>5</sup>                                       |
| <b>Moment of inertia of rotor</b>                                |                                                           |                                                        |                                                       |                                                       |
| • Solid shaft                                                    | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | 1.90 × 10 <sup>-6</sup><br>(16.8 × 10 <sup>-6</sup> )  | 1.45 × 10 <sup>-6</sup><br>(12.8 × 10 <sup>-6</sup> ) | 1.45 × 10 <sup>-6</sup><br>(12.8 × 10 <sup>-6</sup> ) |
| • Hollow shaft                                                   | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | 2.80 × 10 <sup>-6</sup><br>(24.8 × 10 <sup>-6</sup> )  | –                                                     | –                                                     |
| <b>Vibration (55 ... 2000 Hz)</b><br><b>acc. to EN 60068-2-6</b> | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 100 (328)                                            | ≤ 300 (984)                                           | ≤ 300 (984)                                           |
| <b>Shock</b><br><b>acc. to EN 60068-2-27</b>                     |                                                           |                                                        |                                                       |                                                       |
| • 2 ms                                                           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 2000 (6562)                                          | ≤ 2000 (6562)                                         | ≤ 2000 (6562)                                         |
| • 6 ms                                                           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 1000 (3281)                                          | ≤ 1000 (3281)                                         | ≤ 1000 (3281)                                         |
| <b>Degree of protection acc. to DIN EN 60529 (IEC 60529)</b>     |                                                           |                                                        |                                                       |                                                       |
| • Without shaft input                                            |                                                           | IP67                                                   | IP67                                                  | IP67                                                  |
| • With shaft input                                               |                                                           | IP64                                                   | IP64                                                  | IP64                                                  |
| <b>Ambient temperature</b>                                       |                                                           |                                                        |                                                       |                                                       |
| • Operation                                                      | °C (°F)                                                   | -20 ... +100 (-4 ... +212)                             | -40 ... +85 (-40 ... +185)                            | -40 ... +100 (-40 ... +212)                           |
| <b>Weight, approx.</b>                                           |                                                           |                                                        |                                                       |                                                       |
| • Single-turn                                                    | kg (lb)                                                   | 0.4 (0.88)                                             | 0.35 (0.77)                                           | 0.35 (0.77)                                           |
| • Multi-turn                                                     | kg (lb)                                                   | 0.5 (1.10)                                             | 0.35 (0.77)                                           | 0.35 (0.77)                                           |
| <b>EMC</b>                                                       |                                                           | Tested in accordance with DIN EN 50081 and EN 50082    | Tested in accordance with DIN EN 50081 and EN 50082   | Tested in accordance with DIN EN 50081 and EN 50082   |
| <b>Approvals according to</b>                                    |                                                           | CE, cULus                                              | CE, cULus                                             | CE, cULus                                             |

S/R = signals/revolution

# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Absolute encoders

#### Technical specifications (continued)

| Product name                                                    |         | Absolute encoder with PROFIBUS DP<br>6FX2001-5.P..                                                                                   | Absolute encoder with PROFINET IO<br>6FX2001-5.N..                                                                              |
|-----------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Operating voltage DC<br>$V_p$ on encoder                        | V       | 10 ... 30                                                                                                                            | 10 ... 30                                                                                                                       |
| Current consumption,<br>approx.                                 |         |                                                                                                                                      |                                                                                                                                 |
| • Single-turn                                                   | mA      | 300 ... 100 (2.5 W)                                                                                                                  | 400 ... 130 (< 4 W)                                                                                                             |
| • Multi-turn                                                    | mA      | 300 ... 100 (2.5 W)                                                                                                                  | 400 ... 130 (< 4 W)                                                                                                             |
| Interface                                                       |         | PROFIBUS DP-V2                                                                                                                       | PROFINET IO with RT/IRT                                                                                                         |
| Clock input                                                     |         | Differential cable receiver<br>acc. to EIA standard RS 485                                                                           | 2 ports IRT                                                                                                                     |
| Data output                                                     |         | Differential cable driver<br>acc. to EIA standard RS 485                                                                             | 2 ports IRT                                                                                                                     |
| Short-circuit strength                                          |         | Yes                                                                                                                                  | Yes                                                                                                                             |
| Transmission rate                                               | Mbit/s  | 12                                                                                                                                   | 100                                                                                                                             |
| LED for diagnostics                                             |         | Green/red                                                                                                                            | Green/red/yellow                                                                                                                |
| Speed, max.                                                     |         |                                                                                                                                      |                                                                                                                                 |
| • Electrical                                                    |         |                                                                                                                                      |                                                                                                                                 |
| - At $\pm 1$ bit accuracy                                       | rpm     | 5800                                                                                                                                 | 5800                                                                                                                            |
| • Mechanical                                                    |         |                                                                                                                                      |                                                                                                                                 |
| - Single-turn                                                   | rpm     | 12000                                                                                                                                | 12000                                                                                                                           |
| - Multi-turn                                                    | rpm     | 6000                                                                                                                                 | 6000                                                                                                                            |
| Cable length to down-<br>stream electronics, max. <sup>1)</sup> |         |                                                                                                                                      |                                                                                                                                 |
| • Up to 93.75 kbit/s                                            | m (ft)  | 1200 (3937)                                                                                                                          | –                                                                                                                               |
| • Up to 1.5 Mbit/s                                              | m (ft)  | 200 (656)                                                                                                                            | –                                                                                                                               |
| • Up to 12 Mbit/s                                               | m (ft)  | 100 (328)                                                                                                                            | 100 (328)                                                                                                                       |
| Number of nodes                                                 |         | 99                                                                                                                                   | –                                                                                                                               |
| Connection                                                      |         | Terminal block with address selector switch and<br>bus terminating resistor in removable cover with<br>radial cable glands (3 units) | 2 × M12 plug connectors, 4-pole for PROFINET ports<br>1 × M12 plug connector, 4-pole for operating voltage                      |
| • Cable diameter                                                | mm (in) | 6.5 ... 9 (0.26 ... 0.35)<br>Removal of cover possible without interrupting bus                                                      | –                                                                                                                               |
| Resolution                                                      |         |                                                                                                                                      |                                                                                                                                 |
| • Single-turn                                                   | bit     | 13<br>(8192 steps)                                                                                                                   | 13<br>(8192 steps)                                                                                                              |
| • Multi-turn                                                    | bit     | 27<br>(8192 steps × 16384 revolutions)                                                                                               | 27<br>(8192 steps × 16384 revolutions)                                                                                          |
| Frame                                                           |         | According to PNO encoder profile V4.1<br>Class 1, Class 2, Class 3<br>Standard frame 81                                              | According to PNO encoder profile V4.1<br>Class 1, Class 2, Class 3, Class 4<br>Standard frames 81/82/83/84<br>Siemens frame 860 |
| Code type                                                       |         |                                                                                                                                      |                                                                                                                                 |
| • Sampling                                                      |         | Gray                                                                                                                                 | Gray                                                                                                                            |
| • Transfer                                                      |         | Binary, PROFIBUS                                                                                                                     | Binary, PROFINET                                                                                                                |
| Network load, approx.                                           |         |                                                                                                                                      |                                                                                                                                 |
| • At 12 Mbit/s per encoder                                      | μs      | 20                                                                                                                                   | –                                                                                                                               |
| Cycle time                                                      | ms      | 0.667                                                                                                                                | 1 ... 100                                                                                                                       |

<sup>1)</sup> Observe the max. permissible cable length of the connected module.

# SINAMICS S120 drive system

## Measuring systems

Built-on optoelectronic rotary encoders  
Absolute encoders

### Technical specifications (continued)

| Product name                                                         |                                                           | Absolute encoder with PROFIBUS DP<br>6FX2001-5.P..     | Absolute encoder with PROFINET IO<br>6FX2001-5.N..     |
|----------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| <b>Parameterization capability</b>                                   |                                                           |                                                        |                                                        |
| • Resolution per revolution                                          |                                                           | 1 ... 8192                                             | 1 ... 8192                                             |
| • Total resolution                                                   |                                                           | 1 ... 16384                                            | 1 ... 16384                                            |
| • Preset                                                             |                                                           | Yes                                                    | Yes                                                    |
| • Counting direction                                                 |                                                           | Yes                                                    | Yes                                                    |
| • Speed signal                                                       |                                                           | Yes                                                    | Yes                                                    |
| • Limit switches                                                     |                                                           | Yes, 2 units                                           | No                                                     |
| • Isochronous mode                                                   |                                                           | Yes                                                    | Yes                                                    |
| • Direct data exchange                                               |                                                           | Yes                                                    | No                                                     |
| <b>Online parameterization</b>                                       |                                                           | Yes                                                    | Yes                                                    |
| <b>PNO certificate</b>                                               |                                                           | Yes                                                    | Yes                                                    |
| <b>Supported profiles</b>                                            |                                                           | PNO encoder profile V4.1                               | PNO encoder profile V4.1                               |
| <b>Accuracy with 8192 steps</b>                                      | arcsec                                                    | ± 79<br>(± ½ LSB)                                      | ± 79<br>(± ½ LSB)                                      |
| <b>Friction torque</b><br>(at 20 °C) (68 °F)                         | Nm (lb <sub>f</sub> -in)                                  | ≤ 0.01 (0.09)                                          | ≤ 0.01 (0.09)                                          |
| <b>Starting torque</b><br>(at 20 °C) (68 °F)                         | Nm (lb <sub>f</sub> -in)                                  | ≤ 0.01 (0.09)                                          | ≤ 0.01 (0.09)                                          |
| <b>Shaft load capability</b>                                         |                                                           |                                                        |                                                        |
| • $n \leq 6000$ rpm                                                  |                                                           |                                                        |                                                        |
| - Axial                                                              | N (lb <sub>f</sub> )                                      | 40 (8.99)                                              | 40 (8.99)                                              |
| - Radial at shaft extension                                          | N (lb <sub>f</sub> )                                      | 110 (24.73)                                            | 110 (24.73)                                            |
| • $n > 6000$ rpm                                                     |                                                           |                                                        |                                                        |
| - Axial                                                              | N (lb <sub>f</sub> )                                      | 10 (2.25)                                              | 10 (2.25)                                              |
| - Radial at shaft extension                                          | N (lb <sub>f</sub> )                                      | 20 (4.50)                                              | 20 (4.50)                                              |
| <b>Shaft diameter</b>                                                |                                                           |                                                        |                                                        |
| • Synchro flange                                                     | mm (in)                                                   | 6 (0.24)                                               | 6 (0.24)                                               |
| • Clamp flange                                                       | mm (in)                                                   | 10 (0.39)                                              | 10 (0.39)                                              |
| • Torque arm<br>Hollow shaft                                         | mm (in)                                                   | 15 (0.59) <sup>1)</sup>                                | 15 (0.59) <sup>1)</sup>                                |
| <b>Angular acceleration, max.</b>                                    | rad/s <sup>2</sup>                                        | 10 <sup>5</sup>                                        | 10 <sup>5</sup>                                        |
| <b>Moment of inertia of rotor</b>                                    |                                                           |                                                        |                                                        |
| • Solid shaft                                                        | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | 1.90 × 10 <sup>-6</sup><br>(16.8 × 10 <sup>-6</sup> )  | 1.90 × 10 <sup>-6</sup><br>(16.8 × 10 <sup>-6</sup> )  |
| • Hollow shaft                                                       | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | 2.80 × 10 <sup>-6</sup><br>(24.8 × 10 <sup>-6</sup> )  | 2.80 × 10 <sup>-6</sup><br>(24.8 × 10 <sup>-6</sup> )  |
| <b>Vibration (55 ... 2000 Hz)<br/>acc. to EN 60068-2-6</b>           | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 100 (328)                                            | ≤ 100 (328)                                            |
| <b>Shock<br/>acc. to EN 60068-2-27</b>                               |                                                           |                                                        |                                                        |
| • 2 ms                                                               | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 2000 (6562)                                          | ≤ 2000 (6562)                                          |
| • 6 ms                                                               | m/s <sup>2</sup> (ft/s <sup>2</sup> )                     | ≤ 1000 (3281)                                          | ≤ 1000 (3281)                                          |
| <b>Degree of protection<br/>acc. to DIN EN 60529<br/>(IEC 60529)</b> |                                                           |                                                        |                                                        |
| • Without shaft input                                                |                                                           | IP67                                                   | IP67                                                   |
| • With shaft input                                                   |                                                           | IP64                                                   | IP64                                                   |
| <b>Ambient temperature</b>                                           |                                                           |                                                        |                                                        |
| • Operation                                                          | °C (°F)                                                   | -40 ... +85 (-40 ... +185)                             | -40 ... +85 (-40 ... +185)                             |
| <b>Weight, approx.</b>                                               |                                                           |                                                        |                                                        |
| • Single-turn                                                        | kg (lb)                                                   | 0.4 (0.88)                                             | 0.4 (0.88)                                             |
| • Multi-turn                                                         | kg (lb)                                                   | 0.5 (1.10)                                             | 0.5 (1.10)                                             |
| <b>EMC</b>                                                           |                                                           | Tested in accordance<br>with DIN EN 50081 and EN 50082 | Tested in accordance<br>with DIN EN 50081 and EN 50082 |
| <b>Approvals according to</b>                                        |                                                           | CE, cULus                                              | CE, cULus                                              |

<sup>1)</sup> Hollow shaft diameter of 12 mm, 10 mm or 8 mm (0.47 in, 0.39 in or 0.31 in) possible via reduction sleeves included in the delivery.

# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders Absolute encoders

#### Selection and ordering data

| Description                                                         | Order No.                    |
|---------------------------------------------------------------------|------------------------------|
| <b>Absolute encoders with DRIVE-CLiQ</b>                            |                              |
| 24 V DC supply voltage                                              |                              |
| <u>Radial connection</u>                                            |                              |
| • Synchro flange<br>Solid shaft                                     | <b>6FX2001-5FD</b> ■ ■ -0AA1 |
| • Clamp flange<br>Solid shaft                                       | <b>6FX2001-5QD</b> ■ ■ -0AA1 |
| • Torque arm<br>Hollow shaft diameter 10 mm (0.39 in)               | <b>6FX2001-5VD</b> ■ ■ -0AA1 |
| • Torque arm<br>Hollow shaft diameter 12 mm (0.47 in)               | <b>6FX2001-5WD</b> ■ ■ -0AA1 |
| <u>Resolution</u>                                                   |                              |
| • Single-turn 22 bit                                                | <b>1 3</b>                   |
| • Multi-turn 34 bit                                                 | <b>2 5</b>                   |
| <b>Absolute encoders with SSI</b>                                   |                              |
| 10 ... 30 V DC supply voltage                                       |                              |
| <u>Synchro flange and connection via</u>                            |                              |
| • Axial flange outlet                                               | <b>6FX2001-5HS</b> ■ ■       |
| • Radial flange outlet                                              | <b>6FX2001-5FS</b> ■ ■       |
| <u>Clamp flange and connection via</u>                              |                              |
| • Axial flange outlet                                               | <b>6FX2001-5SS</b> ■ ■       |
| • Radial flange outlet                                              | <b>6FX2001-5QS</b> ■ ■       |
| <u>Resolution</u>                                                   |                              |
| • Single-turn<br>8192 steps/revolution (13 bit)                     | <b>1 2</b>                   |
| • Multi-turn<br>8192 steps/revolution,<br>4096 revolutions (25 bit) | <b>2 4</b>                   |
| <b>Absolute encoders with EnDat</b>                                 |                              |
| 5 V DC supply voltage                                               |                              |
| <u>Synchro flange and connection via</u>                            |                              |
| • Axial flange outlet                                               | <b>6FX2001-5HE</b> ■ ■       |
| • Radial flange outlet                                              | <b>6FX2001-5FE</b> ■ ■       |
| <u>Clamp flange and connection via</u>                              |                              |
| • Axial flange outlet                                               | <b>6FX2001-5SE</b> ■ ■       |
| • Radial flange outlet                                              | <b>6FX2001-5QE</b> ■ ■       |
| <u>Resolution</u>                                                   |                              |
| • Single-turn<br>8192 steps/revolution (13 bit)                     | <b>1 3</b>                   |
| • Multi-turn<br>8192 steps/revolution,<br>4096 revolutions (25 bit) | <b>2 5</b>                   |

| Description                                                          | Order No.              |
|----------------------------------------------------------------------|------------------------|
| <b>Absolute encoders with PROFIBUS DP</b>                            |                        |
| 10 ... 30 V DC supply voltage                                        |                        |
| <u>Radial connection</u>                                             |                        |
| • Synchro flange<br>Solid shaft                                      | <b>6FX2001-5FP</b> ■ ■ |
| • Clamp flange<br>Solid shaft                                        | <b>6FX2001-5QP</b> ■ ■ |
| • Torque arm<br>Hollow shaft diameter 15 mm (0.59 in) <sup>1)</sup>  | <b>6FX2001-5WP</b> ■ ■ |
| <u>Resolution</u>                                                    |                        |
| • Single-turn<br>8192 steps/revolution (13 bit)                      | <b>1 2</b>             |
| • Multi-turn<br>8192 steps/revolution,<br>16384 revolutions (27 bit) | <b>2 4</b>             |
| <b>Absolute encoders with PROFINET IO</b>                            |                        |
| 10 ... 30 V DC supply voltage                                        |                        |
| <u>Radial connection</u>                                             |                        |
| • Synchro flange<br>Solid shaft                                      | <b>6FX2001-5FN</b> ■ ■ |
| • Clamp flange<br>Solid shaft                                        | <b>6FX2001-5QN</b> ■ ■ |
| • Torque arm<br>Hollow shaft diameter 15 mm (0.59 in) <sup>1)</sup>  | <b>6FX2001-5WN</b> ■ ■ |
| <u>Resolution</u>                                                    |                        |
| • Single-turn<br>8192 steps/revolution (13 bit)                      | <b>1 3</b>             |
| • Multi-turn<br>8192 steps/revolution,<br>16384 revolutions (27 bit) | <b>2 5</b>             |

#### More information

| Description                                   | Order No.                                         |
|-----------------------------------------------|---------------------------------------------------|
| <b>Decentralization with PROFIBUS DP/DPV1</b> | <b>Via book trade<br/>ISBN: 978-3-89578-218-3</b> |

<sup>1)</sup> Hollow shaft diameter of 12 mm, 10 mm or 8 mm (0.47 in, 0.39 in or 0.31 in) possible via reduction sleeves included in the delivery.

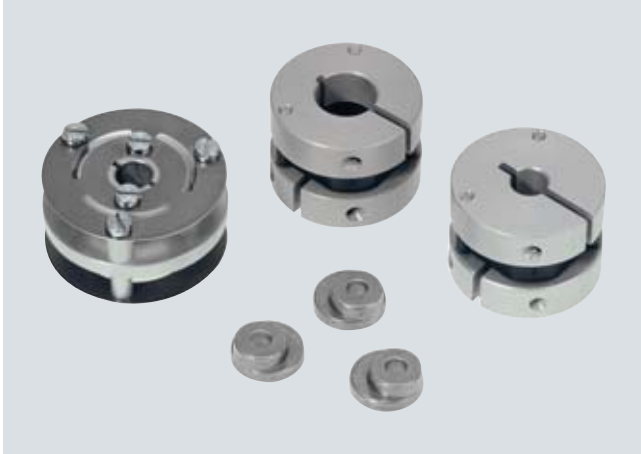
# SINAMICS S120 drive system

## Measuring systems

### Built-on optoelectronic rotary encoders

#### Accessories

## Overview



Couplings and clamps

### Couplings and clamps

Couplings and clamps are available as mounting accessories for the built-on rotary encoders. The clamps are used to fix the encoders with Synchro flange.

### Signal connector as mating connector

A signal connector is available as mating connector for encoders with flange outlet or with cable and connector. The connector with 12 contacts is suitable for all incremental encoders. The connector with 17 contacts is suitable for absolute encoders with EnDat.

### Signal connector

A signal connector is available as replacement for encoders with cable and connector.

## Technical specifications

| Product name                         |                                                        | Spring disk coupling<br>6FX2001-7KF.. | Plug-in coupling<br>6FX2001-7KS.. |
|--------------------------------------|--------------------------------------------------------|---------------------------------------|-----------------------------------|
| Transmission torque, max.            | Nm (oz <sub>f</sub> )                                  | 0.8 (2.88)                            | 0.7 (2.52)                        |
| Shaft diameter                       |                                                        |                                       |                                   |
| • Both ends                          | mm (in)                                                | 6 (0.24)                              | 6 (0.24) or 10 (0.39)             |
| • $d_1/d_2$                          | mm (in)                                                | 6/5 (0.24/0.20)                       | –                                 |
| Center offset of shafts, max.        | mm (in)                                                | 0.4 (0.02)                            | 0.5 (0.02)                        |
| Axial offset                         | mm (in)                                                | ± 0.4 (0.02)                          | ± 0.5 (0.02)                      |
| Angular displacement of shafts, max. | Degrees                                                | 3                                     | 1                                 |
| Torsional rigidity                   | Nm/rad (oz <sub>f</sub> /rad)                          | 150 (539.51)                          | 31 (111.5)                        |
| Lateral spring stiffness             | N/mm (lb <sub>f</sub> )                                | 6 (1.35)                              | 10 (2.25)                         |
| Moment of inertia                    | gcm <sup>2</sup> (lb <sub>f</sub> -in-s <sup>2</sup> ) | 19 (168 × 10 <sup>-7</sup> )          | 20 (177 × 10 <sup>-7</sup> )      |
| Speed, max.                          | rpm                                                    | 12000                                 | 12000                             |
| Ambient temperature                  |                                                        |                                       |                                   |
| • Operation                          | °C (°F)                                                | -40 ... +150 (-40 ... +302)           | -40 ... +80 (-40 ... +176)        |
| Weight, approx.                      | g (oz)                                                 | 16 (0.56)                             | 20 (0.71)                         |

## Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                            | Order No.                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Spring disk coupling</b><br>Shaft diameter:<br>• 6 mm/6 mm (0.24 in/0.24 in)<br>• 6 mm/5 mm (0.24 in/0.20 in)                                                                                                                                                                                                                       | <b>6FX2001-7KF10</b><br><b>6FX2001-7KF06</b>                                                                         |
| <b>Plug-in coupling</b><br>Shaft diameter:<br>• 6 mm/6 mm (0.24 in/0.24 in)<br>• 10 mm/10 mm (0.39 in/0.39 in)                                                                                                                                                                                                                         | <b>6FX2001-7KS06</b><br><b>6FX2001-7KS10</b>                                                                         |
| <b>Clamp (1 unit)</b><br>For double-track encoders and encoders with Synchro flange (3 units are required)                                                                                                                                                                                                                             | <b>6FX2001-7KP01</b>                                                                                                 |
| <b>Signal connector with cap nut (1 unit)</b><br>Mating connector for incremental encoder with TTL, sin/cos 1 V <sub>pp</sub> , HTL and absolute encoder with SSI 12-pin, insulator each with 12 socket contacts 0.08 ... 0.22 mm <sup>2</sup> and 0.20 ... 0.56 mm <sup>2</sup> , 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm | <b>6FX2003-0SU12</b>                                                                                                 |
| <b>Signal connector with cap nut (1 unit)</b><br>Mating connector for absolute encoder with EnDat 17-pin, insulator with 17 socket contacts 0.20 ... 0.56 mm <sup>2</sup> , 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm                                                                                                        | <b>6FX2003-0SU17</b>                                                                                                 |
| <b>Signal connector with external thread for encoders with cable (1 unit)</b><br>Replacement connector for incremental encoder with RS422, sin/cos 1 V <sub>pp</sub> and HTL 12-pin, insulator with 12 pin contacts 0.20 ... 0.56 mm <sup>2</sup> , 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm                                | <b>6FX2003-0SA12</b>                                                                                                 |
| <b>Power connecting cable</b><br>Pre-assembled cable for power supply of the absolute encoders with PROFINET IO with M12 plug connector and M12 plug socket, A-coded, 4-pin<br>• Length 2 m (6.56 ft)<br>• Length 3 m (9.84 ft)<br>• Length 5 m (16.4 ft)<br>• Length 10 m (32.8 ft)<br>• Length 15 m (49.21 ft)                       | <b>6XV1801-5DH20</b><br><b>6XV1801-5DH30</b><br><b>6XV1801-5DH50</b><br><b>6XV1801-5DN10</b><br><b>6XV1801-5DN15</b> |
| <b>IE connecting cable</b><br>Pre-assembled signal cable for absolute encoders PROFINET IO with M12 plug connector and RJ45, D-coded, 4-pole<br>• Length 2 m (6.56 ft)<br>• Length 3 m (9.84 ft)<br>• Length 5 m (16.4 ft)<br>• Length 10 m (32.8 ft)<br>• Length 15 m (49.21 ft)                                                      | <b>6XV1871-5TH20</b><br><b>6XV1871-5TH30</b><br><b>6XV1871-5TH50</b><br><b>6XV1871-5TN10</b><br><b>6XV1871-5TN15</b> |
| <b>IE FC RJ45 Plug 145 (1 unit)</b><br>2 × 2 RJ45 connector with rugged metal enclosure and FC connection technology, 145° cable outlet                                                                                                                                                                                                | <b>6GK1901-1BB30-0AA0</b>                                                                                            |
| <b>IE FC M12 Plug PRO (1 unit)</b><br>M12 connector with metal enclosure and FC connection technology, axial cable outlet, D-coded                                                                                                                                                                                                     | <b>6GK1901-0DB20-6AA0</b>                                                                                            |
| <b>IE FC TP Trailing Cable 2 × 2 (PROFINET Type C)</b><br>4-wire, shielded, PROFINET-compliant, TP installation cable for use in cable carriers, sold by the meter<br>Max. length 2000 m (6562 ft)<br>Minimum order 20 m (65.6 ft)                                                                                                     | <b>6XV1840-3AH10</b>                                                                                                 |

# SINAMICS S120 drive system

## Notes

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## SIMOTICS motors



|             |                                                                                      |              |                                                                               |
|-------------|--------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------|
| <b>6/2</b>  | <b>Introduction</b>                                                                  | <b>6/100</b> | <b>Main spindle motors</b>                                                    |
| 6/2         | Type overview and rated data                                                         | 6/100        | <u>SIMOTICS M asynchronous and synchronous motors for SINAMICS S120</u>       |
| 6/6         | Technical definitions for AC motors                                                  | 6/100        | SIMOTICS M-1PH8 asynchronous motors                                           |
| <b>6/16</b> | <b>Feed motors</b>                                                                   | 6/104        | • SH 80 to SH 160 – Forced ventilation                                        |
| 6/16        | <u>SIMOTICS S servomotors for SINAMICS S120</u>                                      | 6/106        | • SH 100/SH 132 – Forced ventilation                                          |
| 6/16        | SIMOTICS S-1FT7 synchronous motors                                                   | 6/108        | • SH 180 to SH 280 – Forced ventilation                                       |
| 6/18        | • Compact core type – Natural cooling                                                | 6/110        | • SH 80 to SH 160 – Water cooling                                             |
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| 6/24        | • Compact – Forced ventilation                                                       | 6/114        | • Order No. supplement for SH 80/SH 100/SH 132/SH 160                         |
| 6/26        | • Compact – Water cooling                                                            | 6/115        | • Order No. supplement for SH 180/SH 225/SH 280                               |
| 6/30        | • High Dynamic – Forced ventilation/ Water cooling                                   | 6/116        | • Order No. supplement for SH 280                                             |
| 6/32        | SIMOTICS S-1FK7 synchronous motors                                                   | 6/117        | • Options                                                                     |
| 6/36        | • Compact – Natural cooling                                                          | 6/119        | • Terminal box assignment, max. connectable conductor cross-sections          |
| 6/42        | • High Dynamic – Natural cooling                                                     | 6/120        | SIMOTICS M-1PH8 synchronous motors                                            |
| 6/44        | • High Inertia – Natural cooling                                                     | 6/122        | • SH 132 – Forced ventilation/water cooling                                   |
| 6/46        | • Compact for Power Modules 230 V 1 AC                                               | 6/124        | • SH 160 – Forced ventilation/water cooling                                   |
| 6/50        | • High Dynamic for Power Modules 230 V 1 AC                                          | 6/126        | • SH 180/SH 225 – Forced ventilation                                          |
| 6/52        | Selection aids – Built-in holding brakes for SIMOTICS S-1FT7/1FK7 synchronous motors | 6/128        | • SH 180/SH 225 – Water cooling                                               |
| 6/53        | <u>Gearboxes for SIMOTICS S servomotors</u>                                          | 6/130        | • Order No. supplement for SH 132/SH 160                                      |
| 6/53        | Planetary gearboxes series SP+ for SIMOTICS S-1FT7 synchronous motors                | 6/131        | • Order No. supplement for SH 180/SH 225                                      |
| 6/58        | Planetary gearboxes series SP+ for SIMOTICS S-1FK7 synchronous motors                | 6/132        | • Options                                                                     |
| 6/64        | Planetary gearboxes series LP+ for SIMOTICS S-1FK7 synchronous motors                | 6/133        | • Terminal box assignment, max. connectable conductor cross-sections          |
| <b>6/66</b> | <b>Direct drives</b>                                                                 | 6/134        | SIMOTICS M-1FE1 synchronous built-in motors                                   |
| 6/66        | <u>SIMOTICS L linear motors for SINAMICS S120</u>                                    | 6/136        | • Standard type, water cooling                                                |
| 6/66        | SIMOTICS L-1FN3 synchronous linear motors – Water cooling                            | 6/144        | SIMOTICS M-1PH2 asynchronous built-in motors for direct drive – Water cooling |
| 6/68        | • Standard type, version for peak load – Water cooling                               | 6/148        | SIMOTICS M-1PH8, 1FE1, 1PH2 motors – Water cooling                            |
| 6/72        | • Version for continuous load – Water cooling                                        | 6/149        | 2SP1 motor spindles                                                           |
| 6/74        | • Optional components                                                                | 6/152        | • Standard type, water cooling                                                |
| 6/76        | • Hall-effect sensor box                                                             | 6/151        | • Characteristic curves, More information                                     |
| 6/77        | SIMOTICS L-1FN3/SIMOTICS L-1FN6 synchronous linear motors – Liquid cooling           | <b>6/154</b> | <b>Dimensional drawings</b>                                                   |
| 6/78        | SIMOTICS L-1FN6 synchronous linear motors                                            | 6/154        | <u>SIMOTICS S servomotors for SINAMICS S120</u>                               |
| 6/80        | • Version – Natural cooling                                                          | 6/154        | SIMOTICS S-1FT7 synchronous motors                                            |
| 6/84        | • Version – Water cooling                                                            | 6/159        | SIMOTICS S-1FK7 synchronous motors                                            |
| 6/86        | <u>SIMOTICS T torque motors for SINAMICS S120</u>                                    | 6/164        | <u>Gearboxes</u>                                                              |
| 6/88        | SIMOTICS T-1FW6 synchronous built-in torque motors – Water cooling                   | 6/164        | Planetary gearboxes series SP+ for SIMOTICS S-1FT7/1FK7 synchronous motors    |
|             |                                                                                      | 6/166        | Planetary gearboxes series LP+ for SIMOTICS S-1FK7 synchronous motors         |
|             |                                                                                      | 6/167        | <u>SIMOTICS L linear motors for SINAMICS S120</u>                             |
|             |                                                                                      | 6/171        | <u>SIMOTICS T torque motors for SINAMICS S120</u>                             |
|             |                                                                                      | 6/174        | <u>SIMOTICS M asynchronous and synchronous motors for SINAMICS S120</u>       |
|             |                                                                                      | 6/174        | SIMOTICS M-1PH8 asynchronous motors                                           |
|             |                                                                                      | 6/210        | SIMOTICS M-1PH8 synchronous motors                                            |
|             |                                                                                      | 6/234        | SIMOTICS M-1FE1 synchronous built-in motors                                   |
|             |                                                                                      | 6/235        | SIMOTICS M-1PH2 asynchronous built-in motors                                  |
|             |                                                                                      | 6/236        | <u>2SP1 motor spindles – Water cooling</u>                                    |
|             | <b>CAD CREATOR</b>                                                                   |              |                                                                               |
|             | Dimension drawing and 2D/3D CAD generator                                            |              |                                                                               |
|             | <a href="http://www.siemens.com/cadcreator">www.siemens.com/cadcreator</a>           |              |                                                                               |

# Introduction

## Type overview and rated data

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| Motor type                                                                                                                                                  | Designation                                                                         | Degree of protection                        | Type of cooling                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------|
| <b>SIMOTICS S Servomotors – Synchronous motors, permanent-magnet</b>                                                                                        |                                                                                     |                                             |                                                        |
|  <b>SIMOTICS S-1FT7</b><br>Compact                                         | Feed motor – Compact<br>Very high power density                                     | IP64 <sup>1)</sup><br>(optional IP65, IP67) | Natural cooling<br>Forced ventilation<br>Water cooling |
|                                                                                                                                                             | Feed motor – High Dynamic<br>Very low rotor moment of inertia                       | IP64<br>(optional IP65, IP67)               | Forced ventilation<br>Water cooling                    |
|  <b>SIMOTICS S-1FK7</b><br>Compact<br>Compact for Power Modules 230 V 1 AC | Feed motor – Compact<br>High power density                                          | IP64<br>(optional IP65)                     | Natural cooling                                        |
|                                                                                                                                                             | <b>SIMOTICS S-1FK7</b><br>High Dynamic<br>High Dynamic for Power Modules 230 V 1 AC | IP64<br>(optional IP65)                     | Natural cooling                                        |
|                                                                                                                                                             | Feed motor – High Inertia<br>High or variable load moment of inertia                | IP64<br>(optional IP65)                     | Natural cooling                                        |
|                                                                                                                                                             |                                                                                     |                                             |                                                        |
| Motor type                                                                                                                                                  | Designation                                                                         | Degree of protection                        | Type of cooling                                        |
| <b>SIMOTICS L Linear motors – Synchronous motors, permanent-magnet</b>                                                                                      |                                                                                     |                                             |                                                        |
|  <b>SIMOTICS L-1FN3</b>                                                  | Direct drive                                                                        | IP65                                        | Water cooling                                          |
|  <b>SIMOTICS L-1FN6</b>                                                  | Direct drive                                                                        | Primary section: IP65 <sup>2)</sup>         | Natural cooling<br>Water cooling                       |

### Feed motors and direct drives

The applications for the SIMOTICS S-1FT7/S-1FK7/L-1FN3/L-1FN6/T-1FW6 motors are extremely diverse.

On machine tools, they are designated and used as feed motors.

On production machines e.g. printing, packaging and textile machines, they are designated as synchronous servomotors.

**Core types** can be supplied for certain motor types. These core types can be express delivered as replacement motors in the event of plant outages and offer the advantage of a quicker spare parts supply. For this reason, core types should be used for configuration wherever possible.

The selection and ordering data for the SINAMICS S120 Motor Modules are based on the booksize format by way of example. Other formats are also possible. The SIZER configuration tool is available for detailed configuration.

<sup>1)</sup> Core type: IP65.

<sup>2)</sup> Degree of protection of the motor is determined by the design of the motor's installation in the machine. Minimum requirement: IP23.

# Introduction

## Type overview and rated data

| Shaft height                                                                                       | Rated power $P_{rated}$ for S1 duty<br>kW (HP)     |            |            |             |             |              | Rated torque<br>$M_{rated}$                           | Selection and<br>ordering data |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------|------------|------------|-------------|-------------|--------------|-------------------------------------------------------|--------------------------------|
|                                                                                                    | 0.01                                               | 0.1        | 1          | 10          | 100         | 1000         | 10000                                                 | Page                           |
| SH 36/SH 48/SH 63/<br>SH 80/SH 100                                                                 |                                                    |            | 0.88 (1.2) | 10.5 (14.8) |             |              | 1.4 ... 61 Nm<br>(12.4 ... 540 lb <sub>f</sub> -in)   | 6/18 ... 6/23                  |
| SH 80/SH 100                                                                                       |                                                    |            | 5 (6.71)   | 18.8 (25.2) |             |              | 21 ... 73 Nm<br>(186 ... 646 lb <sub>f</sub> -in)     | 6/24 ... 6/25                  |
| SH 63/SH 80/SH 100                                                                                 |                                                    |            | 3.1 (4.16) | 34.2 (45.9) |             |              | 9.2 ... 125 Nm<br>(81.4 ... 1106 lb <sub>f</sub> -in) | 6/26 ... 6/29                  |
| SH 63/SH 80                                                                                        |                                                    |            | 3.8 (5.10) | 10.8 (14.5) |             |              | 11 ... 33 Nm<br>(97.4 ... 292 lb <sub>f</sub> -in)    | 6/30 ... 6/31                  |
| SH 63/SH 80                                                                                        |                                                    |            | 5.7 (7.64) | 21.7 (29.1) |             |              | 16.5 ... 51 Nm<br>(146 ... 451 lb <sub>f</sub> -in)   | 6/30 ... 6/31                  |
| SH 20/SH 28/SH 36/<br>SH 48/SH 63/SH 80/<br>SH 100                                                 | 0.05 (0.07)                                        |            |            | 8.2 (11)    |             |              | 0.08 ... 37 Nm<br>(0.71 ... 327 lb <sub>f</sub> -in)  | 6/36 ... 6/41                  |
| SH 20/SH 28/SH 36/<br>SH 48                                                                        | 0.05 (0.07)                                        | 0.8 (1.07) |            |             |             |              | 0.08 ... 2.6 Nm<br>(0.71 ... 23 lb <sub>f</sub> -in)  | 6/46 ... 6/49                  |
| SH 36/SH 48/SH 63/<br>SH 80                                                                        |                                                    |            | 0.6 (0.8)  | 3.8 (5.10)  |             |              | 0.9 ... 18 Nm<br>(8.0 ... 159 lb <sub>f</sub> -in)    | 6/42 ... 6/43                  |
| SH 36/SH 48                                                                                        |                                                    |            | 0.4 (0.54) | 0.9 (1.21)  |             |              | 1.2 ... 3 Nm<br>(10.6 ... 26.6 lb <sub>f</sub> -in)   | 6/50 ... 6/51                  |
| SH 48/SH 63/SH 80                                                                                  |                                                    |            | 0.9 (1.21) | 3.1 (4.16)  |             |              | 1.5 ... 15 Nm<br>(13.3 ... 133 lb <sub>f</sub> -in)   | 6/44 ... 6/45                  |
| Primary section<br>width<br>mm                                                                     | Feedrate force $F_{rated}$<br>N (lb <sub>f</sub> ) |            |            |             |             |              | Velocity $v_{max}$ at<br>$F_{rated}$                  | Selection and<br>ordering data |
|                                                                                                    | 0.01                                               | 0.1        | 1          | 10          | 100         | 1000         | 10000                                                 | Page                           |
| Precision cooling<br>without with<br>67/96 76/105<br>126/141 135/150<br>188/248 197/257<br>342 351 |                                                    |            |            |             | 200 (45)    | 8100 (1821)  | 105 ... 836 m/min<br>(345 ... 2743 ft/min)            | 6/68 ... 6/71                  |
|                                                                                                    |                                                    |            |            |             | 150 (33.7)  | 10375 (2332) | 129 ... 435 m/min<br>(423 ... 1427 ft/min)            | 6/72 ... 6/73                  |
| 80/115/130/<br>209/289                                                                             |                                                    |            |            |             | 66.3 (14.9) | 3000 (674)   | 93.9 ... 1280 m/min<br>(308 ... 4200 ft/min)          | 6/80 ... 6/83                  |
| 80/115                                                                                             |                                                    |            |            |             | 119 (26.8)  | 1430 (321)   | 57.5 ... 852 m/min<br>(189 ... 2795 ft/min)           | 6/84 ... 6/85                  |

### Main spindle motors

The applications for SIMOTICS M-1PH8/M-1FE1/M-1PH2 motors and 2SP1 motor spindles are extremely diverse.

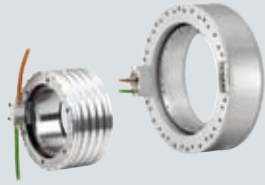
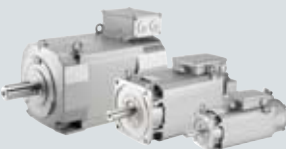
In machine tools, they are usually designated and used as main spindle motors.

In production machines, such as printing, packaging and re-forming machines, they are used as high-output main motors.

The selection and ordering data for the SINAMICS S120 Motor Modules are based on the booksize format by way of example. Blocksize and chassis formats are also possible. The detailed configuration is performed using the SIZER configuration tool.

# Introduction

## Type overview and rated data

| Motor type                                                                                                 | Designation                                                                                                          | Degree of protection                                           | Type of cooling    |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------|
| <b>SIMOTICS T Torque motors</b>                                                                            |                                                                                                                      |                                                                |                    |
|  <b>SIMOTICS T-1FW6</b>   | Synchronous motor, permanent-magnet<br>Built-in torque motor direct drive                                            | IP23 <sup>4)</sup>                                             | Water cooling      |
| Motor type                                                                                                 | Designation                                                                                                          | Degree of protection                                           | Type of cooling    |
| <b>SIMOTICS M Main spindle motors</b>                                                                      |                                                                                                                      |                                                                |                    |
|  <b>SIMOTICS M-1PH8</b>   | Asynchronous motor<br>Three-phase squirrel-cage motor without housing<br>Main spindle motor<br>Solid or hollow shaft | IP55 <sup>1)</sup>                                             | Forced ventilation |
|                                                                                                            |                                                                                                                      | IP55/IP65 <sup>2)</sup>                                        | Water cooling      |
|                                                                                                            | Synchronous motor, permanent-magnet<br>Main spindle/feed motor                                                       | IP55 <sup>1)</sup>                                             | Forced ventilation |
|                                                                                                            |                                                                                                                      | IP55/IP65 <sup>2)</sup>                                        | Water cooling      |
|  <b>SIMOTICS M-1FE1</b> | Synchronous motor, permanent-magnet<br>Built-in spindle motor<br>Main spindle motor for direct drives                | IP00                                                           | Water cooling      |
|  <b>SIMOTICS M-1PH2</b> | Asynchronous motor<br>Three-phase squirrel-cage motor<br>Main spindle motor for direct drives                        | IP00 <sup>5)</sup>                                             | Water cooling      |
| <b>Motor spindles</b>                                                                                      |                                                                                                                      |                                                                |                    |
|  <b>2SP1</b>            | Motor spindle, synchronous and asynchronous versions<br>Main spindle motor                                           | Operating range:<br>IP64<br>Behind the spindle flange:<br>IP53 | Water cooling      |

<sup>1)</sup> See Options for additional versions.

<sup>2)</sup> From SH 180: IP55.

<sup>3)</sup> The final degree of protection (minimum degree of protection is IP54) for the installed motor is determined by the machine manufacturer.

<sup>4)</sup> According to spindle manufacturer specifications.

# Introduction

## Type overview and rated data

| Diameter<br>mm                                                   | Rated torque $M_{rated}$<br>Nm (lb <sub>F</sub> -in) |   |    |            |              |       | Max. speed $n_{max}$<br>at $M_{rated}$ | Selection and<br>ordering data |
|------------------------------------------------------------------|------------------------------------------------------|---|----|------------|--------------|-------|----------------------------------------|--------------------------------|
|                                                                  | 0.1                                                  | 1 | 10 | 100        | 1000         | 10000 |                                        |                                |
| External diameter<br>159/184/230/310/<br>385/440/502/576/<br>730 |                                                      |   |    | 22 (194.7) | 5760 (50982) |       | 38 ... 940 rpm                         | 6/88 ... 6/99                  |

| Diameter<br>mm                                                                             | Rated power $P_{rated}$ for S1 duty<br>kW (HP) |            |              |              |      |       | Rated torque<br>$M_{rated}$                                                                                     | Selection and<br>ordering data     |
|--------------------------------------------------------------------------------------------|------------------------------------------------|------------|--------------|--------------|------|-------|-----------------------------------------------------------------------------------------------------------------|------------------------------------|
|                                                                                            | 0.1                                            | 1          | 10           | 100          | 1000 | 10000 |                                                                                                                 |                                    |
| SH 80/SH 100/<br>SH 132/SH 160/<br>SH 180/SH 225/<br>SH 280                                |                                                | 2.8 (3.75) |              | 250 (335)    |      |       | 10 ... 2459 Nm<br>(88.5 ... 21765 lb <sub>F</sub> -in)<br>14 ... 2602 Nm<br>(124 ... 23030 lb <sub>F</sub> -in) | 6/104 ... 6/109<br>6/110 ... 6/113 |
| SH 80/SH 100/<br>SH 132/SH 160/<br>SH 180/SH 225/<br>SH 280                                |                                                | 3.5 (4.69) |              | 227 (304)    |      |       |                                                                                                                 |                                    |
| SH 132/SH 160/<br>SH 180/SH 225                                                            |                                                |            | 15.7 (21.05) | 168 (225)    |      |       | 96 ... 1091 Nm<br>(850 ... 9656 lb <sub>F</sub> -in)                                                            | 6/122 ... 6/127                    |
| SH 132/SH 160/<br>SH 180/SH 225                                                            |                                                |            | 17.6 (23.6)  | 228 (306)    |      |       | 109 ... 1651 Nm<br>(146 ... 2214 lb <sub>F</sub> -in)                                                           | 6/122 ... 6/129                    |
| Outer diameter<br>(cooling jacket)<br>High-Torque series<br>95/115/130/190/<br>205/250/310 |                                                |            | 4 (5.36)     | 104 (139)    |      |       | 4.5 ... 820 Nm<br>(39.8 ... 7258 lb <sub>F</sub> -in)                                                           | 6/136 ... 6/139                    |
| High-Speed series<br>120/155/180/205/<br>230/270                                           |                                                |            | 6.5 (8.72)   | 94 (126)     |      |       | 5 ... 300 Nm<br>(44.3 ... 2655 lb <sub>F</sub> -in)                                                             | 6/140 ... 6/143                    |
| Outer diameter<br>mm<br>205/250                                                            |                                                |            | 7.5 (10.06)  | 23.6 (31.65) |      |       | 48 ... 146 Nm<br>(425 ... 1292 lb <sub>F</sub> -in)                                                             | 6/146 ... 6/147                    |

| Diameter<br>mm                 | Rated torque $M_{rated}$<br>Nm (lb <sub>F</sub> -in) |   |           |             |      |       | Max. speed $n_{max}$<br>at $M_{rated}$              | Selection and<br>ordering data |
|--------------------------------|------------------------------------------------------|---|-----------|-------------|------|-------|-----------------------------------------------------|--------------------------------|
|                                | 0.1                                                  | 1 | 10        | 100         | 1000 | 10000 |                                                     |                                |
| Spindle<br>diameter<br>200/250 |                                                      |   | 12 (16.1) | 53.4 (71.6) |      |       | 42 ... 170 Nm<br>(372 ... 1505 lb <sub>F</sub> -in) | 6/152 ... 6/153                |

# Introduction

## Technical definitions for AC motors

### Overview

#### Regulations, standards and specifications

The motors comply with the appropriate standards and regulations, see table below.

As a result of the fact that in many countries the national regulations have been completely harmonized with the international IEC 60034-1 recommendation, there are no longer any differences with respect to coolant temperatures, temperature classes and temperature rise limits.

|                                                                         |                       |
|-------------------------------------------------------------------------|-----------------------|
| General specifications for rotating electrical machines                 | IEC 60034-1           |
| Terminal designations and direction of rotation for electrical machines | IEC 60034-8           |
| Types of rotating electrical machines                                   | IEC 60034-7           |
| Cooling methods of rotating electrical machines                         | IEC 60034-6           |
| Degrees of protection of rotating electrical machines                   | IEC 60034-5           |
| Vibration severity of rotating electrical machines                      | IEC 60034-14          |
| Noise limit values for rotating electrical machines                     | IEC 60034-9           |
| Cylindrical shaft extensions for electrical machines                    | DIN 748-3/IEC 60072-1 |

The motors listed below are UL-approved by Underwriters Laboratories Inc. and also comply with Canadian cUR standards: 1FE1/1FK7/1FT7/1FN3/1FN6/1FW6/1PH8 (without brake).

#### Degrees of protection for AC motors

A suitable degree of protection must be selected to protect the machine against the following hazards depending on the relevant operating and environmental conditions:

- Ingress of water, dust and solid foreign objects,
- contact with or approach to rotating parts inside a motor and
- contact with or approach to live parts.

Degrees of protection of electric motors are specified by a code. This comprises 2 letters, 2 digits and, if required, an additional letter.

#### IP (International Protection)

Code letter designating the degree of protection against contact and the ingress of solid foreign objects and water

#### 0 to 6

1st digit designating the degree of touch protection and protection against ingress of solid foreign objects

#### 0 to 8

2nd digit designating the degree of protection against ingress of water (no oil protection)

#### W, S and M

Additional code letters for special degrees of protection

Most motors are supplied with the following degrees of protection:

| Motor             | Degree of protection     | 1st digit: Touch protection                    | Protection against the ingress of solid foreign objects                        | 2nd digit: Protection against water                          |
|-------------------|--------------------------|------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------|
| Internally cooled | <b>IP23</b>              | Protection against finger contact              | Protection against medium-sized, solid foreign objects above 12 mm (0.47 in) Ø | Protection against spray water up to 60° from the vertical   |
| Surface-cooled    | <b>IP54</b>              | Complete protection against accidental contact | Protection against harmful dust deposits                                       | Splash water from any direction                              |
|                   | <b>IP55</b>              |                                                |                                                                                | Jet water from any direction                                 |
|                   | <b>IP64</b>              | Complete protection against accidental contact | Protection against dust ingress                                                | Splash water from any direction                              |
|                   | <b>IP65<sup>1)</sup></b> |                                                |                                                                                | Jet water from any direction                                 |
|                   | <b>IP67<sup>1)</sup></b> |                                                |                                                                                | Motor under defined pressure and time conditions under water |

#### Recommended degrees of protection for AC motors

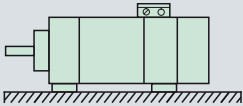
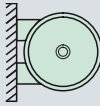
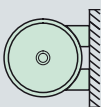
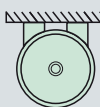
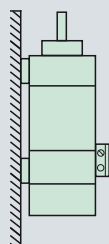
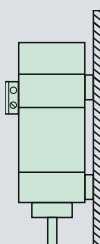
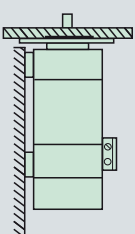
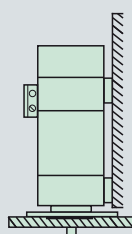
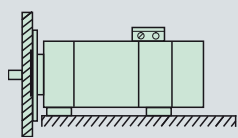
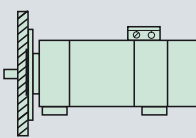
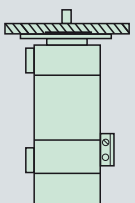
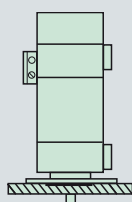
When cooling lubricants are used, protection against water alone is inadequate. The IP rating should only be considered here as a guideline. The motors may have to be protected by suitable covers. Attention must be paid to providing suitable sealing of the motor shaft for the selected degree of protection for the motor (for 1FT7: degree of protection IP67 and flange 0).

The table can serve as a decision aid for selecting the proper degree of protection for motors. A permanent covering of liquid on the flange must be avoided when the motor is mounted with the shaft extension facing upwards IM V3/IM V19/IM V6/IM V35.

|                                                   | Liquids | General workshop environment | Water; gen. cooling lubricant (95 % water, 5 % oil) |
|---------------------------------------------------|---------|------------------------------|-----------------------------------------------------|
| <b>Effect</b>                                     |         |                              |                                                     |
| Dry                                               |         | IP64                         | –                                                   |
| Water-enriched environment/<br>increased humidity |         | –                            | IP64                                                |
| Mist                                              |         | –                            | IP65                                                |
| Spray                                             |         | –                            | IP65                                                |
| Jet                                               |         | –                            | IP67                                                |
| Splash/brief immersion/constant inundation        |         | –                            | IP67                                                |

<sup>1)</sup> DIN VDE 0530 Part 5 or EN 60034 Part 5 specifies that there are only 5 degrees of protection for the first digit code and 8 degrees of protection for the second digit code in relation to rotating electrical machinery. However, IP6 is included in DIN 40050 which generally applies to electrical equipment.

### Overview (continued)

| Mounting types/mounting positions                                                                                 | Mounting types/mounting positions                                                                                   |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>IM B3</b><br>                 | <b>IM B6</b><br>                 |
| <b>IM B7</b><br>                 | <b>IM B8</b><br>                 |
| <b>IM V6</b><br>                | <b>IM V5</b><br>                |
| <b>IM V35<sup>1)</sup></b><br> | <b>IM V15<sup>1)</sup></b><br> |
| <b>IM B35<sup>1)</sup></b><br> | <b>IM B5, IM B 14</b><br>       |
| <b>IM V3, IM V19</b><br>       | <b>IM V1, IM V18</b><br>       |

<sup>1)</sup> Fixing on the flange and feet is necessary.



# Introduction

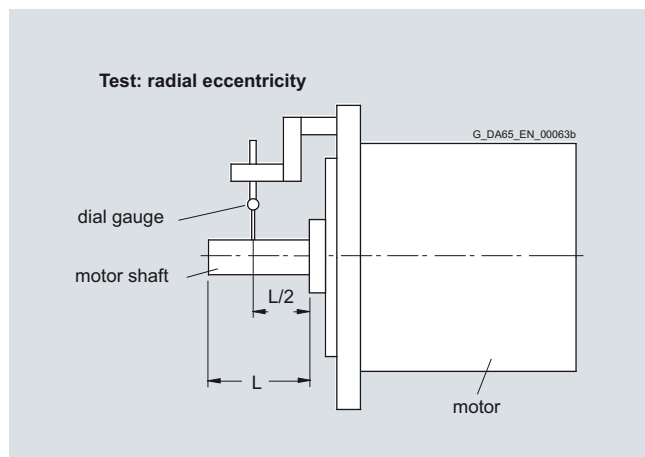
## Technical definitions for AC motors

### Overview (continued)

#### Radial eccentricity tolerance of shaft in relation to housing axis

refers to cylindrical shaft extensions

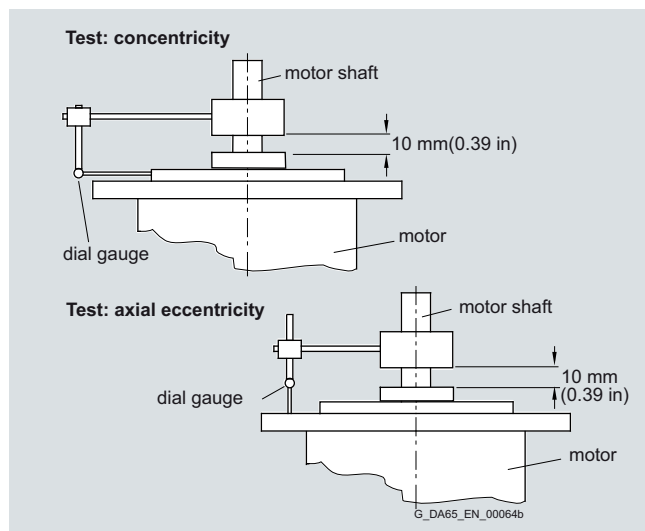
| Shaft height<br>SH | Tolerance<br>N<br>mm (in) | Tolerance<br>R<br>mm (in) | Tolerance<br>SPECIAL<br>mm (in) |
|--------------------|---------------------------|---------------------------|---------------------------------|
| 28/36              | 0.035 (0.00138)           | 0.018 (0.00071)           | –                               |
| 48/63              | 0.04 (0.00157)            | 0.021 (0.00083)           | –                               |
| 80/100/132         | 0.05 (0.00197)            | 0.025 (0.00098)           | 0.01 (0.00039)                  |
| 160/180/225        | 0.06 (0.00236)            | 0.03 (0.00118)            | 0.01 (0.00039)/<br>–/–          |
| 280                | 0.07 (0.00276)            | 0.035 (0.00138)           | –                               |
| 355                | 0.08 (0.00315)            | 0.04 (0.00157)            | –                               |



#### Concentricity and axial eccentricity tolerance of the flange surface to the shaft axis

referred to the centering diameter of the mounting flange

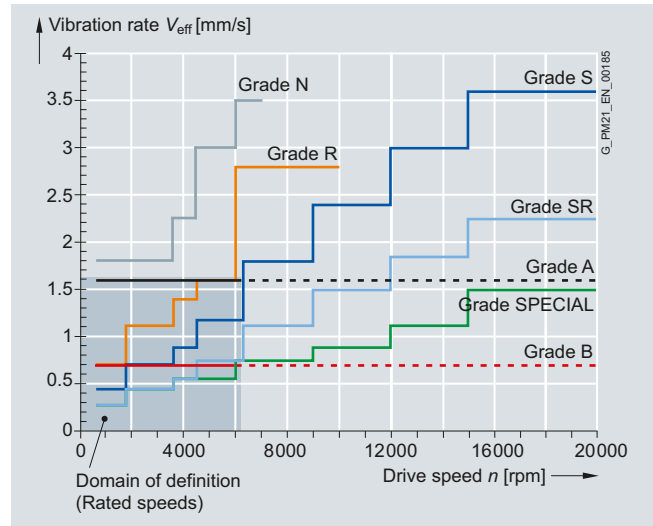
| Shaft height<br>SH | Tolerance<br>N<br>mm (in) | Tolerance<br>R<br>mm (in) | Tolerance<br>SPECIAL<br>mm (in)     |
|--------------------|---------------------------|---------------------------|-------------------------------------|
| 28/36/48           | 0.08 (0.00315)            | 0.04 (0.00157)            | –                                   |
| 63/80/100          | 0.1 (0.00394)             | 0.05 (0.00197)            | –/0.03 (0.00118)/<br>0.04 (0.00157) |
| 132/160/180/225    | 0.125 (0.00492)           | 0.063 (0.00248)           | 0.04 (0.00157)/<br>0.04 (0.00157)/– |
| 280/355            | 0.16 (0.00630)            | 0.08 (0.00315)            | –                                   |



#### Vibration severity and vibration severity grade A according to IEC 60034-14

The vibration severity is the RMS value of the vibration velocity (frequency range from 10 to 1000 Hz). The vibration severity is measured using electrical measuring instruments in compliance with DIN 45666.

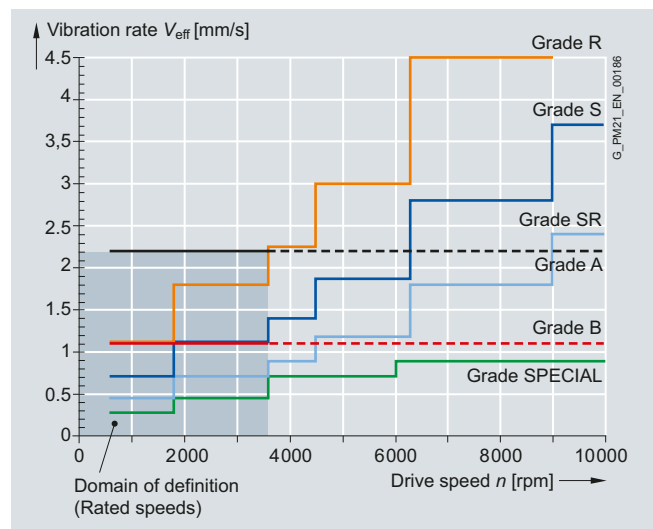
The values indicated refer only to the motor. These values can increase as a result of the overall system vibrational behavior due to installation.



Vibration severity limit values for shaft heights 20 to 132

The speeds of 1800 rpm and 3600 rpm and the associated limit values are defined in accordance with IEC 60034-14. Speeds of 4500 rpm and 6000 rpm and the specified values are defined by the motor manufacturer.

The motors maintain vibration severity grade A up to rated speed.



Vibration severity limit values for shaft heights 160 to 355

### Overview (continued)

#### Balancing in accordance with DIN ISO 8821

In addition to the balance quality of the motor, the vibration quality of motors with mounted belt pulleys and coupling is essentially determined by the balance quality of the mounted component.

If the motor and mounted component are separately balanced before they are assembled, then the process used to balance the belt pulley or coupling must be adapted to the motor balancing type. The following different balancing methods are used on motors of types SIMOTICS M-1PH8:

- Half-key balancing
- Full-key balancing
- Plain shaft extension

The letter H (half key) or F (full key) is printed on the shaft extension face to identify a half-key balanced or a full-key balanced SIMOTICS M-1PH8 motor.

SIMOTICS S-1FT7/1FK7 motors with feather key are always half-key balanced.

In general, motors with a plain shaft are recommended for systems with the most stringent vibrational quality requirements. For full-key balanced motors, we recommend belt pulleys with two opposite keyways, but only one feather key in the shaft extension.

#### Vibration stress, immitted vibration values

The following maximum permissible vibration stress limits at full reliability performance apply only to SIMOTICS S-1FT7/1FK7 permanent-magnet servomotors.

Vibration stress in accordance with DIN ISO 10816:

- 1 g at 20 Hz to 2 kHz

For all main motors of type SIMOTICS M-1PH8, the following limits are valid for (immitted) vibration values introduced into the motor from outside:

| Vibration frequency | Vibration values for 1PH808/1PH810/1PH813/1PH816 |                                                        |
|---------------------|--------------------------------------------------|--------------------------------------------------------|
| < 6.3 Hz            | Vibration displacement $s$                       | $\leq 0.16 \text{ mm}$<br>(0.006 in)                   |
| 6.3 ... 250 Hz      | Vibration velocity $V_{\text{rms}}$              | $\leq 4.5 \text{ mm/s}$<br>(0.18 in/s)                 |
| > 250 Hz            | Vibration acceleration $a$                       | $\leq 10 \text{ m/s}^2$<br>(32.8 ft/s <sup>2</sup> )   |
| Vibration frequency | Vibration values for 1PH818/1PH822/1PH828/1PH835 |                                                        |
| < 6.3 Hz            | Vibration displacement $s$                       | $\leq 0.25 \text{ mm}$<br>(0.099 in)                   |
| 6.3 ... 63 Hz       | Vibration velocity $V_{\text{rms}}$              | $\leq 7.1 \text{ mm/s}$<br>(0.28 in/s)                 |
| > 63 Hz             | Vibration acceleration $a$                       | $\leq 4.0 \text{ m/s}^2$<br>(13.12 ft/s <sup>2</sup> ) |

#### Coolant temperature (ambient temperature) and installation altitude for motors with natural cooling and forced ventilation

Operation (unrestricted): -15 ... +40 °C (+5 ... 104 °F)

The rated power (rated torque) is applicable to continuous duty (S1) in accordance with EN 60034-1 at rated frequency, a coolant temperature of 40 °C (104 °F) and an installation altitude of 1000 m (3281 ft) above sea level.

Apart from the SIMOTICS M-1PH8 motors, all motors are designed for temperature class 155 (F) and utilized in accordance with temperature class 155 (F). The SIMOTICS M-1PH8 motors are designed for temperature class 180 (H). For all other conditions, the factors given in the table below must be applied to determine the permissible output (torque).

The coolant temperature and installation altitude are rounded to 5 °C (41 °F) and 500 m (1640 ft) respectively.

| Installation altitude above sea level | Coolant temperature (ambient temperature) |                              |                |                |
|---------------------------------------|-------------------------------------------|------------------------------|----------------|----------------|
| m (ft)                                | < 30 °C (86 °F)                           | 30 ... 40 °C (86 ... 104 °F) | 45 °C (113 °F) | 50 °C (122 °F) |
| 1000 (3281)                           | 1.07                                      | 1.00                         | 0.96           | 0.92           |
| 1500 (4922)                           | 1.04                                      | 0.97                         | 0.93           | 0.89           |
| 2000 (6562)                           | 1.00                                      | 0.94                         | 0.90           | 0.86           |
| 2500 (8203)                           | 0.96                                      | 0.90                         | 0.86           | 0.83           |
| 3000 (9843)                           | 0.92                                      | 0.86                         | 0.82           | 0.79           |
| 3500 (11484)                          | 0.88                                      | 0.82                         | 0.79           | 0.75           |
| 4000 (13124)                          | 0.82                                      | 0.77                         | 0.74           | 0.71           |

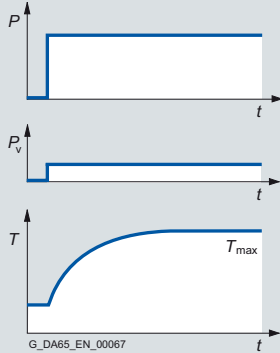
# Introduction

## Technical definitions for AC motors

### Overview (continued)

#### Duty types S1 and S6 in accordance with EN 60034-1

##### S1: Continuous duty

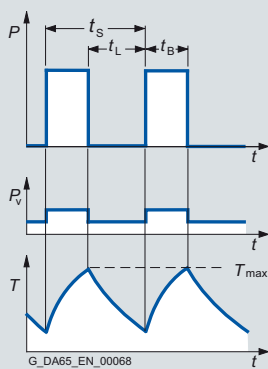


Duty cycle under constant load condition of sufficient duration to establish thermal equilibrium.

**Designation: S1**  
Output specification (torque).

G\_DA65\_EN\_00067

##### S6: Continuous duty with intermittent loading



Duty cycle comprising a sequence of identical duty cycles, each of which consists of a period of constant load followed by an interval at no load. There are no de-energized intervals.

**Designation:**  
e.g.: S6 - 40 %, 85 kW.  
(114 HP).

$$t_r = \frac{t_B}{t_B + t_L}$$

$$t_s = 10 \text{ min}$$

G\_DA65\_EN\_00068

#### Rated torque

The torque supplied on the shaft is indicated in Nm (lb<sub>f</sub>-ft) in the selection and ordering data.

$$M_{\text{rated}} = 9.55 \times P_{\text{rated}} \times \frac{1000}{n_{\text{rated}}}$$

$P_{\text{rated}}$  Rated power in kW  
 $n_{\text{rated}}$  Rated speed in rpm  
 $M_{\text{rated}}$  Rated torque in Nm

$$M_{\text{rated}} = P_{\text{rated}} \times \frac{5250}{n_{\text{rated}}}$$

$P_{\text{rated}}$  Rated power in HP  
 $n_{\text{rated}}$  Rated speed in rpm  
 $M_{\text{rated}}$  Rated torque in lb<sub>f</sub>-ft

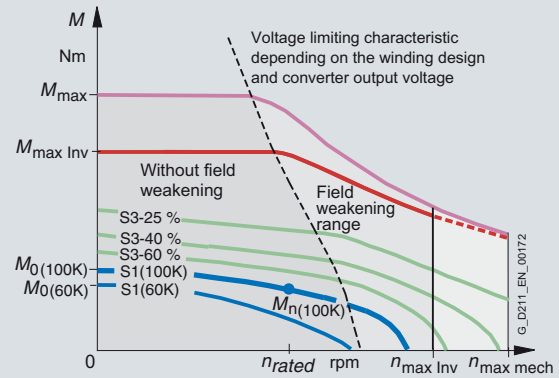
#### DURIGNIT IR 2000 insulation

The DURIGNIT IR 2000 insulation system consists of high-quality enamel wires and insulating sheeting in conjunction with solvent-free resin impregnation.

The insulating material system ensures that these motors will have a high mechanical and electrical stability, high service value and a long service life.

The insulating system protects the winding to a large degree against aggressive gases, vapors, dust, oil, and increased air humidity. It can withstand the usual vibration stressing.

#### Characteristic curves

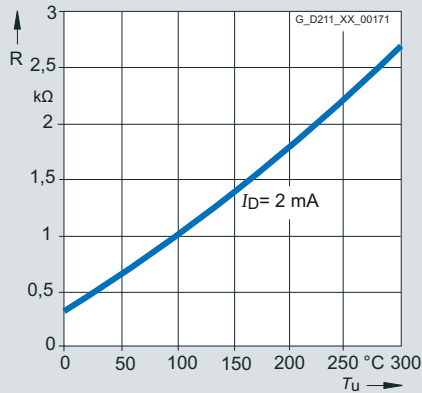


Torque characteristic of a synchronous motor operating on a converter with field weakening (example)

|                       | Explanations                                            |
|-----------------------|---------------------------------------------------------|
| $n_{\text{rated}}$    | Rated speed                                             |
| $n_{\text{max Inv}}$  | Maximum permissible electric speed limit                |
| $n_{\text{max mech}}$ | Maximum permissible mechanical speed limit              |
| $M_0$                 | Static torque                                           |
| $M_{\text{rated}}$    | Rated torque at rated speed                             |
| $M_{\text{max Inv}}$  | Achievable maximum torque with recommended motor module |
| $M_{\text{max}}$      | Maximum permissible torque                              |

### Overview (continued)

#### Motor protection



The KTY84-130 temperature sensor is used to measure the motor temperature for converter-fed motor operation.

This sensor is a semi-conductor that changes its resistance depending on temperature in accordance with a defined curve.

Siemens converters determine the motor temperature using the resistance of the temperature sensor.

Their parameters can be set for specific alarm and shutdown temperatures.

The KTY84-130 temperature sensor is embedded in the winding overhang of the motor like a PTC thermistor.

The sensor is evaluated in the SINAMICS S120 drive system as a standard function.

If the motors are operated on converters that do not feature a KTY84 evaluation circuit, the temperature can be measured with the external 3RS1040 temperature monitoring relay.

For a detailed description, please see Catalog IC 10 or Siemens Industry Mall:

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)

#### Paint finish (for possible optional version)

Motors without a paint finish have an impregnated resin coating. Motors with primer have corrosion protection.

All motors can be painted over with commercially available paints. Up to 2 additional paint coats are permissible.

| Finish               | Suitability of paint finish for climate group in accordance with IEC 60721, Part 2-1                                                                                                                                                            |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Paint finish         | <b>Moderate</b> (expanded) for indoor and outdoor installation with roof protection<br>Briefly Up to 150 °C (302 °F)<br>Continuously Up to 120 °C (248 °F)                                                                                      |
| Special paint finish | <b>Worldwide</b> (expanded) for outdoor installation<br>Briefly Up to 150 °C (302 °F)<br>Continuously Up to 120 °C (248 °F)<br>Also for aggressive atmospheres up to 1 % acid and alkali concentration or permanent dampness in sheltered rooms |

# Introduction

## Technical definitions for AC motors

### Overview (continued)

#### Built-in encoder systems without DRIVE-CLiQ interface

For motors without an integrated DRIVE-CLiQ interface, the analog encoder signal in the drive system is converted to a digital signal. For these motors as well as external encoders, the encoder signals must be connected to SINAMICS S120 via Sensor Modules.

#### Built-in encoder systems with DRIVE-CLiQ interface

For motors with an integrated DRIVE-CLiQ interface, the analog encoder signal is internally converted to a digital signal. There is no further conversion of the encoder signal in the drive system. The motor-internal encoders are the same encoders that are used for motors without a DRIVE-CLiQ interface. Motors with a DRIVE-CLiQ interface simplify the commissioning and diagnostics, for example, due to automatic identification of the encoder system.

The different encoder types, incremental, absolute or resolver, are uniformly connected with one type of MOTION-CONNECT DRIVE-CLiQ cable.

#### Short designations for the encoder systems

The first letters of the short designation define the encoder type. This is followed by the resolution in signals per revolution if S/R is specified (for encoders without DRIVE-CLiQ interface) or in bits if DQ is specified (for encoders with DRIVE-CLiQ interface).

| Type                        | Resolution/interface                                                 |                                                                                         |
|-----------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| AM<br>AS<br>IC<br>IN<br>HTL | xxxxSR                                                               | Encoder <u>without</u> DRIVE-CLiQ interface<br>Resolution = xxxx signals per revolution |
| AM<br>AS<br>IC<br>IN<br>R   | xxDQ<br>or<br>xxDQI                                                  | Encoder <u>with</u> DRIVE-CLiQ interface<br>Resolution = xx bits ( $2^{xx}$ )           |
| AM                          | Absolute encoder, multi-turn                                         |                                                                                         |
| AS                          | Absolute encoder, single-turn                                        |                                                                                         |
| IC                          | Incremental encoder sin/cos with commutation position C and D tracks |                                                                                         |
| IN                          | Incremental encoder sin/cos without commutation position             |                                                                                         |
| HTL                         | Incremental encoder with HTL signal                                  |                                                                                         |
| R                           | Resolver                                                             |                                                                                         |

## 6

### Overview of motor encoder systems

| Encoder without DRIVE-CLiQ interface | Encoder with DRIVE-CLiQ interface | Absolute position within one revolution (single-turn) | Absolute position over 4096 revolutions (multi-turn) | For use in Safety applications <sup>1)</sup> | Identification letter in the motor order number (without DRIVE-CLiQ interface) |      |      | Identification letter in the motor order number (with DRIVE-CLiQ interface) |      |      |
|--------------------------------------|-----------------------------------|-------------------------------------------------------|------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------|------|------|-----------------------------------------------------------------------------|------|------|
|                                      |                                   |                                                       |                                                      |                                              | 1FT7                                                                           | 1FK7 | 1PH8 | 1FT7                                                                        | 1FK7 | 1PH8 |
|                                      | AM24DQI                           | Yes                                                   | Yes                                                  | Yes                                          |                                                                                |      |      | C                                                                           | C    |      |
|                                      | AM20DQI                           | Yes                                                   | Yes                                                  | Yes                                          |                                                                                |      |      |                                                                             | R    |      |
|                                      | AS24DQI                           | Yes                                                   | No                                                   | Yes                                          |                                                                                |      |      | B                                                                           | B    |      |
|                                      | AS20DQI                           | Yes                                                   | No                                                   | Yes                                          |                                                                                |      |      |                                                                             | Q    |      |
| AM2048S/R                            | AM22DQ                            | Yes                                                   | Yes                                                  | Yes                                          | M                                                                              | E    | E    | F                                                                           | F    | F    |
| AM512S/R                             | AM20DQ                            | Yes                                                   | Yes                                                  | Yes                                          | –                                                                              | H    | –    | –                                                                           | L    | –    |
| AM32S/R                              | AM16DQ                            | Yes                                                   | Yes                                                  | No                                           | –                                                                              | G    | –    | –                                                                           | K    | –    |
| AM16S/R                              | AM15DQ                            | Yes                                                   | Yes                                                  | No                                           | –                                                                              | J    | –    | –                                                                           | V    | –    |
| AS2048S/R                            | AS22DQ                            | Yes                                                   | No                                                   | No                                           | –                                                                              | –    | –    | –                                                                           | –    | –    |
| IC2048S/R                            | IC22DQ                            | No                                                    | No                                                   | Yes                                          | N                                                                              | A    | M    | D                                                                           | D    | D    |
| IN2048/R                             | IN22DQ                            | No                                                    | No                                                   | Yes                                          | –                                                                              | –    | –    | –                                                                           | –    | –    |
| HTL1024S/R                           | –                                 | No                                                    | No                                                   | No                                           | –                                                                              | –    | H    | –                                                                           | –    | –    |
| HTL2048S/R                           | –                                 | No                                                    | No                                                   | No                                           | –                                                                              | –    | J    | –                                                                           | –    | –    |
| Resolver p=1                         | R14DQ                             | Yes                                                   | No                                                   | No                                           | –                                                                              | T    | –    | –                                                                           | P    | –    |
| Resolver p=3                         | R15DQ                             | No                                                    | No                                                   | No                                           | –                                                                              | S    | –    | –                                                                           | U    | –    |
| Resolver p=4                         | R15DQ                             | No                                                    | No                                                   | No                                           | –                                                                              | S    | –    | –                                                                           | U    | –    |

Not every encoder is available for every motor frame size.

– Not possible

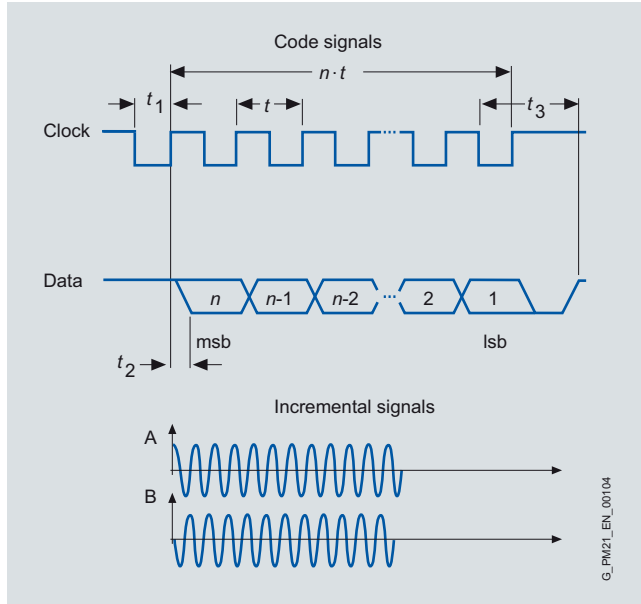
<sup>1)</sup> Not for 1FW3 motors.

### Overview (continued)

#### Absolute encoder, multi-turn

This encoder outputs an absolute angular position between 0° and 360° in the specified resolution. An internal measuring gearbox enables it to differentiate 4096 revolutions.

So with a ball screw, for example, the absolute position of the slide can be determined over a long distance.



Absolute encoder, multi-turn

#### Absolute encoder, single-turn

This encoder outputs an absolute angular position between 0° and 360° in the specified resolution. In contrast to the multi-turn absolute encoder, it has no measuring gearbox and can therefore only supply the position value within one revolution. It does not have a traversing range.

#### Absolute encoders without DRIVE-CLiQ interface

|           |                                                                               |
|-----------|-------------------------------------------------------------------------------|
| AM2048S/R | Absolute encoder 2048 S/R, 4096 revolutions, multi-turn, with EnDat interface |
| AM512S/R  | Absolute encoder 512 S/R, 4096 revolutions, multi-turn, with EnDat interface  |
| AM32S/R   | Absolute encoder 32 S/R, 4096 revolutions, multi-turn, with EnDat interface   |
| AM16S/R   | Absolute encoder 16 S/R, 4096 revolutions, multi-turn, with EnDat interface   |
| AS2048S/R | Absolute encoder, single-turn 2048 S/R                                        |

#### Absolute encoders with DRIVE-CLiQ interface

|                       |                                              |
|-----------------------|----------------------------------------------|
| AM24DQI               | Absolute encoder, 24 bit + 12 bit multi-turn |
| AM20DQI               | Absolute encoder, 20 bit + 12 bit multi-turn |
| AM22DQ                | Absolute encoder, 22 bit + 12 bit multi-turn |
| AM20DQ                | Absolute encoder, 20 bit + 12 bit multi-turn |
| AM16DQ                | Absolute encoder, 16 bit + 12 bit multi-turn |
| AM15DQ                | Absolute encoder, 15 bit + 12 bit multi-turn |
| AS24DQI <sup>2)</sup> | Absolute encoder, single-turn, 24 bit        |
| AS20DQI <sup>2)</sup> | Absolute encoder, single-turn, 20 bit        |
| AS22DQ                | Absolute encoder, single-turn, 22 bit        |

#### Technical specifications

|                        |        |
|------------------------|--------|
| Angular error          |        |
| • AM2048S/R and AM22DQ | ± 40"  |
| • AM512S/R and AM20DQ  | ± 120" |
| • AM32S/R and AM16DQ   | ± 280" |
| • AM16S/R and AM15DQ   | ± 480" |
| • AS2048S/R and AS22DQ | ± 40"  |

#### Absolute encoders without DRIVE-CLiQ interface

|                                                      |                  |
|------------------------------------------------------|------------------|
| Supply voltage                                       | 5 V              |
| Absolute position interface via EnDat 2.1            |                  |
| • Traversing range (multi-turn) <sup>1)</sup>        | 4096 revolutions |
| Incremental signals (sinusoidal, 1 V <sub>pp</sub> ) |                  |
| • Signals per revolution                             | 2048/512/32/16   |

#### Absolute encoders with DRIVE-CLiQ interface

|                                               |                                                                        |
|-----------------------------------------------|------------------------------------------------------------------------|
| Supply voltage                                | 24 V                                                                   |
| Absolute position via DRIVE-CLiQ              |                                                                        |
| • Resolution within one revolution            | 2 <sup>22</sup> /2 <sup>20</sup> /2 <sup>16</sup> /2 <sup>15</sup> bit |
| • Traversing range (multi-turn) <sup>1)</sup> | 4096 revolutions                                                       |

<sup>1)</sup> Not for absolute encoder, single-turn AS

<sup>2)</sup> The single-turn absolute encoder is used for the previous incremental encoders.

# Introduction

## Technical definitions for AC motors

### Overview (continued)

#### Incremental encoder

This encoder senses relative movements and does not supply absolute position information. In combination with evaluation logic, a zero point can be determined using the integrated reference mark, which can be used to calculate the absolute position.

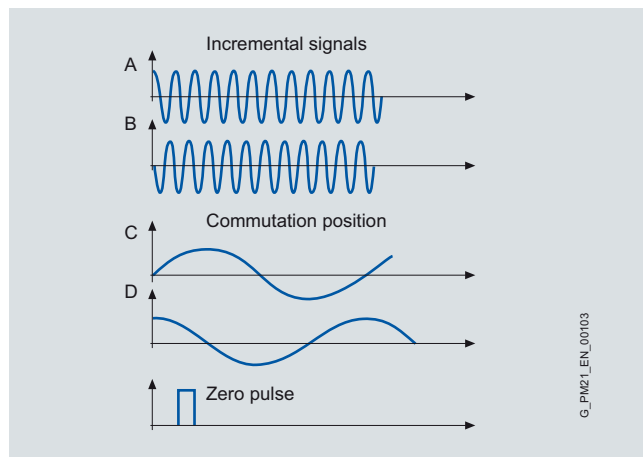
#### Incremental encoder IC/IN (sin/cos)

The encoder outputs sine and cosine signals. These can be interpolated using evaluation logic (usually 2048 points) and the direction of rotation can be determined.

In the version with DRIVE-CLiQ interface, this evaluation logic is already integrated in the encoder.

#### Commutation position

The position of the rotor is required for commutation of a synchronous motor. Encoders with commutation position (also termed C and D tracks) detect the angular position of the rotor.

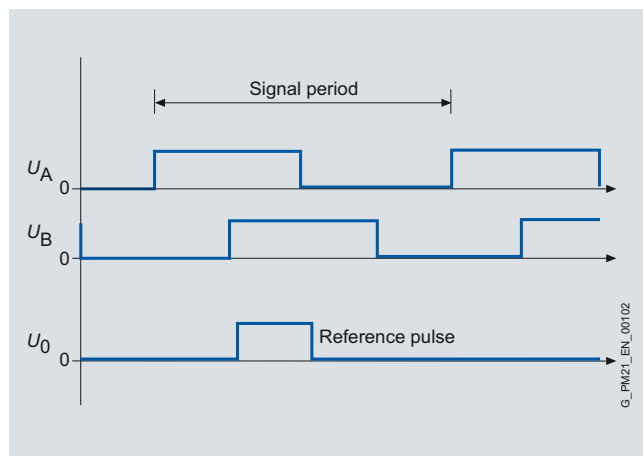


Incremental encoder IC/IN (sin/cos), commutation position only for IC

#### Incremental encoder HTL

The encoder outputs square wave signals. The direction of rotation can be evaluated by means of edge evaluation.

The resolution is four times the number of encoder pulses. This encoder type is preferred for long signal cables.



Incremental encoder HTL

#### Incremental encoders without DRIVE-CLiQ interface

|            |                                                                              |
|------------|------------------------------------------------------------------------------|
| IC2048S/R  | Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks   |
| IN2048S/R  | Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R without C or D tracks |
| HTL2048S/R | Incremental encoder HTL 2048 S/R                                             |
| HTL1024S/R | Incremental encoder HTL 1024 S/R                                             |

#### Incremental encoders with DRIVE-CLiQ interface<sup>1)</sup>

|        |                                                                                                  |
|--------|--------------------------------------------------------------------------------------------------|
| IC22DQ | Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit |
| IN22DQ | Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) without commutation position  |

#### Technical specifications

|                        |        |
|------------------------|--------|
| Angular error          |        |
| • IC2048S/R and IC22DQ | ± 40"  |
| • IN2048S/R and IN22DQ | ± 120" |
| • HTL2048S/R           | ± 60"  |
| • HTL1024S/R           | ± 60"  |

#### Incremental encoders IC/IN (sin/cos) without DRIVE-CLiQ interface

|                                      |           |
|--------------------------------------|-----------|
| Supply voltage                       | 5 V       |
| Incremental signals per revolution   |           |
| • Resolution (sin/cos)               | 2048      |
| • Commutation position (for IC only) | 1 sin/cos |
| • Reference signal                   | 1         |

#### Incremental encoders IC/IN (sin/cos) with DRIVE-CLiQ interface

|                                             |                     |
|---------------------------------------------|---------------------|
| Supply voltage                              | 24 V                |
| Incremental signals per revolution          |                     |
| • Resolution                                | 2 <sup>22</sup> bit |
| • Commutation position in bit (for IC only) | 11                  |
| • Reference signal                          | 1                   |

#### Incremental encoders HTL without DRIVE-CLiQ interface

|                                    |             |
|------------------------------------|-------------|
| Supply voltage                     | 10 ... 30 V |
| Incremental signals per revolution |             |
| • Resolution (HTL)                 | 2048/1024   |
| • Reference signal                 | 1           |

<sup>1)</sup> Instead of the incremental encoder IC22DQ, the single-turn absolute encoder AS24DQ1 is used for SIMOTICS S-1FK7/1FT7.

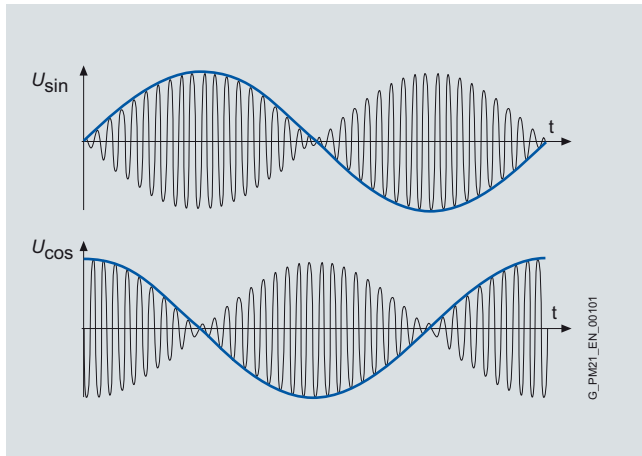


### Overview (continued)

#### Resolver

The number of sine and cosine periods per revolution corresponds to the number of pole pairs of the resolver. In the case of a 2-pole resolver, the evaluation electronics may output an additional zero pulse per encoder revolution. This zero pulse ensures a unique assignment of the position information in relation to an encoder revolution. A 2-pole resolver can therefore be used as a single-turn encoder.

2-pole resolvers can be used for motors with any number of pairs of poles. For multi-pole resolvers, the motor and resolver must always have the same numbers of pole pairs. The resolution is correspondingly higher than with 2-pole resolvers.



#### Resolvers without DRIVE-CLiQ interface<sup>1)</sup>

Resolver p = 1 2-pole resolver

Resolver p = 3 6-pole resolver

Resolver p = 4 8-pole resolver

#### Resolvers with DRIVE-CLiQ interface

R15DQ Resolver 15 bit  
(resolution 32768, internal, multi-pole)

R14DQ Resolver 14 bit  
(resolution 16384, internal, 2-pole)

#### Technical specifications

Angular error

- Resolver p = 1 and R14DQ  $\pm 840''^{(2)}$
- Resolver p = 3 and R15DQ  $\pm 420''$
- Resolver p = 4 and R15DQ  $\pm 240''$

#### Resolvers without DRIVE-CLiQ interface

Excitation voltage, rms 2 ... 8 V

Excitation frequency 5 ... 10 kHz

Output signals  $U_{\text{sine track}} = r \times U_{\text{excitation}} \times \sin \alpha$   
 $U_{\text{cosine track}} = r \times U_{\text{excitation}} \times \cos \alpha$   
 $\alpha = \arctan (U_{\text{sine track}} / U_{\text{cosine track}})$

Transmission ratio  $r = 0.5 \pm 5 \%$

#### Resolvers with DRIVE-CLiQ interface

Supply voltage 24 V

- Resolution  $2^{15}/2^{14}$  bit

<sup>1)</sup> Output signals:  
 2-pole resolver: 1 sin/cos signal per revolution  
 6-pole resolver: 3 sin/cos signals per revolution  
 8-pole resolver: 4 sin/cos signals per revolution

<sup>2)</sup> For the 1FK701/1FK702 motors: 1200''

## Feed motors

### SIMOTICS S servomotors for SINAMICS S120

#### SIMOTICS S-1FT7 synchronous motors

##### Overview



SIMOTICS S-1FT7 motors forced ventilation, water cooling and natural cooling

The SIMOTICS S-1FT7 servomotors are permanent-magnet synchronous motors with very compact dimensions and an optically attractive design.

The 1FT7 motors fulfill the highest demands on dynamic performance, speed setting range, shaft and flange accuracy. They are equipped with state-of-the-art encoder technology and optimized for operation on our fully digital drive and control systems.

Natural cooling, forced ventilation or water cooling are available as cooling types. With the natural cooling method, heat is dissipated through the surface of the motor, whereas with the forced ventilation method, heat is forced out by means of built-on fans. Maximum cooling, and thus maximum power ratings can be achieved using water cooling.

##### Benefits

- Excellent dynamic performance in a wide speed range thanks to high overload capability  $\geq 4 \times M_0$  with natural cooling
- Wide speed setting range
- High robustness against vibratory and shock loads thanks to vibration-isolated encoder mounting
- High degree of protection – allows operation even with demanding ambient conditions
- Quick and easy mounting due to cross-profile and rotatable connectors with quick-release locks
- Zero-backlash holding brake
- Extremely high efficiency
- 1FT7 Compact motors have a low torque ripple and are therefore especially suited for use in machine tools that require maximum surface quality and optimum machining quality. Their compact dimensions permit mounting in confined spaces.
- 1FT7 High Dynamic motors have very low rotor moments of inertia to achieve extremely good dynamic performance and very short cycle times. The 1FT7 High Dynamic motors are available with forced ventilation and with water cooling, they possess high continuous performance capabilities.

##### Application

- High-performance machine tools
- Machines with stringent requirements in terms of dynamic performance and precision, e.g.:
  - Packaging machines
  - Foil extractor machines
  - Printing machines
  - Handling equipment

## Technical specifications

|                                                                                                  |                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SIMOTICS S-1FT7 Compact/1FT7 High Dynamic motor</b>                                           |                                                                                                                                                                                                                                                               |
| Type of motor                                                                                    | Permanent-magnet synchronous motor                                                                                                                                                                                                                            |
| Magnet material                                                                                  | Rare-earth magnet material                                                                                                                                                                                                                                    |
| Cooling                                                                                          | Natural cooling, forced ventilation, water cooling                                                                                                                                                                                                            |
| Temperature monitoring                                                                           | KTY84 temperature sensor in the stator winding                                                                                                                                                                                                                |
| Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)                     | Temperature class 155 (F) for a winding temperature rise of $\Delta T = 100\text{ K}$ at an ambient temperature of $40\text{ °C}$ ( $104\text{ °F}$ ).<br>For water cooling, max. inlet temperature $30\text{ °C}$ ( $86\text{ °F}$ ).<br>Avoid condensation. |
| Type of construction in accordance with EN 60034-7 (IEC 60034-7)                                 | IM B5 (IM V1, IM V3) with flange 0/flange 1 (compatible with 1FT6)                                                                                                                                                                                            |
| Degree of protection in accordance with EN 60034-5 (IEC 60034-5)                                 | IP64/IP65/IP67                                                                                                                                                                                                                                                |
| Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60072-1)                      | Plain shaft/feather key and keyway (half-key balancing)                                                                                                                                                                                                       |
| Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) <sup>1)</sup>               | Tolerance N/Tolerance R                                                                                                                                                                                                                                       |
| Vibration severity in accordance with EN 60034-14 (IEC 60034-14)                                 | Grade A is maintained up to rated speed/<br>Grade R                                                                                                                                                                                                           |
| Sound pressure level $L_{pA}$ (1 m) in accordance with DIN EN ISO 1680, max.<br>Tolerance + 3 dB |                                                                                                                                                                                                                                                               |
|                                                                                                  | <ul style="list-style-type: none"> <li>1FT703 60 dB</li> <li>1FT704 ... 1FT706 65 dB</li> <li>1FT708 ... 1FT710 70 dB</li> </ul>                                                                                                                              |
| Connection                                                                                       | Connectors for signals and power rotatable                                                                                                                                                                                                                    |
| Paint finish                                                                                     | Pearl dark gray RAL 9023                                                                                                                                                                                                                                      |
| 2nd rating plate                                                                                 | Enclosed separately                                                                                                                                                                                                                                           |
| Holding brake                                                                                    | Without/with                                                                                                                                                                                                                                                  |
| Approvals, according to                                                                          | cURus                                                                                                                                                                                                                                                         |

Built-in encoder systems without DRIVE-CLiQ interface

|                            |                                                                     |
|----------------------------|---------------------------------------------------------------------|
| <b>Incremental encoder</b> |                                                                     |
| IC2048S/R encoder          | Incremental encoder sin/cos 1 $V_{pp}$ 2048 S/R with C and D tracks |
| <b>Absolute encoder</b>    |                                                                     |
| AM2048S/R encoder          | Absolute encoder 2048 S/R, 4096 revolutions, multi-turn             |

Built-in encoder systems with DRIVE-CLiQ interface

|                                                    |                                                                                                                          |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Absolute encoders, single-turn<sup>2)</sup></b> |                                                                                                                          |
| AS24DQI encoder                                    | Absolute encoder, single-turn, 24 bit (resolution 16777216, internal 2048 S/R)                                           |
| <b>Absolute encoder, multi-turn</b>                |                                                                                                                          |
| AM24DQI encoder                                    | Absolute encoder 24 bit (resolution 16777216, internal 2048 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) |

S/R = signals/revolution

## Options

| Order code     | Description                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------|
| <b>N05</b>     | Non-standard shaft extension (dimensions as for 1FT5 motors)                                                       |
| <b>X01</b>     | Paint finish: Jet black, matt RAL 9005                                                                             |
| <b>X02</b>     | Paint finish: Cream white RAL 9001                                                                                 |
| <b>X03</b>     | Paint finish: Reseda green RAL 6011                                                                                |
| <b>X04</b>     | Paint finish: Pebble gray RAL 7032                                                                                 |
| <b>X05</b>     | Paint finish: Sky blue RAL 5015                                                                                    |
| <b>X06</b>     | Paint finish: Light ivory RAL 1015                                                                                 |
| <b>X09</b>     | Paint finish: Anthracite RAL 7016                                                                                  |
| <b>K23</b>     | Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite RAL 7016                   |
| <b>K23+X..</b> | Special paint finish for "Worldwide" climate group: Primer and paint finish selectable from X01 to X09             |
| <b>K24</b>     | Primed (unpainted)                                                                                                 |
| <b>Q12</b>     | Sealing air connection (Only in conjunction with IP67 degree of protection. Not in combination with terminal box.) |
| <b>J..</b>     | Mounting of SP+ planetary gearbox (see Gearboxes for SIMOTICS S servomotors)                                       |
| <b>X08</b>     | Paint finish: White aluminum                                                                                       |
| <b>Y84</b>     | Customer specifications on the rating plate                                                                        |

When ordering a motor with options, **-Z** should be added to the order number.

**N05**  
Non-standard shaft extension (dimensions as for 1FT5 motors)

For the following order numbers, naturally cooled 1FT7 servomotors (Compact) can be delivered with the shaft dimensions compatible with 1FT5 motors:

- 1FT7034-5A.71-.... 1FT7042-5A.71-....
- 1FT7062-5A.71-.... 1FT7064-5A.71-....
- 1FT7082-5A.71-.... 1FT7084-5A.71-....
- 1FT7086-5A.71-.... 1FT7102-5A.71-....
- 1FT7105-5A.71-.... 1FT7108-5A.71-....

Shaft dimensions (diameter x length) according to shaft height (SH) with Option N05:

- SH 36: 11 × 23 mm (0.43 × 0.91 in)
- SH 48: 14 × 30 mm (0.55 × 1.18 in)
- SH 63: 19 × 40 mm (0.75 × 1.57 in) (not compatible with flange)
- SH 80: 24 × 50 mm (0.94 × 1.97 in)
- SH 100: 32 × 58 mm (1.26 × 2.28 in)

<sup>1)</sup> Shaft extension run-out, concentricity of centering ring and shaft and perpendicularity of flange to shaft.

<sup>2)</sup> The single-turn absolute encoder is applied for the previously used incremental encoders.

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact core type – Natural cooling

#### Selection and ordering data

| Rated speed                                              | Shaft height | Rated power                                   | Static torque                                            | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7<br>Compact synchronous motors<br>Core type | Number of pole pairs | Moment of inertia of rotor (without brake) | Weight (without brake)                                            |
|----------------------------------------------------------|--------------|-----------------------------------------------|----------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------------------|----------------------|--------------------------------------------|-------------------------------------------------------------------|
| $n_{\text{rated}}$                                       | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                         | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                                            | $p$                  | $J$                                        | $m$                                                               |
| rpm                                                      |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                 | Nm (lb <sub>f</sub> -ft)                      | A                                             |                                                            | Order No.            |                                            | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_f\text{-in-s}^2$ ) |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC        |              |                                               |                                                          |                                               |                                               |                                                            |                      |                                            |                                                                   |
| 2000                                                     | 100          | 5.03 (6.75)                                   | 30 (22.1)                                                | 24 (17.7)                                     | 10                                            | 1FT7102-1AC7■-1 ■ ■ 1                                      | 5                    | 91.4 (80.9)                                | 26.1 (57.5)                                                       |
|                                                          |              | 7.96 (10.7)                                   | 50 (36.9)                                                | 38 (28)                                       | 15                                            | 1FT7105-1AC7■-1 ■ ■ 1                                      | 5                    | 178 (157)                                  | 44.2 (97.5)                                                       |
| 3000                                                     | 48           | 1.35 (1.81)                                   | 5 (3.7)                                                  | 4.3 (3.2)                                     | 2.6                                           | 1FT7044-1AF7■-1 ■ ■ 1                                      | 3                    | 5.43 (4.81)                                | 7.2 (15.9)                                                        |
|                                                          | 63           | 1.7 (2.28)                                    | 6.0 (4.4)                                                | 5.4 (4)                                       | 3.9                                           | 1FT7062-1AF7■-1 ■ ■ 1                                      | 5                    | 7.36 (6.51)                                | 7.1 (15.7)                                                        |
|                                                          |              | 2.39 (3.2)                                    | 9.0 (6.6)                                                | 7.6 (5.6)                                     | 5.2                                           | 1FT7064-1AF7■-1 ■ ■ 1                                      | 5                    | 11.9 (10.5)                                | 9.7 (21.4)                                                        |
|                                                          | 80           | 3.24 (4.34)                                   | 13 (9.6)                                                 | 10.3 (7.6)                                    | 6.6                                           | 1FT7082-1AF7■-1 ■ ■ 1                                      | 5                    | 26.5 (23.4)                                | 14 (30.9)                                                         |
|                                                          |              | 4.56 (6.11)                                   | 20 (14.8)                                                | 14.5 (10.7)                                   | 8.5                                           | 1FT7084-1AF7■-1 ■ ■ 1                                      | 5                    | 45.1 (39.9)                                | 20.8 (45.9)                                                       |
|                                                          |              | 5.65 (7.58)                                   | 28 (20.7)                                                | 18 (13.3)                                     | 11                                            | 1FT7086-1AF7■-1 ■ ■ 1                                      | 5                    | 63.6 (56.2)                                | 27.5 (60.6)                                                       |
| 4500                                                     | 80           | 4.82 (6.46) <sup>1)</sup>                     | 20 (14.8)                                                | 11.5 (8.48) <sup>1)</sup>                     | 10.1 <sup>1)</sup>                            | 1FT7084-1AH7■-1 ■ ■ 1                                      | 5                    | 45.1 (39.9)                                | 20.8 (45.9)                                                       |
|                                                          |              | 4.71 (6.32)                                   | 28 (20.7)                                                | 10 (7.4)                                      | 10                                            | 1FT7086-1AH7■-1 ■ ■ 1                                      | 5                    | 63.6 (56.2)                                | 27.5 (60.6)                                                       |
| 6000                                                     | 36           | 0.88 (1.2)                                    | 2 (1.5)                                                  | 1.4 (1)                                       | 2.1                                           | 1FT7034-1AK7■-1 ■ ■ 1                                      | 3                    | 0.85 (0.75)                                | 3.8 (8.38)                                                        |
|                                                          | 63           | 2.13 (2.86) <sup>2)</sup>                     | 6.0 (4.4)                                                | 3.7 (2.73) <sup>2)</sup>                      | 5.9 <sup>2)</sup>                             | 1FT7062-1AK7■-1 ■ ■ 1                                      | 5                    | 7.36 (6.51)                                | 7.1 (15.7)                                                        |
|                                                          |              | 2.59 (3.47) <sup>3)</sup>                     | 9.0 (6.6)                                                | 5.5 (4.06) <sup>3)</sup>                      | 6.1 <sup>3)</sup>                             | 1FT7064-1AK7■-1 ■ ■ 1                                      | 5                    | 11.9 (10.5)                                | 9.7 (21.4)                                                        |
| Type of construction:                                    |              |                                               | IM B5                                                    | Flange 0<br>Flange 1 (compatible with 1FT6)   |                                               | 0<br>1                                                     |                      |                                            |                                                                   |
| Encoder systems for motors without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder                   |                                               |                                               |                                                            | N<br>M               |                                            |                                                                   |
| Encoder systems for motors with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder<br>AM24DQI encoder                       |                                               |                                               |                                                            | B<br>C               |                                            |                                                                   |
| Shaft extension:<br>Plain shaft<br>Plain shaft           |              |                                               | Shaft and flange accuracy:<br>Tolerance N<br>Tolerance N |                                               | Holding brake:<br>Without<br>With             |                                                            | G<br>H               |                                            |                                                                   |
| Vibration severity:<br>Grade A                           |              |                                               | Degree of protection:<br>IP65                            |                                               |                                               |                                                            |                      | 1                                          |                                                                   |

To select the type of construction and degree of protection, see Technical definitions.

Some 1FT7 Compact motors are available as core types. These core types can be express-delivered as replacement motors in the event of plant outages and offer the advantage of a quicker spare parts supply. For this reason, core types should be used for configuration wherever possible.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact core type – Natural cooling

| Motor type<br>(repeated) | Efficiency <sup>4)</sup> | Stall current                           | Calculated power <sup>7)</sup><br>$P_{calc}$ | SINAMICS S120 Motor Module         |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|--------------------------|--------------------------|-----------------------------------------|----------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                          | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K | Rated output current <sup>5)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>6)</sup> | Pre-assembled cable |
|                          | %                        | A                                       | kW (HP)                                      | A                                  | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| 1FT7102-1AC7...          | 93                       | 12.5                                    | 6.28 (8.42)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-....    |
| 1FT7105-1AC7...          | 93                       | 18                                      | 10.47 (14)                                   | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7044-1AF7...          | 92                       | 2.8                                     | 1.57 (2.11)                                  | 3                                  | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7062-1AF7...          | 91                       | 3.9                                     | 1.88 (2.52)                                  | 5                                  | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7064-1AF7...          | 93                       | 5.7                                     | 2.83 (3.8)                                   | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7082-1AF7...          | 93                       | 7.6                                     | 4.08 (5.47)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7084-1AF7...          | 93                       | 11                                      | 6.28 (8.42)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7086-1AF7...          | 93                       | 15.5                                    | 8.8 (11.8)                                   | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7084-1AH7...          | 93                       | 15.6                                    | 9.42 (12.6)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7086-1AH7...          | 91                       | 22.4                                    | 13.19 (17.7)                                 | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-....    |
| 1FT7034-1AK7...          | 90                       | 2.7                                     | 1.26 (1.69)                                  | 3                                  | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7062-1AK7...          | 90                       | 8.4                                     | 3.77 (5.06)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7064-1AK7...          | 91                       | 9                                       | 5.65 (7.58)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> These values refer to  $n = 4000$  rpm.

<sup>2)</sup> These values refer to  $n = 5500$  rpm.

<sup>3)</sup> These values refer to  $n = 4500$  rpm.

<sup>4)</sup> Optimum efficiency in continuous duty.

<sup>5)</sup> With default setting of the pulse frequency.

<sup>6)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>7)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$      $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

## SIMOTICS S-1FT7 synchronous motors Compact – Natural cooling

| Rated speed                                       | Shaft height | Rated power                                   | Static torque                    | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7 Compact synchronous motors | Number of pole pairs | Moment of inertia of rotor (without brake)                                               | Weight (without brake) |
|---------------------------------------------------|--------------|-----------------------------------------------|----------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|------------------------------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$ | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                            | $p$                  | $J$                                                                                      | $m$                    |
| rpm                                               |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)         | Nm (lb <sub>f</sub> -ft)                      | A                                             | Order No.                                  |                      | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC |              |                                               |                                  |                                               |                                               |                                            |                      |                                                                                          |                        |
| 1500                                              | 100          | 4.08 (5.47)                                   | 30 (22.1)                        | 26 (19.2)                                     | 8                                             | 1FT7102-5AB7-1 ■ ■ ■ ■                     | 5                    | 91.4 (80.9)                                                                              | 26.1 (57.5)            |
|                                                   |              | 6.6 (8.85)                                    | 50 (36.9)                        | 42 (31)                                       | 13                                            | 1FT7105-5AB7-1 ■ ■ ■ ■                     | 5                    | 178 (157)                                                                                | 44.2 (97.5)            |
|                                                   |              | 9.58 (12.8)                                   | 70 (51.6)                        | 61 (45)                                       | 16                                            | 1FT7108-5AB7-1 ■ ■ ■ ■                     | 5                    | 248 (219)                                                                                | 59 (130)               |
| 2000                                              | 80           | 2.39 (3.2)                                    | 13 (9.6)                         | 11.4 (8.4)                                    | 4.9                                           | 1FT7082-5AC7-1 ■ ■ ■ ■                     | 5                    | 26.5 (23.4)                                                                              | 14 (30.9)              |
|                                                   |              | 3.54 (4.75)                                   | 20 (14.8)                        | 16.9 (12.5)                                   | 8.4                                           | 1FT7084-5AC7-1 ■ ■ ■ ■                     | 5                    | 45.1 (39.9)                                                                              | 20.8 (45.9)            |
|                                                   |              | 4.71 (6.32)                                   | 28 (20.7)                        | 22.5 (16.6)                                   | 9.2                                           | 1FT7086-5AC7-1 ■ ■ ■ ■                     | 5                    | 63.6 (56.3)                                                                              | 27.5 (60.6)            |
|                                                   | 100          | 5.03 (6.75)                                   | 30 (22.1)                        | 30 (17.7)                                     | 10                                            | 1FT7102-5AC7-1 ■ ■ ■ ■                     | 5                    | 91.4 (80.9)                                                                              | 26.1 (57.5)            |
|                                                   |              | 7.96 (10.7)                                   | 50 (36.9)                        | 38 (28)                                       | 15                                            | 1FT7105-5AC7-1 ■ ■ ■ ■                     | 5                    | 178 (157)                                                                                | 44.2 (97.5)            |
|                                                   |              | 10.47 (14)                                    | 70 (51.6)                        | 50 (36.9)                                     | 18                                            | 1FT7108-5AC7-1 ■ ■ ■ ■                     | 5                    | 248 (219)                                                                                | 59 (130)               |
| 3000                                              | 48           | 0.85 (1.14)                                   | 3 (2.2)                          | 2.7 (2)                                       | 2.1                                           | 1FT7042-5AF7-1 ■ ■ ■ ■                     | 3                    | 2.81 (2.49)                                                                              | 4.6 (10.1)             |
|                                                   |              | 1.35 (1.81)                                   | 5 (3.7)                          | 4.3 (3.2)                                     | 2.6                                           | 1FT7044-5AF7-1 ■ ■ ■ ■                     | 3                    | 5.43 (4.81)                                                                              | 7.2 (15.9)             |
|                                                   |              | 1.76 (2.36)                                   | 7 (5.2)                          | 5.6 (4.1)                                     | 3.5                                           | 1FT7046-5AF7-1 ■ ■ ■ ■                     | 3                    | 7.52 (6.66)                                                                              | 9.3 (20.5)             |
|                                                   | 63           | 1.7 (2.28)                                    | 6 (4.4)                          | 5.4 (4.0)                                     | 3.9                                           | 1FT7062-5AF7-1 ■ ■ ■ ■                     | 5                    | 7.36 (6.51)                                                                              | 7.1 (15.7)             |
|                                                   |              | 2.39 (3.2)                                    | 9 (6.6)                          | 7.6 (5.6)                                     | 5.2                                           | 1FT7064-5AF7-1 ■ ■ ■ ■                     | 5                    | 11.9 (10.5)                                                                              | 9.7 (21.4)             |
|                                                   |              | 2.92 (3.92)                                   | 12 (8.9)                         | 9.3 (6.9)                                     | 7.2                                           | 1FT7066-5AF7-1 ■ ■ ■ ■                     | 5                    | 16.4 (14.5)                                                                              | 12.3 (27.1)            |
|                                                   |              | 3.42 (4.59)                                   | 15 (11.1)                        | 10.9 (8)                                      | 6.7                                           | 1FT7068-5AF7-1 ■ ■ ■ ■                     | 5                    | 23.2 (20.5)                                                                              | 16.3 (35.9)            |
|                                                   | 80           | 3.24 (4.34)                                   | 13 (9.6)                         | 10.3 (7.6)                                    | 6.6                                           | 1FT7082-5AF7-1 ■ ■ ■ ■                     | 5                    | 26.5 (23.5)                                                                              | 14 (30.9)              |
|                                                   |              | 4.55 (6.1)                                    | 20 (14.8)                        | 14.5 (10.7)                                   | 8.5                                           | 1FT7084-5AF7-1 ■ ■ ■ ■                     | 5                    | 45.1 (39.9)                                                                              | 20.8 (45.9)            |
|                                                   |              | 5.65 (7.58)                                   | 28 (20.7)                        | 18 (13.3)                                     | 11                                            | 1FT7086-5AF7-1 ■ ■ ■ ■                     | 5                    | 63.6 (56.3)                                                                              | 27.5 (60.6)            |
|                                                   | 100          | 6.28 (8.42)                                   | 30 (22.1)                        | 20 (14.8)                                     | 12                                            | 1FT7102-5AF7-1 ■ ■ ■ ■                     | 5                    | 91.4 (80.9)                                                                              | 26.1 (57.5)            |
|                                                   |              | 8.8 (11.8)                                    | 50 (36.9)                        | 28 (20.7)                                     | 15                                            | 1FT7105-5AF7-1 ■ ■ ■ ■                     | 5                    | 178 (157)                                                                                | 44.2 (97.5)            |
|                                                   |              | 6.28 (8.42)                                   | 70 (51.6)                        | 20 (14.8)                                     | 12                                            | 1FT7108-5AF7-1 ■ ■ ■ ■                     | 5                    | 248 (220)                                                                                | 59 (130)               |

|                                                          |                                        |                                             |                                      |
|----------------------------------------------------------|----------------------------------------|---------------------------------------------|--------------------------------------|
| Type of construction:                                    | IM B5                                  | Flange 0<br>Flange 1 (compatible with 1FT6) | 0<br>1                               |
| Encoder systems for motors without DRIVE-CLiQ interface: | IC2048S/R encoder<br>AM2048S/R encoder |                                             | N<br>M                               |
| Encoder systems for motors with DRIVE-CLiQ interface:    | AS24DQI encoder<br>AM24DQI encoder     |                                             | B<br>C                               |
| Shaft extension:                                         | Shaft and flange accuracy:             | Holding brake:                              | A<br>B<br>D<br>E<br>G<br>H<br>K<br>L |
| Feather key and keyway                                   | Tolerance N                            | Without                                     |                                      |
| Feather key and keyway                                   | Tolerance N                            | With                                        |                                      |
| Feather key and keyway                                   | Tolerance R                            | Without                                     |                                      |
| Feather key and keyway                                   | Tolerance R                            | With                                        |                                      |
| Plain shaft                                              | Tolerance N                            | Without                                     |                                      |
| Plain shaft                                              | Tolerance N                            | With                                        |                                      |
| Plain shaft                                              | Tolerance R                            | Without                                     |                                      |
| Plain shaft                                              | Tolerance R                            | With                                        |                                      |
| Vibration severity:                                      | Degree of protection:                  |                                             |                                      |
| Grade A                                                  | IP64                                   |                                             |                                      |
| Grade A                                                  | IP65                                   |                                             |                                      |
| Grade A                                                  | IP67                                   |                                             |                                      |
| Grade R                                                  | IP64                                   |                                             |                                      |
| Grade R                                                  | IP65                                   |                                             |                                      |
| Grade R                                                  | IP67                                   |                                             |                                      |

To select the type of construction and degree of protection, see Technical definitions.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact – Natural cooling

| Motor type<br>(repeated) | Efficiency <sup>1)</sup> | Stall current                         | Calculated power<br>$P_{calc}$ <sup>4)</sup> | SINAMICS S120 Motor Module            |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|--------------------------|--------------------------|---------------------------------------|----------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                          | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T=100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T=100$ K   | Rated output<br>current <sup>2)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>3)</sup> | Pre-assembled cable |
|                          | %                        | A                                     | kW (HP)                                      | A                                     | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| 1FT7102-5AB7...          | 93                       | 9                                     | 4.71 (6.32)                                  | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-....    |
| 1FT7105-5AB7...          | 93                       | 15                                    | 7.85 (10.5)                                  | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-....    |
| 1FT7108-5AB7...          | 93                       | 18                                    | 10.99 (14.7)                                 | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7082-5AC7...          | 93                       | 5                                     | 2.72 (3.65)                                  | 5                                     | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7084-5AC7...          | 93                       | 9                                     | 4.19 (5.62)                                  | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7086-5AC7...          | 93                       | 10.6                                  | 5.86 (7.86)                                  | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7102-5AC7...          | 93                       | 12.5                                  | 6.28 (8.42)                                  | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-....    |
| 1FT7105-5AC7...          | 93                       | 18                                    | 10.47 (14)                                   | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7108-5AC7...          | 93                       | 25                                    | 14.66 (19.7)                                 | 30                                    | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-....    |
| 1FT7042-5AF7...          | 92                       | 2.1                                   | 0.94 (1.26)                                  | 3                                     | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7044-5AF7...          | 92                       | 2.8                                   | 1.57 (2.11)                                  | 3                                     | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7046-5AF7...          | 92                       | 4                                     | 2.20 (2.95)                                  | 5                                     | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7062-5AF7...          | 91                       | 3.9                                   | 1.88 (2.52)                                  | 5                                     | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7064-5AF7...          | 93                       | 5.7                                   | 2.83 (3.8)                                   | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7066-5AF7...          | 92                       | 8.4                                   | 3.77 (5.06)                                  | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7068-5AF7...          | 92                       | 8.3                                   | 4.71 (6.32)                                  | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7082-5AF7...          | 93                       | 7.6                                   | 4.08 (5.47)                                  | 9                                     | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7084-5AF7...          | 93                       | 11                                    | 6.28 (8.42)                                  | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7086-5AF7...          | 93                       | 15.5                                  | 8.8 (11.8)                                   | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7102-5AF7...          | 93                       | 18                                    | 9.42 (12.6)                                  | 18                                    | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7105-5AF7...          | 94                       | 26                                    | 15.71 (21)                                   | 30                                    | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-....    |
| 1FT7108-5AF7...          | 93                       | 36                                    | 21.99 (29.5)                                 | 45                                    | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N54-....    |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> Optimum efficiency in continuous duty.

<sup>2)</sup> With default setting of the pulse frequency.

<sup>3)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>4)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$



# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact – Natural cooling

#### Selection and ordering data

| Rated speed                                              | Shaft height | Rated power                                   | Static torque                    | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7<br>Compact<br>synchronous motors | Number of pole pairs       | Moment of inertia of rotor (without brake) | Weight (without brake)                                                                   |         |
|----------------------------------------------------------|--------------|-----------------------------------------------|----------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------------|----------------------------|--------------------------------------------|------------------------------------------------------------------------------------------|---------|
| $n_{\text{rated}}$                                       | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$ | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                                  | $p$                        | $J$                                        | $m$                                                                                      |         |
| rpm                                                      |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)         | Nm (lb <sub>f</sub> -ft)                      | A                                             |                                                  | Order No.                  |                                            | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb) |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC        |              |                                               |                                  |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| 4500                                                     | 48           | 1.32 (1.77) <sup>1)</sup>                     | 7 (5.2)                          | 3.6 (2.66) <sup>1)</sup>                      | 4.7 <sup>1)</sup>                             | 1FT7046-5AH7■-1■ ■ ■ ■                           | 3                          | 7.52 (6.66)                                | 9.3 (20.5)                                                                               |         |
|                                                          | 63           | 2.55 (3.42) <sup>2)</sup>                     | 12 (8.9)                         | 6.1 (4.50) <sup>2)</sup>                      | 7.5 <sup>2)</sup>                             | 1FT7066-5AH7■-1■ ■ ■ ■                           | 5                          | 16.4 (14.5)                                | 12.3 (27.1)                                                                              |         |
|                                                          | 80           | 3.77 (5.06)                                   | 13 (9.6)                         | 8 (5.9)                                       | 7.8                                           | 1FT7082-5AH7■-1■ ■ ■ ■                           | 5                          | 26.5 (23.4)                                | 14 (30.9)                                                                                |         |
|                                                          |              | 4.82 (6.46) <sup>2)</sup>                     | 20 (14.8)                        | 11.5 (8.48) <sup>2)</sup>                     | 10.1 <sup>2)</sup>                            | 1FT7084-5AH7■-1■ ■ ■ ■                           | 5                          | 45.1 (39.9)                                | 20.8 (45.9)                                                                              |         |
|                                                          |              | 4.71 (6.32)                                   | 28 (20.7)                        | 10 (7.4)                                      | 10                                            | 1FT7086-5AH7■-1■ ■ ■ ■                           | 5                          | 63.6 (56.3)                                | 27.5 (60.6)                                                                              |         |
| 6000                                                     | 36           | 0.88 (1.18)                                   | 2 (1.5)                          | 1.4 (1)                                       | 2.1                                           | 1FT7034-5AK7■-1■ ■ ■ ■                           | 3                          | 0.85 (0.75)                                | 3.8 (8.38)                                                                               |         |
|                                                          |              | 1.07 (1.43)                                   | 3 (2.2)                          | 1.7 (1.3)                                     | 2.4                                           | 1FT7036-5AK7■-1■ ■ ■ ■                           | 3                          | 1.33 (1.18)                                | 5.0 (11)                                                                                 |         |
|                                                          | 48           | 1.26 (1.69)                                   | 3 (2.2)                          | 2 (1.5)                                       | 3                                             | 1FT7042-5AK7■-1■ ■ ■ ■                           | 3                          | 2.81 (2.49)                                | 4.6 (10.1)                                                                               |         |
|                                                          |              | 1.41 (1.89) <sup>3)</sup>                     | 5 (3.7)                          | 3 (2.21) <sup>3)</sup>                        | 3.6 <sup>3)</sup>                             | 1FT7044-5AK7■-1■ ■ ■ ■                           | 3                          | 5.43 (4.81)                                | 7.2 (15.9)                                                                               |         |
|                                                          | 63           | 2.13 (2.86) <sup>4)</sup>                     | 6 (4.4)                          | 3.7 (2.73) <sup>4)</sup>                      | 5.9 <sup>4)</sup>                             | 1FT7062-5AK7■-1■ ■ ■ ■                           | 5                          | 7.36 (6.51)                                | 7.1 (15.7)                                                                               |         |
|                                                          |              | 2.59 (3.47) <sup>3)</sup>                     | 9 (6.6)                          | 5.5 (4.06) <sup>3)</sup>                      | 6.1 <sup>3)</sup>                             | 1FT7064-5AK7■-1■ ■ ■ ■                           | 5                          | 11.9 (10.5)                                | 9.7 (21.4)                                                                               |         |
| Type of construction:                                    |              |                                               | IM B5                            |                                               | Flange 0<br>Flange 1 (compatible with 1FT6)   |                                                  | 0<br>1                     |                                            |                                                                                          |         |
| Encoder systems for motors without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder                |                                               |                                               |                                                  | N                          |                                            |                                                                                          |         |
|                                                          |              |                                               | AM2048S/R encoder                |                                               |                                               |                                                  |                            |                                            |                                                                                          | M       |
| Encoder systems for motors with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder                  |                                               |                                               |                                                  | B                          |                                            |                                                                                          |         |
|                                                          |              |                                               | AM24DQI encoder                  |                                               |                                               |                                                  |                            |                                            |                                                                                          | C       |
| Shaft extension:                                         |              |                                               | Shaft and flange accuracy:       |                                               |                                               | Holding brake:                                   |                            | A<br>B<br>D<br>E<br>G<br>H<br>K<br>L       |                                                                                          |         |
| Feather key and keyway                                   |              |                                               | Tolerance N                      |                                               |                                               | Without                                          |                            |                                            |                                                                                          |         |
| Feather key and keyway                                   |              |                                               | Tolerance N                      |                                               |                                               | With                                             |                            |                                            |                                                                                          |         |
| Feather key and keyway                                   |              |                                               | Tolerance R                      |                                               |                                               | Without                                          |                            |                                            |                                                                                          |         |
| Feather key and keyway                                   |              |                                               | Tolerance R                      |                                               |                                               | With                                             |                            |                                            |                                                                                          |         |
| Plain shaft                                              |              |                                               | Tolerance N                      |                                               |                                               | Without                                          |                            |                                            |                                                                                          |         |
| Plain shaft                                              |              |                                               | Tolerance N                      |                                               |                                               | With                                             |                            |                                            |                                                                                          |         |
| Plain shaft                                              |              |                                               | Tolerance R                      |                                               |                                               | Without                                          |                            |                                            |                                                                                          |         |
| Plain shaft                                              |              |                                               | Tolerance R                      |                                               |                                               | With                                             |                            |                                            |                                                                                          |         |
| Vibration severity:                                      |              |                                               | Degree of protection:            |                                               |                                               |                                                  | 0<br>1<br>2<br>3<br>4<br>5 |                                            |                                                                                          |         |
| Grade A                                                  |              |                                               | IP64                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| Grade A                                                  |              |                                               | IP65                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| Grade A                                                  |              |                                               | IP67                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| Grade R                                                  |              |                                               | IP64                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| Grade R                                                  |              |                                               | IP65                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |
| Grade R                                                  |              |                                               | IP67                             |                                               |                                               |                                                  |                            |                                            |                                                                                          |         |

To select the type of construction and degree of protection, see Technical definitions.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact – Natural cooling

| Motor type<br>(repeated) | Efficiency <sup>5)</sup> | Stall current                           | Calculated power <sup>8)</sup><br>$P_{calc}$ | SINAMICS S120 Motor Module         |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|--------------------------|--------------------------|-----------------------------------------|----------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                          | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K | Rated output current <sup>6)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>7)</sup> | Pre-assembled cable |
|                          | %                        | A                                       | kW (HP)                                      | A                                  | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| 1FT7046-5AH7...          | 90                       | 8.1                                     | 3.3 (4.43)                                   | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7066-5AH7...          | 90                       | 13.6                                    | 5.65 (7.58)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7082-5AH7...          | 93                       | 12.3                                    | 6.13 (8.22)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7084-5AH7...          | 93                       | 15.6                                    | 9.42 (12.6)                                  | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX0002-5N31-....   |
| 1FT7086-5AH7...          | 91                       | 22.4                                    | 13.19 (17.7)                                 | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX0002-5N41-....   |
| 1FT7034-5AK7...          | 90                       | 2.7                                     | 1.26 (1.69)                                  | 3                                  | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7036-5AK7...          | 90                       | 4.0                                     | 1.88 (2.52)                                  | 5                                  | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7042-5AK7...          | 91                       | 3.9                                     | 1.88 (2.52)                                  | 5                                  | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7044-5AK7...          | 91                       | 5.7                                     | 3.14 (4.21)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7062-5AK7...          | 90                       | 8.4                                     | 3.77 (5.06)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |
| 1FT7064-5AK7...          | 91                       | 9                                       | 5.65 (7.59)                                  | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX0002-5N01-....   |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found  
under MOTION-CONNECT connection systems.1) These values refer to  $n = 3500$  rpm.2) These values refer to  $n = 4000$  rpm.3) These values refer to  $n = 4500$  rpm.4) These values refer to  $n = 5500$  rpm.

5) Optimum efficiency in continuous duty.

6) With default setting of the pulse frequency.

7) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

8)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact – Forced ventilation

#### Selection and ordering data

| Rated speed                                                 | Shaft height | Rated power                                   | Static torque                                                                                      | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7 Compact synchronous motors | Number of pole pairs | Moment of inertia of rotor (without brake)                                               | Weight (without brake) |
|-------------------------------------------------------------|--------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|------------------------------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                          | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                   | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                            | $p$                  | $J$                                                                                      | $m$                    |
| rpm                                                         |              | kW (HP)                                       | Nm (lb <sub>F</sub> -ft)                                                                           | Nm (lb <sub>F</sub> -ft)                      | A                                             | Order No.                                  |                      | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>F</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC           |              |                                               |                                                                                                    |                                               |                                               |                                            |                      |                                                                                          |                        |
| 2000                                                        | 80           | 5.0 (6.71)                                    | 27 (19.9)                                                                                          | 24 (17.7)                                     | 13.5                                          | 1FT7084-5SC7■-1■ ■ ■ ■                     | 5                    | 45 (39.8)                                                                                | 25 (55.1)              |
|                                                             |              | 6.7 (8.98)                                    | 36 (26.6)                                                                                          | 32 (23.6)                                     | 17                                            | 1FT7086-5SC7■-1■ ■ ■ ■                     | 5                    | 64 (56.6)                                                                                | 36 (79.4)              |
|                                                             | 100          | 11.7 (15.7)                                   | 65 (47.9)                                                                                          | 56 (41.3)                                     | 29                                            | 1FT7105-5SC7■-1■ ■ ■ ■                     | 5                    | 178 (158)                                                                                | 50 (110)               |
|                                                             |              | 15.3 (20.5)                                   | 91 (67)                                                                                            | 73 (54)                                       | 33                                            | 1FT7108-5SC7■-1■ ■ ■ ■                     | 5                    | 248 (220)                                                                                | 64 (57)                |
| 3000                                                        | 80           | 7.2 (9.66)                                    | 27 (19.9)                                                                                          | 23 (17)                                       | 18.5                                          | 1FT7084-5SF7■-1■ ■ ■ ■                     | 5                    | 45 (39.8)                                                                                | 25 (55.1)              |
|                                                             |              | 9.1 (12.2)                                    | 36 (26.6)                                                                                          | 29 (21.4)                                     | 24                                            | 1FT7086-5SF7■-1■ ■ ■ ■                     | 5                    | 64 (56.6)                                                                                | 36 (79.4)              |
|                                                             | 100          | 15.1 (20.2)                                   | 65 (47.9)                                                                                          | 48 (35.4)                                     | 35                                            | 1FT7105-5SF7■-1■ ■ ■ ■                     | 5                    | 178 (158)                                                                                | 50 (110)               |
|                                                             |              | 18.8 (25.2)                                   | 91 (67)                                                                                            | 60 (44)                                       | 38                                            | 1FT7108-5SF7■-1■ ■ ■ ■                     | 5                    | 248 (220)                                                                                | 64 (57)                |
| 4500                                                        | 80           | 9.9 (13.3)                                    | 27 (19.9)                                                                                          | 21 (15.5)                                     | 24.5                                          | 1FT7084-5SH7■-1■ ■ ■ ■                     | 5                    | 45 (39.8)                                                                                | 25 (55.1)              |
|                                                             |              | 11.8 (15.8)                                   | 36 (26.6)                                                                                          | 25 (18.4)                                     | 25                                            | 1FT7086-5SH7■-1■ ■ ■ ■                     | 5                    | 64 (56.6)                                                                                | 36 (79.4)              |
| Type of construction:                                       |              |                                               | IM B5                                                                                              |                                               | Flange 0<br>Flange 1 (compatible with 1FT6)   |                                            | 0<br>1               |                                                                                          |                        |
| Connector outlet direction:                                 |              |                                               | Connector sizes 1 and 1.5 Rotatable connector                                                      |                                               |                                               |                                            | 1                    |                                                                                          |                        |
|                                                             |              |                                               | Connector size 3 <sup>1)</sup><br><br>Transverse right<br>Transverse left<br>Axial NDE<br>Axial DE |                                               |                                               |                                            | 1                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 2                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 3                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 4                    |                                                                                          |                        |
| Terminal box/<br>cable entry: <sup>1)</sup>                 |              |                                               | Top/transverse from right<br>Top/transverse from left<br>Top/axial from NDE<br>Top/axial from DE   |                                               |                                               |                                            | 5                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 6                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 7                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | 8                    |                                                                                          |                        |
| Encoder systems for motors<br>without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder                                                             |                                               |                                               |                                            | N                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | M                    |                                                                                          |                        |
| Encoder systems for motors<br>with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder<br>AM24DQI encoder                                                                 |                                               |                                               |                                            | B                    |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            | C                    |                                                                                          |                        |
| Shaft extension:                                            |              |                                               | Shaft and flange accuracy:                                                                         |                                               |                                               | Holding brake:                             |                      | A<br>B<br>D<br>E<br>G<br>H<br>K<br>L                                                     |                        |
| Feather key                                                 |              |                                               | Tolerance N                                                                                        |                                               |                                               | Without                                    |                      |                                                                                          |                        |
| Feather key                                                 |              |                                               | Tolerance N                                                                                        |                                               |                                               | With                                       |                      |                                                                                          |                        |
| Feather key                                                 |              |                                               | Tolerance R                                                                                        |                                               |                                               | Without                                    |                      |                                                                                          |                        |
| Feather key                                                 |              |                                               | Tolerance R                                                                                        |                                               |                                               | With                                       |                      |                                                                                          |                        |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                        |                                               |                                               | Without                                    |                      |                                                                                          |                        |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                        |                                               |                                               | With                                       |                      |                                                                                          |                        |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                        |                                               |                                               | Without                                    |                      |                                                                                          |                        |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                        |                                               |                                               | With                                       |                      |                                                                                          |                        |
|                                                             |              |                                               |                                                                                                    |                                               |                                               |                                            |                      |                                                                                          |                        |
| Vibration severity:                                         |              |                                               | Degree of protection: <sup>2)</sup>                                                                |                                               |                                               |                                            | 0                    |                                                                                          |                        |
| Grade A                                                     |              |                                               | IP64                                                                                               |                                               |                                               |                                            | 1                    |                                                                                          |                        |
| Grade A                                                     |              |                                               | IP65                                                                                               |                                               |                                               |                                            | 3                    |                                                                                          |                        |
| Grade R                                                     |              |                                               | IP64                                                                                               |                                               |                                               |                                            | 4                    |                                                                                          |                        |
| Grade R                                                     |              |                                               | IP65                                                                                               |                                               |                                               |                                            |                      |                                                                                          |                        |

To select the type of construction and degree of protection, see Technical definitions.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact – Forced ventilation

| Motor type<br>(repeated) | Efficiency <sup>3)</sup> | Stall current                         | Calculated power <sup>6)</sup><br>$P_{calc}$ | SINAMICS S120 Motor Module                        |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|--------------------------|--------------------------|---------------------------------------|----------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                          | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T=100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T=100$ K   | Rated output current <sup>4)</sup><br>$I_{rated}$ | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>5)</sup> | Pre-assembled cable |
|                          | %                        | A                                     | kW (HP)                                      | A                                                 | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| 1FT7084-5SC7...          | 93                       | 15                                    | 5.7 (7.64)                                   | 18                                                | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-....    |
| 1FT7086-5SC7...          | 93                       | 19.5                                  | 7.5 (10.1)                                   | 30                                                | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7105-5SC7...          | 93                       | 31                                    | 13.6 (18.2)                                  | 45                                                | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N54-....    |
| 1FT7108-5SC7...          | 93                       | 39                                    | 19.1 (25.6)                                  | 45                                                | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 10                            | 6FX002-5N64-....    |
| 1FT7084-5SF7...          | 94                       | 21                                    | 8.5 (11.4)                                   | 30                                                | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7086-5SF7...          | 93                       | 29                                    | 11.3 (15.2)                                  | 30                                                | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N51-....    |
| 1FT7105-5SF7...          | 94                       | 45                                    | 20.4 (27.4)                                  | 45                                                | 6SL312-1-TE24-5AA3                                                                                             | 3                                                                                                  | 4 × 10                            | 6FX002-5S14-....    |
| 1FT7108-5SF7...          | 94                       | 57                                    | 28.6 (38.4)                                  | 60                                                | 6SL312-1-TE26-0AA3                                                                                             | 3                                                                                                  | 4 × 16                            | 6FX002-5S23-....    |
| 1FT7084-5SH7...          | 94                       | 30.5                                  | 12.7 (17.0)                                  | 30                                                | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N51-....    |
| 1FT7086-5SH7...          | 93                       | 34                                    | 17.0 (22.8)                                  | 45                                                | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N54-....    |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found  
under MOTION-CONNECT connection systems.

<sup>1)</sup> Connector size 3 not rotatable. An alternative terminal box can be selected with connector size 3 only.

<sup>2)</sup> The degree of protection refers to the motor. The built-in fan meets the requirements of degree of protection IP54.

<sup>3)</sup> Optimum efficiency in continuous duty.

<sup>4)</sup> With default setting of the pulse frequency.

<sup>5)</sup> The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>6)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact – Water cooling

#### Selection and ordering data

| Rated speed                                                 | Shaft height | Rated power                                   | Static torque                                                                                    | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7 Compact synchronous motors | Number of pole pairs | Moment of inertia of rotor (without brake)                                               | Weight (without brake) |
|-------------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------|------------------------------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                          | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                 | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                            | $p$                  | $J$                                                                                      | $m$                    |
| rpm                                                         |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                         | Nm (lb <sub>f</sub> -ft)                      | A                                             | Order No.                                  |                      | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC           |              |                                               |                                                                                                  |                                               |                                               |                                            |                      |                                                                                          |                        |
| 1500                                                        | 100          | 7.9 (10.6)                                    | 50 (36.9)                                                                                        | 50 (36.9)                                     | 20.3                                          | 1FT7102-5WB7■-1■ ■ ■                       | 5                    | 98.9 (87.5)                                                                              | 36.6 (80.7)            |
|                                                             |              | 14.1 (18.9)                                   | 90 (66.4)                                                                                        | 90 (66.4)                                     | 29.5                                          | 1FT7105-5WB7■-1■ ■ ■                       | 5                    | 191 (169)                                                                                | 54.8 (121)             |
|                                                             |              | 19.6 (26.3)                                   | 125 (92.2)                                                                                       | 125 (92.2)                                    | 40.3                                          | 1FT7108-5WB7■-1■ ■ ■                       | 5                    | 265 (235)                                                                                | 68.6 (151)             |
| 2000                                                        | 80           | 4.4 (5.90)                                    | 21 (15.5)                                                                                        | 21 (15.5)                                     | 11                                            | 1FT7082-5WC7■-1■ ■ ■                       | 5                    | 28.9 (25.6)                                                                              | 20.7 (45.6)            |
|                                                             |              | 7.33 (9.83)                                   | 35 (25.8)                                                                                        | 35 (25.8)                                     | 17                                            | 1FT7084-5WC7■-1■ ■ ■                       | 5                    | 48.3 (42.8)                                                                              | 27.5 (60.6)            |
|                                                             |              | 10.5 (14.1)                                   | 50 (36.9)                                                                                        | 50 (36.9)                                     | 24                                            | 1FT7086-5WC7■-1■ ■ ■                       | 5                    | 67.8 (60)                                                                                | 34.1 (75.2)            |
|                                                             | 100          | 10.4 (13.9)                                   | 50 (36.9)                                                                                        | 49.5 (36.5)                                   | 29.3                                          | 1FT7102-5WC7■-1■ ■ ■                       | 5                    | 98.9 (87.5)                                                                              | 36.6 (80.7)            |
|                                                             |              | 18.8 (25.2)                                   | 90 (66.4)                                                                                        | 90 (66.4)                                     | 40.8                                          | 1FT7105-5WC7■-1■ ■ ■                       | 5                    | 191 (169)                                                                                | 54.8 (121)             |
|                                                             |              | 26.2 (35.1)                                   | 125 (92.2)                                                                                       | 125 (92.2)                                    | 47.5                                          | 1FT7108-5WC7■-■ ■ ■ ■                      | 5                    | 265 (235)                                                                                | 69.6 (154)             |
| Type of construction:                                       |              |                                               | IM B5                                                                                            |                                               | Flange 0<br>Flange 1 (compatible with 1FT6)   | 0<br>1                                     |                      |                                                                                          |                        |
| Connector outlet direction:                                 |              |                                               | Connector sizes 1 and 1.5 Rotatable connector                                                    |                                               |                                               | 1                                          |                      |                                                                                          |                        |
|                                                             |              |                                               | Connector size 3 <sup>1)</sup>                                                                   |                                               |                                               | 1<br>2<br>3<br>4                           |                      |                                                                                          |                        |
| Terminal box/<br>cable entry: <sup>1)</sup>                 |              |                                               | Top/transverse from right<br>Top/transverse from left<br>Top/axial from NDE<br>Top/axial from DE |                                               |                                               | 5<br>6<br>7<br>8                           |                      |                                                                                          |                        |
| Encoder systems for motors<br>without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder                                                           |                                               |                                               | N<br>M                                     |                      |                                                                                          |                        |
| Encoder systems for motors<br>with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder<br>AM24DQI encoder                                                               |                                               |                                               | B<br>C                                     |                      |                                                                                          |                        |
| Shaft extension:                                            |              |                                               | Shaft and flange accuracy:                                                                       |                                               | Holding brake:                                |                                            |                      |                                                                                          |                        |
| Feather key and keyway                                      |              |                                               | Tolerance N                                                                                      |                                               | Without                                       |                                            |                      |                                                                                          | A                      |
| Feather key and keyway                                      |              |                                               | Tolerance N                                                                                      |                                               | With                                          |                                            |                      |                                                                                          | B                      |
| Feather key and keyway                                      |              |                                               | Tolerance R                                                                                      |                                               | Without                                       |                                            |                      |                                                                                          | D                      |
| Feather key and keyway                                      |              |                                               | Tolerance R                                                                                      |                                               | With                                          |                                            |                      |                                                                                          | E                      |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                      |                                               | Without                                       |                                            |                      |                                                                                          | G                      |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                      |                                               | With                                          |                                            |                      |                                                                                          | H                      |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                      |                                               | Without                                       |                                            |                      |                                                                                          | K                      |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                      |                                               | With                                          |                                            |                      |                                                                                          | L                      |
| Vibration severity:                                         |              |                                               | Degree of protection:                                                                            |                                               |                                               |                                            |                      |                                                                                          |                        |
| Grade A                                                     |              |                                               | IP64                                                                                             |                                               |                                               |                                            | 0                    |                                                                                          |                        |
| Grade A                                                     |              |                                               | IP65                                                                                             |                                               |                                               |                                            | 1                    |                                                                                          |                        |
| Grade A                                                     |              |                                               | IP67                                                                                             |                                               |                                               |                                            | 2                    |                                                                                          |                        |
| Grade R                                                     |              |                                               | IP64                                                                                             |                                               |                                               |                                            | 3                    |                                                                                          |                        |
| Grade R                                                     |              |                                               | IP65                                                                                             |                                               |                                               |                                            | 4                    |                                                                                          |                        |
| Grade R                                                     |              |                                               | IP67                                                                                             |                                               |                                               |                                            | 5                    |                                                                                          |                        |

To select the type of construction and degree of protection, see Technical definitions.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact – Water cooling

| Motor type<br>(repeated) | Efficiency<br>2) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>5)</sup> | <b>SINAMICS S120 Motor Module</b>     |                                                                                                                      | <b>Power cable with complete shield</b><br>Motor connection (and brake connection)<br>via power connector |                                          |                         |
|--------------------------|------------------|-----------------------------------------|-------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------|
|                          | $\eta$           | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated output<br>current <sup>3)</sup> | <b>Booksize format</b><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connector                                                                                        | Cable<br>cross-<br>section <sup>4)</sup> | Pre-assembled<br>cable  |
|                          | %                | A                                       | kW (HP)                                         | A                                     | Order No.                                                                                                            | Size                                                                                                      | mm <sup>2</sup>                          | Order No.               |
| 1FT7102-5WB7...          | 93               | 17.8                                    | 7.9 (10.6)                                      | 18                                    | <b>6SL312-1-TE21-8AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 2.5                                  | <b>6FX002-5-N31-...</b> |
| 1FT7105-5WB7...          | 94               | 28                                      | 14.1 (18.9)                                     | 30                                    | <b>6SL312-1-TE23-0AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 4                                    | <b>6FX002-5-N41-...</b> |
| 1FT7108-5WB7...          | 94               | 39                                      | 19.6 (26.3)                                     | 45                                    | <b>6SL312-1-TE24-5AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 10                                   | <b>6FX002-5-N64-...</b> |
| 1FT7082-5WC7...          | 93               | 10.7                                    | 4.4 (5.90)                                      | 18                                    | <b>6SL312-1-TE21-8AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 1.5                                  | <b>6FX002-5-N21-...</b> |
| 1FT7084-5WC7...          | 94               | 16.5                                    | 7.3 (9.79)                                      | 18                                    | <b>6SL312-1-TE21-8AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 2.5                                  | <b>6FX002-5-N31-...</b> |
| 1FT7086-5WC7...          | 94               | 23                                      | 10.5 (14.1)                                     | 30                                    | <b>6SL312-1-TE23-0AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 4                                    | <b>6FX002-5-N41-...</b> |
| 1FT7102-5WC7...          | 94               | 25.5                                    | 10.5 (14.1)                                     | 30                                    | <b>6SL312-1-TE23-0AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 4                                    | <b>6FX002-5-N41-...</b> |
| 1FT7105-5WC7...          | 94               | 39                                      | 18.8 (25.2)                                     | 45                                    | <b>6SL312-1-TE24-5AA3</b>                                                                                            | 1.5                                                                                                       | 4 × 10                                   | <b>6FX002-5-N64-...</b> |
| 1FT7108-5WC7...          | 95               | 45.3                                    | 26.2 (35.1)                                     | 45                                    | <b>6SL312-1-TE24-5AA3</b>                                                                                            | 3                                                                                                         | 4 × 10                                   | <b>6FX002-5-S14-...</b> |

|                      |          |
|----------------------|----------|
| <b>Cooling:</b>      |          |
| Internal air cooling | <b>0</b> |
| External air cooling | <b>1</b> |
| <b>Motor Module:</b> |          |
| Single Motor Module  | <b>1</b> |
| Double Motor Module  | <b>2</b> |

|                     |            |
|---------------------|------------|
| <b>Power cable:</b> |            |
| MOTION-CONNECT 800  | <b>8</b>   |
| MOTION-CONNECT 500  | <b>5</b>   |
| Without brake cores | <b>C</b>   |
| With brake cores    | <b>D</b>   |
| Length code         | <b>...</b> |

More information about cables can be found  
under MOTION-CONNECT connection systems.

<sup>1)</sup> Connector size 3 not rotatable. An alternative terminal box can be selected with connector size 3 only.

<sup>2)</sup> Optimum efficiency in continuous duty.

<sup>3)</sup> With default setting of the pulse frequency.

<sup>4)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>5)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$      $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact – Water cooling

#### Selection and ordering data

| Rated speed                                                 | Shaft height | Rated power                                   | Static torque                                                                                    | Rated torque                                  | Rated current                                 | SIMOTICS S-1FT7 Compact synchronous motors | Number of pole pairs   | Moment of inertia of rotor (without brake)                                               | Weight (without brake) |             |
|-------------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------|------------------------|------------------------------------------------------------------------------------------|------------------------|-------------|
| $n_{\text{rated}}$                                          | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                 | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                            | $p$                    | $J$                                                                                      | $m$                    |             |
| rpm                                                         |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                         | Nm (lb <sub>f</sub> -ft)                      | A                                             | Order No.                                  |                        | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                |             |
| 1FT7 Compact for DC link voltage 510 ... 720 V DC           |              |                                               |                                                                                                  |                                               |                                               |                                            |                        |                                                                                          |                        |             |
| 3000                                                        | 63           | 3.1 (4.16)                                    | 10 (7.38)                                                                                        | 10 (7.38)                                     | 7.8                                           | 1FT7062-5WF7■-1■ ■ ■ ■                     | 5                      | 8.1 (7.17)                                                                               | 11 (24.3)              |             |
|                                                             |              | 5 (6.71)                                      | 16 (11.8)                                                                                        | 16 (11.8)                                     | 12.5                                          | 1FT7064-5WF7■-1■ ■ ■ ■                     | 5                      | 12.9 (11.4)                                                                              | 13.7 (30.2)            |             |
|                                                             |              | 6.2 (8.31)                                    | 20 (14.8)                                                                                        | 19.6 (14.5)                                   | 14.4                                          | 1FT7066-5WF7■-1■ ■ ■ ■                     | 5                      | 17.7 (15.7)                                                                              | 16.3 (35.9)            |             |
|                                                             |              | 9.3 (12.5)                                    | 30 (22.1)                                                                                        | 29.5 (21.8)                                   | 19.6                                          | 1FT7068-5WF7■-1■ ■ ■ ■                     | 5                      | 24.8 (22)                                                                                | 20.1 (44.3)            |             |
|                                                             | 80           | 6.28 (8.42)                                   | 21 (15.5)                                                                                        | 20.5 (15.1)                                   | 16                                            | 1FT7082-5WF7■-1■ ■ ■ ■                     | 5                      | 28.9 (25.6)                                                                              | 20.7 (45.6)            |             |
|                                                             |              | 11 (14.8)                                     | 35 (25.8)                                                                                        | 35 (25.8)                                     | 24.2                                          | 1FT7084-5WF7■-1■ ■ ■ ■                     | 5                      | 48.3 (42.8)                                                                              | 27.5 (60.6)            |             |
|                                                             |              | 15.4 (20.7)                                   | 50 (36.9)                                                                                        | 49 (36.1)                                     | 36                                            | 1FT7086-5WF7■-1■ ■ ■ ■                     | 5                      | 67.8 (60)                                                                                | 34.1 (75.2)            |             |
|                                                             | 100          | 14.3 (19.2)                                   | 50 (36.9)                                                                                        | 45.5 (33.6)                                   | 38.8                                          | 1FT7102-5WF7■-1■ ■ ■ ■                     | 5                      | 98.9 (87.5)                                                                              | 36.6 (80.7)            |             |
|                                                             |              | 24.8 (33.3)                                   | 90 (66.4)                                                                                        | 79 (58.3)                                     | 49.5                                          | 1FT7105-5WF7■-■ ■ ■ ■ ■                    | 5                      | 164 (145)                                                                                | 55.9 (123)             |             |
|                                                             |              | 34.2 (45.9)                                   | 125 (92.2)                                                                                       | 109 (80.4)                                    | 60                                            | 1FT7108-5WF7■-■ ■ ■ ■ ■                    | 5                      | 265 (235)                                                                                | 69.6 (153)             |             |
|                                                             | 4500         | 63                                            | 9.1 (12.2)                                                                                       | 20 (14.8)                                     | 19.4 (14)                                     | 20.8                                       | 1FT7066-5WH7■-1■ ■ ■ ■ | 5                                                                                        | 17.7 (15.7)            | 16.3 (35.9) |
|                                                             |              | 80                                            | 8.95 (12)                                                                                        | 21 (15.5)                                     | 19 (14)                                       | 23.9                                       | 1FT7082-5WH7■-1■ ■ ■ ■ | 5                                                                                        | 28.9 (25.6)            | 20.7 (45.6) |
| 14.6 (19.6)                                                 |              |                                               | 35 (25.8)                                                                                        | 32 (23.6)                                     | 34.5                                          | 1FT7084-5WH7■-1■ ■ ■ ■                     | 5                      | 48.3 (42.8)                                                                              | 27.5 (60.6)            |             |
| 20.3 (27.2)                                                 |              |                                               | 50 (36.9)                                                                                        | 43 (31.7)                                     | 38                                            | 1FT7086-5WH7■-1■ ■ ■ ■                     | 5                      | 67.8 (60)                                                                                | 34.1 (75.2)            |             |
| 6000                                                        | 63           | 5.8 (7.78)                                    | 10 (7.38)                                                                                        | 9.2 (6.79)                                    | 12.7                                          | 1FT7062-5WK7■-1■ ■ ■ ■                     | 5                      | 8.1                                                                                      | 11                     |             |
|                                                             |              | 8.9 (11.9)                                    | 16 (11.8)                                                                                        | 14.2 (10.5)                                   | 20                                            | 1FT7064-5WK7■-1■ ■ ■ ■                     | 5                      | 12.9                                                                                     | 13.7                   |             |
| Type of construction:                                       |              |                                               | IM B5                                                                                            |                                               | Flange 0<br>Flange 1 (compatible with 1FT6)   |                                            | 0<br>1                 |                                                                                          |                        |             |
| Connector outlet direction:                                 |              |                                               | Connector sizes 1 and 1.5 Rotatable connector                                                    |                                               |                                               |                                            | 1                      |                                                                                          |                        |             |
|                                                             |              |                                               | Connector size 3 <sup>1)</sup>                                                                   |                                               | Transverse right                              |                                            | 1                      |                                                                                          |                        |             |
|                                                             |              |                                               |                                                                                                  |                                               | Transverse left                               |                                            | 2                      |                                                                                          |                        |             |
|                                                             |              |                                               |                                                                                                  |                                               | Axial NDE<br>Axial DE                         |                                            | 3<br>4                 |                                                                                          |                        |             |
| Terminal box/<br>cable entry: <sup>1)</sup>                 |              |                                               | Top/transverse from right<br>Top/transverse from left<br>Top/axial from NDE<br>Top/axial from DE |                                               |                                               |                                            | 5<br>6<br>7<br>8       |                                                                                          |                        |             |
| Encoder systems for motors<br>without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder                                                                                |                                               |                                               |                                            | N                      |                                                                                          |                        |             |
|                                                             |              |                                               | AM2048S/R encoder                                                                                |                                               |                                               |                                            | M                      |                                                                                          |                        |             |
| Encoder systems for motors<br>with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder                                                                                  |                                               |                                               |                                            | B                      |                                                                                          |                        |             |
|                                                             |              |                                               | AM24DQI encoder                                                                                  |                                               |                                               |                                            | C                      |                                                                                          |                        |             |
| Shaft extension:                                            |              |                                               | Shaft and flange accuracy:                                                                       |                                               |                                               | Holding brake:                             |                        |                                                                                          |                        |             |
| Feather key and keyway                                      |              |                                               | Tolerance N                                                                                      |                                               |                                               | Without                                    |                        | A                                                                                        |                        |             |
| Feather key and keyway                                      |              |                                               | Tolerance N                                                                                      |                                               |                                               | With                                       |                        | B                                                                                        |                        |             |
| Feather key and keyway                                      |              |                                               | Tolerance R                                                                                      |                                               |                                               | Without                                    |                        | D                                                                                        |                        |             |
| Feather key and keyway                                      |              |                                               | Tolerance R                                                                                      |                                               |                                               | With                                       |                        | E                                                                                        |                        |             |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                      |                                               |                                               | Without                                    |                        | G                                                                                        |                        |             |
| Plain shaft                                                 |              |                                               | Tolerance N                                                                                      |                                               |                                               | With                                       |                        | H                                                                                        |                        |             |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                      |                                               |                                               | Without                                    |                        | K                                                                                        |                        |             |
| Plain shaft                                                 |              |                                               | Tolerance R                                                                                      |                                               |                                               | With                                       |                        | L                                                                                        |                        |             |
| Vibration severity:                                         |              |                                               | Degree of protection:                                                                            |                                               |                                               |                                            |                        |                                                                                          |                        |             |
| Grade A                                                     |              |                                               | IP64                                                                                             |                                               |                                               |                                            | 0                      |                                                                                          |                        |             |
| Grade A                                                     |              |                                               | IP65                                                                                             |                                               |                                               |                                            | 1                      |                                                                                          |                        |             |
| Grade A                                                     |              |                                               | IP67                                                                                             |                                               |                                               |                                            | 2                      |                                                                                          |                        |             |
| Grade R                                                     |              |                                               | IP64                                                                                             |                                               |                                               |                                            | 3                      |                                                                                          |                        |             |
| Grade R                                                     |              |                                               | IP65                                                                                             |                                               |                                               |                                            | 4                      |                                                                                          |                        |             |
| Grade R                                                     |              |                                               | IP67                                                                                             |                                               |                                               |                                            | 5                      |                                                                                          |                        |             |

To select the type of construction and degree of protection, see Technical definitions.



## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
Compact – Water cooling

| Motor type<br>(repeated) | Efficiency <sup>2)</sup> | Stall current                           | Calculated power <sup>6)</sup><br>$P_{calc}$ | SINAMICS S120 Motor Module         |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|--------------------------|--------------------------|-----------------------------------------|----------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                          | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K | Rated output current <sup>3)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>4)</sup> | Pre-assembled cable |
|                          | %                        | A                                       | kW (HP)                                      | A                                  | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| 1FT7062-5WF7...          | 91                       | 7.4                                     | 3.1 (4.16)                                   | 9                                  | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7064-5WF7...          | 91                       | 11.9                                    | 5.0 (6.71)                                   | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7066-5WF7...          | 91                       | 14                                      | 6.3 (8.45)                                   | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7068-5WF7...          | 93                       | 19                                      | 9.4 (12.6)                                   | 18 <sup>5)</sup>                   | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 2.5                           | 6FX002-5N11-....    |
| 1FT7082-5WF7...          | 94                       | 16                                      | 6.6 (8.85)                                   | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-....    |
| 1FT7084-5WF7...          | 94                       | 23                                      | 11.0 (14.8)                                  | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-....    |
| 1FT7086-5WF7...          | 94                       | 34                                      | 15.7 (21.1)                                  | 45                                 | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N54-....    |
| 1FT7102-5WF7...          | 95                       | 40                                      | 15.7 (21.1)                                  | 45                                 | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 10                            | 6FX002-5N64-....    |
| 1FT7105-5WF7...          | 94                       | 53.2                                    | 28.3 (38.0)                                  | 60                                 | 6SL312-1-TE26-0AA3                                                                                             | 3                                                                                                  | 4 × 16                            | 6FX002-5S23-....    |
| 1FT7108-5WF7...          | 95                       | 65                                      | 39.3 (52.7)                                  | 85                                 | 6SL312-1-TE28-5AA3                                                                                             | 3                                                                                                  | 4 × 16                            | 6FX002-5G23-....    |
| 1FT7066-5WH7...          | 91                       | 19.7                                    | 9.4 (12.6)                                   | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1                                                                                                  | 4 × 2.5                           | 6FX002-5N11-....    |
| 1FT7082-5WH7...          | 94                       | 24                                      | 9.9 (13.3)                                   | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-....    |
| 1FT7084-5WH7...          | 94                       | 34.3                                    | 16.5 (22.1)                                  | 45                                 | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 6                             | 6FX002-5N54-....    |
| 1FT7086-5WH7...          | 94                       | 40.5                                    | 23.6 (31.6)                                  | 45                                 | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                                | 4 × 10                            | 6FX002-5N64-....    |
| 1FT7062-5WK7...          | 92                       | 12.5                                    | 6.3 (8.5)                                    | 18                                 | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-....    |
| 1FT7064-5WK7...          | 92                       | 20.2                                    | 10.1 (13.5)                                  | 30                                 | 6SL312-1-TE23-0AA3                                                                                             | 1                                                                                                  | 4 × 2.5                           | 6FX002-5N11-....    |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> Connector size 3 is not rotatable. An alternative terminal box can be selected with connector size 3 only.

<sup>2)</sup> Optimum efficiency in continuous duty.

<sup>3)</sup> With default setting of the pulse frequency.

<sup>4)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>5)</sup> With the specified Motor Module, at  $\Delta T = 100$  K winding temperature rise, the motor cannot be fully utilized with  $M_0$ . If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to the larger Motor Module.

<sup>6)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb\cdot ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors

#### High Dynamic – Forced ventilation/Water cooling

#### Selection and ordering data

| Rated speed                                                                 | Shaft height | Rated power                            | Static torque                                 | Rated torque                           | Rated current                          | SIMOTICS S-1FT7<br>High Dynamic synchronous motors | Num-ber of pole pairs | Moment of inertia of rotor (without brake)                                               | Weight (without brake) |
|-----------------------------------------------------------------------------|--------------|----------------------------------------|-----------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------|------------------------|
| $n_{rated}$                                                                 | SH           | $P_{rated}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$              | $M_{rated}$ at $\Delta T=100\text{ K}$ | $I_{rated}$ at $\Delta T=100\text{ K}$ |                                                    | $p$                   | $J$                                                                                      | $m$                    |
| rpm                                                                         |              | kW (HP)                                | Nm (lb <sub>f</sub> -ft)                      | Nm (lb <sub>f</sub> -ft)               | A                                      | Order No.                                          |                       | 10 <sup>-4</sup> kgm <sup>2</sup> (10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FT7 High Dynamic for DC link voltage 510 ... 720 V DC – Forced ventilation |              |                                        |                                               |                                        |                                        |                                                    |                       |                                                                                          |                        |
| 3000                                                                        | 63           | 3.8 (5.10)                             | 14 (10.3)                                     | 12 (8.85)                              | 10.5                                   | 1FT7065-7S F 7■-1 ■ ■ ■ ■                          | 5                     | 6.4 (5.66)                                                                               | 19 (41.9)              |
|                                                                             |              | 4.4 (5.90)                             | 17 (12.5)                                     | 14 (10.3)                              | 13                                     | 1FT7067-7S F 7■-1 ■ ■ ■ ■                          | 5                     | 8.3 (7.35)                                                                               | 23 (50.7)              |
|                                                                             | 80           | 7.2 (9.66)                             | 34 (25.1)                                     | 23 (17.0)                              | 20                                     | 1FT7085-7S F 7■-1 ■ ■ ■ ■                          | 5                     | 20.7 (18.3)                                                                              | 34 (75.0)              |
|                                                                             |              | 10.4 (13.9)                            | 48 (35.4)                                     | 33 (24.3)                              | 29                                     | 1FT7087-7S F 7■-1 ■ ■ ■ ■                          | 5                     | 27.4 (24.3)                                                                              | 42 (92.6)              |
| 4500                                                                        | 63           | 5.2 (6.97)                             | 14 (10.3)                                     | 11 (8.11)                              | 13.5                                   | 1FT7065-7SH 7■-1 ■ ■ ■ ■                           | 5                     | 6.4 (5.66)                                                                               | 19 (41.9)              |
|                                                                             |              | 6.1 (8.18)                             | 17 (12.5)                                     | 13 (9.59)                              | 15                                     | 1FT7067-7SH 7■-1 ■ ■ ■ ■                           | 5                     | 8.3 (7.35)                                                                               | 23 (50.7)              |
|                                                                             | 80           | 8.2 (11)                               | 34 (25.1)                                     | 17.5 (12.9)                            | 22.5                                   | 1FT7085-7SH 7■-1 ■ ■ ■ ■                           | 5                     | 20.7 (18.3)                                                                              | 34 (75.0)              |
|                                                                             |              | 10.8 (14.5)                            | 48 (35.4)                                     | 23 (17.0)                              | 24                                     | 1FT7087-7SH 7■-■ ■ ■ ■ ■                           | 5                     | 27.4 (24.3)                                                                              | 43 (94.8)              |
| 1FT7 High Dynamic for DC link voltage 510 ... 720 V DC – Water cooling      |              |                                        |                                               |                                        |                                        |                                                    |                       |                                                                                          |                        |
| 3000                                                                        | 63           | 5.7 (7.64)                             | 19 (14.0)                                     | 18 (13.3)                              | 15                                     | 1FT7065-7WF 7■-1 ■ ■ ■ ■                           | 5                     | 6.4 (5.66)                                                                               | 16 (35.3)              |
|                                                                             |              | 7.4 (9.92)                             | 25 (18.4)                                     | 23.5 (17.3)                            | 21                                     | 1FT7067-7WF 7■-1 ■ ■ ■ ■                           | 5                     | 8.3 (7.35)                                                                               | 22 (48.5)              |
|                                                                             | 80           | 11.9 (16.0)                            | 43 (31.7)                                     | 38 (28.0)                              | 32                                     | 1FT7085-7WF 7■-1 ■ ■ ■ ■                           | 5                     | 20.7 (18.3)                                                                              | 32 (70.6)              |
|                                                                             |              | 16.0 (21.5)                            | 61 (45.0)                                     | 51 (37.6)                              | 43                                     | 1FT7087-7WF 7■-■ ■ ■ ■ ■                           | 5                     | 27.4 (24.3)                                                                              | 41 (90.4)              |
| 4500                                                                        | 63           | 7.8 (10.5)                             | 19 (14.0)                                     | 16.5 (12.2)                            | 20                                     | 1FT7065-7WH 7■-1 ■ ■ ■ ■                           | 5                     | 6.4 (5.66)                                                                               | 16 (35.3)              |
|                                                                             |              | 10.4 (13.9)                            | 25 (18.4)                                     | 22 (16.2)                              | 25                                     | 1FT7067-7WH 7■-1 ■ ■ ■ ■                           | 5                     | 8.3 (7.35)                                                                               | 22 (48.5)              |
|                                                                             | 80           | 15.6 (20.9)                            | 43 (31.7)                                     | 33 (24.3)                              | 48                                     | 1FT7085-7WH 7■-■ ■ ■ ■ ■                           | 5                     | 20.7 (18.3)                                                                              | 32 (70.6)              |
|                                                                             |              | 21.7 (29.1)                            | 61 (45.0)                                     | 46 (33.9)                              | 53                                     | 1FT7087-7WH 7■-■ ■ ■ ■ ■                           | 5                     | 27.4 (24.3)                                                                              | 41 (90.4)              |
| Type of construction:                                                       |              |                                        | IM B5                                         |                                        | Flange 0                               | 0                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        |                                               |                                        | Flange 1 (compatible with 1FT6)        | 1                                                  |                       |                                                                                          |                        |
| Connector outlet direction:                                                 |              |                                        | Connector sizes 1 and 1.5 Rotatable connector |                                        |                                        | 1                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Connector size 3 <sup>1)</sup>                |                                        |                                        | 1                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Transverse right                              |                                        |                                        | 2                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Transverse left                               |                                        |                                        | 3                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Axial NDE                                     |                                        |                                        | 4                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Axial DE                                      |                                        |                                        |                                                    |                       |                                                                                          |                        |
| Terminal box/<br>cable entry: <sup>1)</sup>                                 |              |                                        | Top/transverse from right                     |                                        |                                        | 5                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Top/transverse from left                      |                                        |                                        | 6                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Top/axial from NDE                            |                                        |                                        | 7                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | Top/axial from DE                             |                                        |                                        | 8                                                  |                       |                                                                                          |                        |
| Encoder systems for motors<br>without DRIVE-CLiQ interface:                 |              |                                        | IC2048S/R encoder                             |                                        |                                        | N                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | AM2048S/R encoder                             |                                        |                                        | M                                                  |                       |                                                                                          |                        |
| Encoder systems for motors<br>with DRIVE-CLiQ interface:                    |              |                                        | AS24DQI encoder                               |                                        |                                        | B                                                  |                       |                                                                                          |                        |
|                                                                             |              |                                        | AM24DQI encoder                               |                                        |                                        | C                                                  |                       |                                                                                          |                        |
| Shaft extension:                                                            |              |                                        | Shaft and flange accuracy:                    |                                        | Holding brake:                         |                                                    |                       |                                                                                          |                        |
| Feather key and keyway                                                      |              |                                        | Tolerance N                                   |                                        | Without                                |                                                    |                       |                                                                                          | A                      |
| Feather key and keyway                                                      |              |                                        | Tolerance N                                   |                                        | With                                   |                                                    |                       |                                                                                          | B                      |
| Feather key and keyway                                                      |              |                                        | Tolerance R                                   |                                        | Without                                |                                                    |                       |                                                                                          | D                      |
| Feather key and keyway                                                      |              |                                        | Tolerance R                                   |                                        | With                                   |                                                    |                       |                                                                                          | E                      |
| Plain shaft                                                                 |              |                                        | Tolerance N                                   |                                        | Without                                |                                                    |                       |                                                                                          | G                      |
| Plain shaft                                                                 |              |                                        | Tolerance N                                   |                                        | With                                   |                                                    |                       |                                                                                          | H                      |
| Plain shaft                                                                 |              |                                        | Tolerance R                                   |                                        | Without                                |                                                    |                       |                                                                                          | K                      |
| Plain shaft                                                                 |              |                                        | Tolerance R                                   |                                        | With                                   |                                                    |                       |                                                                                          | L                      |
| Vibration severity:                                                         |              |                                        | Degree of protection:                         |                                        |                                        |                                                    |                       |                                                                                          |                        |
| Grade A                                                                     |              |                                        | IP64                                          |                                        |                                        |                                                    |                       |                                                                                          | 0                      |
| Grade A                                                                     |              |                                        | IP65                                          |                                        |                                        |                                                    |                       |                                                                                          | 1                      |
| Grade A                                                                     |              |                                        | IP67 (only for water cooling)                 |                                        |                                        |                                                    |                       |                                                                                          | 2                      |
| Grade R                                                                     |              |                                        | IP64                                          |                                        |                                        |                                                    |                       |                                                                                          | 3                      |
| Grade R                                                                     |              |                                        | IP65                                          |                                        |                                        |                                                    |                       |                                                                                          | 4                      |
| Grade R                                                                     |              |                                        | IP67 (only for water cooling)                 |                                        |                                        |                                                    |                       |                                                                                          | 5                      |

To select the type of construction and degree of protection, see Technical definitions.

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors  
High Dynamic – Forced ventilation/Water cooling

| Motor type<br>(repeated) | Efficiency <sup>2)</sup> | Stall current                              | Calculated power <sup>5)</sup><br>$P_{calc}$          | SINAMICS S120 Motor Module                             |                                                                                                                             | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                                          |                                  |
|--------------------------|--------------------------|--------------------------------------------|-------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------|
|                          | $\eta$<br>%              | $I_0$<br>at $M_0$<br>$\Delta T=100$ K<br>A | $P_{calc}$<br>at $M_0$<br>$\Delta T=100$ K<br>kW (HP) | Rated output current <sup>3)</sup><br>$I_{rated}$<br>A | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system<br>Order No. | Power connector<br>Size                                                                            | Conductor cross-section <sup>4)</sup><br>mm <sup>2</sup> | Pre-assembled cable<br>Order No. |
| 1FT7065-7SF7...          | 92                       | 12                                         | 4.4 (5.90)                                            | 18                                                     | 6SL312-1-TE21-8AA3                                                                                                          | 1.5                                                                                                | 4 × 1.5                                                  | 6FX0002-5 N21-....               |
| 1FT7067-7SF7...          | 94                       | 15                                         | 5.3 (7.11)                                            | 18                                                     | 6SL312-1-TE21-8AA3                                                                                                          | 1.5                                                                                                | 4 × 1.5                                                  | 6FX0002-5 N21-....               |
| 1FT7085-7SF7...          | 92                       | 28                                         | 10.7 (14.3)                                           | 30                                                     | 6SL312-1-TE23-0AA3                                                                                                          | 1.5                                                                                                | 4 × 4                                                    | 6FX0002-5 N41-....               |
| 1FT7087-7SF7...          | 93                       | 40                                         | 15.1 (20.2)                                           | 45                                                     | 6SL312-1-TE24-5AA3                                                                                                          | 1.5                                                                                                | 4 × 10                                                   | 6FX0002-5 N64-....               |
| 1FT7065-7SH7...          | 92                       | 16                                         | 6.6 (8.85)                                            | 18                                                     | 6SL312-1-TE21-8AA3                                                                                                          | 1.5                                                                                                | 4 × 2.5                                                  | 6FX0002-5 N31-....               |
| 1FT7067-7SH7...          | 94                       | 19                                         | 8.0 (10.7)                                            | 30                                                     | 6SL312-1-TE23-0AA3                                                                                                          | 1.5                                                                                                | 4 × 2.5                                                  | 6FX0002-5 N31-....               |
| 1FT7085-7SH7...          | 92                       | 40                                         | 16.0 (21.5)                                           | 45                                                     | 6SL312-1-TE24-5AA3                                                                                                          | 1.5                                                                                                | 4 × 10                                                   | 6FX0002-5 N64-....               |
| 1FT7087-7SH7...          | 93                       | 45                                         | 22.6 (30.3)                                           | 45                                                     | 6SL312-1-TE24-5AA3                                                                                                          | 3                                                                                                  | 4 × 10                                                   | 6FX0002-5 S14-....               |
| 1FT7065-7WF7...          | 92                       | 16                                         | 6.0 (8.05)                                            | 18                                                     | 6SL312-1-TE21-8AA3                                                                                                          | 1.5                                                                                                | 4 × 2.5                                                  | 6FX0002-5 N31-....               |
| 1FT7067-7WF7...          | 94                       | 22                                         | 7.9 (10.6)                                            | 30                                                     | 6SL312-1-TE23-0AA3                                                                                                          | 1.5                                                                                                | 4 × 4                                                    | 6FX0002-5 N41-....               |
| 1FT7085-7WF7...          | 93                       | 36                                         | 13.5 (18.1)                                           | 45                                                     | 6SL312-1-TE24-5AA3                                                                                                          | 1.5                                                                                                | 4 × 6                                                    | 6FX0002-5 N54-....               |
| 1FT7087-7WF7...          | 94                       | 51                                         | 19.2 (25.7)                                           | 60                                                     | 6SL312-1-TE26-0AA3                                                                                                          | 3                                                                                                  | 4 × 16                                                   | 6FX0002-5 S23-....               |
| 1FT7065-7WH7...          | 92                       | 22                                         | 9.0 (12.1)                                            | 30                                                     | 6SL312-1-TE23-0AA3                                                                                                          | 1.5                                                                                                | 4 × 4                                                    | 6FX0002-5 N41-....               |
| 1FT7067-7WH7...          | 94                       | 28                                         | 11.8 (15.8)                                           | 30                                                     | 6SL312-1-TE23-0AA3                                                                                                          | 1.5                                                                                                | 4 × 4                                                    | 6FX0002-5 N41-....               |
| 1FT7085-7WH7...          | 94                       | 58                                         | 20.3 (27.2)                                           | 60                                                     | 6SL312-1-TE26-0AA3                                                                                                          | 3                                                                                                  | 4 × 16                                                   | 6FX0002-5 S23-....               |
| 1FT7087-7WH7...          | 94                       | 67                                         | 28.7 (38.5)                                           | 85                                                     | 6SL312-1-TE28-5AA3                                                                                                          | 3                                                                                                  | 4 × 25                                                   | 6FX0002-5 DG33-....              |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                     |      |
|---------------------|------|
| <b>Power cable:</b> |      |
| MOTION-CONNECT 800  | 8    |
| MOTION-CONNECT 500  | 5    |
| Without brake cores | C    |
| With brake cores    | D    |
| Length code         | .... |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> Connector size 3 is not rotatable. An alternative terminal box can be selected with connector size 3 only.

<sup>2)</sup> Optimum efficiency in continuous duty.

<sup>3)</sup> With default setting of the pulse frequency.

<sup>4)</sup> The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

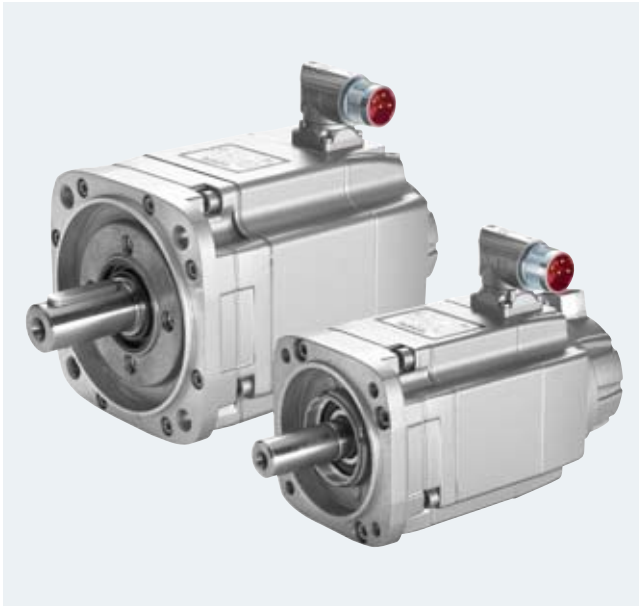
<sup>5)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

## Feed motors

### SIMOTICS S servomotors for SINAMICS S120

#### SIMOTICS S-1FK7 synchronous motors

##### Overview



SIMOTICS S-1FK7 motors

SIMOTICS S-1FK7 motors are compact permanent-magnet synchronous motors. The available options, gearboxes and encoders, together with the expanded product range, mean that the SIMOTICS S-1FK7 motors can be optimally adapted to any application. They therefore also satisfy the permanently increasing demands of state-of-the-art machine generations.

1FK7 motors can be combined with the SINAMICS S120 drive system to create a powerful system with high functionality. The integrated encoder systems for speed and position control can be selected depending on the application.

The motors are designed for operation without external cooling and the heat is dissipated through the motor surface. 1FK7 motors have a high overload capability.

##### Benefits

###### **1FK7 Compact motors offer:**

- Space-saving installation due to extremely high power density
- For universal applications
- Wide range of motors

###### **1FK7 High Dynamic motors offer:**

- Extremely high dynamic response thanks to the very low rotor moment of inertia

###### **1FK7 High Inertia motors offer:**

- Robust closed-loop control properties for high or variable load moment of inertia
- Minimal optimization and commissioning overhead for the compensation of disturbances

##### Application

- Machine tools
- Robots and handling systems
- Wood, glass, ceramics and stone working
- Packaging, plastics and textile machines
- Printing machines
- Auxiliary axes

## Technical specifications

| SIMOTICS S-1FK7 Compact/High Dynamic/High Inertia motor                                       |                                                                                                                            |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Type of motor                                                                                 | Permanent-magnet synchronous motor                                                                                         |
| Magnet material                                                                               | Rare-earth magnet material                                                                                                 |
| Cooling                                                                                       | Natural cooling                                                                                                            |
| Temperature monitoring                                                                        | KTY84 temperature sensor in the stator winding                                                                             |
| Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)                  | Temperature class 155 (F) for a winding temperature rise of $\Delta T = 100$ K at an ambient temperature of 40 °C (104 °F) |
| Type of construction in accordance with EN 60034-7 (IEC 60034-7)                              | IM B5 (IM V1, IM V3)                                                                                                       |
| Degree of protection in accordance with EN 60034-5 (IEC 60034-5) <sup>1)</sup>                | IP64 (optional IP65)                                                                                                       |
| Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60072-1)                   | Plain shaft, optional shaft with feather key (half-key balancing)                                                          |
| Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) <sup>2)</sup>            | Tolerance N                                                                                                                |
| Vibration severity in accordance with EN 60034-14 (IEC 60034-14)                              | Grade A is maintained up to rated speed                                                                                    |
| Sound pressure level $L_{pA}$ (1 m) in accordance with DIN EN ISO 1680, max. Tolerance + 3 dB |                                                                                                                            |
| • 1FK701 ... 1FK704                                                                           | 55 dB                                                                                                                      |
| • 1FK706                                                                                      | 65 dB                                                                                                                      |
| • 1FK708/1FK710                                                                               | 70 dB                                                                                                                      |
| Connection                                                                                    | Connectors for signals and power                                                                                           |
| Paint finish <sup>3)</sup>                                                                    | Anthracyte (RAL 7016)                                                                                                      |
| 2nd Rating plate                                                                              | Enclosed separately                                                                                                        |
| Holding brake                                                                                 | Optional integrated holding brake (free of backlash, 24 V DC)                                                              |
| Approvals, according to                                                                       | cURus                                                                                                                      |

Built-in encoder systems without DRIVE-CLiQ interface

| Incremental encoder |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| IC2048S/R encoder   | Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks                  |
| Absolute encoder    |                                                                                             |
| AM2048S/R encoder   | Absolute encoder 2048 S/R, 4096 revolutions, multi-turn                                     |
| AM512S/R encoder    | Absolute encoder 512 S/R, 4096 revolutions, multi-turn                                      |
| AM16S/R encoder     | Absolute encoder 16 S/R, 4096 revolutions, multi-turn                                       |
| Resolver            |                                                                                             |
| Multi-pole resolver | Multi-pole resolver (number of pole pairs corresponds to number of pole pairs of the motor) |
| 2-pole resolver     | 2-pole resolver                                                                             |

Built-in encoder systems with DRIVE-CLiQ interface

| Incremental encoders/absolute encoders, single-turn <sup>4)</sup> |                                                                                                                          |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| IC22DQ encoder                                                    | Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit                         |
| AS24DQI encoder                                                   | Absolute encoder, single-turn, 24 bit (resolution 16777216, internal 2048 S/R)                                           |
| AS20DQI encoder                                                   | Absolute encoder, single-turn, 20 bit (resolution 1048576, internal 512 S/R)                                             |
| Absolute encoder, multi-turn                                      |                                                                                                                          |
| AM24DQI encoder                                                   | Absolute encoder 24 bit (resolution 16777216, internal 2048 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) |
| AM22DQ encoder                                                    | Absolute encoder 22 bit (resolution 4194304, internal 2048 S/R) + 12 bit multi-turn (traversing range 4096 revolutions)  |
| AM20DQI/AM20DQ encoder                                            | Absolute encoder 20 bit (resolution 1048576, internal 512 S/R) + 12 bit multi-turn (traversing range 4096 revolutions)   |
| AM15DQ encoder                                                    | Absolute encoder 15 bit (resolution 32768, internal 16 S/R) + 12 bit multi-turn (traversing range 4096 revolutions)      |
| Resolver                                                          |                                                                                                                          |
| R15DQ resolver                                                    | Resolver 15 bit (resolution 32768, internal, multi-pole)                                                                 |
| R14DQ resolver                                                    | Resolver 14 bit (resolution 16384, internal, 2-pole)                                                                     |

S/R = signals/revolution

<sup>1)</sup> 1FK701 can be supplied only with IP54 degree of protection.<sup>2)</sup> Shaft extension run-out, concentricity of centering ring and shaft and perpendicularity of flange to shaft.<sup>3)</sup> 1FK702 without a paint finish as standard.<sup>4)</sup> The single-turn absolute encoder is applied for the previously used incremental encoders.

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors

#### Options

| Order code     | Description                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>M03</b>     | Version for Zone 2 hazardous areas according to EN 50021/IEC 60079-15 (only for 1FK7 Compact/1FK7 High Dynamic)                                                                                           |
| <b>M39</b>     | Version for Zone 22 hazardous areas according to EN 50281/IEC 61241-1 (only for 1FK7 Compact/1FK7 High Dynamic)                                                                                           |
| <b>N05</b>     | Non-standard shaft extension (dimensions as for 1FT5 motors)                                                                                                                                              |
| <b>N16</b>     | Nickel-plated connectors and special paint application (PS Premium) for increased chemical resistance, e.g. in the food industry. (Only for 1FK7 Compact/1FK7 High Dynamic without DRIVE-CLiQ interface). |
| <b>Q31</b>     | Metal rating plate instead of adhesive label                                                                                                                                                              |
| <b>X01</b>     | Paint finish: Jet black, matt RAL 9005 <sup>1)</sup>                                                                                                                                                      |
| <b>X02</b>     | Paint finish: Cream white RAL 9001 <sup>1)</sup>                                                                                                                                                          |
| <b>X03</b>     | Paint finish: Reseda green RAL 6011 <sup>1)</sup>                                                                                                                                                         |
| <b>X04</b>     | Paint finish: Pebble grey RAL 7032 <sup>1)</sup>                                                                                                                                                          |
| <b>X05</b>     | Paint finish: Sky blue RAL 5015 <sup>1)</sup>                                                                                                                                                             |
| <b>X06</b>     | Paint finish: Pale ivory RAL 1015 <sup>1)</sup>                                                                                                                                                           |
| <b>X08</b>     | Paint finish: Suitable for food grade applications White aluminum RAL 9006 <sup>1)</sup>                                                                                                                  |
| <b>X27</b>     | Paint finish: Dark pearl grey RAL 9023 <sup>1)</sup>                                                                                                                                                      |
| <b>K23</b>     | Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite RAL 7016 <sup>1)</sup>                                                                                            |
| <b>K23+X..</b> | Special paint finish for "Worldwide" climate group: Primer and paint finish selectable from X01 to X27 <sup>2)</sup>                                                                                      |
| <b>K24</b>     | Primed (unpainted)                                                                                                                                                                                        |
| <b>J..</b>     | Mounting of SP+ planetary gearbox<br>(see <a href="#">Gearboxes for SIMOTICS S servomotors</a> )                                                                                                          |
| <b>V..</b>     | Mounting of LP+ planetary gearbox<br>(see <a href="#">Gearboxes for SIMOTICS S servomotors</a> )                                                                                                          |

When ordering a motor with options, **-Z** should be added to the order number.

<sup>1)</sup> For the paint finish, 1FK702 motors must be ordered with 3 or 5 in the 16th data position.

<sup>2)</sup> For the paint primer, 1FK702 motors must be ordered with 0 or 2 in the 16th data position.

## Options (continued)

**M03****Version for Zone 2 hazardous areas according to IEC EN 60079-15**

Combustible or explosive gases or vapors occur only rarely or briefly in Zone 2 areas. The type of protection designation is EEx nA II (non sparking).

The special conditions for operating 1FK7 motors in Zone 2 areas, in particular the reduction in permissible operating speeds, are described in detail in Appendix 610.40063.01 to the EC Declaration of Conformity 664.20025.21.

**M39****Version for Zone 22 hazardous areas according to IEC 61241-1**

Combustible or potentially explosive dust (non-conductive dust) occurs only rarely or briefly in Zone 22 areas. The type of protection designation is Ex 3D T 160 °C (320 °F).

The special conditions for operating 1FK7 motors in Zone 22 areas are described in detail in Appendix 610.40071.01 to the EC Declaration of Conformity 664.20031.21.

Note regarding M03 and M39 options:

When used in Zone 2 or Zone 22, 1FK7 motors are only designed for encoder connection through connectors. A version with a DRIVE-CLiQ interface on the motor is not possible. Connection to SINAMICS S120 is only possible via SMC (Sensor Module Cabinet-Mounted).

**N05****Non-standard shaft extension (dimensions as for 1FT5 motors)**

1FK7 motors are shipped with the following shaft dimensions that are compatible with 1FT5 motors:

- SH 36: 11 × 23 mm (0.43 × 0.91 in)
- SH 48: 14 × 30 mm (0.55 × 1.18 in)
- SH 63: 19 × 40 mm (0.75 × 1.57 in)
- SH 80: 24 × 50 mm (0.94 × 1.97 in)
- SH 100: 32 × 58 mm (1.26 × 2.28 in)

Note:

1FK706 motors with Option N05 do not have a compatible flange with 1FT506 motors.

**N16****Version for increased chemical resistance with protective properties checked according to DIN EN ISO 4628-1**

Suitable for all areas with increased demands on the protective properties of the paint system. These requirements may include applications with acids (e.g. phosphoric acid), alkalis (e.g. active chlorine), disinfectants (e.g. hydrogen peroxide and peracetic acid), saltwater and more.

Note:

The paint application PS Premium has been tested with a broad spectrum of industrial cleaning products with pH values ranging from 1.5 – 13. Resistance against the acidic and alkali cleaning products used, as well as disinfectants, was proved by a material resistance test performed by ECOLAB Deutschland GmbH.



# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors Compact – Natural cooling

#### Selection and ordering data

| Rated speed                                                                  | Shaft height | Rated power                                   | Static torque                                                                                                | Rated torque                                  | Rated current                                        | SIMOTICS S-1FK7<br>Compact synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake)                                                  | Weight (without brake) |
|------------------------------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                                           | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                             | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$        |                                                                  | $p$                  | $J$                                                                                         | $m$                    |
| rpm                                                                          |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                                     | Nm (lb <sub>f</sub> -ft)                      | A                                                    | Order No.<br>Standard type                                       |                      | 10 <sup>-4</sup> kgm <sup>2</sup><br>(10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FK7 Compact for DC link voltage 510 ... 720 V DC                            |              |                                               |                                                                                                              |                                               |                                                      |                                                                  |                      |                                                                                             |                        |
| 2000                                                                         | 48           | 0.6 (0.8)                                     | 3.0 (2.2)                                                                                                    | 2.8 (2.1)                                     | 1.55                                                 | 1FK7042-2AC71-1■ ■ ■ ■                                           | 4                    | 2.9 (2.57)                                                                                  | 4.6 (10.1)             |
|                                                                              | 63           | 1.1 (1.48)                                    | 6.0 (4.0)                                                                                                    | 5.3 (4.0)                                     | 2.95                                                 | 1FK7060-2AC71-1■ ■ ■ ■                                           | 4                    | 7.7 (6.82)                                                                                  | 7.1 (15.7)             |
|                                                                              |              | 1.5 (2.01)                                    | 8.5 (6.0)                                                                                                    | 7.0 (5.0)                                     | 2.65                                                 | 1FK7062-2AC71-1■ ■ ■ ■                                           | 4                    | 11.2 (9.91)                                                                                 | 9.1 (20.1)             |
|                                                                              |              | 1.9 (2.55)                                    | 11.0 (8.0)                                                                                                   | 8.9 (7.0)                                     | 4.4                                                  | 1FK7063-2AC71-1■ ■ ■ ■                                           | 4                    | 14.7 (13.01)                                                                                | 11.1 (24.5)            |
|                                                                              |              |                                               |                                                                                                              |                                               |                                                      |                                                                  |                      |                                                                                             |                        |
|                                                                              | 80           | 2.1 (2.82)                                    | 12.0 (8.9)                                                                                                   | 10.0 (7.4)                                    | 4.4                                                  | 1FK7081-2AC71-1■ ■ ■ ■                                           | 4                    | 20 (17.7)                                                                                   | 12.9 (28.4)            |
|                                                                              |              | 2.6 (3.49)                                    | 16.0 (11.8)                                                                                                  | 12.5 (9.2)                                    | 6.3                                                  | 1FK7083-2AC71-1■ ■ ■ ■                                           | 4                    | 26 (23)                                                                                     | 15.6 (34.4)            |
|                                                                              |              | 3.1 (4.16)                                    | 20.0 (14.8)                                                                                                  | 15.0 (11.1)                                   | 6.7                                                  | 1FK7084-2AC71-1■ ■ ■ ■                                           | 4                    | 32.5 (28.8)                                                                                 | 18.3 (40.4)            |
|                                                                              | 100          | 3 (4.02)                                      | 18.0 (13.3)                                                                                                  | 14.5 (10.7)                                   | 7.1                                                  | 1FK7100-2AC71-1■ ■ ■ ■                                           | 4                    | 54 (47.8)                                                                                   | 17.6 (38.8)            |
|                                                                              |              | 4.3 (5.77)                                    | 27.0 (19.9)                                                                                                  | 20.5 (15.1)                                   | 9.7                                                  | 1FK7101-2AC71-1■ ■ ■ ■                                           | 4                    | 79 (69.9)                                                                                   | 23.0 (50.7)            |
|                                                                              |              | 5.2 (6.97)                                    | 36.0 (26.6)                                                                                                  | 25.0 (18.4)                                   | 11.0                                                 | 1FK7103-2AC71-1■ ■ ■ ■                                           | 4                    | 104 (92.1)                                                                                  | 28.5 (62.8)            |
|                                                                              |              | 7.7 (10.33)                                   | 48.0 (35.4)                                                                                                  | 37.0 (27.3)                                   | 16.0                                                 | 1FK7105-2AC71-1■ ■ ■ ■                                           | 4                    | 154 (136.3)                                                                                 | 39.0 (86)              |
| 3000                                                                         | 48           | 0.8 (1.07)                                    | 3.0 (2.2)                                                                                                    | 2.6 (1.9)                                     | 2.0                                                  | 1FK7042-2AF71-1■ ■ ■ ■                                           | 4                    | 2.9 (2.57)                                                                                  | 4.6 (10.1)             |
|                                                                              | 63           | 1.5 (2.01)                                    | 6.0 (4.0)                                                                                                    | 4.7 (3.0)                                     | 3.7                                                  | 1FK7060-2AF71-1■ ■ ■ ■                                           | 4                    | 7.7 (6.82)                                                                                  | 7.1 (15.7)             |
|                                                                              |              | 1.9 (2.55)                                    | 8.5 (6.0)                                                                                                    | 6.0 (4.0)                                     | 4.0                                                  | 1FK7062-2AF71-1■ ■ ■ ■                                           | 4                    | 11.2 (9.91)                                                                                 | 9.1 (20.1)             |
|                                                                              |              | 2.3 (3.08)                                    | 11.0 (8.0)                                                                                                   | 7.3 (5.0)                                     | 5.6                                                  | 1FK7063-2AF71-1■ ■ ■ ■                                           | 4                    | 14.7 (13.01)                                                                                | 11.1 (24.5)            |
|                                                                              |              |                                               |                                                                                                              |                                               |                                                      |                                                                  |                      |                                                                                             |                        |
|                                                                              | 80           | 2.1 (2.82)                                    | 8.0 (5.9)                                                                                                    | 6.8 (5.0)                                     | 4.4                                                  | 1FK7080-2AF71-1■ ■ ■ ■                                           | 4                    | 14.2 (12.8)                                                                                 | 10.3 (22.7)            |
|                                                                              |              | 2.7 (3.62)                                    | 12.0 (8.9)                                                                                                   | 8.7 (6.4)                                     | 6.8                                                  | 1FK7081-2AF71-1■ ■ ■ ■                                           | 4                    | 20 (17.7)                                                                                   | 12.9 (28.4)            |
|                                                                              |              | 3.3 (4.43)                                    | 16.0 (11.8)                                                                                                  | 10.5 (7.7)                                    | 7.2                                                  | 1FK7083-2AF71-1■ ■ ■ ■                                           | 4                    | 26 (23)                                                                                     | 15.6 (34.4)            |
|                                                                              |              | 3.1 (4.16)                                    | 20.0 (14.8)                                                                                                  | 10.0 (7.4)                                    | 6.5                                                  | 1FK7084-2AF71-1■ ■ ■ ■                                           | 4                    | 32.5 (28.8)                                                                                 | 18.3 (40.4)            |
|                                                                              | 100          | 3.8 (5.10)                                    | 18.0 (13.3)                                                                                                  | 12.0 (8.9)                                    | 8.0                                                  | 1FK7100-2AF71-1■ ■ ■ ■                                           | 4                    | 54 (47.8)                                                                                   | 17.6 (38.8)            |
|                                                                              |              | 4.9 (6.57)                                    | 27.0 (19.9)                                                                                                  | 15.5 (11.4)                                   | 11.6                                                 | 1FK7101-2AF71-1■ ■ ■ ■                                           | 4                    | 79 (69.9)                                                                                   | 23.0 (50.7)            |
|                                                                              |              | 4.4 (5.9)                                     | 36.0 (26.6)                                                                                                  | 14.0 (10.3)                                   | 11.5                                                 | 1FK7103-2AF71-1■ ■ ■ ■                                           | 4                    | 104 (92.1)                                                                                  | 28.5 (62.8)            |
| 8.2 (11)                                                                     |              | 48.0 (35.4)                                   | 26.0 (19.2)                                                                                                  | 18.0                                          | 1FK7105-2AF71-1■ ■ ■ ■                               | 4                                                                | 154 (136.3)          | 39.0 (86)                                                                                   |                        |
| Encoder systems for motors without DRIVE-CLiQ interface:                     |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder<br>Multi-pole resolver<br>2-pole resolver                             |                                               |                                                      | A<br>E<br>S<br>T                                                 |                      |                                                                                             |                        |
| Encoder systems for motors with DRIVE-CLiQ interface:                        |              |                                               | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder<br>R15DQ resolver<br>R14DQ resolver |                                               |                                                      | B<br>C<br>Q<br>R<br>U<br>P                                       |                      |                                                                                             |                        |
| Shaft extension:<br>Feather key<br>Feather key<br>Plain shaft<br>Plain shaft |              |                                               | Shaft and flange accuracy:<br>Tolerance N<br>Tolerance N<br>Tolerance N<br>Tolerance N                       |                                               | Holding brake:<br>Without<br>With<br>Without<br>With |                                                                  | A<br>B<br>G<br>H     |                                                                                             |                        |
| Degree of protection:                                                        |              |                                               | IP64<br>IP65<br>IP65 and DE flange IP67                                                                      |                                               |                                                      | 0<br>1<br>2                                                      |                      |                                                                                             |                        |

| Motor type<br>(repeated)        | Efficiency <sup>1)</sup> | Stall current                         | Calculated power <sup>5)</sup><br>$P_{calc}$ | SINAMICS S120 Motor Module                        |                                                                                                               | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|---------------------------------|--------------------------|---------------------------------------|----------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                                 | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T=100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T=100$ K   | Rated output current <sup>2)</sup><br>$I_{rated}$ | Booksize format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power connector                                                                                    | Cable cross-section <sup>3)</sup> | Pre-assembled cable |
|                                 | %                        | A                                     | kW (HP)                                      | A                                                 | Order No.                                                                                                     | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| Line voltage 380 ... 480 V 3 AC |                          |                                       |                                              |                                                   |                                                                                                               |                                                                                                    |                                   |                     |
| 1FK7042-2AC71-...               | 88                       | 1.6                                   | 0.6 (0.8)                                    | 3                                                 | 6SL312-TE13-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7060-2AC71-...               | 90                       | 3.15                                  | 1.3 (1.74)                                   | 3 <sup>4)</sup>                                   | 6SL312-TE15-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7062-2AC71-...               | 91                       | 3.0                                   | 1.8 (2.41)                                   | 3                                                 | 6SL312-TE13-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7063-2AC71-...               | 91                       | 5.3                                   | 2.3 (3.08)                                   | 5 <sup>4)</sup>                                   | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7081-2AC71-...               | 93                       | 5.0                                   | 2.5 (3.35)                                   | 5                                                 | 6SL312-TE15-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7083-2AC71-...               | 93                       | 7.5                                   | 3.4 (4.56)                                   | 9                                                 | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7084-2AC71-...               | 93                       | 8.5                                   | 4.2 (5.63)                                   | 9                                                 | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7100-2AC71-...               | 92                       | 8.4                                   | 3.8 (5.10)                                   | 9                                                 | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7101-2AC71-...               | 93                       | 12.3                                  | 5.7 (7.64)                                   | 18                                                | 6SL312-TE21-8AA3                                                                                              | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-...     |
| 1FK7103-2AC71-...               | 93                       | 14.4                                  | 7.5 (10.1)                                   | 18                                                | 6SL312-TE21-8AA3                                                                                              | 1.5                                                                                                | 4 × 1.5                           | 6FX002-5N21-...     |
| 1FK7105-2AC71-...               | 93                       | 20.0                                  | 10.1 (13.54)                                 | 30                                                | 6SL312-TE23-0AA3                                                                                              | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-...     |
| 1FK7042-2AF71-...               | 89                       | 2.2                                   | 0.9 (1.21)                                   | 3                                                 | 6SL312-TE13-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7060-2AF71-...               | 90                       | 4.45                                  | 1.9 (2.55)                                   | 5                                                 | 6SL312-TE15-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7062-2AF71-...               | 91                       | 5.3                                   | 2.7 (3.62)                                   | 9 <sup>4)</sup>                                   | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7063-2AF71-...               | 91                       | 8.0                                   | 3.5 (4.69)                                   | 9                                                 | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7080-2AF71-...               | 92                       | 4.9                                   | 2.5 (3.35)                                   | 5                                                 | 6SL312-TE15-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7081-2AF71-...               | 93                       | 8.7                                   | 3.8 (5.10)                                   | 9                                                 | 6SL312-TE21-0AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7083-2AF71-...               | 93                       | 10.1                                  | 5 (6.71)                                     | 18                                                | 6SL312-TE21-8AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7084-2AF71-...               | 93                       | 12.1                                  | 6.3 (8.45)                                   | 18                                                | 6SL312-TE21-8AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7100-2AF71-...               | 92                       | 11.1                                  | 5.7 (7.64)                                   | 18                                                | 6SL312-TE21-8AA3                                                                                              | 1                                                                                                  | 4 × 1.5                           | 6FX002-5N01-...     |
| 1FK7101-2AF71-...               | 93                       | 18.8                                  | 8.5 (11.4)                                   | 18 <sup>4)</sup>                                  | 6SL312-TE23-8AA3                                                                                              | 1.5                                                                                                | 4 × 2.5                           | 6FX002-5N31-...     |
| 1FK7103-2AF71-...               | 93                       | 26.0                                  | 11.3 (15.2)                                  | 30                                                | 6SL312-TE23-0AA3                                                                                              | 1.5                                                                                                | 4 × 4                             | 6FX002-5N41-...     |
| 1FK7105-2AF71-...               | 94                       | 31.0                                  | 15.1 (20.25)                                 | 30 <sup>4)</sup>                                  | 6SL312-TE24-0AA3                                                                                              | 1.5                                                                                                | 4 × 6                             | 6FX002-5N51-...     |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                         |      |
|-------------------------|------|
| <b>Power cable:</b>     |      |
| MOTION-CONNECT 800 PLUS | 8    |
| MOTION-CONNECT 500      | 5    |
| Without brake cores     | C    |
| With brake cores        | D    |
| Length code             | .... |

More information about cables can be found  
under MOTION-CONNECT connection systems.

<sup>1)</sup> Optimum efficiency in continuous duty.

<sup>2)</sup> With default setting of the pulse frequency.

<sup>3)</sup> The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.

<sup>4)</sup> With the specified Motor Module, the motor cannot be fully utilized with  $M_0$  at  $\Delta T = 100$  K winding temperature rise. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to the larger Motor Module.

<sup>5)</sup>  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors Compact – Natural cooling

#### Selection and ordering data

| Rated speed                                                                  | Shaft height | Rated power                                   | Static torque                                                                                                | Rated torque                                  | Rated current                                        | SIMOTICS S-1FK7<br>Compact synchronous motors<br>Natural cooling | Num-ber of pole pairs | Moment of inertia of rotor (without brake)                                                  | Weight (without brake) |
|------------------------------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                                           | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                             | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$        |                                                                  | $p$                   | $J$                                                                                         | $m$                    |
| rpm                                                                          |              | kW (HP)                                       | Nm (lb <sub>F</sub> -ft)                                                                                     | Nm (lb <sub>F</sub> -ft)                      | A                                                    | Order No.<br>Standard type                                       |                       | 10 <sup>-4</sup> kgm <sup>2</sup><br>(10 <sup>-3</sup> lb <sub>F</sub> -in-s <sup>2</sup> ) | kg (lb)                |
| 1FK7 Compact for DC link voltage 510 ... 720 V DC                            |              |                                               |                                                                                                              |                                               |                                                      |                                                                  |                       |                                                                                             |                        |
| 4500                                                                         | 63           | 1.7 (2.28)                                    | 6.0 (4.4)                                                                                                    | 3.7 (2.7)                                     | 4.3                                                  | 1FK7060-2AH71-1 ■ ■ ■ ■                                          | 4                     | 7.7 (6.82)                                                                                  | 7.1 (15.7)             |
|                                                                              |              | 1.4 (1.88)                                    | 8.5 (6.0)                                                                                                    | 3.0 (2.2)                                     | 3.3                                                  | 1FK7062-2AH71-1 ■ ■ ■ ■                                          | 4                     | 11.2 (9.91)                                                                                 | 9.1 (20.1)             |
|                                                                              |              | 1.4 (1.88)                                    | 11.0 (8.0)                                                                                                   | 3.0 (2.2)                                     | 3.8                                                  | 1FK7063-2AH71-1 ■ ■ ■ ■                                          | 4                     | 14.7 (13.01)                                                                                | 11.1 (24.5)            |
|                                                                              | 80           | 2.1 (2.82)                                    | 8.0 (6.0)                                                                                                    | 4.5 (3.3)                                     | 4.8                                                  | 1FK7080-2AH71-1 ■ ■ ■ ■                                          | 4                     | 14.2 (12.57)                                                                                | 10.3 (22.7)            |
|                                                                              |              | 1.8 (2.41)                                    | 12.0 (8.9)                                                                                                   | 3.8 (2.8)                                     | 4.9                                                  | 1FK7081-2AH71-1 ■ ■ ■ ■                                          | 4                     | 20 (17.7)                                                                                   | 12.9 (28.4)            |
|                                                                              |              | 1.4 (1.88)                                    | 16.0 (11.8)                                                                                                  | 3.0 (2.2)                                     | 3.6                                                  | 1FK7083-2AH71-1 ■ ■ ■ ■                                          | 4                     | 26 (23.01)                                                                                  | 15.6 (34.4)            |
| 6000                                                                         | 36           | 0.5 (0.67)                                    | 1.15 (0.8)                                                                                                   | 0.8 (0.6)                                     | 1.3                                                  | 1FK7032-2AK71-1 ■ ■ ■ ■                                          | 3                     | 0.65 (0.58)                                                                                 | 2.7 (5.95)             |
|                                                                              |              | 0.6 (0.8)                                     | 1.6 (1.2)                                                                                                    | 1.0 (0.7)                                     | 1.3                                                  | 1FK7034-2AK71-1 ■ ■ ■ ■                                          | 3                     | 0.9 (0.8)                                                                                   | 3.5 (7.72)             |
|                                                                              | 48           | 0.7 (0.94)                                    | 1.6 (1.2)                                                                                                    | 1.1 (0.8)                                     | 1.85                                                 | 1FK7040-2AK71-1 ■ ■ ■ ■                                          | 4                     | 1.6 (1.42)                                                                                  | 3.2 (7.06)             |
|                                                                              |              | 0.9 (1.21)                                    | 3.0 (2.2)                                                                                                    | 1.5 (1.1)                                     | 2.5                                                  | 1FK7042-2AK71-1 ■ ■ ■ ■                                          | 4                     | 2.9 (2.57)                                                                                  | 4.6 (10.14)            |
| Encoder systems for motors without DRIVE-CLiQ interface:                     |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder<br>Multi-pole resolver<br>2-pole resolver                             |                                               |                                                      | A<br>E<br>S<br>T                                                 |                       |                                                                                             |                        |
| Encoder systems for motors with DRIVE-CLiQ interface:                        |              |                                               | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder<br>R15DQ resolver<br>R14DQ resolver |                                               |                                                      | B<br>C<br>Q<br>R<br>U<br>P                                       |                       |                                                                                             |                        |
| Shaft extension:<br>Feather key<br>Feather key<br>Plain shaft<br>Plain shaft |              |                                               | Shaft and flange accuracy:<br>Tolerance N<br>Tolerance N<br>Tolerance N<br>Tolerance N                       |                                               | Holding brake:<br>Without<br>With<br>Without<br>With |                                                                  | A<br>B<br>G<br>H      |                                                                                             |                        |
| Degree of protection:                                                        |              |                                               | IP64<br>IP65<br>IP65 and DE flange IP67                                                                      |                                               |                                                      | 0<br>1<br>2                                                      |                       |                                                                                             |                        |

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
Compact – Natural cooling

| Motor type<br>(repeated) | Effi-<br>ciency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>4)</sup> | SINAMICS S120 Motor Module               |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                          |                        |
|--------------------------|-----------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------|------------------------|
|                          | $\eta$                | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connector                                                                                 | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable |
|                          | %                     | A                                       | kW (HP)                                         | A                                        | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                          | Order No.              |
|                          |                       |                                         |                                                 | Line voltage 380 ... 480 V 3 AC          |                                                                                                                |                                                                                                    |                                          |                        |
| 1FK7060-2AH71-...        | 90                    | 6.3                                     | 2.8 (3.75)                                      | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7062-2AH71-...        | 91                    | 8.0                                     | 4 (5.36)                                        | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7063-2AH71-...        | 90                    | 12.0                                    | 5.2 (6.97)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7080-2AH71-...        | 92                    | 7.4                                     | 3.8 (5.10)                                      | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7081-2AH71-...        | 93                    | 13.1                                    | 5.7 (7.64)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7083-2AH71-...        | 93                    | 15.0                                    | 7.5 (10.06)                                     | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7032-2AK71-...        | 88                    | 1.7                                     | 0.7 (0.94)                                      | 3                                        | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7034-2AK71-...        | 88                    | 1.9                                     | 1 (1.34)                                        | 3                                        | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7040-2AK71-...        | 88                    | 2.35                                    | 1 (1.34)                                        | 3                                        | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |
| 1FK7042-2AK71-...        | 89                    | 4.4                                     | 1.9 (2.55)                                      | 5                                        | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX002-5N01-....       |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                         |      |
|-------------------------|------|
| <b>Power cable:</b>     |      |
| MOTION-CONNECT 800 PLUS | 8    |
| MOTION-CONNECT 500      | 5    |
| Without brake cores     | C    |
| With brake cores        | D    |
| Length code             | .... |

More information about cables can be found  
under MOTION-CONNECT connection  
systems.

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.

4)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors Compact – Natural cooling

#### Selection and ordering data

| Rated speed                                                                                                                                                                                 | Shaft height | Rated power                                   | Static torque                                                                                                        | Rated torque                                  | Rated current                                        | SIMOTICS S-1FK7<br>Compact synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake)                        | Weight (without brake) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------|------------------------------------------------------------------|----------------------|-------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                                                                                                                                                          | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                                     | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$        |                                                                  | $p$                  | $J$                                                               | $m$                    |
| rpm                                                                                                                                                                                         |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                                             | Nm (lb <sub>f</sub> -ft)                      | A                                                    |                                                                  | Order No.            | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_f\text{-in-s}^2$ ) | kg (lb)                |
| 1FK7 Compact for DC link voltage 510 ... 720 V DC                                                                                                                                           |              |                                               |                                                                                                                      |                                               |                                                      |                                                                  |                      |                                                                   |                        |
| 6000                                                                                                                                                                                        | 20           | 0.05 (0.07)                                   | 0.18 (0,13)                                                                                                          | 0.08 (0.06)                                   | 0.85                                                 | 1FK7011-5AK71-1 ■■■                                              | 4                    | 0.064 (0.06)                                                      | 0.9 (1.98)             |
|                                                                                                                                                                                             |              | 0.1 (0.13)                                    | 0.35 (0.26)                                                                                                          | 0.16 (0.12)                                   | 0.85                                                 | 1FK7015-5AK71-1 ■■■                                              | 4                    | 0.083 (0.07)                                                      | 1.1 (2.43)             |
|                                                                                                                                                                                             | 28           | 0.38 (0.51)                                   | 0.85 (0.63)                                                                                                          | 0.6 (0.44)                                    | 1.4                                                  | 1FK7022-5AK71-1 ■■■                                              | 3                    | 0.28 (0.25)                                                       | 1.8 (3.97)             |
| Encoder systems for motors without DRIVE-CLiQ interface:                                                                                                                                    |              |                                               | IC2048S/R encoder<br>AM512S/R encoder (only for 1FK702)<br>AM16S/R encoder<br>multi-pole resolver<br>2-pole resolver |                                               |                                                      | A<br>H<br>J<br>S<br>T                                            |                      |                                                                   |                        |
| Encoder systems for motors with DRIVE-CLiQ interface:<br>(Only for 1FK702) <sup>1)</sup>                                                                                                    |              |                                               | IC22DQ encoder<br>AM20DQ encoder<br>AM15DQ encoder<br>R15DQ resolver<br>R14DQ resolver                               |                                               |                                                      | D<br>L<br>V<br>U<br>P                                            |                      |                                                                   |                        |
| Shaft extension:<br>Feather key<br>Feather key<br>Plain shaft<br>Plain shaft                                                                                                                |              |                                               | Shaft and flange accuracy:<br>Tolerance N<br>Tolerance N<br>Tolerance N<br>Tolerance N                               |                                               | Holding brake:<br>Without<br>With<br>Without<br>With | A<br>B<br>G<br>H                                                 |                      |                                                                   |                        |
| Degree of protection:<br>IP64 (only for 1FK702)<br>IP65 and DE flange IP67 (only for 1FK702)<br>IP54 (only for 1FK701), IP64 (only for 1FK702)<br>IP65 and DE flange IP67 (only for 1FK702) |              |                                               |                                                                                                                      |                                               | Paint finish:<br>Without<br>Without<br>With<br>With  |                                                                  | 0<br>2<br>3<br>5     |                                                                   |                        |

<sup>1)</sup> 1FK701 motors are not available with a DRIVE-CLiQ interface. The encoder systems are connected via the SMC (Sensor Module Cabinet-Mounted).

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
Compact – Natural cooling

| Motor type<br>(repeated) | Effi-<br>ciency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>4)</sup> | <b>SINAMICS S120 Motor Module</b>        |                                                                                                                      | <b>Power cable with complete shield</b><br>Motor connection (and brake connection)<br>via power connector |                                          |                          |
|--------------------------|-----------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------|
|                          | $\eta$                | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup> | <b>Booksize format</b><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connector                                                                                        | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable   |
|                          | %                     | A                                       | kW (HP)                                         | A                                        | Order No.                                                                                                            | Size                                                                                                      | mm <sup>2</sup>                          | Order No.                |
|                          |                       |                                         |                                                 | <b>Line voltage 380 ... 480 V 3 AC</b>   |                                                                                                                      |                                                                                                           |                                          |                          |
| 1FK7011-5AK71-...        | 62                    | 1.5                                     | 0.1 (0.13)                                      | 3                                        | <b>6SL312-1-TE13-0AA3</b>                                                                                            | 0.5                                                                                                       | 4 × 1.5                                  | <b>6FX5002-5DN20-...</b> |
| 1FK7015-5AK71-...        | 68                    | 1.5                                     | 0.2 (0.27)                                      | 3                                        | <b>6SL312-1-TE13-0AA3</b>                                                                                            | 0.5                                                                                                       | 4 × 1.5                                  | <b>6FX5002-5DN20-...</b> |
| 1FK7022-5AK71-...        | 86                    | 1.8                                     | 0.5 (0.67)                                      | 3                                        | <b>6SL312-1-TE13-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX5002-5N01-...</b>  |
|                          |                       |                                         |                                                 | <b>Cooling:</b>                          |                                                                                                                      | <b>Power cable:</b>                                                                                       |                                          |                          |
|                          |                       |                                         |                                                 | Internal air cooling                     |                                                                                                                      | MOTION-CONNECT 800 PLUS                                                                                   |                                          |                          |
|                          |                       |                                         |                                                 | External air cooling                     |                                                                                                                      | MOTION-CONNECT 500                                                                                        |                                          |                          |
|                          |                       |                                         |                                                 |                                          |                                                                                                                      |                                                                                                           |                                          |                          |
|                          |                       |                                         |                                                 | <b>Motor Module:</b>                     |                                                                                                                      | Without brake cores                                                                                       |                                          |                          |
|                          |                       |                                         |                                                 | Single Motor Module                      |                                                                                                                      | With brake cores                                                                                          |                                          |                          |
|                          |                       |                                         |                                                 | Double Motor Module                      |                                                                                                                      | Length code                                                                                               |                                          |                          |
|                          |                       |                                         |                                                 |                                          |                                                                                                                      | More information about cables can be found<br>under MOTION-CONNECT connection<br>systems.                 |                                          |                          |

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.4)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors High Dynamic – Natural cooling

#### Selection and ordering data

| Rated speed                                                                  | Shaft height | Rated power                                         | Static torque                                                                                                | Rated torque                                        | Rated current                                        | SIMOTICS S-1FK7<br>High Dynamic<br>synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake) | Weight (without brake)                                                                      |
|------------------------------------------------------------------------------|--------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------|----------------------|--------------------------------------------|---------------------------------------------------------------------------------------------|
| $n_{\text{rated}}$                                                           | SH           | $P_{\text{rated}}$<br>at<br>$\Delta T=100\text{ K}$ | $M_0$<br>at<br>$\Delta T=100\text{ K}$                                                                       | $M_{\text{rated}}$<br>at<br>$\Delta T=100\text{ K}$ | $I_{\text{rated}}$<br>at<br>$\Delta T=100\text{ K}$  |                                                                          | $p$                  | $J$                                        | $m$                                                                                         |
| rpm                                                                          |              | kW (HP)                                             | Nm (lb <sub>f</sub> -ft)                                                                                     | Nm (lb <sub>f</sub> -ft)                            | A                                                    |                                                                          | Order No.            |                                            | 10 <sup>-4</sup> kgm <sup>2</sup><br>(10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) |
| 1FK7 High Dynamic for DC link voltage 510 ... 720 V DC                       |              |                                                     |                                                                                                              |                                                     |                                                      |                                                                          |                      |                                            |                                                                                             |
| 2000                                                                         | 63           | 2.1 (2.82)                                          | 12.0 (8.85)                                                                                                  | 10.0 (7.38)                                         | 7.1                                                  | 1FK7064-4CC71-1                                                          | 3                    | 7.5 (6.64)                                 | 15.4 (33.96)                                                                                |
|                                                                              | 80           | 3.1 (4.16)                                          | 22.0 (16.23)                                                                                                 | 15.0 (11.06)                                        | 10.0                                                 | 1FK7085-4CC71-1                                                          | 4                    | 22 (19.5)                                  | 23.0 (50.7)                                                                                 |
|                                                                              |              | 3.8 (5.10)                                          | 28.0 (20.65)                                                                                                 | 18.0 (13.28)                                        | 9.0                                                  | 1FK7086-4CC71-1                                                          | 4                    | 22 (19.5)                                  | 23.0 (50.7)                                                                                 |
| 3000                                                                         | 48           | 1.2 (1.61)                                          | 4.5 (3.32)                                                                                                   | 3.7 (2.73)                                          | 3.45                                                 | 1FK7044-4CF71-1                                                          | 3                    | 1.26 (1.12)                                | 7.4 (16.3)                                                                                  |
|                                                                              | 63           | 1.7 (2.28)                                          | 6.4 (4.72)                                                                                                   | 5.4 (3.98)                                          | 5.3                                                  | 1FK7061-4CF71-1                                                          | 3                    | 4.1 (3.63)                                 | 9.5 (20.95)                                                                                 |
|                                                                              |              | 2.5 (3.35)                                          | 12.0 (8.85)                                                                                                  | 8.0 (5.9)                                           | 7.6                                                  | 1FK7064-4CF71-1                                                          | 3                    | 7.5 (6.64)                                 | 15.4 (33.96)                                                                                |
|                                                                              | 80           | 2 (2.68)                                            | 22.0 (16.23)                                                                                                 | 6.5 (4.8)                                           | 7.0                                                  | 1FK7085-4CF71-1                                                          | 4                    | 22 (19.5)                                  | 23.0 (50.7)                                                                                 |
|                                                                              |              | 2 (2.68)                                            | 28.0 (20.65)                                                                                                 | 6.5 (4.8)                                           | 5.7                                                  | 1FK7086-4CF71-1                                                          | 4                    | 22 (19.5)                                  | 23.0 (50.7)                                                                                 |
| 4500                                                                         | 48           | 1.2 (1.61)                                          | 3.5 (2.58)                                                                                                   | 2.6 (1.9)                                           | 3.3                                                  | 1FK7043-4CH71-1                                                          | 3                    | 1 (0.89)                                   | 6.0 (13.23)                                                                                 |
|                                                                              |              | 1.4 (1.88)                                          | 4.5 (3.32)                                                                                                   | 3.0 (2.2)                                           | 3.9                                                  | 1FK7044-4CH71-1                                                          | 3                    | 1.26 (1.12)                                | 7.4 (16.3)                                                                                  |
|                                                                              | 63           | 2 (2.68)                                            | 6.4 (4.72)                                                                                                   | 4.3 (3.2)                                           | 6.2                                                  | 1FK7061-4CH71-1                                                          | 3                    | 4.1 (3.63)                                 | 9.5 (20.95)                                                                                 |
|                                                                              |              | 2.4 (3.22)                                          | 12.0 (8.85)                                                                                                  | 5.0 (3.7)                                           | 7.0                                                  | 1FK7064-4CH71-1                                                          | 3                    | 7.5 (6.64)                                 | 15.4 (33.96)                                                                                |
| 6000                                                                         | 36           | 0.6 (0.8)                                           | 1.3 (1.0)                                                                                                    | 0.9 (0.66)                                          | 1.6                                                  | 1FK7033-4CK71-1                                                          | 3                    | 0.25 (0.22)                                | 3.0 (6.62)                                                                                  |
|                                                                              | 48           | 1.3 (1.74)                                          | 3.5 (2.58)                                                                                                   | 2.0 (1.48)                                          | 3.5                                                  | 1FK7043-4CK71-1                                                          | 3                    | 1 (0.89)                                   | 6.0 (13.23)                                                                                 |
| Encoder systems for motors without DRIVE-CLiQ interface:                     |              |                                                     | IC2048S/R encoder<br>AM2048S/R encoder<br>Multi-pole resolver<br>2-pole resolver                             |                                                     |                                                      | A<br>E<br>S<br>T                                                         |                      |                                            |                                                                                             |
| Encoder systems for motors with DRIVE-CLiQ interface:                        |              |                                                     | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder<br>R15DQ resolver<br>R14DQ resolver |                                                     |                                                      | B<br>C<br>Q<br>R<br>U<br>P                                               |                      |                                            |                                                                                             |
| Shaft extension:<br>Feather key<br>Feather key<br>Plain shaft<br>Plain shaft |              |                                                     | Shaft and flange accuracy:<br>Tolerance N<br>Tolerance N<br>Tolerance N<br>Tolerance N                       |                                                     | Holding brake:<br>Without<br>With<br>Without<br>With |                                                                          | A<br>B<br>G<br>H     |                                            |                                                                                             |
| Degree of protection:                                                        |              |                                                     | IP64<br>IP65<br>IP65 and DE flange IP67                                                                      |                                                     |                                                      | 0<br>1<br>2                                                              |                      |                                            |                                                                                             |

6



## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
High Dynamic – Natural cooling

| Motor type<br>(repeated) | Effi-<br>ciency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>4)</sup> | SINAMICS S120 Motor Module               |                                                                                                                | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                          |                        |
|--------------------------|-----------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------|------------------------|
|                          | $\eta$                | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup> | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connector                                                                                 | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable |
|                          | %                     | A                                       | kW (HP)                                         | A                                        | Order No.                                                                                                      | Size                                                                                               | mm <sup>2</sup>                          | Order No.              |
|                          |                       |                                         |                                                 | Line voltage 380 ... 480 V 3 AC          |                                                                                                                |                                                                                                    |                                          |                        |
| 1FK7064-4CC71-...        | 93                    | 8.1                                     | 2.5 (3.35)                                      | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7085-4CC71-...        | 92                    | 13.5                                    | 4.6 (6.17)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7086-4CC71-...        | 93                    | 13.2                                    | 5.9 (7.91)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7044-4CF71-...        | 91                    | 4.0                                     | 1.4 (1.88)                                      | 5                                        | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7061-4CF71-...        | 93                    | 6.1                                     | 2 (2.68)                                        | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7064-4CF71-...        | 93                    | 10.8                                    | 3.8 (5.10)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7085-4CF71-...        | 92                    | 22.0                                    | 6.9 (9.25)                                      | 30                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                                    | 6FX0002-5N41-...       |
| 1FK7086-4CF71-...        | 93                    | 21.5                                    | 8.8 (11.8)                                      | 30                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                                | 4 × 4                                    | 6FX0002-5N41-...       |
| 1FK7043-4CH71-...        | 90                    | 4.1                                     | 1.6 (2.15)                                      | 5                                        | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7044-4CH71-...        | 91                    | 5.4                                     | 2.1 (2.8)                                       | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7061-4CH71-...        | 93                    | 8.7                                     | 3 (4.02)                                        | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7064-4CH71-...        | 93                    | 15.0                                    | 5.7 (7.64)                                      | 18                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7033-4CK71-...        | 88                    | 2.1                                     | 0.8 (1.07)                                      | 3                                        | 6SL312-1-TE13-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |
| 1FK7043-4CK71-...        | 90                    | 5.6                                     | 2.2 (2.95)                                      | 9                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5N01-...       |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

|                         |      |
|-------------------------|------|
| <b>Power cable:</b>     |      |
| MOTION-CONNECT 800 PLUS | 8    |
| MOTION-CONNECT 500      | 5    |
| Without brake cores     | C    |
| With brake cores        | D    |
| Length code             | .... |

More information about cables can be found under MOTION-CONNECT connection systems.

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.4)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors High Inertia – Natural cooling

#### Selection and ordering data

| Rated speed                                                     | Shaft height | Rated power                                  | Static torque                                                            | Rated torque                                 | Rated current                                | SIMOTICS S-1FK7<br>High Inertia<br>synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake)                        | Weight (without brake) |
|-----------------------------------------------------------------|--------------|----------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------|------------------------|
| $n_{rated}$                                                     | SH           | $P_{rated}$<br>at<br>$\Delta T=100\text{ K}$ | $M_0$<br>at<br>$\Delta T=100\text{ K}$                                   | $M_{rated}$<br>at<br>$\Delta T=100\text{ K}$ | $I_{rated}$<br>at<br>$\Delta T=100\text{ K}$ |                                                                          | $p$                  | $J$                                                               | $m$                    |
| rpm                                                             |              | kW (HP)                                      | Nm (lb <sub>f</sub> -ft)                                                 | Nm (lb <sub>f</sub> -ft)                     | A                                            | Order No.<br>Standard type                                               |                      | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_f\text{-in-s}^2$ ) | kg (lb)                |
| <b>1FK7 High Inertia for DC link voltage 510 ... 720 V DC</b>   |              |                                              |                                                                          |                                              |                                              |                                                                          |                      |                                                                   |                        |
| <b>2000</b>                                                     | 80           | 3.1 (4.16)                                   | 20.0 (14.75)                                                             | 15.0 (11.06)                                 | 6.7                                          | <b>1FK7084-3BC71-1</b> ■ ■ ■                                             | 4                    | 99 (87.62)                                                        | 23.0 (50.72)           |
| <b>3000</b>                                                     | 63           | 1.5 (2.01)                                   | 6.0 (4.43)                                                               | 4.7 (3.5)                                    | 3.7                                          | <b>1FK7060-3BF71-1</b> ■ ■ ■                                             | 4                    | 12.5 (11.06)                                                      | 7.9 (17.42)            |
|                                                                 |              | 1.9 (2.55)                                   | 8.5 (6.27)                                                               | 6.0 (4.43)                                   | 4.0                                          | <b>1FK7062-3BF71-1</b> ■ ■ ■                                             | 4                    | 23.5 (20.80)                                                      | 10.7 (23.59)           |
|                                                                 | 80           | 2.7 (3.62)                                   | 12.0 (8.85)                                                              | 8.7 (6.4)                                    | 6.8                                          | <b>1FK7081-3BF71-1</b> ■ ■ ■                                             | 4                    | 49 (43.37)                                                        | 15.2 (33.52)           |
|                                                                 |              | 3.1 (4.16)                                   | 20.0 (14.75)                                                             | 10.0 (7.4)                                   | 6.5                                          | <b>1FK7084-3BF71-1</b> ■ ■ ■                                             | 4                    | 99 (87.62)                                                        | 23.0 (50.72)           |
| <b>6000</b>                                                     | 48           | 0.9 (1.21)                                   | 3.0 (2.21)                                                               | 1.5 (1.1)                                    | 2.5                                          | <b>1FK7042-3BK71-1</b> ■ ■ ■                                             | 4                    | 5.1 (4.51)                                                        | 5.1 (11.25)            |
| <b>Encoder systems for motors without DRIVE-CLiQ interface:</b> |              |                                              | IC2048S/R encoder<br>AM2048S/R encoder                                   |                                              |                                              | <b>A</b><br><b>E</b>                                                     |                      |                                                                   |                        |
| <b>Encoder systems for motors with DRIVE-CLiQ interface:</b>    |              |                                              | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder |                                              |                                              | <b>B</b><br><b>C</b><br><b>Q</b><br><b>R</b>                             |                      |                                                                   |                        |
| <b>Shaft extension:</b>                                         |              |                                              | <b>Shaft and flange accuracy:</b>                                        |                                              |                                              | <b>Holding brake:</b>                                                    |                      |                                                                   |                        |
| Feather key                                                     |              |                                              | Tolerance N                                                              |                                              |                                              | Without                                                                  |                      | <b>A</b>                                                          |                        |
| Feather key                                                     |              |                                              | Tolerance N                                                              |                                              |                                              | With                                                                     |                      | <b>B</b>                                                          |                        |
| Plain shaft                                                     |              |                                              | Tolerance N                                                              |                                              |                                              | Without                                                                  |                      | <b>G</b>                                                          |                        |
| Plain shaft                                                     |              |                                              | Tolerance N                                                              |                                              |                                              | With                                                                     |                      | <b>H</b>                                                          |                        |
| <b>Degree of protection:</b>                                    |              |                                              | IP64<br>IP65<br>IP65 and DE flange IP67                                  |                                              |                                              |                                                                          |                      | <b>0</b><br><b>1</b><br><b>2</b>                                  |                        |

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
High Inertia – Natural cooling

| Motor type<br>(repeated) | Efficiency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>5)</sup> | <b>SINAMICS S120 Motor Module</b>        |                                                                                                                      | <b>Power cable with complete shield</b><br>Motor connection (and brake connection)<br>via power connector |                                          |                           |
|--------------------------|------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------|
|                          | $\eta$           | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup> | <b>Booksize format</b><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connector                                                                                        | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable    |
|                          | %                | A                                       | kW (HP)                                         | A                                        | Order No.                                                                                                            | Size                                                                                                      | mm <sup>2</sup>                          | Order No.                 |
|                          |                  |                                         |                                                 | <b>Line voltage 380 ... 480 V 3 AC</b>   |                                                                                                                      |                                                                                                           |                                          |                           |
| 1FK7084-3BC71-...        | 93               | 8.5                                     | 4.2 (5.63)                                      | 9                                        | <b>6SL312-1-TE21-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
| 1FK7060-3BF71-...        | 90               | 4.45                                    | 1.9 (2.55)                                      | 5                                        | <b>6SL312-1-TE15-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
| 1FK7062-3BF71-...        | 91               | 5.3                                     | 2.7 (3.62)                                      | 5 <sup>4)</sup>                          | <b>6SL312-1-TE21-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
| 1FK7081-3BF71-...        | 93               | 8.7                                     | 3.8 (5.10)                                      | 9                                        | <b>6SL312-1-TE21-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
| 1FK7084-3BF71-...        | 93               | 12.1                                    | 6.3 (8.45)                                      | 18                                       | <b>6SL312-1-TE21-8AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
| 1FK7042-3BK71-...        | 89               | 4.4                                     | 1.9 (2.55)                                      | 5                                        | <b>6SL312-1-TE15-0AA3</b>                                                                                            | 1                                                                                                         | 4 × 1.5                                  | <b>6FX0002-5 N01-....</b> |
|                          |                  |                                         |                                                 | <b>Cooling:</b>                          |                                                                                                                      | <b>Power cable:</b>                                                                                       |                                          |                           |
|                          |                  |                                         |                                                 | Internal air cooling                     |                                                                                                                      | MOTION-CONNECT 800                                                                                        |                                          |                           |
|                          |                  |                                         |                                                 | External air cooling                     |                                                                                                                      | MOTION-CONNECT 500                                                                                        |                                          |                           |
|                          |                  |                                         |                                                 |                                          |                                                                                                                      |                                                                                                           |                                          |                           |
|                          |                  |                                         |                                                 | <b>Motor Module:</b>                     |                                                                                                                      | Without brake cores                                                                                       |                                          |                           |
|                          |                  |                                         |                                                 | Single Motor Module                      |                                                                                                                      | With brake cores                                                                                          |                                          |                           |
|                          |                  |                                         |                                                 | Double Motor Module                      |                                                                                                                      | Length code                                                                                               |                                          |                           |
|                          |                  |                                         |                                                 |                                          |                                                                                                                      | More information about cables can be found<br>under MOTION-CONNECT connection<br>systems.                 |                                          |                           |

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.4) With the specified Motor Module, the motor cannot be fully utilized with  $M_0$  at  $\Delta T = 100$  K winding temperature rise. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to the larger Motor Module.5)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb_f \cdot ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors Compact for Power Modules 230 V 1 AC

#### Selection and ordering data

| Rated speed                                              | Shaft height | Rated power                                   | Static torque                                                                                                | Rated torque                                  | Rated current                                 | SIMOTICS S-1FK7<br>Compact synchronous motors<br>Natural cooling                                                                                                                                                                                                      | Number of pole pairs | Moment of inertia of rotor (without brake)                        | Weight (without brake) |
|----------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                       | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                             | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                                                                                                                                                                                                                                                       | $p$                  | $J$                                                               | $m$                    |
| rpm                                                      |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                                     | Nm (lb <sub>f</sub> -ft)                      | A                                             |                                                                                                                                                                                                                                                                       | Order No.            | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_f\text{-in-s}^2$ ) | kg (lb)                |
| 1FK7 Compact for DC link voltage 270 V ... 330 V DC      |              |                                               |                                                                                                              |                                               |                                               |                                                                                                                                                                                                                                                                       |                      |                                                                   |                        |
| 3000                                                     | 36           | 0.3 (0.4)                                     | 1.15 (0.85)                                                                                                  | 1.0 (0.74)                                    | 1.6                                           | 1FK7032-2AF21-1    | 3                    | 0.65 (0.58)                                                       | 2.7 (5.95)             |
|                                                          |              | 0.5 (0.67)                                    | 1.6 (1.18)                                                                                                   | 1.45 (1.07)                                   | 1.8                                           | 1FK7034-2AF21-1    | 3                    | 0.9 (0.8)                                                         | 3.5 (7.72)             |
|                                                          | 48           | 0.8 (1.07)                                    | 3.0 (2.21)                                                                                                   | 2.6 (1.92)                                    | 3.5                                           | 1FK7042-2AF21-1    | 4                    | 2.9 (2.57)                                                        | 4.6 (10.14)            |
| Encoder systems for motors without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder<br>Multi-pole resolver<br>2-pole resolver                             |                                               |                                               | A<br>E<br>S<br>T                                                                                                                                                                                                                                                      |                      |                                                                   |                        |
| Encoder systems for motors with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder<br>R15DQ resolver<br>R14DQ resolver |                                               |                                               | B<br>C<br>Q<br>R<br>U<br>P                                                                                                                                                                                                                                            |                      |                                                                   |                        |
| Shaft extension:                                         |              |                                               | Shaft and flange accuracy:                                                                                   |                                               |                                               | Holding brake:                                                                                                                                                                                                                                                        |                      |                                                                   |                        |
| Feather key                                              |              |                                               | Tolerance N                                                                                                  |                                               |                                               | Without                                                                                                                                                                                                                                                               |                      | A                                                                 |                        |
| Feather key                                              |              |                                               | Tolerance N                                                                                                  |                                               |                                               | With                                                                                                                                                                                                                                                                  |                      | B                                                                 |                        |
| Plain shaft                                              |              |                                               | Tolerance N                                                                                                  |                                               |                                               | Without                                                                                                                                                                                                                                                               |                      | G                                                                 |                        |
| Plain shaft                                              |              |                                               | Tolerance N                                                                                                  |                                               |                                               | With                                                                                                                                                                                                                                                                  |                      | H                                                                 |                        |
| Degree of protection:                                    |              |                                               | IP64                                                                                                         |                                               |                                               | 0                                                                                                                                                                                                                                                                     |                      |                                                                   |                        |
|                                                          |              |                                               | IP65                                                                                                         |                                               |                                               | 1                                                                                                                                                                                                                                                                     |                      |                                                                   |                        |
|                                                          |              |                                               | IP65 and DE flange IP67                                                                                      |                                               |                                               | 2                                                                                                                                                                                                                                                                     |                      |                                                                   |                        |

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
Compact for Power Modules 230 V 1 AC

| Motor type<br>(repeated)                     | Efficiency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>5)</sup> | <b>SINAMICS S110/S120<br/>blocksize format</b> |                                           | <b>Power cable with complete shield</b><br>Motor connection (and brake connection)<br>via power connector |                                          |                           |
|----------------------------------------------|------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------|
|                                              | $\eta$           | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup>       | <b>PM340 Power Module<br/>Air cooling</b> | Power<br>connector                                                                                        | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable    |
|                                              | %                | A                                       | kW (HP)                                         | A                                              | Order No.                                 | Size                                                                                                      | mm <sup>2</sup>                          | Order No.                 |
| <b>Line voltage 200 ... 240 V 1 AC</b>       |                  |                                         |                                                 |                                                |                                           |                                                                                                           |                                          |                           |
| 1FK7032-2AF21-...                            | 85               | 1.7                                     | 0.4 (0.54)                                      | 2.3                                            | <b>6SL3210-1SB12-3 A0</b>                 | 1                                                                                                         | 4 × 1.5                                  | <b>6FX 002-5 G10-....</b> |
| 1FK7034-2AF21-...                            | 85               | 1.9                                     | 0.5 (0.67)                                      | 2.3                                            | <b>6SL3210-1SB12-3 A0</b>                 | 1                                                                                                         | 4 × 1.5                                  | <b>6FX 002-5 G10-....</b> |
| 1FK7042-2AF21-...                            | 88               | 3.95                                    | 0.9 (1.21)                                      | 3.9 <sup>4)</sup>                              | <b>6SL3210-1SB14-0 A0</b>                 | 1                                                                                                         | 4 × 1.5                                  | <b>6FX 002-5 G10-....</b> |
| <b>Line filter:</b><br>Without<br>Integrated |                  |                                         |                                                 |                                                | <b>U<br/>A</b>                            | <b>Power cable:</b><br>MOTION-CONNECT 800 PLUS<br>MOTION-CONNECT 500                                      |                                          |                           |
|                                              |                  |                                         |                                                 |                                                |                                           | Without brake cores<br>With brake cores                                                                   |                                          |                           |
|                                              |                  |                                         |                                                 |                                                |                                           | Length code                                                                                               |                                          |                           |
|                                              |                  |                                         |                                                 |                                                |                                           | More information about cables can be found<br>under MOTION-CONNECT connection<br>systems.                 |                                          |                           |

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.4) With the specified Motor Module, the motor cannot be fully utilized with  $M_0$  at  $\Delta T = 100$  K winding temperature rise. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to the larger Motor Module.5)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb_f \cdot ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors Compact for Power Modules 230 V 1 AC

#### Selection and ordering data

| Rated speed                                                                     | Shaft height | Rated power                                   | Static torque                                                                                                                | Rated torque                                  | Rated current                                 | SIMOTICS S-1FK7<br>Compact<br>synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake)                        | Weight (without brake) |
|---------------------------------------------------------------------------------|--------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|----------------------|-------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                                              | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                                             | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                                                     | $p$                  | $J$                                                               | $m$                    |
| rpm                                                                             |              | kW (HP)                                       | Nm (lb <sub>f</sub> -ft)                                                                                                     | Nm (lb <sub>f</sub> -ft)                      | A                                             |                                                                     | Order No.            | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_f\text{-in-s}^2$ ) | kg (lb)                |
| 1FK7 Compact for DC link voltage 270 ... 330 V DC                               |              |                                               |                                                                                                                              |                                               |                                               |                                                                     |                      |                                                                   |                        |
| 6000                                                                            | 20           | 0.05 (0.07)                                   | 0.18 (0.13)                                                                                                                  | 0.08 (0.06)                                   | 0.5                                           | 1FK7011-5AK21-1 ■ ■ ■                                               | 4                    | 0.064 (0.06)                                                      | 0.9 (1.98)             |
|                                                                                 |              | 0.1 (0.13)                                    | 0.35 (0.26)                                                                                                                  | 0.16 (0.12)                                   | 0.5                                           | 1FK7015-5AK21-1 ■ ■ ■                                               | 4                    | 0.083 (0.07)                                                      | 1.1 (2.43)             |
|                                                                                 | 28           | 0.38 (0.51)                                   | 0.85 (0.63)                                                                                                                  | 0.6 (0.44)                                    | 1.4                                           | 1FK7022-5AK21-1 ■ ■ ■                                               | 3                    | 0.28 (0.25)                                                       | 1.8 (3.97)             |
| Encoder systems for motors without DRIVE-CLiQ interface:                        |              |                                               | IC2048S/R encoder<br>AM512S/R encoder<br>AM16S/R encoder ( <u>only</u> for 1FK702)<br>Multi-pole resolver<br>2-pole resolver |                                               |                                               | A<br>H<br>J<br>S<br>T                                               |                      |                                                                   |                        |
| Encoder systems for motors with DRIVE-CLiQ interface: ( <u>Only</u> for 1FK702) |              |                                               | IC22DQ encoder<br>AM20DQ encoder<br>AM15DQ encoder<br>R15DQ resolver<br>R14DQ resolver                                       |                                               |                                               | D<br>L<br>V<br>U<br>P                                               |                      |                                                                   |                        |
| Shaft extension:                                                                |              |                                               | Shaft and flange accuracy:                                                                                                   |                                               |                                               | Holding brake:                                                      | A<br>B<br>G<br>H     |                                                                   |                        |
| Feather key                                                                     |              |                                               | Tolerance N                                                                                                                  |                                               |                                               |                                                                     |                      |                                                                   |                        |
| Feather key                                                                     |              |                                               | Tolerance N                                                                                                                  |                                               |                                               |                                                                     |                      |                                                                   |                        |
| Plain shaft                                                                     |              |                                               | Tolerance N                                                                                                                  |                                               |                                               |                                                                     |                      |                                                                   |                        |
| Plain shaft                                                                     |              |                                               | Tolerance N                                                                                                                  |                                               |                                               |                                                                     |                      |                                                                   |                        |
| Degree of protection:                                                           |              |                                               |                                                                                                                              |                                               | Paint finish:                                 |                                                                     |                      |                                                                   |                        |
| IP64 ( <u>only</u> for 1FK702)                                                  |              |                                               |                                                                                                                              |                                               | Without                                       |                                                                     |                      | 0                                                                 |                        |
| IP65 and DE flange IP67 ( <u>only</u> for 1FK702)                               |              |                                               |                                                                                                                              |                                               | Without                                       |                                                                     |                      | 2                                                                 |                        |
| IP54 ( <u>only</u> for 1FK701), IP64 ( <u>only</u> for 1FK702)                  |              |                                               |                                                                                                                              |                                               | With                                          |                                                                     |                      | 3                                                                 |                        |
| IP65 and DE flange IP67 ( <u>only</u> for 1FK702)                               |              |                                               |                                                                                                                              |                                               | With                                          |                                                                     |                      | 5                                                                 |                        |

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
Compact for Power Modules 230 V 1 AC

| Motor type<br>(repeated)              | Efficiency <sup>1)</sup> | Stall current                                | Calculated power <sup>4)</sup><br>$P_{calc}$      | SINAMICS S110/S120<br>blocksize format               |                                   | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                   |                     |
|---------------------------------------|--------------------------|----------------------------------------------|---------------------------------------------------|------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|
|                                       | $\eta$                   | $I_0$<br>at $M_0$<br>$\Delta T=100\text{ K}$ | $P_{calc}$<br>at $M_0$<br>$\Delta T=100\text{ K}$ | Rated output<br>current <sup>2)</sup><br>$I_{rated}$ | PM340 Power Module<br>Air cooling | Power connector                                                                                    | Cable cross-section <sup>3)</sup> | Pre-assembled cable |
|                                       | %                        | A                                            | kW (HP)                                           | A                                                    | Order No.                         | Size                                                                                               | mm <sup>2</sup>                   | Order No.           |
| Line voltage 200 ... 240 V 1 AC       |                          |                                              |                                                   |                                                      |                                   |                                                                                                    |                                   |                     |
| 1FK7011-5AK21-...                     | 62                       | 0.85                                         | 0.1 (0.13)                                        | 0.9                                                  | 6SL3210-1SB11-0 A0                | 0.5                                                                                                | 4 × 1.5                           | 6FX5002-5DN30-....  |
| 1FK7015-5AK21-...                     | 68                       | 0.85                                         | 0.2 (0.27)                                        | 0.9                                                  | 6SL3210-1SB11-0 A0                | 0.5                                                                                                | 4 × 1.5                           | 6FX5002-5DN30-....  |
| 1FK7022-5AK21-...                     | 86                       | 1.8                                          | 0.5 (0.67)                                        | 2.3                                                  | 6SL3210-1SB12-3 A0                | 1                                                                                                  | 4 × 1.5                           | 6FX5002-5 G10-....  |
| Line filter:<br>Without<br>Integrated |                          |                                              |                                                   |                                                      | U<br>A                            | Power cable:<br>MOTION-CONNECT 800 PLUS<br>MOTION-CONNECT 500                                      |                                   |                     |
|                                       |                          |                                              |                                                   |                                                      |                                   | Without brake cores<br>With brake cores                                                            |                                   |                     |
|                                       |                          |                                              |                                                   |                                                      |                                   | C<br>D                                                                                             |                                   |                     |
|                                       |                          |                                              |                                                   |                                                      |                                   | Length code                                                                                        |                                   |                     |
|                                       |                          |                                              |                                                   |                                                      |                                   | ....                                                                                               |                                   |                     |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> Optimum efficiency in continuous duty.

<sup>2)</sup> With default setting of the pulse frequency.

<sup>3)</sup> The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.

<sup>4)</sup>  $P_{calc} [\text{kW}] = \frac{M_0 [\text{Nm}] \times n_{rated}}{9550}$      $P_{calc} [\text{hp}] = \frac{M_0 [\text{lb}_f\text{-ft}] \times n_{rated}}{5250}$



# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FK7 synchronous motors High Dynamic for Power Modules 230 V 1 AC

#### Selection and ordering data

| Rated speed                                              | Shaft height | Rated power                                   | Static torque                                                                                                | Rated torque                                  | Rated current                                 | SIMOTICS S-1FK7<br>High Dynamic<br>synchronous motors<br>Natural cooling | Number of pole pairs | Moment of inertia of rotor (without brake)                        | Weight (without brake) |
|----------------------------------------------------------|--------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------|------------------------|
| $n_{\text{rated}}$                                       | SH           | $P_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $M_0$ at $\Delta T=100\text{ K}$                                                                             | $M_{\text{rated}}$ at $\Delta T=100\text{ K}$ | $I_{\text{rated}}$ at $\Delta T=100\text{ K}$ |                                                                          | $p$                  | $J$                                                               | $m$                    |
| rpm                                                      |              | kW (HP)                                       | Nm (lb <sub>F</sub> -ft)                                                                                     | Nm (lb <sub>F</sub> -ft)                      | A                                             |                                                                          | Order No.            | $10^{-4}\text{ kgm}^2$<br>( $10^{-3}\text{ lb}_F\text{-in-s}^2$ ) | kg (lb)                |
| 1FK7 High Dynamic for DC link voltage 270 V ... 330 V DC |              |                                               |                                                                                                              |                                               |                                               |                                                                          |                      |                                                                   |                        |
| 3000                                                     | 36           | 0.4 (0.54)                                    | 1.3 (0.96)                                                                                                   | 1.2 (0.89)                                    | 2.05                                          | 1FK7033-4CF21-1                                                          | 3                    | 0.25 (0.22)                                                       | 3.0 (6.62)             |
|                                                          | 48           | 0.9 (1.21)                                    | 3.3 (2.43)                                                                                                   | 3.0 (2.21)                                    | 3.7                                           | 1FK7043-4CF21-1                                                          | 3                    | 1 (0.89)                                                          | 6.0 (13.23)            |
| Encoder systems for motors without DRIVE-CLiQ interface: |              |                                               | IC2048S/R encoder<br>AM2048S/R encoder<br>Multi-pole resolver<br>2-pole resolver                             |                                               |                                               | A<br>E<br>S<br>T                                                         |                      |                                                                   |                        |
| Encoder systems for motors with DRIVE-CLiQ interface:    |              |                                               | AS24DQI encoder<br>AM24DQI encoder<br>AS20DQI encoder<br>AM20DQI encoder<br>R15DQ resolver<br>R14DQ resolver |                                               |                                               | B<br>C<br>Q<br>R<br>U<br>P                                               |                      |                                                                   |                        |
| Shaft extension:                                         |              |                                               | Shaft and flange accuracy:                                                                                   |                                               | Holding brake:                                | A<br>B<br>G<br>H                                                         |                      |                                                                   |                        |
| Feather key                                              |              |                                               | Tolerance N                                                                                                  |                                               | Without                                       |                                                                          |                      |                                                                   |                        |
| Feather key                                              |              |                                               | Tolerance N                                                                                                  |                                               | With                                          |                                                                          |                      |                                                                   |                        |
| Plain shaft                                              |              |                                               | Tolerance N                                                                                                  |                                               | Without                                       |                                                                          |                      |                                                                   |                        |
| Plain shaft                                              |              |                                               | Tolerance N                                                                                                  |                                               | With                                          |                                                                          |                      |                                                                   |                        |
| Degree of protection:                                    |              |                                               | IP64<br>IP65<br>IP65 and DE flange IP67                                                                      |                                               |                                               | 0<br>1<br>2                                                              |                      |                                                                   |                        |

## SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors  
High Dynamic for Power Modules 230 V 1 AC

| Motor type<br>(repeated) | Efficiency<br>1) | Stall<br>current                        | Calculated<br>power<br>$P_{calc}$ <sup>4)</sup> | SINAMICS S120 blocksize format           |                                   | Power cable with complete shield<br>Motor connection (and brake connection)<br>via power connector |                                          |                        |
|--------------------------|------------------|-----------------------------------------|-------------------------------------------------|------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------|------------------------|
|                          | $\eta$           | $I_0$<br>at $M_0$<br>$\Delta T = 100$ K | $P_{calc}$<br>at $M_0$<br>$\Delta T = 100$ K    | Rated<br>output<br>current <sup>2)</sup> | PM340 Power Module<br>Air cooling | Power<br>connector                                                                                 | Cable<br>cross-<br>section <sup>3)</sup> | Pre-assembled<br>cable |
|                          | %                | A                                       | kW (HP)                                         | A                                        | Order No.                         | Size                                                                                               | mm <sup>2</sup>                          | Order No.              |
|                          |                  |                                         |                                                 | Line voltage 200 ... 240 V 1 AC          |                                   |                                                                                                    |                                          |                        |
| 1FK7033-4CF21-...        | 86               | 2.1                                     | 0.4 (0.54)                                      | 2.3                                      | 6SL3210-1SB12-3 A0                | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5 G10-....     |
| 1FK7043-4CF21-...        | 88               | 3.9                                     | 1 (1.34)                                        | 3.9                                      | 6SL3210-1SB14-0 A0                | 1                                                                                                  | 4 × 1.5                                  | 6FX0002-5 G10-....     |
|                          |                  |                                         |                                                 | Line filter:                             |                                   | Power cable:                                                                                       |                                          |                        |
|                          |                  |                                         |                                                 | Without                                  |                                   | MOTION-CONNECT 800 PLUS                                                                            |                                          |                        |
|                          |                  |                                         |                                                 | Integrated                               |                                   | MOTION-CONNECT 500                                                                                 |                                          |                        |
|                          |                  |                                         |                                                 |                                          |                                   | Without brake cores                                                                                |                                          |                        |
|                          |                  |                                         |                                                 |                                          |                                   | With brake cores                                                                                   |                                          |                        |
|                          |                  |                                         |                                                 |                                          |                                   | Length code                                                                                        |                                          |                        |

More information about cables can be found  
under MOTION-CONNECT connection  
systems.

1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

3) The current carrying capacity of the power cable complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F). Cable cross-section for brake connection 2 × 1.5 mm<sup>2</sup>.

4)  $P_{calc} [kW] = \frac{M_0 [Nm] \times n_{rated}}{9550}$   $P_{calc} [hp] = \frac{M_0 [lb-ft] \times n_{rated}}{5250}$

# Feed motors

## SIMOTICS S servomotors for SINAMICS S120

### Selection aids – Built-in holding brakes for SIMOTICS S-1FT7/1FK7 synchronous motors

#### Overview

Many drives need a holding brake with an emergency stop function for safety reasons or to meet process requirements.

The permanent magnet single-surface brakes used on the SIMOTICS S-1FT7/1FK7 motors function according to the closed circuit principle. The magnetic field of the permanent magnet exerts a tension on the brake anchor plate, i.e. in a condition of zero current, the brake is closed and the motor shaft thereby stopped. When the rated voltage of 24 V DC  $\pm$  10 % is applied to the brake, current flows through the coil and produces a counter-field that cancels the pull of the permanent magnet, causing the brake to release.

In the event of an emergency stop or power outage, approximately 2000 braking operations can be performed with the maximum switched energy without causing excessive wear on the holding brake (condition: maximum external moment of inertia = moment of inertia of motor and  $n_{\max}$  type-specific).

The holding brake is not an operational brake.

In order to avoid switching overvoltages and any related effects on the plant environment, the brake cables must be connected externally with a varistor. The connection is made via the power connector or the terminal box.

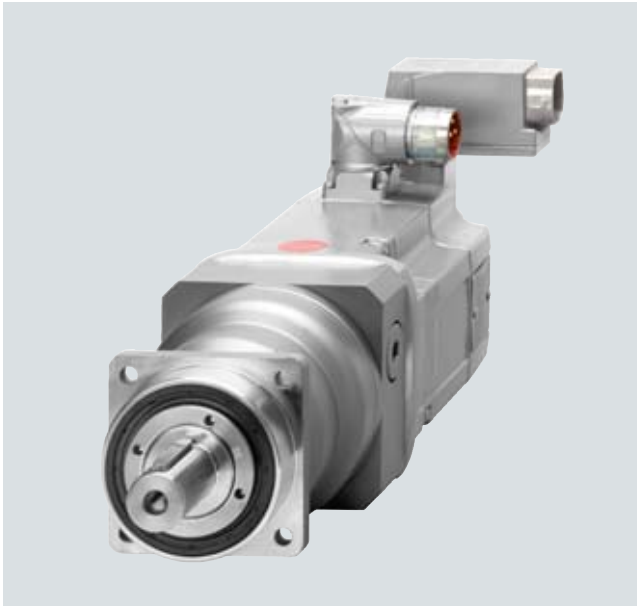
When connected to the SINAMICS S120 drive system, this overvoltage protection is already included.

#### Technical specifications

| Motor<br>Shaft<br>height<br>SH                                    | Type                          | Built-in holding brake          |                   |                               |                               |                                                                                |                                                                          |
|-------------------------------------------------------------------|-------------------------------|---------------------------------|-------------------|-------------------------------|-------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|                                                                   |                               | Holding<br>torque <sup>1)</sup> | Direct<br>current | Opening time<br>with varistor | Closing time<br>with varistor | Moment<br>of inertia                                                           | Maximum switched<br>energy<br>per brake operation<br>from $n = 3000$ rpm |
|                                                                   |                               | Nm (lb <sub>F</sub> -ft)        | A                 | ms                            | ms                            | $10^{-4}$ kgm <sup>2</sup><br>( $10^{-3}$ lb <sub>F</sub> -in-s <sup>2</sup> ) |                                                                          |
| 1FT7 motors with permanent-magnet brake, without backlash         |                               |                                 |                   |                               |                               |                                                                                |                                                                          |
| 36                                                                | 1FT703                        | 3 (2.21)                        | 0.3               | 60                            | 25                            | 0.12 (0.11)                                                                    | 30                                                                       |
| 48                                                                | 1FT704                        | 8 (5.9)                         | 0.6               | 90                            | 30                            | 0.87 (0.77)                                                                    | 270                                                                      |
| 63                                                                | 1FT706                        | 18 (13.28)                      | 0.8               | 150                           | 50                            | 2.84 (2.51)                                                                    | 880                                                                      |
| 80                                                                | 1FT708                        | 48 (35.4)                       | 1.0               | 220                           | 65                            | 15.4 (13.63)                                                                   | 1900                                                                     |
| 100                                                               | 1FT710                        | 85 (62.7)                       | 1.6               | 250                           | 70                            | 27.6 (24.43)                                                                   | 5300                                                                     |
| 1FK7 Compact motors with permanent-magnet brake, without backlash |                               |                                 |                   |                               |                               |                                                                                |                                                                          |
| 20                                                                | 1FK701                        | 0.4 (0.3)                       | 0.3               | 30                            | 20                            | 0.019 (0.02)                                                                   | 2                                                                        |
| 28                                                                | 1FK7022                       | 1.0 (0.7)                       | 0.3               | 30                            | 20                            | 0.07 (0.06)                                                                    | 8                                                                        |
| 36                                                                | 1FK7032                       | 1.9 (1.4)                       | 0.3               | 50                            | 30                            | 0.08 (0.07)                                                                    | 40                                                                       |
| 48                                                                | 1FK704                        | 4.0 (3.0)                       | 0.5               | 70                            | 30                            | 0.72 (0.64)                                                                    | 150                                                                      |
| 63                                                                | 1FK706                        | 13 (9.6)                        | 0.8               | 100                           | 50                            | 2.25 (1.99)                                                                    | 380                                                                      |
| 80                                                                | 1FK708                        | 22 (16.2)                       | 0.9               | 200                           | 60                            | 8.6 (7.61)                                                                     | 1400                                                                     |
| 100                                                               | 1FK7100                       | 23 (16.96)                      | 1.0               | 300                           | 70                            | 8.6 (7.61)                                                                     | 3380                                                                     |
| 100                                                               | 1FK7101<br>1FK7103<br>1FK7105 | 43 (31.72)                      | 1.0               | 300                           | 70                            | 13.5 (11.95)                                                                   | 3380                                                                     |

<sup>1)</sup> The holding torque is the highest permissible torque with which the closed brake can be loaded in steady-state operation without slip (holding function when motor is stationary).

## Overview



SIMOTICS S-1FT7 motor with mounted SP+ series planetary gearbox

SIMOTICS S-1FT7 motors can be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

When selecting the gearbox, ensure that its maximum permissible input speed is not exceeded by the maximum speed of the motor. In the case of high operating frequencies, allowance must be made for the factor  $f_2$  (see Configuration Manual, SIMOTICS S-1FT7 synchronous motors). The frictional losses of the gearbox must always be taken into account.

The gearboxes are only available in non-balanced design.

## Benefits

- High efficiency  
Single-stage: > 97 %  
Two-stage: > 94 %
- Minimum torsional backlash  
Single-stage: ≤ 4 arcmin  
Two-stage: ≤ 6 arcmin
- Power transmission from the central sun wheel via planet wheels
- No shaft deflections in the planet wheel set due to symmetrical force distribution
- Very low moment of inertia and thus short acceleration times of the motors
- Output shaft bearings dimensioned for high cantilever and axial loads with preloaded tapered-roller bearings
- The gearboxes are connected to the motor shaft via an integrated clamping hub. A plain motor shaft extension is necessary for this purpose. Shaft and flange accuracy tolerance N in accordance with DIN 42955 and vibration severity grade A in accordance with EN 60034-14 are sufficient. The motor flange is adapted by means of adapter plates.
- Output shaft of gearbox exactly coaxial with the motor
- The gearboxes are enclosed (seal between gearbox and motor) and filled with oil at the factory. They are lubricated and sealed for their service life.  
The gearboxes are suitable for all mounting positions.
- Degree of protection of gearbox: IP65
- Small dimensions
- Low weight

## Integration

SIMOTICS S-1FT703 to 1FT710 motors can be supplied ex factory (Siemens AG) complete with flange-mounted planetary gearbox.

The gearboxes assigned to the individual motors and gear ratios  $i$  available for these motor/gearbox combinations are listed in the subsequent selection table. When making a selection, account must be taken of the maximum permissible input speed of the gearbox (this is the same as the maximum motor speed).

The motor/gearbox combinations listed in the selection tables are mainly intended for cycle operation S3-60% (ON time ≤ 60 % and ≤ 20 min). Reduced maximum motor speeds and output torques apply for use in S1 continuous duty (ON time > 60 % or > 20 min). The gear unit temperature must not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for SIMOTICS S-1FT7 synchronous motors when assigning gearboxes to the motor.

# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FT7 synchronous motors

#### Selection and ordering data

| Motor   | Planetary gearbox<br>Single-stage |                                     |                                              | Available gear ratio $i =$ |     |           |     | Motor speed,<br>max.<br>S3-60 %      | Output torque,<br>max.<br>S3-60 %                            | Radial<br>output shaft<br>loading,<br>max. <sup>1)</sup> | Axial<br>output shaft<br>loading,<br>max. <sup>1)</sup>  |
|---------|-----------------------------------|-------------------------------------|----------------------------------------------|----------------------------|-----|-----------|-----|--------------------------------------|--------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Type    | Type                              | Torsional<br>backlash<br><br>arcmin | Gearbox<br>weight,<br>approx.<br><br>kg (lb) | 4                          | 5   | 7         | 10  | $n_{G1}$<br><br>( $n_1$ )<br><br>rpm | $M_{G2}$<br><br>( $T_{2B}$ )<br><br>Nm (lb <sub>f</sub> -ft) | $F_r$<br><br>( $F_{2Rmax}$ )<br><br>N (lb <sub>f</sub> ) | $F_a$<br><br>( $F_{2Amax}$ )<br><br>N (lb <sub>f</sub> ) |
| 1FT7034 | SP 060S-MF1                       | ≤ 4                                 | 1.9 (4.2)                                    | ✓                          | ✓   | ✓         | –   | 6000                                 | 40 (29.5)                                                    | 2700 (606)                                               | 2400 (540)                                               |
| 1FT7034 | SP 075S-MF1                       | ≤ 4                                 | 3.9 (8.6)                                    | –                          | –   | –         | ✓   | 6000                                 | 110 (81.1)<br>(90 for $i = 10$ )                             | 4000 (899)                                               | 3350 (753)                                               |
| 1FT7036 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7042 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7044 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7046 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7046 | SP 100S-MF1                       | ≤ 3                                 | 7.7 (17.0)                                   | –                          | –   | –         | ✓   | 4500                                 | 300 (221)<br>(225 for $i = 10$ )                             | 6300 (1416)                                              | 5650 (1270)                                              |
| 1FT7062 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7064 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7065 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7066 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7067 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7068 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7065 | SP 140S-MF1                       | ≤ 3                                 | 17.2 (37.9)                                  | –                          | –   | –         | ✓   | 4000                                 | 600 (442)<br>(480 for $i = 10$ )                             | 9450 (2124)                                              | 9870 (2218)                                              |
| 1FT7067 |                                   |                                     |                                              | –                          | –   | –         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7068 |                                   |                                     |                                              | –                          | –   | –         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7082 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7084 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7085 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7086 |                                   |                                     |                                              | ✓                          | ✓   | ✓         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7087 |                                   |                                     |                                              | ✓                          | ✓   | –         | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7085 |                                   |                                     |                                              | SP 180S-MF1                | ≤ 3 | 34 (75.0) | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7086 | –                                 | –                                   | –                                            |                            |     |           | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7087 | –                                 | –                                   | ✓                                            |                            |     |           | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7102 | ✓                                 | ✓                                   | ✓                                            |                            |     |           | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FT7105 | ✓                                 | ✓                                   | ✓                                            |                            |     |           | –   |                                      |                                                              |                                                          |                                                          |
| 1FT7108 | ✓                                 | ✓                                   | ✓                                            | –                          |     |           |     |                                      |                                                              |                                                          |                                                          |
| 1FT7105 | SP 210S-MF1                       | ≤ 3                                 | 56 (123)                                     | –                          | –   | –         | ✓   | 2500                                 | 2500 (1844)<br>(2400 for $i = 7$<br>1900 for $i = 10$ )      | 21000 (4721)                                             | 30000 (6744)                                             |
| 1FT7108 |                                   |                                     |                                              | –                          | –   | –         | ✓   |                                      |                                                              |                                                          |                                                          |
|         | Gear shaft                        |                                     |                                              | Order code                 |     |           |     |                                      |                                                              |                                                          |                                                          |
|         | With feather key                  |                                     |                                              | J02                        | J03 | J05       | J09 |                                      |                                                              |                                                          |                                                          |
|         | Without feather key               |                                     |                                              | J22                        | J23 | J25       | J29 |                                      |                                                              |                                                          |                                                          |

#### Preconditions:

SP+ planetary gearboxes can be mounted with the following motor versions:

- Flange 1
- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- Vibration severity grade A/IP65 degree of protection

SP+ planetary gearboxes can therefore only be ordered with these 1FT7 motors:

1FT7...-5..71-...G1  
1FT7...-5..71-...H1  
1FT7...-7..71-...G1  
1FT7...-7..71-...H1

When ordering a motor with gearbox, **-Z** should be added to the order number.

#### Example:

1FT7042 motor without holding brake with single-stage SP+ planetary gearbox with  $i = 5$  and gear shaft without feather key.  
1FT7042-5AF71-1NG1-**Z**  
**J23**

✓ Possible

– Not possible

<sup>1)</sup> In relation to the output shaft center.

## Technical specifications

## SIMOTICS S-1FT7 motor with SP+ planetary gearbox

| Single-stage<br>Type | Gear ratio<br><i>i</i> | Motor speed                      | Output torque                                     | Moments of inertia of the gearboxes (relating to the drive)    |                                                                |                                                                |                                                                |                                                                |
|----------------------|------------------------|----------------------------------|---------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
|                      |                        | Continuous duty S1 <sup>1)</sup> |                                                   | 1FT703.                                                        | 1FT704.                                                        | 1FT706.                                                        | 1FT708.                                                        | 1FT710.                                                        |
|                      |                        | $n_{N1}$<br>rpm                  | $M_{N2}$ ( $T_{2N}$ )<br>Nm (lb <sub>f</sub> -ft) | $J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | $J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | $J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | $J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | $J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) |
| SP 060S-MF1          | 4                      | 3300                             | 26 (19.2)                                         | 0.22 (0.08)                                                    | –                                                              | –                                                              | –                                                              | –                                                              |
|                      | 5                      | 3300                             | 26 (19.2)                                         | 0.20 (0.07)                                                    | –                                                              | –                                                              | –                                                              | –                                                              |
|                      | 7                      | 4000                             | 26 (19.2)                                         | 0.18 (0.06)                                                    | –                                                              | –                                                              | –                                                              | –                                                              |
| SP 075S-MF1          | 4                      | 2900                             | 75 (55.3)                                         | 0.61 (0.21)                                                    | 0.78 (0.27)                                                    | –                                                              | –                                                              | –                                                              |
|                      | 5                      | 2900                             | 75 (55.3)                                         | 0.51 (0.17)                                                    | 0.68 (0.23)                                                    | –                                                              | –                                                              | –                                                              |
|                      | 7                      | 3100                             | 75 (55.3)                                         | 0.42 (0.14)                                                    | 0.59 (0.20)                                                    | –                                                              | –                                                              | –                                                              |
|                      | 10                     | 3100                             | 52 (38.3)                                         | 0.38 (0.13)                                                    | 0.54 (0.19)                                                    | –                                                              | –                                                              | –                                                              |
| SP 100S-MF1          | 4                      | 2500                             | 180 (132)                                         | –                                                              | –                                                              | 3.04 (1.04)                                                    | –                                                              | –                                                              |
|                      | 5                      | 2500                             | 175 (129)                                         | –                                                              | –                                                              | 2.61 (0.89)                                                    | –                                                              | –                                                              |
|                      | 7                      | 2800                             | 170 (125)                                         | –                                                              | –                                                              | 2.29 (0.78)                                                    | –                                                              | –                                                              |
|                      | 10                     | 2800                             | 120 (88.5)                                        | –                                                              | 1.38 (0.5)                                                     | 2.07 (0.71)                                                    | –                                                              | –                                                              |
| SP 140S-MF1          | 4                      | 2100                             | 360 (266)                                         | –                                                              | –                                                              | –                                                              | 11.0 (3.67)                                                    | –                                                              |
|                      | 5                      | 2100                             | 360 (266)                                         | –                                                              | –                                                              | –                                                              | 9.95 (3.40)                                                    | –                                                              |
|                      | 7                      | 2600                             | 360 (266)                                         | –                                                              | –                                                              | –                                                              | 9.01 (3.08)                                                    | –                                                              |
|                      | 10                     | 2600                             | 220 (162)                                         | –                                                              | –                                                              | 5.28 (1.80)                                                    | 8.44 (2.88)                                                    | –                                                              |
| SP 180S-MF1          | 4                      | 1500                             | 750 (553)                                         | –                                                              | –                                                              | –                                                              | –                                                              | 33.9 (11.6)                                                    |
|                      | 5                      | 1500                             | 750 (553)                                         | –                                                              | –                                                              | –                                                              | –                                                              | 27.9 (9.53)                                                    |
|                      | 7                      | 2300                             | 750 (553)                                         | –                                                              | –                                                              | –                                                              | –                                                              | 22.2 (7.59)                                                    |
|                      | 10                     | 2300                             | 750 (553)                                         | –                                                              | –                                                              | –                                                              | 19.2 (6.56)                                                    | 19.2 (6.56)                                                    |
| SP 210S-MF1          | 10                     | 2000                             | 1000 (738)                                        | –                                                              | –                                                              | –                                                              | –                                                              | 53.1 (18.1)                                                    |

<sup>1)</sup> The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).

# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FT7 synchronous motors

#### Selection and ordering data

| Motor                                               | Planetary gearbox<br>Two-stage |                       |                               | Available gear ratio $i =$ |     |             |     |     | Motor<br>speed,<br>max.<br>S3-60 % | Output<br>torque,<br>max.<br>S3-60 %                     | Radial<br>output shaft<br>loading,<br>max. <sup>1)</sup> | Axial<br>output shaft<br>loading,<br>max. <sup>1)</sup> |                                     |              |              |      |            |              |              |
|-----------------------------------------------------|--------------------------------|-----------------------|-------------------------------|----------------------------|-----|-------------|-----|-----|------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|-------------------------------------|--------------|--------------|------|------------|--------------|--------------|
| Type                                                | Type                           | Torsional<br>backlash | Gearbox<br>weight,<br>approx. | 16                         | 20  | 28          | 40  | 50  | $n_{G1}$                           | $M_{G2}$                                                 | $F_r$                                                    | $F_a$                                                   |                                     |              |              |      |            |              |              |
|                                                     |                                | arcmin                | kg (lb)                       |                            |     |             |     |     | $(n_1)$<br>rpm                     | $(T_{2B})$<br>Nm (lb <sub>f</sub> -ft)                   | $(F_{2Rmax})$<br>N (lb <sub>f</sub> )                    | $(F_{2Amax})$<br>N (lb <sub>f</sub> )                   |                                     |              |              |      |            |              |              |
| 1FT7034<br>1FT7036                                  | SP 075S-MF2                    | ≤ 6                   | 3.6 (7.9)                     | ✓                          | ✓   | ✓           | –   | –   | 6000                               | 110 (81.1)                                               | 4000 (899)                                               | 3350 (753)                                              |                                     |              |              |      |            |              |              |
| 1FT7042                                             |                                |                       |                               | ✓                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7034<br>1FT7036                                  | SP 100S-MF2                    | ≤ 5                   | 7.9 (17.4)                    | –                          | –   | –           | ✓   | ✓   | 4500                               | 300 (221)                                                | 6300 (1416)                                              | 5650 (1270)                                             |                                     |              |              |      |            |              |              |
| 1FT7042                                             |                                |                       |                               | –                          | ✓   | ✓           | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7044                                             |                                |                       |                               | ✓                          | ✓   | ✓           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7046                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7062                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7064                                             |                                |                       |                               | ✓                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7044<br>1FT7046                                  | SP 140S-MF2                    | ≤ 5                   | 17 (37.5)                     | –                          | –   | –           | ✓   | ✓   | 4000                               | 600 (442)                                                | 9450 (2124)                                              | 9870 (2218)                                             |                                     |              |              |      |            |              |              |
| 1FT7062                                             |                                |                       |                               | –                          | –   | ✓           | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7064                                             |                                |                       |                               | –                          | ✓   | ✓           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7065                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7066                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7067                                             |                                |                       |                               | ✓                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7068                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7082                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7084                                             |                                |                       |                               | ✓                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7064<br>1FT7065<br>1FT7066<br>1FT7067<br>1FT7068 |                                |                       |                               | SP 180S-MF2                | ≤ 5 | 36.4 (80.3) | –   | –   |                                    |                                                          |                                                          |                                                         | –                                   | ✓            | ✓            | 4000 | 1100 (811) | 14700 (3305) | 14150 (3181) |
| 1FT7082                                             | –                              | –                     | ✓                             |                            |     |             | ✓   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7084                                             | –                              | ✓                     | ✓                             |                            |     |             | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7085                                             | ✓                              | –                     | –                             |                            |     |             | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7086                                             | ✓                              | ✓                     | –                             |                            |     |             | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7102                                             | ✓                              | ✓                     | –                             |                            |     |             | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7084<br>1FT7085<br>1FT7086<br>1FT7087            | SP 210S-MF2                    | ≤ 5                   | 55.0 (121)                    |                            |     |             | –   | –   | –                                  | ✓                                                        | ✓                                                        | 3500                                                    | 2400 (1770)<br>(2500 for $i = 20$ ) | 21000 (4721) | 30000 (6744) |      |            |              |              |
| 1FT7102                                             |                                |                       |                               |                            |     |             | –   | –   | ✓                                  | –                                                        | –                                                        |                                                         |                                     |              |              |      |            |              |              |
| 1FT7105                                             |                                |                       |                               | ✓                          | ✓   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7108                                             |                                |                       |                               | ✓                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7085<br>1FT7086<br>1FT7102<br>1FT7105<br>1FT7108 | SP 240S-MF2                    | ≤ 5                   | 80.6 (178)                    | –                          | –   | –           | ✓   | ✓   | 3500                               | 4500 (3319)<br>(4000 for $i = 40$<br>4300 for $i = 50$ ) | 30000 (6744)                                             | 33000 (7419)                                            |                                     |              |              |      |            |              |              |
| 1FT7086                                             |                                |                       |                               | –                          | –   | –           | –   | ✓   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7102                                             |                                |                       |                               | –                          | –   | –           | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7105                                             |                                |                       |                               | –                          | –   | –           | –   | –   |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| 1FT7108                                             | –                              | ✓                     | ✓                             | –                          | –   |             |     |     |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| Gear shaft                                          |                                |                       |                               | Order code                 |     |             |     |     |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| With feather key                                    |                                |                       |                               | J12                        | J13 | J15         | J16 | J17 |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |
| Without feather key                                 |                                |                       |                               | J32                        | J33 | J35         | J36 | J37 |                                    |                                                          |                                                          |                                                         |                                     |              |              |      |            |              |              |

Preconditions, see page 4/46.

✓ Possible

– Not possible

<sup>1)</sup> In relation to the output shaft center.



## Technical specifications

## SIMOTICS S-1FT7 motor with SP+ planetary gearbox

| Two-stage<br>Type | Gear ratio<br><i>i</i> | Motor speed                                         | Output torque                                     | Moments of inertia of the gearboxes (relating to the drive)               |                                                                           |                                                                           |                                                                           |                                                                           |
|-------------------|------------------------|-----------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                   |                        | Continuous duty S1 <sup>1)</sup><br>$n_{N1}$<br>rpm | $M_{N2}$ ( $T_{2N}$ )<br>Nm (lb <sub>f</sub> -ft) | 1FT703.<br>$J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | 1FT704.<br>$J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | 1FT706.<br>$J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | 1FT708.<br>$J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) | 1FT710.<br>$J_1$<br>kgcm <sup>2</sup> (lb <sub>f</sub> -in <sup>2</sup> ) |
| SP 075S-MF2       | 16                     | 3500                                                | 75 (55.3)                                         | 0.23 (0.08)                                                               | 0.55 (0.19)                                                               | –                                                                         | –                                                                         | –                                                                         |
|                   | 20                     | 3500                                                | 75 (55.3)                                         | 0.20 (0.07)                                                               | –                                                                         | –                                                                         | –                                                                         | –                                                                         |
|                   | 28                     | 3500                                                | 75 (55.3)                                         | 0.18 (0.06)                                                               | –                                                                         | –                                                                         | –                                                                         | –                                                                         |
| SP 100S-MF2       | 16                     | 3100                                                | 180 (133)                                         | –                                                                         | 0.81 (0.28)                                                               | 2.18 (0.75)                                                               | –                                                                         | –                                                                         |
|                   | 20                     | 3100                                                | 180 (133)                                         | 0.54 (0.19)                                                               | 0.70 (0.24)                                                               | 2.07 (0.71)                                                               | –                                                                         | –                                                                         |
|                   | 28                     | 3100                                                | 180 (133)                                         | 0.43 (0.15)                                                               | 0.60 (0.21)                                                               | –                                                                         | –                                                                         | –                                                                         |
|                   | 40                     | 3100                                                | 180 (133)                                         | 0.38 (0.13)                                                               | 0.55 (0.19)                                                               | –                                                                         | –                                                                         | –                                                                         |
|                   | 50                     | 3500                                                | 175 (129)                                         | 0.38 (0.13)                                                               | 0.54 (0.19)                                                               | –                                                                         | –                                                                         | –                                                                         |
| SP 140S-MF2       | 16                     | 2900                                                | 360 (265)                                         | –                                                                         | –                                                                         | 3.19 (1.09)                                                               | 10.3 (3.52)                                                               | –                                                                         |
|                   | 20                     | 2900                                                | 360 (265)                                         | –                                                                         | –                                                                         | 2.71 (0.93)                                                               | 9.77 (3.34)                                                               | –                                                                         |
|                   | 28                     | 2900                                                | 360 (265)                                         | –                                                                         | 1.65 (0.56)                                                               | 2.34 (0.80)                                                               | –                                                                         | –                                                                         |
|                   | 40                     | 2900                                                | 360 (265)                                         | –                                                                         | 1.40 (0.48)                                                               | 2.10 (0.72)                                                               | –                                                                         | –                                                                         |
|                   | 50                     | 3200                                                | 360 (265)                                         | –                                                                         | 1.39 (0.48)                                                               | 2.08 (0.71)                                                               | –                                                                         | –                                                                         |
| SP 180S-MF2       | 16                     | 2700                                                | 750 (553)                                         | –                                                                         | –                                                                         | –                                                                         | 12.4 (4.24)                                                               | 13.5 (4.61)                                                               |
|                   | 20                     | 2700                                                | 750 (553)                                         | –                                                                         | –                                                                         | –                                                                         | 10.9 (3.73)                                                               | 12.0 (4.10)                                                               |
|                   | 28                     | 2700                                                | 750 (553)                                         | –                                                                         | –                                                                         | 6.32 (2.16)                                                               | 9.48 (3.24)                                                               | –                                                                         |
|                   | 40                     | 2700                                                | 750 (553)                                         | –                                                                         | –                                                                         | 5.51 (1.88)                                                               | 8.67 (2.96)                                                               | –                                                                         |
|                   | 50                     | 2900                                                | 750 (553)                                         | –                                                                         | –                                                                         | 5.45 (1.86)                                                               | 8.61 (2.94)                                                               | –                                                                         |
| SP 210S-MF2       | 16                     | 2500                                                | 1500 (1106)                                       | –                                                                         | –                                                                         | –                                                                         | –                                                                         | 34.5 (11.8)                                                               |
|                   | 20                     | 2500                                                | 1500 (1106)                                       | –                                                                         | –                                                                         | –                                                                         | –                                                                         | 31.5 (10.76)                                                              |
|                   | 28                     | 2500                                                | 1500 (1106)                                       | –                                                                         | –                                                                         | –                                                                         | 30.0 (10.25)                                                              | 30.0 (10.25)                                                              |
|                   | 40                     | 2500                                                | 1500 (1106)                                       | –                                                                         | –                                                                         | –                                                                         | 28.5 (9.74)                                                               | –                                                                         |
|                   | 50                     | 2500                                                | 1500 (1106)                                       | –                                                                         | –                                                                         | –                                                                         | 28.3 (9.67)                                                               | –                                                                         |
| SP 240S-MF2       | 20                     | 2500                                                | 2500 (1844)                                       | –                                                                         | –                                                                         | –                                                                         | –                                                                         | 34.6 (11.8)                                                               |
|                   | 28                     | 2500                                                | 2500 (1844)                                       | –                                                                         | –                                                                         | –                                                                         | –                                                                         | 30.5 (10.4)                                                               |
|                   | 40                     | 2500                                                | 2500 (1844)                                       | –                                                                         | –                                                                         | –                                                                         | –                                                                         | 28.2 (9.64)                                                               |
|                   | 50                     | 2500                                                | 2500 (1844)                                       | –                                                                         | –                                                                         | –                                                                         | 27.9 (9.53)                                                               | 27.9 (9.53)                                                               |

<sup>1)</sup> The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).

# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FK7 synchronous motors

#### Overview



SIMOTICS S-1FK7 motor with mounted series SP+ planetary gearbox

SIMOTICS S-1FK7 motors can easily be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

When selecting the gearbox, ensure that its maximum permissible input speed is not exceeded by the maximum speed of the motor. In the case of high operating frequencies, allowance must be made for the factor  $f_2$  (see Configuration Manual, SIMOTICS S-1FK7 synchronous motors). The frictional losses of the gearbox must always be taken into account.

The gearboxes are only available in non-balanced design.

#### Benefits

- High efficiency  
Single-stage: > 97 %  
Two-stage: > 94 %
- Minimum torsional backlash  
Single-stage: ≤ 4 arcmin  
Two-stage: ≤ 6 arcmin
- Power transmission from the central sun wheel via planet wheels
- No shaft deflections in the planet wheel set due to symmetrical force distribution
- Very low moment of inertia and thus short acceleration times of the motors
- Output shaft bearings dimensioned for high cantilever and axial loads with preloaded tapered-roller bearings
- The gearboxes are connected to the motor shaft via an integrated clamping hub. A plain motor shaft extension is necessary for this purpose. Shaft and flange accuracy tolerance N in accordance with DIN 42955 and vibration severity grade A in accordance with EN 60034-14 are sufficient. The motor flange is adapted by means of adapter plates.
- Output shaft of gearbox exactly coaxial with the motor
- The gearboxes are enclosed (seal between gearbox and motor) and filled with oil at the factory. They are lubricated and sealed for their service life.  
The gearboxes are suitable for all mounting positions.
- Degree of protection of gearbox: IP65
- Small dimensions
- Low weight

#### Integration

SIMOTICS S-1FK702 to 1FK710 motors can be supplied ex factory (Siemens AG) complete with flange-mounted planetary gearbox.

The gearboxes assigned to the individual motors and gear ratios  $i$  available for these motor/gearbox combinations are listed in the subsequent selection table. When making a selection, account must be taken of the maximum permissible input speed of the gearbox (this is the same as the maximum motor speed).

The motor/gearbox combinations listed in the selection table are mainly intended for cycle operation S3-60% (ON time ≤ 60 % and ≤ 20 min). Reduced maximum motor speeds and output torques apply for use in S1 continuous duty (ON time > 60 % or > 20 min). The gear unit temperature must not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for SIMOTICS S-1FK7 synchronous motors when assigning gearboxes to the motor.

## Selection and ordering data

| Motor   | Planetary gearbox<br>Single-stage |                       |                               | Available gear ratio $i =$ |     |     |     | Motor<br>speed,<br>max.<br>S3-60 % | Output<br>torque,<br>max.<br>S3-60 %                     | Radial<br>output shaft<br>loading,<br>max. <sup>1)</sup> | Axial<br>output shaft<br>loading,<br>max. <sup>1)</sup> |
|---------|-----------------------------------|-----------------------|-------------------------------|----------------------------|-----|-----|-----|------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Type    | Type                              | Torsional<br>backlash | Gearbox<br>weight,<br>approx. | 4                          | 5   | 7   | 10  | $n_{G1}$<br><br>( $n_1$ )<br>rpm   | $M_{G2}$<br><br>( $T_{2B}$ )<br>Nm (lb <sub>f</sub> -ft) | $F_r$<br><br>( $F_{2Rmax}$ )<br>N (lb <sub>f</sub> )     | $F_a$<br><br>( $F_{2Amax}$ )<br>N (lb <sub>f</sub> )    |
|         |                                   | arcmin                | kg (lb)                       |                            |     |     |     |                                    |                                                          |                                                          |                                                         |
| 1FK7022 | SP 060S-MF1                       | ≤ 4                   | 1.9 (4.2)                     | ✓                          | ✓   | ✓   | ✓   | 6000                               | 40 (29.5)                                                | 2700 (606)                                               | 2400 (540)                                              |
| 1FK7032 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    | (32 for $i = 10$ )                                       |                                                          |                                                         |
| 1FK7033 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7034 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7040 | SP 075S-MF1                       | ≤ 4                   | 3.9 (8.6)                     | ✓                          | ✓   | ✓   | ✓   | 6000                               | 110 (81.1)                                               | 4000 (899)                                               | 3350 (753)                                              |
| 1FK7042 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    | (90 for $i = 10$ )                                       |                                                          |                                                         |
| 1FK7043 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7044 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7060 | SP 100S-MF1                       | ≤ 3                   | 7.7 (17.0)                    | ✓                          | ✓   | ✓   | ✓   | 4500                               | 300 (221)                                                | 6300 (1416)                                              | 5650 (1270)                                             |
| 1FK7061 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    | (225 for $i = 10$ )                                      |                                                          |                                                         |
| 1FK7062 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7063 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7064 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7080 | SP 140S-MF1                       | ≤ 3                   | 17.2 (37.9)                   | ✓                          | ✓   | ✓   | ✓   | 4000                               | 600 (442)                                                | 9450 (2124)                                              | 9870 (2218)                                             |
| 1FK7081 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    | (480 for $i = 10$ )                                      |                                                          |                                                         |
| 1FK7083 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7084 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7085 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7086 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7100 | SP 180S-MF1                       | ≤ 3                   | 34 (75.0)                     | ✓                          | ✓   | ✓   | ✓   | 3500                               | 1100 (810)                                               | 14700 (3304)                                             | 14150 (3181)                                            |
| 1FK7101 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    | (880 for $i = 10$ )                                      |                                                          |                                                         |
| 1FK7103 |                                   |                       |                               | ✓                          | ✓   | ✓   | ✓   |                                    |                                                          |                                                          |                                                         |
| 1FK7105 |                                   |                       |                               | ✓                          | ✓   | ✓   | –   |                                    |                                                          |                                                          |                                                         |
| 1FK7105 | SP 210S-MF1                       | ≤ 3                   | 56 (123)                      | –                          | –   | –   | ✓   | 2500                               | 2500 (1844)                                              | 21000 (4721)                                             | 30000 (6744)                                            |
|         |                                   |                       |                               |                            |     |     |     |                                    | (2400 for $i = 7$<br>1900 for $i = 10$ )                 |                                                          |                                                         |
|         | Gear shaft                        |                       |                               | Order code                 |     |     |     |                                    |                                                          |                                                          |                                                         |
|         | With feather key                  |                       |                               | J02                        | J03 | J05 | J09 |                                    |                                                          |                                                          |                                                         |
|         | Without feather key               |                       |                               | J22                        | J23 | J25 | J29 |                                    |                                                          |                                                          |                                                         |

## Preconditions:

SP+ planetary gearboxes can be mounted with the following motor versions:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection and anthracite paint finish

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:

1FK7 ■■■-■■■■■-■■■ 1

2A Compact G without brake  
 3B High H with brake  
 Inertia  
 4C High  
 Dynamic

or

1FK7 0 2 ■-5 A ■■■-■■■ 5

G without brake  
 H with brake

When ordering a motor with gearbox, **-Z** should be added to the order number.

## Example:

1FK7042 motor without holding brake with single-stage SP+ planetary gearbox

with  $i = 7$  and gear shaft without feather key.

1FK7042-2AF71-1AG1-**Z**

**J25**

✓ Possible

– Not possible

<sup>1)</sup> In relation to the output shaft center.

# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FK7 synchronous motors

#### Technical specifications

##### SIMOTICS S-1FK7 motor with SP+ planetary gearbox

| Single-stage Type | Gear ratio $i$ | Motor speed $n_{N1}$<br>rpm | Moments of inertia of the gearboxes (relating to the drive)                          |                                                                              |                                                                              |                                                                              |                                                                              |                                                                              |                                                                              |
|-------------------|----------------|-----------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                   |                |                             | Continuous duty S1 <sup>1)</sup><br>$M_{N2} (T_{2N})$<br>Nm<br>(lb <sub>f</sub> -ft) | 1FK702.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) | 1FK703.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) | 1FK704.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) | 1FK706.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) | 1FK708.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) | 1FK710.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>f</sub> -in <sup>2</sup> ) |
| SP 060S-MF1       | 4              | 3300                        | 26 (19.2)                                                                            | 0.15 (0.05)                                                                  | 0.22 (0.08)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 5              | 3300                        | 26 (19.2)                                                                            | 0.12 (0.04)                                                                  | 0.20 (0.07)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 7              | 4000                        | 26 (19.2)                                                                            | 0.10 (0.03)                                                                  | 0.18 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 10             | 4000                        | 17 (12.5)                                                                            | 0.09 (0.03)                                                                  | 0.17 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
| SP 075S-MF1       | 4              | 2900                        | 75 (55.3)                                                                            | –                                                                            | –                                                                            | 0.78 (0.27)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 5              | 2900                        | 75 (55.3)                                                                            | –                                                                            | –                                                                            | 0.68 (0.23)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 7              | 3100                        | 75 (55.3)                                                                            | –                                                                            | –                                                                            | 0.59 (0.20)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 10             | 3100                        | 52 (38.4)                                                                            | –                                                                            | –                                                                            | 0.54 (0.19)                                                                  | –                                                                            | –                                                                            | –                                                                            |
| SP 100S-MF1       | 4              | 2500                        | 180 (133)                                                                            | –                                                                            | –                                                                            | –                                                                            | 3.04 (1.04)                                                                  | –                                                                            | –                                                                            |
|                   | 5              | 2500                        | 175 (129)                                                                            | –                                                                            | –                                                                            | –                                                                            | 2.61 (0.89)                                                                  | –                                                                            | –                                                                            |
|                   | 7              | 2800                        | 170 (125)                                                                            | –                                                                            | –                                                                            | –                                                                            | 2.29 (0.78)                                                                  | –                                                                            | –                                                                            |
|                   | 10             | 2800                        | 120 (88.5)                                                                           | –                                                                            | –                                                                            | –                                                                            | 2.07 (0.71)                                                                  | –                                                                            | –                                                                            |
| SP 140S-MF1       | 4              | 2100                        | 360 (266)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 11.0 (3.76)                                                                  | –                                                                            |
|                   | 5              | 2100                        | 360 (266)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 9.95 (3.40)                                                                  | –                                                                            |
|                   | 7              | 2600                        | 360 (266)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 9.01 (3.08)                                                                  | –                                                                            |
|                   | 10             | 2600                        | 220 (162)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 8.44 (2.88)                                                                  | –                                                                            |
| SP 180S-MF1       | 4              | 1500                        | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 33.9 (11.6)                                                                  |
|                   | 5              | 1500                        | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 27.9 (9.53)                                                                  |
|                   | 7              | 2300                        | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 22.2 (7.59)                                                                  |
|                   | 10             | 2300                        | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 19.2 (6.56)                                                                  |
| SP 210S-MF1       | 10             | 2000                        | 1000 (738)                                                                           | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 53.1 (18.1)                                                                  |

<sup>1)</sup> The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).

## Selection and ordering data

| Motor   | Planetary gearbox<br>Two-stage |                       |                               | Available gear ratio $i =$ |     |     |     |     | Motor<br>speed,<br>max.<br>S3-60 % | Output<br>torque,<br>max.<br>S3-60 %   | Radial<br>output shaft<br>loading,<br>max. <sup>1)</sup> | Axial<br>output shaft<br>loading,<br>max. <sup>1)</sup> |
|---------|--------------------------------|-----------------------|-------------------------------|----------------------------|-----|-----|-----|-----|------------------------------------|----------------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Type    | Type                           | Torsional<br>backlash | Gearbox<br>weight,<br>approx. | 16                         | 20  | 28  | 40  | 50  | $n_{G1}$                           | $M_{G2}$                               | $F_r$                                                    | $F_a$                                                   |
|         |                                | arcmin                | kg (lb)                       |                            |     |     |     |     | $(n_1)$<br>rpm                     | $(T_{2B})$<br>Nm (lb <sub>f</sub> -ft) | $(F_{2Rmax})$<br>N (lb <sub>f</sub> )                    | $(F_{2Amax})$<br>N (lb <sub>f</sub> )                   |
| 1FK7022 | SP 060S-MF2                    | ≤ 6                   | 2 (4.4)                       | ✓                          | ✓   | ✓   | –   | –   | 6000                               | 40 (29.5)                              | 2700 (606)                                               | 2400 (540)                                              |
| 1FK7032 |                                |                       |                               | ✓                          | ✓   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7033 |                                |                       |                               | ✓                          | ✓   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7022 | SP 075S-MF2                    | ≤ 6                   | 3.6 (7.9)                     | –                          | –   | –   | ✓   | ✓   | 6000                               | 110 (81.1)                             | 4000 (899)                                               | 3350 (753)                                              |
| 1FK7032 |                                |                       |                               | –                          | –   | ✓   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7033 |                                |                       |                               | –                          | –   | ✓   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7034 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7040 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7042 |                                |                       |                               | ✓                          | ✓   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7043 |                                |                       |                               | ✓                          | –   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7034 | SP 100S-MF2                    | ≤ 5                   | 7.9 (17.4)                    | –                          | –   | –   | ✓   | ✓   | 4500                               | 300 (221)                              | 6300 (1416)                                              | 2400 (540)                                              |
| 1FK7040 |                                |                       |                               | –                          | –   | –   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7042 |                                |                       |                               | –                          | –   | ✓   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7043 |                                |                       |                               | –                          | ✓   | ✓   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7044 |                                |                       |                               | ✓                          | ✓   | ✓   | ✓   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7060 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7061 |                                |                       |                               | ✓                          | ✓   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7062 | ✓                              | ✓                     | –                             | –                          | –   |     |     |     |                                    |                                        |                                                          |                                                         |
| 1FK7044 | SP 140S-MF2                    | ≤ 5                   | 17 (37.5)                     | –                          | –   | –   | –   | ✓   | 4000                               | 600 (442)                              | 9450 (2124)                                              | 9870 (2219)                                             |
| 1FK7060 |                                |                       |                               | –                          | –   | –   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7061 |                                |                       |                               | –                          | –   | ✓   | ✓   | ✓   |                                    |                                        |                                                          |                                                         |
| 1FK7062 |                                |                       |                               | –                          | –   | ✓   | ✓   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7063 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7064 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7080 |                                |                       |                               | ✓                          | ✓   | ✓   | ✓   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7081 |                                |                       |                               | ✓                          | ✓   | ✓   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7083 |                                |                       |                               | ✓                          | ✓   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
| 1FK7084 |                                |                       |                               | ✓                          | –   | –   | –   | –   |                                    |                                        |                                                          |                                                         |
|         | Gear shaft                     |                       |                               | Order code                 |     |     |     |     |                                    |                                        |                                                          |                                                         |
|         | With feather key               |                       |                               | J12                        | J13 | J15 | J16 | J17 |                                    |                                        |                                                          |                                                         |
|         | Without feather key            |                       |                               | J32                        | J33 | J35 | J36 | J37 |                                    |                                        |                                                          |                                                         |

## Preconditions:

SP+ planetary gearboxes can be mounted with the following motor versions:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection and anthracite paint finish

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:

1FK7 ■■■■-■■■■■-■■■ 1  
 2A Compact G without brake  
 3B High H with brake  
 Inertia  
 4C High  
 Dynamic

or

1FK7 0 2 ■-5 A ■■■■-■■■ 5  
 G without brake  
 H with brake

✓ Possible

– Not possible

<sup>1)</sup> In relation to the center of the output shaft at 100 rpm.

When ordering a motor with gearbox, **-Z** should be added to the order number.

## Example:

1FK7042 motor without holding brake with 2-stage SP+ planetary gearbox  
 with  $i = 28$  and gear shaft without feather key.

1FK7042-2AF71-1AG1-**Z**  
**J35**

# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FK7 synchronous motors

#### Selection and ordering data

| Motor               | Planetary gearbox<br>Two-stage |                                     |                                              | Available gear ratio $i =$ |     |     |     |     | Motor<br>speed,<br>max.<br>S3-60 %   | Output<br>torque,<br>max.<br>S3-60 %                         | Radial<br>output shaft<br>loading,<br>max. <sup>1)</sup> | Axial<br>output shaft<br>loading,<br>max. <sup>1)</sup>  |
|---------------------|--------------------------------|-------------------------------------|----------------------------------------------|----------------------------|-----|-----|-----|-----|--------------------------------------|--------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Type                | Type                           | Torsional<br>backlash<br><br>arcmin | Gearbox<br>weight,<br>approx.<br><br>kg (lb) | 16                         | 20  | 28  | 40  | 50  | $n_{G1}$<br><br>( $n_1$ )<br><br>rpm | $M_{G2}$<br><br>( $T_{2B}$ )<br><br>Nm (lb <sub>f</sub> -ft) | $F_r$<br><br>( $F_{2Rmax}$ )<br><br>N (lb <sub>f</sub> ) | $F_a$<br><br>( $F_{2Amax}$ )<br><br>N (lb <sub>f</sub> ) |
| 1FK7062             | SP 180S-MF2                    | ≤ 5                                 | 36.4 (80.3)                                  | –                          | –   | –   | –   | ✓   | 4000                                 | 1100 (811)                                                   | 14700 (3305)                                             | 14150 (3181)                                             |
| 1FK7063             |                                |                                     |                                              | –                          | –   | –   | ✓   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7064             |                                |                                     |                                              | –                          | –   | –   | ✓   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7080             |                                |                                     |                                              | –                          | –   | –   | –   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7081             |                                |                                     |                                              | –                          | –   | –   | ✓   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7083             |                                |                                     |                                              | –                          | –   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7084             |                                |                                     |                                              | –                          | ✓   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7085             |                                |                                     |                                              | ✓                          | ✓   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7086             |                                |                                     |                                              | ✓                          | ✓   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7100             |                                |                                     |                                              | ✓                          | ✓   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7101             |                                |                                     |                                              | ✓                          | ✓   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7103             |                                |                                     |                                              | ✓                          | –   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7083             | SP 210S-MF2                    | ≤ 6                                 | 55.0 (121)                                   | –                          | –   | –   | ✓   | ✓   | 3500                                 | 2400 (1770)<br>(2500 for $i = 20$ )                          | 21000 (4721)                                             | 30000 (6744)                                             |
| 1FK7084             |                                |                                     |                                              | –                          | –   | –   | ✓   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7085             |                                |                                     |                                              | –                          | –   | ✓   | ✓   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7086             |                                |                                     |                                              | –                          | –   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7100             |                                |                                     |                                              | –                          | –   | –   | ✓   | ✓   |                                      |                                                              |                                                          |                                                          |
| 1FK7101             |                                |                                     |                                              | –                          | –   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7103             |                                |                                     |                                              | –                          | ✓   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7105             |                                |                                     |                                              | ✓                          | ✓   | –   | –   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7101             | SP 240S-MF2                    | ≤ 6                                 | 80.6 (178)                                   | –                          | –   | –   | ✓   | ✓   | 3500                                 | 4500 (3319)<br>(4000 for $i = 40$<br>4300 for $i = 50$ )     | 30000 (6744)                                             | 33000 (7419)                                             |
| 1FK7103             |                                |                                     |                                              | –                          | –   | ✓   | ✓   | –   |                                      |                                                              |                                                          |                                                          |
| 1FK7105             |                                |                                     |                                              | –                          | –   | ✓   | –   | –   |                                      |                                                              |                                                          |                                                          |
| Gear shaft          |                                |                                     |                                              | Order code                 |     |     |     |     |                                      |                                                              |                                                          |                                                          |
| With feather key    |                                |                                     |                                              | J12                        | J13 | J15 | J16 | J17 |                                      |                                                              |                                                          |                                                          |
| Without feather key |                                |                                     |                                              | J32                        | J33 | J35 | J36 | J37 |                                      |                                                              |                                                          |                                                          |

#### Preconditions:

SP+ planetary gearboxes can be mounted with the following motor versions:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection and anthracite paint finish

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:

1FK7 ■■■■-■■■■■-■■■ 1  
 2 A Compact G without brake  
 3 B High H with brake  
 Inertia  
 4 C High  
 Dynamic

or

1FK7 0 2 ■-5 A ■■■■-■■■ 5  
 G without brake  
 H with brake

When ordering a motor with gearbox, **-Z** should be added to the order number.

#### Example:

1FK7042 motor without holding brake with 2-stage SP+ planetary gearbox with  $i = 16$  and gear shaft without feather key.

1FK7103-2AC71-1AG1-**Z**

**J32**

✓ Possible

– Not possible

<sup>1)</sup> In relation to the output shaft center.

## Technical specifications

## SIMOTICS S-1FK7 motor with SP+ planetary gearbox

| Two-stage<br>Type | Gear ratio<br><i>i</i> | Motor speed<br>$n_{N1}$<br>rpm | Moments of inertia of the gearboxes (relating to the drive)                          |                                                                              |                                                                              |                                                                              |                                                                              |                                                                              |                                                                              |
|-------------------|------------------------|--------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                   |                        |                                | Continuous duty S1 <sup>1)</sup><br>$M_{N2} (T_{2N})$<br>Nm<br>(lb <sub>F</sub> -ft) | 1FK702.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) | 1FK703.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) | 1FK704.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) | 1FK706.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) | 1FK708.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) | 1FK710.<br>$J_1$<br>kgcm <sup>2</sup><br>(lb <sub>F</sub> -in <sup>2</sup> ) |
| SP 060S-MF2       | 16                     | 4400                           | 26 (19.2)                                                                            | 0.08 (0.03)                                                                  | 0.17 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 20                     | 4400                           | 26 (19.2)                                                                            | 0.07 (0.02)                                                                  | 0.16 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 28                     | 4400                           | 26 (19.2)                                                                            | 0.06 (0.02)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
| SP 075S-MF2       | 16                     | 3500                           | 75 (55.3)                                                                            | –                                                                            | 0.23 (0.08)                                                                  | 0.55 (0.19)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 20                     | 3500                           | 75 (55.3)                                                                            | –                                                                            | 0.20 (0.07)                                                                  | 0.53 (0.18)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 28                     | 3500                           | 75 (55.3)                                                                            | –                                                                            | 0.18 (0.06)                                                                  | 0.50 (0.17)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 40                     | 3500                           | 75 (55.3)                                                                            | 0.10 (0.03)                                                                  | 0.17 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
|                   | 50                     | 3800                           | 75 (55.3)                                                                            | 0.10 (0.03)                                                                  | 0.16 (0.06)                                                                  | –                                                                            | –                                                                            | –                                                                            | –                                                                            |
| SP 100S-MF2       | 16                     | 3100                           | 180 (133)                                                                            | –                                                                            | –                                                                            | 0.81 (0.28)                                                                  | 2.18 (0.75)                                                                  | –                                                                            | –                                                                            |
|                   | 20                     | 3100                           | 180 (133)                                                                            | –                                                                            | –                                                                            | 0.70 (0.24)                                                                  | 2.07 (0.71)                                                                  | –                                                                            | –                                                                            |
|                   | 28                     | 3100                           | 180 (133)                                                                            | –                                                                            | –                                                                            | 0.60 (0.21)                                                                  | 1.97 (0.67)                                                                  | –                                                                            | –                                                                            |
|                   | 40                     | 3100                           | 180 (133)                                                                            | –                                                                            | 0.38 (0.13)                                                                  | 0.55 (0.19)                                                                  | –                                                                            | –                                                                            | –                                                                            |
|                   | 50                     | 3500                           | 175 (129)                                                                            | –                                                                            | 0.38 (0.13)                                                                  | 0.54 (0.19)                                                                  | –                                                                            | –                                                                            | –                                                                            |
| SP 140S-MF2       | 16                     | 2900                           | 360 (265)                                                                            | –                                                                            | –                                                                            | –                                                                            | 3.19 (1.09)                                                                  | 10.3 (3.52)                                                                  | –                                                                            |
|                   | 20                     | 2900                           | 360 (265)                                                                            | –                                                                            | –                                                                            | –                                                                            | 2.71 (0.93)                                                                  | 9.77 (3.34)                                                                  | –                                                                            |
|                   | 28                     | 2900                           | 360 (265)                                                                            | –                                                                            | –                                                                            | –                                                                            | 2.34 (0.80)                                                                  | 9.41 (3.22)                                                                  | –                                                                            |
|                   | 40                     | 2900                           | 360 (265)                                                                            | –                                                                            | –                                                                            | –                                                                            | 2.10 (0.72)                                                                  | 9.16 (3.13)                                                                  | –                                                                            |
|                   | 50                     | 3200                           | 360 (265)                                                                            | –                                                                            | –                                                                            | 1.39 (0.48)                                                                  | 2.08 (0.71)                                                                  | –                                                                            | –                                                                            |
| SP 180S-MF2       | 16                     | 2700                           | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 12.4 (4.24)                                                                  | 13.5 (4.61)                                                                  |
|                   | 20                     | 2700                           | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 10.9 (3.73)                                                                  | 12.0 (4.10)                                                                  |
|                   | 28                     | 2700                           | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 9.48 (3.24)                                                                  | 10.6 (3.62)                                                                  |
|                   | 40                     | 2700                           | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | 5.51 (1.88)                                                                  | 8.67 (2.96)                                                                  | –                                                                            |
|                   | 50                     | 2900                           | 750 (553)                                                                            | –                                                                            | –                                                                            | –                                                                            | 5.45 (1.86)                                                                  | 8.61 (2.94)                                                                  | –                                                                            |
| SP 210S-MF2       | 16                     | 2500                           | 1500 (1106)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 34.5 (11.8)                                                                  |
|                   | 20                     | 2500                           | 1500 (1106)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 31.5 (10.76)                                                                 |
|                   | 28                     | 2500                           | 1500 (1106)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 30.0 (10.25)                                                                 | 30.0 (10.25)                                                                 |
|                   | 40                     | 2500                           | 1500 (1106)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 28.5 (9.74)                                                                  | 28.5 (9.74)                                                                  |
|                   | 50                     | 2500                           | 1500 (1106)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 28.3 (9.67)                                                                  | 28.3 (9.67)                                                                  |
| SP 240S-MF2       | 28                     | 2500                           | 2500 (1844)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 30.5 (10.4)                                                                  |
|                   | 40                     | 2500                           | 2500 (1844)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 28.2 (9.64)                                                                  |
|                   | 50                     | 2500                           | 2500 (1844)                                                                          | –                                                                            | –                                                                            | –                                                                            | –                                                                            | –                                                                            | 27.9 (9.53)                                                                  |

<sup>1)</sup> The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).



# Feed motors

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series LP+ for SIMOTICS S-1FK7 synchronous motors

#### Overview



SIMOTICS S-1FK7 motor with mounted series LP+ planetary gearbox

SIMOTICS S-1FK7 motors can easily be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

When selecting the gearbox, ensure that its maximum permissible input speed is not exceeded by the maximum speed of the motor. In the case of high operating frequencies, allowance must be made for the factor  $f_2$  (see Configuration Manual, SIMOTICS S-1FK7 synchronous motors). The frictional losses of the gearbox must always be taken into account.

The gearboxes are only available in non-balanced design and with feather key.

#### Benefits

- High efficiency  
Single-stage: > 97 %
- Minimum torsional backlash  
Single-stage: ≤ 12 arcmin
- Power transmission from the central sun wheel via planet wheels
- No shaft deflections in the planet wheel set due to symmetrical force distribution
- The gearboxes are connected to the motor shaft via an integrated clamping hub. A plain motor shaft extension is necessary for this purpose. Shaft and flange accuracy tolerance N in accordance with DIN 42955 and vibration severity grade A in accordance with EN 60034-14 are sufficient. The motor flange is adapted by means of adapter plates.
- Output shaft of gearbox exactly coaxial with the motor
- The gearboxes are suitable for all mounted systems.
- The gearboxes are enclosed (seal between gearbox and motor) and filled with grease in the factory. They are lubricated and sealed for their service life.
- Degree of protection of gearbox: IP64
- Small dimensions
- Low weight

#### Integration

SIMOTICS S-1FK702 to 1FK710 motors can be supplied ex factory (Siemens AG) complete with flange-mounted planetary gearbox.

The gearboxes assigned to the individual motors and gear ratios  $i$  available for these motor/gearbox combinations are listed in the subsequent selection table. When making a selection, account must be taken of the maximum permissible input speed of the gearbox (this is the same as the maximum motor speed).

The motor/gearbox combinations listed in the selection table are mainly intended for cycle operation S3-60% (ON time ≤ 60 % and ≤ 20 min). Reduced maximum motor speeds and output torques apply for use in S1 continuous duty (ON time > 60 % or > 20 min). The gear unit temperature must not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for SIMOTICS S-1FK7 synchronous motors when assigning gearboxes to the motor.

## Selection and ordering data

| Motor<br>Type                  | Planetary gearbox LP+<br>Single-stage<br>Torsional backlash ≤ 12 arcmin |                                          | Available<br>gear ratio $i =$ |    | Input speed,<br>max.<br>S3-60 % | Output torque,<br>max.<br>S3-60 % |                             | Output shaft<br>radial force,<br>max. <sup>1)</sup> | Gearbox moment<br>of inertia                                                                |
|--------------------------------|-------------------------------------------------------------------------|------------------------------------------|-------------------------------|----|---------------------------------|-----------------------------------|-----------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------|
|                                | Type                                                                    | Gearbox<br>weight,<br>approx.<br>kg (lb) | 5                             | 10 | $n_{G1}$                        | $M_{G2}$<br>at $i = 5$            | $M_{G2}$<br>at $i = 10$     | $F_r$                                               | $J_G$<br>at $i = 5/10$                                                                      |
|                                |                                                                         |                                          |                               |    | rpm                             | Nm<br>(lb <sub>r</sub> -ft)       | Nm<br>(lb <sub>r</sub> -ft) | N<br>(lb <sub>f</sub> )                             | 10 <sup>-4</sup> kgm <sup>2</sup><br>(10 <sup>-3</sup> lb <sub>f</sub> -in-s <sup>2</sup> ) |
| 1FK7022                        | LP 050-MO1                                                              | 0.75 (1.65)                              | ✓                             | –  | 8000                            | 12 (8.9)                          | 11 (8.1)                    | 650 (146)                                           | 0.055 (0.05)                                                                                |
| 1FK7022                        | LP 070-MO1                                                              | 2 (4.41)                                 | –                             | ✓  | 6000                            | 35 (25.8)                         | 32 (23.6)                   | 1450 (326)                                          | 0.28 (0.25)                                                                                 |
| 1FK7032                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7033                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7034                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7040                        | LP 090-MO1                                                              | 4 (8.82)                                 | ✓                             | ✓  | 6000                            | 90 (66.4)                         | 80 (59.0)                   | 1900 (427)                                          | 1.77 (1.57)                                                                                 |
| 1FK7042                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7043                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7044                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7060                        | LP 120-MO1                                                              | 8.6 (19.0)                               | ✓                             | ✓  | 4800                            | 220 (162)                         | 200 (148)                   | 4000 (899)                                          | 5.42 (4.80)                                                                                 |
| 1FK7061                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7062                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7063                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7064                        |                                                                         |                                          | ✓                             | –  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7080                        | LP 155-MO1                                                              | 17 (37.5)                                | ✓                             | ✓  | 3600                            | 450 (332)                         | 350 (258)                   | 6000 (1349)                                         | 25.7 (22.8)                                                                                 |
| 1FK7081                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7083                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7084                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7085                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7086                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7100                        |                                                                         |                                          | ✓                             | ✓  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7101                        |                                                                         |                                          | ✓                             | –  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7103                        |                                                                         |                                          | ✓                             | –  |                                 |                                   |                             |                                                     |                                                                                             |
| 1FK7105                        |                                                                         |                                          | ✓                             | –  |                                 |                                   |                             |                                                     |                                                                                             |
| Gear shaft<br>With feather key |                                                                         |                                          | Order code                    |    |                                 |                                   |                             |                                                     |                                                                                             |
|                                |                                                                         |                                          | V40                           |    | V42                             |                                   |                             |                                                     |                                                                                             |

## Preconditions:

LP+ planetary gearboxes can be mounted with the following motor versions:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP64 degree of protection and anthracite paint finish

LP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:

1FK7 ■■■-■■ . 7 1 - 1 . ■ 0

2A Compact G without brake

3B High H with brake

Inertia

4C High

Dynamic

or

1FK7 0 2 ■-5A . 7 1 - 1 . ■ 3

G without brake

H with brake

When ordering a motor with gearbox, -Z should be added to the order number.

## Example:

1FK7042 motor with holding brake with single-stage LP+ planetary gearbox with  $i = 5$  and gear shaft with feather key.

1FK7042-3BK71-1AH0-Z

V40

## Continuous duty

Continuous duty is permissible at the rated speed and rated torque. The gear unit temperature must not exceed 90 °C (194 °F).

| Planetary gearbox LP+<br>Single-stage<br>Torsional backlash<br>≤ 12 arcmin | Rated input<br>speed | Rated<br>output<br>torque |                          |
|----------------------------------------------------------------------------|----------------------|---------------------------|--------------------------|
| Type                                                                       | $n_{G1}$             | $M_{G2}$<br>at $i = 5$    | $M_{G2}$<br>at $i = 10$  |
|                                                                            | rpm                  | Nm (lb <sub>r</sub> -ft)  | Nm (lb <sub>r</sub> -ft) |
| LP 050-MO1                                                                 | 4000                 | 5.7 (4.2)                 | –                        |
| LP 070-MO1                                                                 | 3700                 | 18 (13.3)                 | 16.5 (12.2)              |
| LP 090-MO1                                                                 | 3400                 | 45 (33.2)                 | 40 (29.5)                |
| LP 120-MO1                                                                 | 2600                 | 110 (81.1)                | 100 (73.8)               |
| LP 155-MO1                                                                 | 2000                 | 320 (236)                 | 190 (140)                |

✓ Possible

– Not possible

<sup>1)</sup> In relation to the center of the output shaft at 100 rpm.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### SIMOTICS L-1FN3 synchronous linear motors – Water cooling

#### Overview



In combination with the SINAMICS S120 drive system, SIMOTICS L-1FN3 linear motors provide an optimally tuned linear direct drive system for the requirements of modern mechanical engineering.

The motors comprise a primary section and a secondary section with magnets made of rare-earth material. The primary section has fixed dimensions, while the secondary section is made up of individual elements (segments) to suit the required traversing range. Through parallel operation of the motors, feedrate force and length can be scaled beyond the available spectrum.

#### Benefits

- Outstanding dynamic response and very high traversing velocity
- Excellent precision
- Simple installation
- Drive components are free of wear thanks to contactless drive force transmission

The main advantage of linear direct drive technology is the extensive avoidance of the effects of elasticity, backlash and friction, as well as natural oscillation in the drive train. This results in a higher dynamic response and increased precision. If suitable measuring systems are used and the temperature conditions are appropriate, the motors can be positioned in the nanometer range.

#### Design

The simple mechanical construction without transmission elements, such as ballscrew, coupling or belt, enhances the reliability of the drive components.

Heat loss occurs almost exclusively in the primary section and is dissipated via an integrated liquid cooling system. The Thermo-Sandwich dual-circuit cooling system permits both a thermal decoupling of the motor from the machine, and also a low-priced cooling design.

The stainless metal encapsulation of the primary section ensure the high mechanical ruggedness and resistance to soiling required for use in machine tools, as well as high resistance to corrosive liquids. In addition, the motor places minimal demands on the preparation of mounting surfaces thanks to the large air gap. The mounting tolerances for the air gap are  $\pm 0.3$  mm (0.012 in).

#### Design variants

SIMOTICS L-1FN3 linear motors are available as single-sided or double-sided motors.

- **Single-sided motors**  
The single-sided version consists of a primary section that is mounted parallel to the associated secondary section.
- **Double-sided motors**  
The special secondary section of the double-sided version lies between two primary sections (one primary section with standard winding and one with complementary winding). The design as a double-sided motor is particularly suitable for applications with movable secondary section and small traversing paths with fast acceleration, e.g. non-circular machining.

#### Application

##### Version for peak load

Used in machine axes that are temporarily accelerated, e.g. S3 duty or when large forces are required for a short time.

Typical applications:

- High-dynamic and flexible machine tool construction
- Laser machining
- Handling

##### Version for continuous load

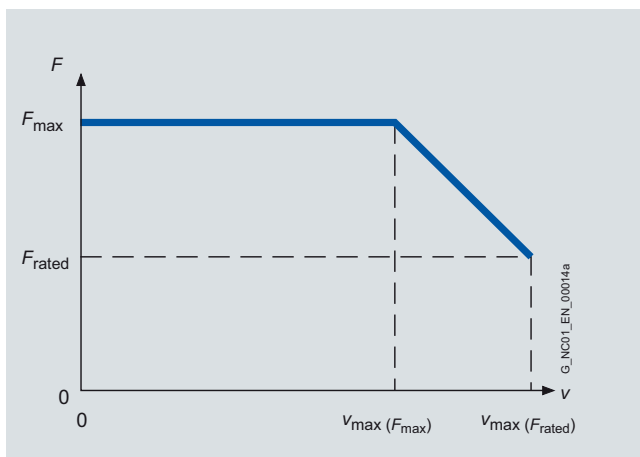
Used in machine axes with constant acceleration changes, e.g. S1 duty, with high process/weight forces or for operation without water cooling.

Typical applications:

- Grinding
- Non-circular machining (e.g. oscillating applications)
- Z axes without weight compensation, quills
- Handling, Cartesian robots

## Technical specifications

|                                                                                       |                                                                                                                                                                                  |                 |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Product name</b>                                                                   | SIMOTICS L-1FN3 linear motors                                                                                                                                                    |                 |
|                                                                                       | Peak load                                                                                                                                                                        | Continuous load |
| <b>Type of motor</b>                                                                  | Permanent-magnet synchronous linear motor                                                                                                                                        |                 |
| <b>Magnet material</b>                                                                | Rare-earth permanent magnets                                                                                                                                                     |                 |
| <b>Overload ratio (<math>F_{MAX}:F_{rated}</math>) up to max.</b>                     | 2.75                                                                                                                                                                             | 1.7             |
| <b>Cooling</b>                                                                        | Water cooling                                                                                                                                                                    |                 |
| <b>Water cooler connections</b>                                                       | G 1/8" internal thread on all primary and secondary section coolers                                                                                                              |                 |
| <b>Temperature influence on surrounding construction with precision cooling, max.</b> | +4 K                                                                                                                                                                             |                 |
| <b>Coolant inlet temperature, permissible</b>                                         | 35 °C (95 °F) (avoid condensation)<br>> 35 °C (95 °F) on reduction of rated motor power                                                                                          |                 |
| <b>Temperature monitoring integrated in the primary section winding</b>               | 2 monitoring circuits (Temp-S with PTC thermistor) and Temp-F with KTY84 temperature sensor. Evaluation via Sensor Module: SME120/SME125/TM120 (see SINAMICS S120 drive system). |                 |
| <b>Insulation of stator winding according to EN (IEC) 60034-1</b>                     | Temperature class 155 (F) for a winding temperature of 120 °C (248 °F)                                                                                                           |                 |
| <b>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</b>               | IP65                                                                                                                                                                             |                 |
| <b>Available configurations</b>                                                       | Different graduations due to modular construction                                                                                                                                |                 |
| <b>Secondary section cover</b>                                                        | Exchangeable through all segments or segment by segment                                                                                                                          |                 |
| <b>2nd rating plate</b>                                                               | Enclosed separately                                                                                                                                                              |                 |
| <b>Encoder system</b><br>(Not included in scope of delivery)                          | Select according to basic conditions specific to the application and the drive.<br>Refer to Overview of measuring systems.                                                       |                 |
| <b>Connection</b>                                                                     | Prepared for separate connection of the power and signal cable                                                                                                                   |                 |
| <b>Approvals, according to</b>                                                        | cURus, UR for 1FN3900-4WC00-...                                                                                                                                                  |                 |



The SIMOTICS L-1FN3 linear motors have an overload range available for acceleration processes. The maximum force  $F_{MAX}$  can only be utilized up to a maximum velocity  $v_{MAX}(F_{MAX})$ ; up to velocity  $v_{MAX}(F_{rated})$  only the feedrate force  $F_{rated}$  is available.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN3 synchronous linear motors Version for peak load – Water cooling

#### Selection and ordering data

| Feedrate force                     |                         | Maximum velocity <sup>3)</sup>          |                                           | SIMOTICS L-1FN3 synchronous linear motors –<br>Version for peak load |                           | Weight, approx.                                         |                                                              |
|------------------------------------|-------------------------|-----------------------------------------|-------------------------------------------|----------------------------------------------------------------------|---------------------------|---------------------------------------------------------|--------------------------------------------------------------|
|                                    |                         |                                         |                                           | Standard type                                                        |                           |                                                         |                                                              |
|                                    |                         |                                         |                                           | Primary section                                                      | Secondary section         | Primary section<br>without/with<br>precision<br>cooling | Secondary<br>section<br>without/with<br>heatsink<br>profiles |
| $F_{\text{rated}}$ <sup>1)2)</sup> | $F_{\text{MAX}}$        | $v_{\text{MAX}}$ at<br>$F_{\text{MAX}}$ | $v_{\text{MAX}}$ at<br>$F_{\text{rated}}$ |                                                                      |                           |                                                         |                                                              |
| N<br>(lb <sub>f</sub> )            | N<br>(lb <sub>f</sub> ) | m/min<br>(ft/min)                       | m/min<br>(ft/min)                         | Order No.                                                            | Order No.                 | kg<br>(lb)                                              | kg<br>(lb)                                                   |
| <b>Water cooling</b>               |                         |                                         |                                           |                                                                      |                           |                                                         |                                                              |
| <b>200 (45)</b>                    | 550 (124)               | 146 (479)                               | 373 (1224)                                | <b>1FN3050-2WC00-0EA1</b>                                            | <b>1FN3050-4SA00-0AA0</b> | 2.4/2.9<br>(5.3/6.4)                                    | 0.4/0.5<br>(0.9/1.1)                                         |
|                                    |                         | 146 (479)                               | 373 (1224)                                | <b>1FN3050-2WC00-0FA1</b>                                            |                           |                                                         |                                                              |
| <b>200 (45)</b>                    | 490 (110)               | 138 (453)                               | 322 (1056)                                | <b>1FN3100-1WC00-0BA1</b>                                            | <b>1FN3100-4SA00-0AA0</b> | 2.2/–<br>(4.9/–) <sup>4)</sup>                          | 0.7/0.8<br>(1.5/1.8)                                         |
| <b>450 (101)</b>                   | 1100 (247)              | 131 (430)                               | 297 (974)                                 | <b>1FN3100-2WC00-0BA1</b>                                            |                           | 3.8/4.4<br>(8.4/9.7)                                    |                                                              |
|                                    |                         | 237 (778)                               | 497 (1631)                                | <b>1FN3100-2WE00-0BA1</b>                                            |                           |                                                         |                                                              |
| <b>675 (152)</b>                   | 1650 (371)              | 120 (394)                               | 277 (909)                                 | <b>1FN3100-3WC00-0BA1</b>                                            |                           | 5.4/6.2<br>(11.9/13.7)                                  |                                                              |
|                                    |                         | 237 (778)                               | 497 (1631)                                | <b>1FN3100-3WE00-0BA1</b>                                            |                           |                                                         |                                                              |
| <b>900 (202)</b>                   | 2200 (495)              | 131 (430)                               | 297 (974)                                 | <b>1FN3100-4WC00-0BA1</b>                                            |                           | 7.4/8.5<br>(16.3/18.7)                                  |                                                              |
|                                    |                         | 237 (778)                               | 497 (1631)                                | <b>1FN3100-4WE00-0BA1</b>                                            |                           |                                                         |                                                              |
| <b>1125 (253)</b>                  | 2750 (618)              | 109 (358)                               | 255 (837)                                 | <b>1FN3100-5WC00-0BA1</b>                                            |                           | 9.1/10.4<br>(20.1/22.9)                                 |                                                              |
| <b>340 (76)</b>                    | 820 (184)               | 126 (413)                               | 282 (925)                                 | <b>1FN3150-1WC00-0BA1</b>                                            | <b>1FN3150-4SA00-0AA0</b> | 3.0/–<br>(6.6/–) <sup>4)</sup>                          | 1.2/1.3<br>(2.7/2.9)                                         |
| <b>675 (152)</b>                   | 1650 (371)              | 126 (413)                               | 282 (925)                                 | <b>1FN3150-2WC00-0BA1</b>                                            |                           | 5.3/6<br>(11.7/13.2)                                    |                                                              |
| <b>1010 (227)</b>                  | 2470 (555)              | 126 (413)                               | 282 (925)                                 | <b>1FN3150-3WC00-0BA1</b>                                            |                           | 7.8/8.7<br>(17.2/19.2)                                  |                                                              |
| <b>1350 (304)</b>                  | 3300 (742)              | 126 (413)                               | 282 (925)                                 | <b>1FN3150-4WC00-0BA1</b>                                            |                           | 10.2/11.4<br>(22.5/25.1)                                |                                                              |
| <b>1690 (380)</b>                  | 4120 (926)              | 126 (413)                               | 282 (925)                                 | <b>1FN3150-5WC00-0BA1</b>                                            |                           | 12.8/14.2<br>(28.2/31.3)                                |                                                              |
| <b>610 (137)</b>                   | 1720 (387)              | 128 (420)                               | 309 (1014)                                | <b>1FN3300-1WC00-0BA1</b>                                            | <b>1FN3300-4SA00-0AA0</b> | 6.2/–<br>(13.7/–) <sup>4)</sup>                         | 2.4/2.6<br>(5.3/5.7)                                         |
| <b>1225 (275)</b>                  | 3450 (776)              | 63 (207)                                | 176 (577)                                 | <b>1FN3300-2WB00-0BA1</b>                                            |                           | 11.4/12.4<br>(25.1/27.3)                                |                                                              |
|                                    |                         | 125 (410)                               | 297 (974)                                 | <b>1FN3300-2WC00-0BA1</b>                                            |                           |                                                         |                                                              |
|                                    |                         | 369 (1211)                              | 805 (2641)                                | <b>1FN3300-2WG00-0BA1</b>                                            |                           |                                                         |                                                              |
| <b>1840 (414)</b>                  | 5170 (1162)             | 125 (410)                               | 297 (974)                                 | <b>1FN3300-3WC00-0BA1</b>                                            |                           | 17.0/18.4<br>(37.5/40.6)                                |                                                              |
|                                    |                         | 383 (1257)                              | 836 (2743)                                | <b>1FN3300-3WG00-0BA1</b>                                            |                           |                                                         |                                                              |
| <b>2450 (551)</b>                  | 6900 (1551)             | 63 (207)                                | 176 (577)                                 | <b>1FN3300-4WB00-0BA1</b>                                            |                           | 22.2/24<br>(48.9/52.9)                                  |                                                              |
|                                    |                         | 125 (410)                               | 297 (974)                                 | <b>1FN3300-4WC00-0BA1</b>                                            |                           |                                                         |                                                              |

#### Type of connection:

1FN3100 to 1FN3900 motors

Connection cover prepared for separate power and signal cables

**B**

1FN3050 motor

Permanently connected power and signal cables with exposed core ends  
Length: 2 m (6.56 ft)

**E**

1FN3050 motor

Permanently connected power and signal cables pre-assembled, with  
connectors  
Length: 0.5 m (1.64 ft)

**F**

Description

Order No.

#### Signal cable, pre-assembled with M17 connector<sup>8)</sup>

- 1FN3100/1FN3150 motors
- 1FN3300 to 1FN3900 motors

**6FX7002-2SL01-....**

**6FX7002-2SL02-....**

## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN3 synchronous linear motors  
Version for peak load – Water cooling

| Motor type<br>Primary section<br>(repeated) | Rated<br>current        | Maxi-<br>mum<br>cur-<br>rent | Calcu-<br>lated<br>power | SINAMICS S120 Motor Module        |                                                                                                                        | Power cable with complete shield                                                               |                         |                                          |                                                     |
|---------------------------------------------|-------------------------|------------------------------|--------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------|-----------------------------------------------------|
|                                             |                         |                              |                          | Required<br>rated<br>current      | Books-<br>ize format<br><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Motor connection via adapter cable with power connector<br>for increased velocity/acceleration |                         |                                          |                                                     |
|                                             |                         |                              |                          |                                   |                                                                                                                        | Pre-assembled<br>adapter cable<br>for motor                                                    | Power<br>con-<br>nector | Cable<br>cross-<br>section <sup>5)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                                             | $I_{\text{rated}}^{1)}$ | $I_{\text{MAX}}$             | $P_{\text{el, max.}}$    | $I_{\text{rated}}/I_{\text{MAX}}$ | Order No.                                                                                                              | Order No.                                                                                      | Size                    | mm <sup>2</sup>                          | Order No.                                           |
| A                                           | A                       |                              | kW (HP)                  | A                                 |                                                                                                                        |                                                                                                |                         |                                          |                                                     |
| 1FN3050-2WC00-...                           | 2.7                     | 8.2                          | 4.1 (5.5)                | 5/10                              | 6SL312-1-TE15-0AA3                                                                                                     | <sup>6)</sup>                                                                                  | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3050-2WC00-...                           | 2.7                     | 8.2                          | 4.1 (5.5)                | 5/10                              | 6SL312-1-TE15-0AA3                                                                                                     | <sup>7)</sup>                                                                                  | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-1WC00-...                           | 2.4                     | 6.5                          | 3.1 (4.2)                | 5/10                              | 6SL312-1-TE15-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-2WC00-...                           | 5.1                     | 13.5                         | 6.3 (8.5)                | 9/18                              | 6SL312-1-TE21-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-2WE00-...                           | 8.1                     | 21.5                         | 8.3 (11.1)               | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-3WC00-...                           | 7.2                     | 19.1                         | 9.2 (12.3)               | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-3WE00-...                           | 12.1                    | 32.2                         | 12.4 (16.6)              | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-4WC00-...                           | 10.1                    | 27.0                         | 12.6 (16.9)              | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-4WE00-...                           | 16.1                    | 43.0                         | 16.6 (22.3)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-5WC00-...                           | 11.0                    | 29.5                         | 14.4 (19.3)              | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-1WC00-...                           | 3.6                     | 9.5                          | 4.3 (5.8)                | 5/10                              | 6SL312-1-TE15-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-2WC00-...                           | 7.2                     | 19.1                         | 8.7 (11.7)               | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-3WC00-...                           | 10.7                    | 28.6                         | 13.0 (17.4)              | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-4WC00-...                           | 14.3                    | 38.2                         | 17.4 (23.3)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-5WC00-...                           | 17.9                    | 47.7                         | 21.7 (29.1)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM42- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-1WC00-...                           | 6.5                     | 20.0                         | 8.7 (11.7)               | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-2WB00-...                           | 8.0                     | 24.7                         | 13.2 (17.7)              | 18/36                             | 6SL312-1-TE21-8AA3                                                                                                     | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-2WC00-...                           | 12.6                    | 39.2                         | 16.7 (22.4)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-2WG00-...                           | 32.2                    | 99.7                         | 30.1 (40.4)              | 60/113                            | 6SL312-1-TE26-0AA3                                                                                                     | 6FX7002-5LM82- ....                                                                            | 1.5                     | 4 × 6                                    | 6FX8002-5CS54- ....                                 |
| 1FN3300-3WC00-...                           | 19.0                    | 58.7                         | 25.1 (33.7)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-3WG00-...                           | 50.0                    | 154.9                        | 46.2 (61.9)              | 132/210                           | 6SL312-1-TE31-3AA3                                                                                                     | 6FX7002-5LM02- ....                                                                            | 1.5                     | 4 × 16                                   | 6FX8002-5CS24- ....                                 |
| 1FN3300-4WB00-...                           | 16.0                    | 49.4                         | 26.3 (35.3)              | 30/56                             | 6SL312-1-TE23-0AA3                                                                                                     | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-4WC00-...                           | 25.3                    | 78.3                         | 33.5 (44.9)              | 45/85                             | 6SL312-1-TE24-5AA3                                                                                                     | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| Cooling:                                    |                         |                              |                          |                                   | .... Length code <sup>8)</sup> ....                                                                                    |                                                                                                |                         |                                          |                                                     |
| Internal air cooling                        |                         |                              |                          |                                   | 0                                                                                                                      |                                                                                                |                         |                                          |                                                     |
| External air cooling                        |                         |                              |                          |                                   | 1                                                                                                                      |                                                                                                |                         |                                          |                                                     |
| Motor Module:                               |                         |                              |                          |                                   | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems.                              |                                                                                                |                         |                                          |                                                     |
| Single Motor Module                         |                         |                              |                          |                                   |                                                                                                                        |                                                                                                |                         |                                          |                                                     |
| Double Motor Module                         |                         |                              |                          |                                   |                                                                                                                        |                                                                                                |                         |                                          |                                                     |
|                                             |                         |                              |                          |                                   | 1                                                                                                                      |                                                                                                |                         |                                          |                                                     |
|                                             |                         |                              |                          |                                   | 2                                                                                                                      |                                                                                                |                         |                                          |                                                     |

<sup>1)</sup> For water cooling with inlet temperature 35 °C (95 °F).

<sup>2)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

<sup>3)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.

<sup>4)</sup> No precision cooler available.

<sup>5)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>6)</sup> Permanently connected power and signal cables, length 2 m (6.56 ft), with exposed core ends:

<sup>7)</sup> Permanently connected power and signal cables, length 0.5 m (1.64 ft), with power connector size 1 and M17 signal connector.

<sup>8)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN3 synchronous linear motors Version for peak load – Water cooling

#### Selection and ordering data

| Feedrate force                     |                         | Maximum velocity <sup>3)</sup>       |                                        | SIMOTICS L-1FN3 synchronous linear motors –<br>Version for peak load<br>Standard type |                           | Weight, approx.                                |                                                  |
|------------------------------------|-------------------------|--------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|---------------------------|------------------------------------------------|--------------------------------------------------|
| $F_{\text{rated}}$ <sup>1)2)</sup> | $F_{\text{MAX}}$        | $v_{\text{MAX}}$ at $F_{\text{MAX}}$ | $V_{\text{MAX}}$ at $F_{\text{rated}}$ | Primary section                                                                       | Secondary section         | Primary section without/with precision cooling | Secondary section without/with heatsink profiles |
| N<br>(lb <sub>f</sub> )            | N<br>(lb <sub>f</sub> ) | m/min<br>(ft/min)                    | m/min<br>(ft/min)                      | Order No.                                                                             | Order No.                 | kg<br>(lb)                                     | kg<br>(lb)                                       |
| <b>Water cooling</b>               |                         |                                      |                                        |                                                                                       |                           |                                                |                                                  |
| <b>1930 (434)</b>                  | 5180 (1165)             | 30 (98)                              | 112 (368)                              | <b>1FN3450-2WA50-0BA1</b>                                                             | <b>1FN3450-4SA00-0AA0</b> | 15.9/17.1<br>(35.1/37.7)                       | 3.8/4<br>(8.4/8.8)                               |
|                                    |                         | 120 (394)                            | 275 (902)                              | <b>1FN3450-2WC00-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 240 (787)                            | 519 (1703)                             | <b>1FN3450-2WE00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>2895 (651)</b>                  | 7760 (1745)             | 62 (203)                             | 164 (538)                              | <b>1FN3450-3WB00-0BA1</b>                                                             |                           | 22.6/24.3<br>(49.8/53.6)                       |                                                  |
|                                    |                         | 90 (295)                             | 217 (712)                              | <b>1FN3450-3WB50-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 120 (394)                            | 275 (902)                              | <b>1FN3450-3WC00-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 240 (787)                            | 519 (1703)                             | <b>1FN3450-3WE00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>3860 (868)</b>                  | 10350 (2327)            | 62 (203)                             | 164 (538)                              | <b>1FN3450-4WB00-0BA1</b>                                                             |                           | 30.9/33.1<br>(68.1/73)                         |                                                  |
|                                    |                         | 90 (295)                             | 217 (712)                              | <b>1FN3450-4WB50-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 120 (394)                            | 275 (902)                              | <b>1FN3450-4WC00-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 240 (787)                            | 519 (1703)                             | <b>1FN3450-4WE00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>2610 (587)</b>                  | 6900 (1551)             | 36 (118)                             | 120 (394)                              | <b>1FN3600-2WA50-0BA1</b>                                                             | <b>1FN3600-4SA00-0AA0</b> | 22.2/24.7<br>(49/54.5)                         | 4.6/5<br>(10.1/11)                               |
| <b>3915 (880)</b>                  | 10350 (2327)            | 58 (190)                             | 155 (509)                              | <b>1FN3600-3WB00-0BA1</b>                                                             |                           | 31.5/33.4<br>(69.5/73.7)                       |                                                  |
|                                    |                         | 127 (417)                            | 279 (915)                              | <b>1FN3600-3WC00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>5220 (1174)</b>                 | 13800 (3102)            | 26 (85)                              | 105 (345)                              | <b>1FN3600-4WA30-0BA1</b>                                                             |                           | 40.8/43.3<br>(90/95.5)                         |                                                  |
|                                    |                         | 58 (190)                             | 155 (509)                              | <b>1FN3600-4WB00-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 91 (299)                             | 215 (705)                              | <b>1FN3600-4WB50-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 112 (367)                            | 254 (833)                              | <b>1FN3600-4WC00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>4050 (910)</b>                  | 10350 (2327)            | 65 (213)                             | 160 (525)                              | <b>1FN3900-2WB00-0BA1</b>                                                             | <b>1FN3900-4SA00-0AA0</b> | 28.2/29.7<br>(62.2/65.4)                       | 7.5/7.9<br>(16.5/17.4)                           |
|                                    |                         | 115 (377)                            | 253 (830)                              | <b>1FN3900-2WC00-0BA1</b>                                                             |                           |                                                |                                                  |
| <b>6075 (1366)</b>                 | 15530 (3491)            | 75 (246)                             | 181 (594)                              | <b>1FN3900-3WB00-0BA1</b>                                                             |                           | 42.2/44.3<br>(93.1/97.6)                       |                                                  |
| <b>8100 (1821)</b>                 | 20700 (4653)            | 65 (213)                             | 160 (525)                              | <b>1FN3900-4WB00-0BA1</b>                                                             |                           | 56.2/58.9<br>(124/130)                         |                                                  |
|                                    |                         | 88 (290)                             | 203 (666)                              | <b>1FN3900-4WB50-0BA1</b>                                                             |                           |                                                |                                                  |
|                                    |                         | 115 (377)                            | 253 (830)                              | <b>1FN3900-4WC00-0BA1</b>                                                             |                           |                                                |                                                  |

#### Type of connection:

1FN3100 to 1FN3900 motors

Connection cover prepared for separate power and signal cables

**B**

| Description                                                        | Order No.                 |
|--------------------------------------------------------------------|---------------------------|
| <b>Signal cable, pre-assembled with M17 connector<sup>7)</sup></b> |                           |
| • 1FN3100/1FN3150 motors                                           | <b>6FX7002-2SL01-....</b> |
| • 1FN3300 to 1FN3900 motors                                        | <b>6FX7002-2SL02-....</b> |



## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN3 synchronous linear motors  
Version for peak load – Water cooling

| Motor type<br>Primary section<br>(repeated) | Rated<br>current        | Maxi-<br>mum<br>current | Calculated<br>power   | SINAMICS S120 Motor Module          |                                                                                                               | Power cable with complete shield                                                               |                         |                                          |                                                     |
|---------------------------------------------|-------------------------|-------------------------|-----------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------|-----------------------------------------------------|
|                                             |                         |                         |                       | Required<br>rated<br>current        | Booksize format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Motor connection via adapter cable with power connector<br>for increased velocity/acceleration |                         |                                          |                                                     |
|                                             |                         |                         |                       |                                     |                                                                                                               | Pre-assembled<br>adapter cable<br>for motor                                                    | Power<br>con-<br>nector | Cable<br>cross-<br>section <sup>4)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                                             | $I_{\text{rated}}^{1)}$ | $I_{\text{MAX}}$        | $P_{\text{el, max.}}$ | $I_{\text{rated}} / I_{\text{MAX}}$ | Order No.                                                                                                     | Order No.                                                                                      | Size                    | mm <sup>2</sup>                          | Order No.                                           |
| 1FN3450-2WA50-...                           | 8.6                     | 25.3                    | 15.9 (21.3)           | 18/36                               | 6SL312-1-TE21-8AA3                                                                                            | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3450-2WC00-...                           | 18.8                    | 55.3                    | 23.1 (31)             | 30/56                               | 6SL312-1-TE23-0AA3                                                                                            | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3450-2WE00-...                           | 33.8                    | 99.7                    | 32.6 (43.7)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM82- ....                                                                            | 1.5                     | 4 × 6                                    | 6FX8002-5CS54- ....                                 |
| 1FN3450-3WB00-...                           | 17.9                    | 52.7                    | 27.5 (36.9)           | 30/56                               | 6SL312-1-TE23-0AA3                                                                                            | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3450-3WB50-...                           | 22.8                    | 67.3                    | 31.1 (41.7)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3450-3WC00-...                           | 28.1                    | 83.0                    | 34.6 (46.4)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3450-3WE00-...                           | 50.7                    | 149.6                   | 49.0 (65.7)           | 132/210                             | 6SL312-1-TE31-3AA3                                                                                            | 6FX7002-5LM02- ....                                                                            | 1.5                     | 4 × 16                                   | 6FX8002-5CS24- ....                                 |
| 1FN3450-4WB00-...                           | 23.8                    | 70.3                    | 36.7 (49.2)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3450-4WB50-...                           | 30.4                    | 89.8                    | 41.4 (55.5)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM82- ....                                                                            | 1.5                     | 4 × 6                                    | 6FX8002-5CS54- ....                                 |
| 1FN3450-4WC00-...                           | 37.5                    | 110.6                   | 46.2 (61.9)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3450-4WE00-...                           | 67.6                    | 199.5                   | 65.3 (87.5)           | 132/210                             | 6SL312-1-TE31-3AA3                                                                                            | 6FX7008-1BB61- .... <sup>5)</sup>                                                              | –                       | 4 × 25                                   | 6FX7008-1BB25- .... <sup>6)</sup>                   |
| 1FN3600-2WA50-...                           | 12.4                    | 36.0                    | 21.9 (29.4)           | 18/36                               | 6SL312-1-TE21-8AA3                                                                                            | 6FX7002-5LM62- ....                                                                            | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3600-3WB00-...                           | 23.2                    | 67.3                    | 35.4 (47.5)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3600-3WC00-...                           | 35.7                    | 105.9                   | 44.6 (59.8)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM82- ....                                                                            | 1.5                     | 4 × 6                                    | 6FX8002-5CS54- ....                                 |
| 1FN3600-4WA30-...                           | 22.3                    | 64.9                    | 41.9 (56.2)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3600-4WB00-...                           | 30.9                    | 89.8                    | 47.2 (63.3)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM82- ....                                                                            | 1.5                     | 4 × 6                                    | 6FX8002-5CS54- ....                                 |
| 1FN3600-4WB50-...                           | 40.8                    | 118.5                   | 53.2 (71.3)           | 85/141                              | 6SL312-1-TE28-5AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3600-4WC00-...                           | 46.9                    | 136.5                   | 55.5 (74.4)           | 85/141                              | 6SL312-1-TE28-5AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3900-2WB00-...                           | 24.7                    | 69.5                    | 34.5 (46.3)           | 45/85                               | 6SL312-1-TE24-5AA3                                                                                            | 6FX7002-5LM72- ....                                                                            | 1.5                     | 4 × 4                                    | 6FX8002-5CS54- ....                                 |
| 1FN3900-2WC00-...                           | 36.7                    | 103.3                   | 40.9 (54.8)           | 60/113                              | 6SL312-1-TE26-0AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3900-3WB00-...                           | 40.6                    | 114.0                   | 54.5 (73.1)           | 85/141                              | 6SL312-1-TE28-5AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3900-4WB00-...                           | 49.4                    | 138.9                   | 68.9 (92.4)           | 132/210                             | 6SL312-1-TE31-3AA3                                                                                            | 6FX7002-5LM32- ....                                                                            | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3900-4WB50-...                           | 60.6                    | 170.3                   | 76.3 (102.3)          | 132/210                             | 6SL312-1-TE31-3AA3                                                                                            | 6FX7002-5LM02- ....                                                                            | 1.5                     | 4 × 16                                   | 6FX8002-5CS24- ....                                 |
| 1FN3900-4WC00-...                           | 73.5                    | 206.5                   | 81.9 (109.8)          | 132/210                             | 6SL312-1-TE31-3AA3                                                                                            | 6FX7008-1BB61- .... <sup>5)</sup>                                                              | –                       | 4 × 25                                   | 6FX7008-1BB25- .... <sup>6)</sup>                   |

**Cooling:**  
Internal air cooling 0  
External air cooling 1

**Motor Module:**  
Single Motor Module 1  
Double Motor Module 2

.... Length code<sup>7)</sup> ....

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> For water cooling with inlet temperature 35 °C (95 °F).

<sup>2)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

<sup>3)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.

<sup>4)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>5)</sup> Sold by the meter only (4 × 16 mm<sup>2</sup>). Connected to primary section with 16 mm<sup>2</sup> (< 1.5 m (4.92 ft)) then routed onwards through terminal box with 25 mm<sup>2</sup>.

<sup>6)</sup> Sold by the meter only (4 × 25 mm<sup>2</sup>).

<sup>7)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN3 synchronous linear motors Version for continuous load – Water cooling

#### Selection and ordering data

| Feedrate force          |                         | Maximum velocity <sup>3)</sup> |                             | SIMOTICS L-1FN3 synchronous linear motors –<br>Version for continuous load |                           | Weight, approx.                                      |                                                              |
|-------------------------|-------------------------|--------------------------------|-----------------------------|----------------------------------------------------------------------------|---------------------------|------------------------------------------------------|--------------------------------------------------------------|
|                         |                         |                                |                             | Standard type                                                              |                           |                                                      |                                                              |
|                         |                         |                                |                             | Primary section                                                            | Secondary section         | Primary section<br>without/with<br>precision cooling | Secondary<br>section<br>without/with<br>heatsink<br>profiles |
| $F_{rated}^{1)2)}$      | $F_{MAX}$               | $v_{MAX}$ at<br>$F_{MAX}$      | $v_{MAX}$ at<br>$F_{rated}$ |                                                                            |                           |                                                      |                                                              |
| N<br>(lb <sub>f</sub> ) | N<br>(lb <sub>f</sub> ) | m/min<br>(ft/min)              | m/min<br>(ft/min)           | Order No.                                                                  | Order No.                 | kg<br>(lb)                                           | kg<br>(lb)                                                   |
| <b>Water cooling</b>    |                         |                                |                             |                                                                            |                           |                                                      |                                                              |
| <b>150 (34)</b>         | 260 (58)                | 242 (794)                      | 435 (1427)                  | <b>1FN3050-1ND00-0EA1</b>                                                  | <b>1FN3050-4SA00-0AA0</b> | 1.9/2.4 (4.2/5.3)                                    | 0.4/0.5<br>(0.9/1.1)                                         |
|                         |                         | 242 (794)                      | 435 (1427)                  | <b>1FN3050-1ND00-0FA1</b>                                                  |                           |                                                      |                                                              |
| <b>300 (67)</b>         | 510 (115)               | 106 (348)                      | 202 (663)                   | <b>1FN3050-2NB80-0EA1</b>                                                  |                           | 3.2/4.0 (7.1/8.8)                                    |                                                              |
|                         |                         | 106 (348)                      | 202 (663)                   | <b>1FN3050-2NB80-0FA1</b>                                                  |                           |                                                      |                                                              |
| <b>300 (67)</b>         | 510 (115)               | 117 (384)                      | 214 (702)                   | <b>1FN3100-1NC00-0BA1</b>                                                  | <b>1FN3100-4SA00-0AA0</b> | 3/3.5 (6.6/7.7)                                      | 0.7/0.8<br>(1.5/1.8)                                         |
| <b>605 (136)</b>        | 1020 (229)              | 170 (558)                      | 307 (1007)                  | <b>1FN3100-2NC80-0BA1</b>                                                  |                           | 5.1/5.9 (11.3/13.1)                                  |                                                              |
| <b>905 (203)</b>        | 1530 (344)              | 115 (337)                      | 211 (692)                   | <b>1FN3100-3NC00-0BA1</b>                                                  |                           | 7.3/8.3 (16.1/18.03)                                 |                                                              |
| <b>1205 (271)</b>       | 2040 (459)              | 169 (555)                      | 305 (1001)                  | <b>1FN3100-4NC80-0BA1</b>                                                  |                           | 10/11.3 (22.1/24.9)                                  |                                                              |
| <b>455 (102)</b>        | 770 (173)               | 129 (423)                      | 234 (768)                   | <b>1FN3150-1NC20-0BA1</b>                                                  | <b>1FN3150-4SA00-0AA0</b> | 4.1/4.6 (9.0/10.1)                                   | 1.2/1.3<br>(2.7/2.9)                                         |
| <b>905 (203)</b>        | 1530 (344)              | 110 (361)                      | 201 (660)                   | <b>1FN3150-2NB80-0BA1</b>                                                  |                           | 7.2/8.1 (15.9/17.9)                                  |                                                              |
| <b>1360 (306)</b>       | 2300 (517)              | 163 (535)                      | 292 (958)                   | <b>1FN3150-3NC70-0BA1</b>                                                  |                           | 10.5/11.7 (23.2/25.8)                                |                                                              |
| <b>1810 (407)</b>       | 3060 (688)              | 109 (358)                      | 200 (656)                   | <b>1FN3150-4NB80-0BA1</b>                                                  |                           | 13.8/15.2 (30.4/33.5)                                |                                                              |
| <b>865 (195)</b>        | 1470 (331)              | 129 (423)                      | 230 (755)                   | <b>1FN3300-1NC10-0BA1</b>                                                  | <b>1FN3300-4SA00-0AA0</b> | 8.8/9.5 (19.4/20.9)                                  | 2.4/2.6<br>(5.3/5.7)                                         |
| <b>1730 (389)</b>       | 2940 (661)              | 127 (417)                      | 228 (748)                   | <b>1FN3300-2NC10-0BA1</b>                                                  |                           | 16.1/17.2 (35.5/37.9)                                |                                                              |
| <b>2595 (583)</b>       | 4400 (989)              | 144 (473)                      | 257 (843)                   | <b>1FN3300-3NC40-0BA1</b>                                                  |                           | 22.8/24.3 (50.3/53.6)                                |                                                              |
| <b>3460 (778)</b>       | 5870 (1320)             | 109 (358)                      | 196 (643)                   | <b>1FN3300-4NB80-0BA1</b>                                                  |                           | 30.4/32.3 (67.0/71.2)                                |                                                              |
| <b>2595 (583)</b>       | 4400 (989)              | 153 (502)                      | 271 (889)                   | <b>1FN3450-2NC50-0BA1</b>                                                  | <b>1FN3450-4SA00-0AA0</b> | 22/23.2 (48.5/51.2)                                  | 3.8/4<br>(8.4/8.8)                                           |
| <b>3890 (875)</b>       | 6600 (1484)             | 152 (499)                      | 270 (886)                   | <b>1FN3450-3NC50-0BA1</b>                                                  |                           | 32/33.6 (70.6/74.1)                                  |                                                              |
| <b>5185 (1166)</b>      | 8810 (1981)             | 106 (348)                      | 190 (623)                   | <b>1FN3450-4NB80-0BA1</b>                                                  |                           | 42.3/44.3 (93.3/97.9)                                |                                                              |
| <b>3460 (778)</b>       | 5870 (1320)             | 112 (368)                      | 200 (656)                   | <b>1FN3600-2NB80-0BA1</b>                                                  | <b>1FN3600-4SA00-0AA0</b> | 28.9/30.4 (63.7/67.0)                                | 4.6/5<br>(10.1/11)                                           |
| <b>5185 (1166)</b>      | 8810 (1981)             | 111 (364)                      | 199 (653)                   | <b>1FN3600-3NB80-0BA1</b>                                                  |                           | 42.9/45.0 (94.6/99.2)                                |                                                              |
| <b>6915 (1555)</b>      | 11740 (2639)            | 111 (364)                      | 199 (653)                   | <b>1FN3600-4NB80-0BA1</b>                                                  |                           | 56.6/59.2 (124.8/130.54)                             |                                                              |
| <b>5185 (1166)</b>      | 8810 (1981)             | 71 (233)                       | 130 (427)                   | <b>1FN3900-2NB20-0BA1</b>                                                  | <b>1FN3900-4SA00-0AA0</b> | 42.4/44.2 (93.5/97.5)                                | 7.5/7.9<br>(16.5/17.4)                                       |
| <b>7780 (1749)</b>      | 13210 (2970)            | 71 (233)                       | 129 (423)                   | <b>1FN3900-3NB20-0BA1</b>                                                  |                           | 62/64.5 (136.7/142.2)                                |                                                              |
| <b>10375 (2332)</b>     | 17610 (3959)            | 70 (230)                       | 129 (423)                   | <b>1FN3900-4NB20-0BA1</b>                                                  |                           | 82.2/85.3 (181.3/188.1)                              |                                                              |

#### Type of connection:

1FN3100 to 1FN3900 motors

Connection cover prepared for separate power and signal cables

**B**

1FN3050 motor

Permanently connected power and signal cables with exposed core ends

**E**

Length: 2 m (6.56 ft)

1FN3050 motor

Permanently connected power and signal cables pre-assembled, with connectors

**F**

Length: 0.5 m (1.64 ft)

Description

Order No.

#### Signal cable, pre-assembled with M17 connector<sup>7)</sup>

- 1FN3100/1FN3150 motors
- 1FN3300 to 1FN3900 motors

**6FX7002-2SL01-....**

**6FX7002-2SL02-....**

## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN3 synchronous linear motors  
Version for continuous load – Water cooling

| Motor type<br>Primary section<br>(repeated)                     | Rated<br>cur-<br>rent | Maxi-<br>mum<br>cur-<br>rent | Calculated<br>power | SINAMICS S120 Motor Module        |                                                                                                                | Power cable with complete shield<br>Motor connection via adapter cable with power connector<br>for increased velocity/acceleration |                         |                                          |                                                     |
|-----------------------------------------------------------------|-----------------------|------------------------------|---------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------|-----------------------------------------------------|
|                                                                 |                       |                              |                     | Required<br>rated<br>current      | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Pre-assembled<br>adapter cable<br>for motor                                                                                        | Power<br>con-<br>nector | Cable<br>cross-<br>section <sup>5)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                                                                 |                       |                              |                     |                                   |                                                                                                                |                                                                                                                                    |                         |                                          |                                                     |
| $I_{\text{rated}}^{1)}$                                         | $I_{\text{MAX}}$      | $P_{\text{el, max.}}$        |                     | $I_{\text{rated}}/I_{\text{MAX}}$ |                                                                                                                |                                                                                                                                    |                         |                                          |                                                     |
| A                                                               | A                     | kW (HP)                      |                     | A                                 | Order No.                                                                                                      | Order No.                                                                                                                          | Size                    | mm <sup>2</sup>                          | Order No.                                           |
| 1FN3050-1ND...                                                  | 2.8                   | 5.9                          | 1.7 (2.28)          | 3/6                               | 6SL312-1-TE13-0AA3                                                                                             | 6)                                                                                                                                 | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3050-1ND...                                                  | 2.8                   | 5.9                          | 1.7 (2.28)          | 3/6                               | 6SL312-1-TE13-0AA3                                                                                             | 6)                                                                                                                                 | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3050-2NB...                                                  | 2.8                   | 5.9                          | 2.3 (3.08)          | 3/6                               | 6SL312-1-TE13-0AA3                                                                                             | 6)                                                                                                                                 | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3050-2NB...                                                  | 2.8                   | 5.9                          | 2.3 (3.08)          | 3/6                               | 6SL312-1-TE13-0AA3                                                                                             | 6)                                                                                                                                 | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-1NC...                                                  | 2.8                   | 5.9                          | 2.1 (2.8)           | 3/6                               | 6SL312-1-TE13-0AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-2NC...                                                  | 8                     | 16.5                         | 5.1 (6.84)          | 9/18                              | 6SL312-1-TE21-0AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-3NC...                                                  | 8.5                   | 17.6                         | 6.3 (8.5)           | 9/18                              | 6SL312-1-TE21-0AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3100-4NC...                                                  | 15.9                  | 33.1                         | 10.2 (13.9)         | 18/36                             | 6SL312-1-TE21-8AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-1NC...                                                  | 4.5                   | 9.4                          | 3.2 (4.3)           | 5/10                              | 6SL312-1-TE15-0AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-2NB...                                                  | 8                     | 16.5                         | 5.8 (7.78)          | 9/18                              | 6SL312-1-TE21-0AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-3NC...                                                  | 16.9                  | 35.2                         | 10.8 (14.5)         | 18/36                             | 6SL312-1-TE21-8AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3150-4NB...                                                  | 15.9                  | 33.1                         | 11.6 (15.6)         | 18/36                             | 6SL312-1-TE21-8AA3                                                                                             | 6FX7002-5LM42- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-1NC...                                                  | 8.1                   | 17.1                         | 5.4 (7.2)           | 9/18                              | 6SL312-1-TE21-0AA3                                                                                             | 6FX7002-5LM62- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-2NC...                                                  | 16.2                  | 34.1                         | 10.7 (14.3)         | 18/36                             | 6SL312-1-TE21-8AA3                                                                                             | 6FX7002-5LM62- ....                                                                                                                | 1                       | 4 × 2.5                                  | 6FX8002-5CS11- ....                                 |
| 1FN3300-3NC...                                                  | 27.3                  | 57.4                         | 17.3 (23.2)         | 30/56 <sup>4)</sup>               | 6SL312-1-TE23-0AA3                                                                                             | 6FX7002-5LM72- ....                                                                                                                | 1.5                     | 4 × 4                                    | 6FX8002-5CS41- ....                                 |
| 1FN3300-4NB...                                                  | 28.4                  | 59.6                         | 19.6 (26.3)         | 30/56 <sup>4)</sup>               | 6SL312-1-TE23-0AA3                                                                                             | 6FX7002-5LM72- ....                                                                                                                | 1.5                     | 4 × 4                                    | 6FX8002-5CS41- ....                                 |
| 1FN3450-2NC...                                                  | 28.4                  | 59.6                         | 17.4 (23.3)         | 30/56 <sup>4)</sup>               | 6SL312-1-TE23-0AA3                                                                                             | 6FX7002-5LM72- ....                                                                                                                | 1.5                     | 4 × 4                                    | 6FX8002-5CS41- ....                                 |
| 1FN3450-3NC...                                                  | 42.5                  | 89.5                         | 26.1 (35.0)         | 45/85 <sup>4)</sup>               | 6SL312-1-TE24-5AA3                                                                                             | 6FX7002-5LM32- ....                                                                                                                | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3450-4NB...                                                  | 40.8                  | 85.8                         | 27.9 (37.4)         | 45/85 <sup>4)</sup>               | 6SL312-1-TE24-5AA3                                                                                             | 6FX7002-5LM32- ....                                                                                                                | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3600-2NB...                                                  | 28.4                  | 59.6                         | 19.3 (25.9)         | 30/56 <sup>4)</sup>               | 6SL312-1-TE23-0AA3                                                                                             | 6FX7002-5LM72- ....                                                                                                                | 1.5                     | 4 × 4                                    | 6FX8002-5CS41- ....                                 |
| 1FN3600-3NB...                                                  | 42.5                  | 89.5                         | 28.9 (38.8)         | 45/85 <sup>4)</sup>               | 6SL312-1-TE24-5AA3                                                                                             | 6FX7002-5LM32- ....                                                                                                                | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3600-4NB...                                                  | 56.7                  | 119.3                        | 38.5 (51.6)         | 60/113 <sup>4)</sup>              | 6SL312-1-TE26-0AA3                                                                                             | 6FX7002-5LM02- ....                                                                                                                | 1.5                     | 4 × 16                                   | 6FX8002-5CS24- ....                                 |
| 1FN3900-2NB...                                                  | 28.4                  | 59.6                         | 22.3 (29.9)         | 30/56 <sup>4)</sup>               | 6SL312-1-TE23-0AA3                                                                                             | 6FX7002-5LM72- ....                                                                                                                | 1.5                     | 4 × 4                                    | 6FX8002-5CS41- ....                                 |
| 1FN3900-3NB...                                                  | 42.5                  | 89.5                         | 33.4 (44.8)         | 45/85 <sup>4)</sup>               | 6SL312-1-TE24-5AA3                                                                                             | 6FX7002-5LM32- ....                                                                                                                | 1.5                     | 4 × 10                                   | 6FX8002-5CS64- ....                                 |
| 1FN3900-4NB...                                                  | 56.7                  | 119.3                        | 44.5 (59.7)         | 60/113 <sup>4)</sup>              | 6SL312-1-TE26-0AA3                                                                                             | 6FX7002-5LM02- ....                                                                                                                | 1.5                     | 4 × 16                                   | 6FX8002-5CS24- ....                                 |
| Cooling:<br>Internal air cooling 0<br>External air cooling 1    |                       |                              |                     |                                   | .... Length code <sup>7)</sup> ....                                                                            |                                                                                                                                    |                         |                                          |                                                     |
| Motor Module:<br>Single Motor Module 1<br>Double Motor Module 2 |                       |                              |                     |                                   | More information about cables can be found under MOTION-CONNECT connection systems.                            |                                                                                                                                    |                         |                                          |                                                     |

<sup>1)</sup> For water cooling with inlet temperature 35 °C (95 °F).

<sup>2)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

<sup>3)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.

<sup>4)</sup> Power modules are designed for feed rate force  $F_{\text{rated}}$ . If feed rate force  $F_{\text{MAX}}$  is utilized, the next largest power module must be used. If a power module with a higher rating is used, you must check whether the specified power cable can be connected to it.

<sup>5)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>6)</sup> Permanently connected power and signal cables.

<sup>7)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### SIMOTICS L-1FN3 synchronous linear motors Optional components

#### Selection and ordering data

| SIMOTICS L-1FN3 linear motors |                          | Optional components     |                                                            |
|-------------------------------|--------------------------|-------------------------|------------------------------------------------------------|
|                               |                          | Secondary section cover |                                                            |
| Type                          | Continuous <sup>1)</sup> |                         | Cover end pieces for secondary section cover <sup>2)</sup> |
|                               | Segmented                |                         | Retaining of the integrated cover without heatsink profile |
|                               | Order No.                | Order No.               | Order No.                                                  |
| 1FN3050-...                   | 1FN3050-0TB00-1 ■ ■ 0    | 1FN3050-4TP00-1A ■ ■    | 1FN3050-0TC00-0AA0                                         |
| 1FN3100-...                   | 1FN3100-0TB00-1 ■ ■ 0    | 1FN3100-4TP00-1A ■ ■    | 1FN3100-0TC00-0AA0                                         |
| 1FN3150-...                   | 1FN3150-0TB00-1 ■ ■ 0    | 1FN3150-4TP00-1A ■ ■    | 1FN3150-0TC00-0AA0                                         |
| 1FN3300-...                   | 1FN3300-0TB00-1 ■ ■ 0    | 1FN3300-4TP00-1A ■ ■    | 1FN3300-0TC00-0AA0                                         |
| 1FN3450-...                   | 1FN3450-0TB00-1 ■ ■ 0    | 1FN3450-4TP00-1A ■ ■    | 1FN3450-0TC00-0AA0                                         |
| 1FN3600-...                   | 1FN3600-0TB00-1 ■ ■ 0    | 1FN3600-4TP00-1A ■ ■    | –                                                          |
| 1FN3900-...                   | 1FN3900-0TB00-1 ■ ■ 0    | 1FN3900-4TP00-1A ■ ■    | –                                                          |

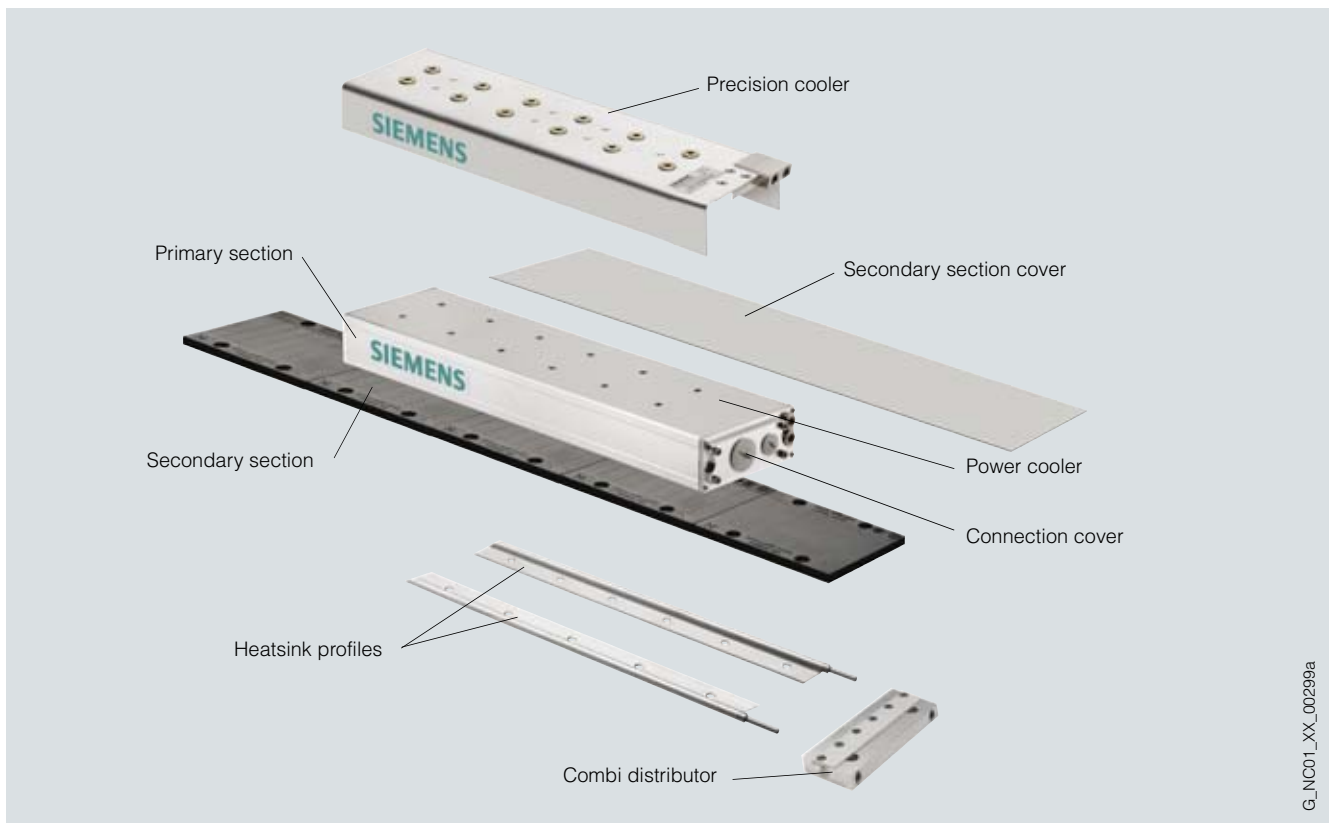
|                              |    |   |                                                         |     |   |   |
|------------------------------|----|---|---------------------------------------------------------|-----|---|---|
| Number of secondary sections | 0  | A | Number of secondary sections for all motors             | 2.5 | C | 5 |
|                              | 10 | B |                                                         | 3   | D | 0 |
|                              | 20 | C |                                                         | 3.5 | D | 5 |
|                              | 30 | D |                                                         | 4   | E | 0 |
|                              | 40 | E |                                                         | 5   | F | 0 |
|                              | 50 | F |                                                         |     |   |   |
|                              | 0  | A | Number of secondary sections for motors 1FN3600/1FN3900 | 5.5 | F | 5 |
|                              | 1  | B |                                                         | 6.5 | G | 5 |
|                              | 2  | C |                                                         |     |   |   |
|                              | 3  | D |                                                         |     |   |   |
|                              | 4  | E |                                                         |     |   |   |
|                              | 5  | F |                                                         |     |   |   |
|                              | 6  | G |                                                         |     |   |   |
|                              | 7  | H |                                                         |     |   |   |
|                              | 8  | J |                                                         |     |   |   |
|                              | 9  | K |                                                         |     |   |   |

| SIMOTICS L-1FN3 synchronous linear motors – Version for peak load | Optional components<br>Precision cooler |
|-------------------------------------------------------------------|-----------------------------------------|
| Type                                                              | Order No.                               |
| 1FN3050-2W...                                                     | 1FN3050-2PK00-0AA0                      |
| 1FN3100-2W...                                                     | 1FN3100-2PK00-0AA0                      |
| 1FN3100-3W...                                                     | 1FN3100-3PK00-0AA0                      |
| 1FN3100-4W...                                                     | 1FN3100-4PK00-0AA0                      |
| 1FN3100-5W...                                                     | 1FN3100-5PK00-0AA0                      |
| 1FN3150-2W...                                                     | 1FN3150-2PK00-0AA0                      |
| 1FN3150-3W...                                                     | 1FN3150-3PK00-0AA0                      |
| 1FN3150-4W...                                                     | 1FN3150-4PK00-0AA0                      |
| 1FN3150-5W...                                                     | 1FN3150-5PK00-0AA0                      |
| 1FN3300-2W...                                                     | 1FN3300-2PK00-0AA0                      |
| 1FN3300-3W...                                                     | 1FN3300-3PK00-0AA0                      |
| 1FN3300-4W...                                                     | 1FN3300-4PK00-0AA0                      |
| 1FN3450-2W...                                                     | 1FN3450-2PK00-0AA0                      |
| 1FN3450-3W...                                                     | 1FN3450-3PK00-0AA0                      |
| 1FN3450-4W...                                                     | 1FN3450-4PK00-0AA0                      |
| 1FN3600-2W...                                                     | 1FN3600-2PK00-0AA0                      |
| 1FN3600-3W...                                                     | 1FN3600-3PK00-0AA0                      |
| 1FN3600-4W...                                                     | 1FN3600-4PK00-0AA0                      |
| 1FN3900-2W...                                                     | 1FN3900-2PK00-0AA0                      |
| 1FN3900-3W...                                                     | 1FN3900-3PK00-0AA0                      |
| 1FN3900-4W...                                                     | 1FN3900-4PK00-0AA0                      |

| SIMOTICS L-1FN3 synchronous linear motors – Version for continuous load | Optional components<br>Precision cooler |
|-------------------------------------------------------------------------|-----------------------------------------|
| Type                                                                    | Order No.                               |
| 1FN3050-1N...                                                           | 1FN3050-1PK10-0AA0                      |
| 1FN3050-2N...                                                           | 1FN3050-2PK10-0AA0                      |
| 1FN3100-1N...                                                           | 1FN3100-1PK10-0AA0                      |
| 1FN3100-2N...                                                           | 1FN3100-2PK10-0AA0                      |
| 1FN3100-3N...                                                           | 1FN3100-3PK10-0AA0                      |
| 1FN3100-4N...                                                           | 1FN3100-4PK10-0AA0                      |
| 1FN3150-1N...                                                           | 1FN3150-1PK10-0AA0                      |
| 1FN3150-2N...                                                           | 1FN3150-2PK10-0AA0                      |
| 1FN3150-3N...                                                           | 1FN3150-3PK10-0AA0                      |
| 1FN3150-4N...                                                           | 1FN3150-4PK10-0AA0                      |
| 1FN3300-1N...                                                           | 1FN3300-1PK10-0AA0                      |
| 1FN3300-2N...                                                           | 1FN3300-2PK10-0AA0                      |
| 1FN3300-3N...                                                           | 1FN3300-3PK10-0AA0                      |
| 1FN3300-4N...                                                           | 1FN3300-4PK10-0AA0                      |
| 1FN3450-2N...                                                           | 1FN3450-2PK10-0AA0                      |
| 1FN3450-3N...                                                           | 1FN3450-3PK10-0AA0                      |
| 1FN3450-4N...                                                           | 1FN3450-4PK10-0AA0                      |
| 1FN3600-2N...                                                           | 1FN3600-2PK10-0AA0                      |
| 1FN3600-3N...                                                           | 1FN3600-3PK10-0AA0                      |
| 1FN3600-4N...                                                           | 1FN3600-4PK10-0AA0                      |
| 1FN3900-2N...                                                           | 1FN3900-2PK10-0AA0                      |
| 1FN3900-3N...                                                           | 1FN3900-3PK10-0AA0                      |
| 1FN3900-4N...                                                           | 1FN3900-4PK10-0AA0                      |

<sup>1)</sup> Integrated cover for several secondary sections. The maximum length of the secondary section cover is 6 m (19.7 ft). For the following motors, this corresponds to: 1FN3050 to 1FN3150, a maximum number of 50 secondary sections (AB to FA). 1FN3300 to 1FN3900, a maximum number of 32 secondary sections (AB to DC).

<sup>2)</sup> The secondary section end pieces are designed to allow clamping of the integrated secondary section cover.



## Selection and ordering data

| SIMOTICS L-1FN3<br>linear motors<br>Type | Optional components            |                                                     |                                                               |                    |
|------------------------------------------|--------------------------------|-----------------------------------------------------|---------------------------------------------------------------|--------------------|
|                                          | Heatsink profile <sup>3)</sup> | Secondary section end pieces <sup>2)</sup>          |                                                               |                    |
|                                          |                                | Combi distributor                                   | Combi adapter                                                 | Combi end piece    |
|                                          |                                | Parallel water connection for all heatsink profiles | Combi adapter and end piece can only be implemented together. | Water diversion    |
|                                          | Order No.                      | Order No.                                           | Order No.                                                     | Order No.          |
| 1FN3050-...                              | 1FN3002-0TK0 ■ -1 ■ ■ 0        | 1FN3050-0TJ01-0AA0                                  | 1FN3050-0TG01-0AA0                                            | 1FN3050-0TF01-0AA0 |
| 1FN3100-...                              | 1FN3002-0TK0 ■ -1 ■ ■ 0        | 1FN3100-0TJ01-0AA0                                  | 1FN3100-0TG01-0AA0                                            | 1FN3100-0TF01-0AA0 |
| 1FN3150-...                              | 1FN3002-0TK0 ■ -1 ■ ■ 0        | 1FN3150-0TJ01-0AA0                                  | 1FN3150-0TG01-0AA0                                            | 1FN3150-0TF01-0AA0 |
| 1FN3300-...                              | 1FN3003-0TK0 ■ -1 ■ ■ 0        | 1FN3300-0TJ01-0AA0                                  | 1FN3300-0TG01-0AA0                                            | 1FN3300-0TF01-0AA0 |
| 1FN3450-...                              | 1FN3003-0TK0 ■ -1 ■ ■ 0        | 1FN3450-0TJ01-0AA0                                  | 1FN3450-0TG01-0AA0                                            | 1FN3450-0TF01-0AA0 |
| 1FN3600-...                              | 1FN3004-0TK0 ■ -1 ■ ■ 0        | 1FN3600-0TJ01-0AA0                                  | —                                                             | —                  |
| 1FN3900-...                              | 1FN3005-0TK0 ■ -1 ■ ■ 0        | 1FN3900-0TJ01-0AA0                                  | —                                                             | —                  |

**With plug-in coupling prepared** for connection to combi distributor with plug-in coupling, combi adapter with plug-in coupling, combi end piece with plug-in coupling or as intermediate unit for heat-sink profile with cable grommet nipple

1FN3050 to 1FN3450 motors<sup>4)</sup>:  
**Grommet nipple only on right end** of secondary section track

1FN3600/1FN3900 motors:  
**Grommet nipple on both ends** of secondary section track

1FN3050 to 1FN3450 motors<sup>4)</sup>:  
**Grommet nipple only on left end** of secondary section track

| Number of secondary sections |   |
|------------------------------|---|
| 0                            | A |
| 10                           | B |
| 20                           | C |
| 0                            | A |
| 1                            | B |
| 2                            | C |
| 3                            | D |
| 4                            | E |
| 5                            | F |
| 6                            | G |
| 7                            | H |
| 8                            | I |
| 9                            | J |

<sup>3)</sup> 1FN3050 to 1FN3450 motors:  
2 units required per secondary section track.  
1FN3600 to 1FN3900:  
3 units per secondary section track.  
The maximum available length of a single-part heatsink profile is 3 m (9.84 ft).  
For the following motors, this corresponds to:  
1FN3050 to 1FN3150, a maximum of 24 secondary sections (AB to CE)  
1FN3300 to 1FN3900, a maximum of 16 secondary sections (AB to BG).

<sup>4)</sup> Available only in length AC (equals 2 secondary sections). The difference in the secondary section track length must be compensated through assembly with the heatsink profile 1FN300.-0TK04-1..0.

## Direct drives

### SIMOTICS L linear motors for SINAMICS S120

#### SIMOTICS L-1FN3 synchronous linear motors Hall-effect sensor box

##### Overview



The motor position can be identified with an incremental linear measuring system using an additional hall-effect sensor box, or also motion-based if certain supplementary conditions are taken into account.

##### Selection and ordering data

| Linear motors                                               | Hall-effect sensor box    |                           |
|-------------------------------------------------------------|---------------------------|---------------------------|
| SIMOTICS L-1FN3                                             | Straight cable outlet     | Cable outlet at side      |
| Type                                                        | Order No.                 | Order No.                 |
| <b><i>Mounted opposite primary section terminal end</i></b> |                           |                           |
| 1FN3050-2...                                                | <b>1FN3002-0PH00-0AA0</b> | <b>1FN3002-0PH01-0AA0</b> |
| 1FN3100-2...                                                |                           |                           |
| 1FN3100-4...                                                |                           |                           |
| 1FN3150-2...                                                |                           |                           |
| 1FN3150-4...                                                |                           |                           |
| 1FN3100-1...                                                | <b>1FN3005-0PH00-0AA0</b> | <b>1FN3005-0PH01-0AA0</b> |
| 1FN3100-3...                                                |                           |                           |
| 1FN3100-5...                                                |                           |                           |
| 1FN3150-1...                                                |                           |                           |
| 1FN3150-3...                                                |                           |                           |
| 1FN3150-5...                                                |                           |                           |
| 1FN3300-2...                                                | <b>1FN3003-0PH00-0AA0</b> | <b>1FN3003-0PH01-0AA0</b> |
| 1FN3300-4...                                                |                           |                           |
| 1FN3450-2...                                                |                           |                           |
| 1FN3450-4...                                                |                           |                           |
| 1FN3600-2...                                                |                           |                           |
| 1FN3600-4...                                                |                           |                           |
| 1FN3900-2...                                                |                           |                           |
| 1FN3900-4...                                                |                           |                           |
| 1FN3300-1...                                                | <b>1FN3006-0PH00-0AA0</b> | <b>1FN3006-0PH01-0AA0</b> |
| 1FN3300-3...                                                |                           |                           |
| 1FN3450-3...                                                |                           |                           |
| 1FN3600-3...                                                |                           |                           |
| 1FN3900-3...                                                |                           |                           |
| <b><i>Mounted on primary section terminal end</i></b>       |                           |                           |
| 1FN3050-...                                                 | <b>1FN3002-0PH00-0AA0</b> | <b>1FN3002-0PH01-0AA0</b> |
| 1FN3100-...                                                 |                           |                           |
| 1FN3150-...                                                 |                           |                           |
| 1FN3300-...                                                 | <b>1FN3003-0PH00-0AA0</b> | <b>1FN3003-0PH01-0AA0</b> |
| 1FN3450-...                                                 |                           |                           |
| 1FN3600-...                                                 |                           |                           |
| 1FN3900-...                                                 |                           |                           |



## SIMOTICS L linear motors for SINAMICS S120

SIMOTICS L-1FN3/SIMOTICS L-1FN6  
synchronous linear motors – Liquid cooling

## Overview

**Recommended linear measuring systems for  
SIMOTICS L-1FN3/SIMOTICS L-1FN6 linear motors**

| Type                                      | Absolute encoder EnDat enclosed                  |                                                  |
|-------------------------------------------|--------------------------------------------------|--------------------------------------------------|
|                                           | LC 183                                           | LC 483                                           |
| Signal cycle                              | 20 µm                                            | 20 µm                                            |
| Acceleration in measuring direction, max. | 100 m/s <sup>2</sup><br>(328 ft/s <sup>2</sup> ) | 100 m/s <sup>2</sup><br>(328 ft/s <sup>2</sup> ) |
| Traversing velocity, max.                 | 180 m/min<br>(591 ft/min)                        | 180 m/min<br>(591 ft/min)                        |
| Measuring length, max.                    | 3040 mm<br>(120 in)                              | 2040 mm<br>(80.3 in)                             |
| Output signal                             | 1 V <sub>pp</sub>                                | 1 V <sub>pp</sub>                                |

| Type                                      | Incremental encoder sin/cos 1 V <sub>pp</sub> enclosed |                                                  |
|-------------------------------------------|--------------------------------------------------------|--------------------------------------------------|
|                                           | LS 187 (C)                                             | LS 487 (C)                                       |
| Signal cycle                              | 20 µm                                                  | 20 µm                                            |
| Acceleration in measuring direction, max. | 100 m/s <sup>2</sup><br>(328 ft/s <sup>2</sup> )       | 100 m/s <sup>2</sup><br>(328 ft/s <sup>2</sup> ) |
| Traversing velocity, max.                 | 120 m/min<br>(394 ft/min)                              | 120 m/min<br>(394 ft/min)                        |
| Measuring length, max.                    | 3040 mm<br>(120 in)                                    | 2040 mm<br>(80.3 in)                             |
| Output signal                             | 1 V <sub>pp</sub>                                      | 1 V <sub>pp</sub>                                |

| Type                                      | Incremental encoder sin/cos 1 V <sub>pp</sub> open             |                                                                |                                                                |
|-------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
|                                           | LIDA 185                                                       | LIDA 485                                                       | Renishaw RG2                                                   |
| Signal cycle                              | 40 µm                                                          | 20 µm                                                          | 20 µm                                                          |
| Acceleration in measuring direction, max. | 200 m/s <sup>2</sup><br>(656 ft/s <sup>2</sup> ) <sup>1)</sup> | 200 m/s <sup>2</sup><br>(656 ft/s <sup>2</sup> ) <sup>1)</sup> | 300 m/s <sup>2</sup><br>(984 ft/s <sup>2</sup> ) <sup>1)</sup> |
| Traversing velocity, max.                 | 480 m/min<br>(1575 ft/min)                                     | 480 m/min<br>(1575 ft/min)                                     | 300 m/min<br>(984 ft/min)                                      |
| Measuring length, max.                    | 30040 mm<br>(1183 in)                                          | 30040 mm<br>(1183 in)                                          | 50000 mm<br>(1968 in)                                          |
| Output signal                             | 1 V <sub>pp</sub>                                              | 1 V <sub>pp</sub>                                              | 1 V <sub>pp</sub>                                              |

## More information

These are non-Siemens products whose fundamental suitability is familiar to us. It goes without saying that equivalent products from other manufacturers may be used. Our recommendations are to be seen as helpful information, not as requirements or dictates. We do not warrant the composition, nature, state or quality of non-Siemens products.

Please get in touch with the contact persons of the cooler manufacturers listed below for technical information.

**BKW Kälte-Wärme-Versorgungstechnik GmbH**

Benzstraße 2  
72649 WOLFESCHLUGEN, Germany  
Telephone: +49 70 22 50 03 - 0  
Fax: +49 70 22 50 03 - 30  
E-mail: [info@bkw-kuema.de](mailto:info@bkw-kuema.de)  
[www.bkw-kuema.de](http://www.bkw-kuema.de)

**Helmut Schimpke and Team Industriekühlanlagen GmbH + Co. KG**

Contact: Ginsterweg 25-27  
Mr. Gerkens 42781 HAAH, Germany  
Telephone: +49 21 29 94 38 - 0  
Fax: +49 21 29 94 38 - 99  
E-mail: [info@schimpke.de](mailto:info@schimpke.de)  
[www.schimpke.com](http://www.schimpke.com)

**Hydac System GmbH**

Contact: Postfach 12 51  
Mr. Klein 66273 SULZBACH/SAAR, Germany  
Telephone: +49 68 97 5 09 - 7 08  
Fax: +49 68 97 5 09 - 4 54  
E-mail: [winfried.klein@hydac.com](mailto:winfried.klein@hydac.com)  
[www.hydac.com](http://www.hydac.com)

**Pfannenberger GmbH**

Contact: Werner-Witt-Straße 1  
Mr. Hille 21035 HAMBURG, Germany  
Telephone: +49 40 7 34 12 - 1 27  
Fax: +49 40 7 34 12 - 1 01  
E-mail: [werner.hille@pfannenberger.com](mailto:werner.hille@pfannenberger.com)  
[www.pfannenberger.com](http://www.pfannenberger.com)

**Rittal GmbH & Co. KG**

Contact: Postfach 16 62  
Mr. Cieslar 35726 HERBORN, Germany  
Telephone: +49 27 72 5 05 - 20 63  
Fax: +49 27 72 5 05 - 29 66  
E-mail: [cieslar.g@rittal.de](mailto:cieslar.g@rittal.de)  
[www.rittal.com](http://www.rittal.com)

For design of the coolers, see Configuration Manual (see documentation for Order No.).

<sup>1)</sup> Refers to the measuring head.



# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### SIMOTICS L-1FN6 synchronous linear motors

#### Overview



In combination with the SINAMICS S120 drive system, 1FN6 linear motors provide an optimally tuned linear direct drive system for the requirements of modern mechanical engineering.

The SIMOTICS L-1FN6 motors comprise a primary section and a secondary section equipped with magnets which are not made of rare-earth material – in contrast to the current synchronous linear motor technology. The primary section has fixed dimensions, while the secondary section is made up of individual elements (segments) to suit the required traversing range. Through parallel operation of the motors, feedrate force and length can be scaled beyond the available spectrum.

#### Benefits

- High dynamic response and very high traversing velocity
- Excellent precision
- Very easy installation due to magnet-free secondary section track
- Drive components are free of wear thanks to contactless drive force transmission

The main advantages of linear direct drive technology are the extensive avoidance of

- Effects of elasticity, backlash and friction
- Natural oscillation in the drive train

This results in a higher dynamic response and increased precision. If suitable measuring systems are used and the temperature conditions are appropriate, the motors can be positioned in the nanometer range.

#### Design

The simple mechanical construction without transmission elements, such as ballscrew, coupling or belt, enhances the reliability of the drive components.

Heat loss occurs almost exclusively in the primary section and is dissipated via the optimized housing type.

In addition, the 1FN6003/1FN6007 motors are available with water cooling.

The stainless metal encapsulation of the primary section achieves the high mechanical ruggedness and resistance to soiling required for use in machine tools, as well as high resistance to corrosive liquids. The motor places minimal demands on the preparation of mounting surfaces thanks to the large air gap. The mounting tolerances for the air gap are  $\pm 0.3$  mm (0.012 in).

#### Design variant

SIMOTICS L-1FN6 linear motors are constructed as single-sided motors. The primary section is mounted parallel to the associated secondary section. Several primary sections can traverse one secondary section track.

#### Application

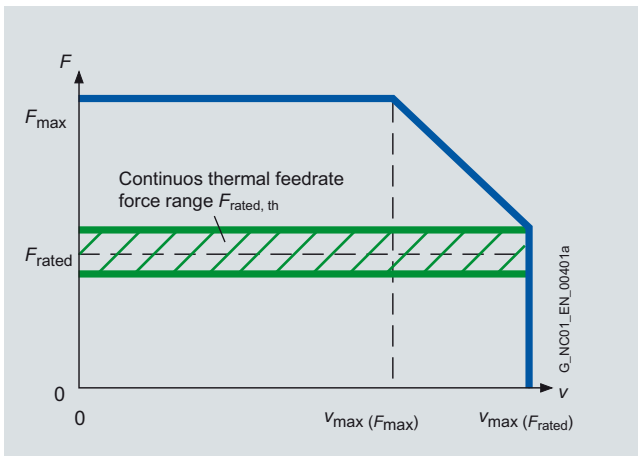
Typical applications:

- Linear axes with traverse paths of approx. 4 m (13.1 ft) or more
- Handling and concatenated axes in the area of machine tools and production machines
- High-dynamic and high-precision feed axes in water jet and laser cutting machines
- Applications that require a non-magnetic secondary section track

## Technical specifications

|                                                                         |                                                                                                                                                                        |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                     | SIMOTICS L-1FN6 linear motor                                                                                                                                           |
| <b>Type of motor</b>                                                    | Permanent-magnet synchronous linear motor                                                                                                                              |
| <b>Magnet material</b>                                                  | Rare-earth permanent magnets                                                                                                                                           |
| <b>Cooling</b>                                                          |                                                                                                                                                                        |
| • 1FN6003 ... 1FN6024                                                   | Natural cooling                                                                                                                                                        |
| • 1FN6003 ... 1FN6007                                                   | Water cooling                                                                                                                                                          |
| <b>Temperature monitoring in primary section<sup>1)</sup></b>           |                                                                                                                                                                        |
| • In accordance with DIN 44081/DIN 44082                                | PTC thermistor in triple connection                                                                                                                                    |
| • In accordance with EN 60034-11 (IEC 60034-11)                         | KTY84 thermistor<br>Evaluation via Sensor Module: SME120/SME125/TM120 (see SINAMICS S120 drive system).                                                                |
| <b>Insulation in accordance with EN (IEC) 60034-1</b>                   | Temperature class 155 (F)                                                                                                                                              |
| <b>Type of construction</b>                                             | Individual components                                                                                                                                                  |
| <b>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</b> | Primary section: IP65<br>Degree of protection of the motor is determined by the construction of the motor's installation in the machine.<br>Minimum requirement: IP23. |
| <b>Encoder system</b><br>(not included in scope of supply)              | Select according to basic conditions specific to the application and the drive.<br>Refer to overview of measuring systems.                                             |
| <b>Connection</b>                                                       |                                                                                                                                                                        |
| • 1FN6003                                                               | Permanently connected signal and power cables with a length of 0.5 m (1.64 ft) incl. connectors                                                                        |
| • 1FN6007 ... 1FN6024                                                   | Power and signal cables are connected via two separate integrated sockets on the front                                                                                 |
| <b>Approvals, according to</b>                                          | cURus                                                                                                                                                                  |

## Characteristic curves



The SIMOTICS L-1FN6 linear motors have an overload range available for acceleration processes. The maximum force  $F_{\text{MAX}}$  can only be utilized up to a maximum velocity  $v_{\text{MAX}}(F_{\text{MAX}})$  up to velocity  $v_{\text{MAX}}(F_{\text{rated}})$  only the feedrate force  $F_{\text{rated}}$  is available (see footnotes for selection and ordering data).

<sup>1)</sup> Evaluation via Sensor Module External SME120/SME125, see SINAMICS S120 drive system.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN6 synchronous linear motors Natural cooling

#### Selection and ordering data

| Continuous thermal feedrate force range <sup>1)3)</sup> | Rated feedrate force, typ. <sup>2)3)</sup> | Feedrate force, max. | Maximum velocity <sup>4)</sup> |                          | SIMOTICS L-1FN6 linear motors<br>Standard type |                   | Weight, approx. |                                                             |             |
|---------------------------------------------------------|--------------------------------------------|----------------------|--------------------------------|--------------------------|------------------------------------------------|-------------------|-----------------|-------------------------------------------------------------|-------------|
| $F_{rated}$ , th                                        | $F_{rated}$                                | $F_{MAX}$            | $v_{MAX}$ at $F_{MAX}$         | $v_{MAX}$ at $F_{rated}$ | Primary section                                | Secondary section | Primary section | Secondary section<br>200 mm (7.87 in)/<br>500 mm (19.69 in) |             |
| N (lb <sub>f</sub> )                                    | N (lb <sub>f</sub> )                       | N (lb <sub>f</sub> ) | m/min (ft/min)                 | m/min (ft/min)           | Order No.                                      | Order No.         | kg (lb)         | kg (lb)                                                     |             |
| Natural cooling                                         |                                            |                      |                                |                          |                                                |                   |                 |                                                             |             |
| 49 ... 119<br>(11 ... 27)                               | 66.3(14.9)                                 | 157 (35.3)           | 345 (1132)                     | 748 (2454)               | 1FN6003-1LC57-0FA1                             | 1FN6003-1S00-0AA0 | 3.19 (7.03)     | 0.76/1.89<br>(1.68/4.17)                                    |             |
|                                                         |                                            |                      | 503 (1650)                     | 1080 (3543)              | 1FN6003-1LC84-0FA1                             |                   |                 |                                                             |             |
| 98 ... 239<br>(22 ... 54)                               | 133 (29.9)                                 | 315 (70.8)           | 226 (742)                      | 515 (1690)               | 1FN6003-1LE38-0FA1                             |                   |                 |                                                             | 4.99 (11.0) |
|                                                         |                                            |                      | 572 (1877)                     | 1280 (4200)              | 1FN6003-1LE88-0FA1                             |                   |                 |                                                             |             |
| 147 ... 358<br>(33 ... 80)                              | 199 (44.7)                                 | 472 (106)            | 141 (463)                      | 333 (1093)               | 1FN6003-1LG24-0FA1                             |                   |                 |                                                             | 6.79 (15.0) |
|                                                         |                                            |                      | 366 (1201)                     | 836 (2743)               | 1FN6003-1LG61-0FA1                             |                   |                 |                                                             |             |
| 196 ... 477<br>(44 ... 107)                             | 265 (59.6)                                 | 630 (142)            | 99.6(327)                      | 243 (797)                | 1FN6003-1LJ17-0FA1                             |                   |                 |                                                             | 8.59 (18.9) |
|                                                         |                                            |                      | 267 (876)                      | 618 (2028)               | 1FN6003-1LJ44-0FA1                             |                   |                 |                                                             |             |
| 245 ... 597<br>(55 ... 134)                             | 332 (74.6)                                 | 787 (177)            | 74.7(245)                      | 190 (623)                | 1FN6003-1LL12-0FA1                             | 10.4 (22.9)       |                 |                                                             |             |
|                                                         |                                            |                      | 208 (682)                      | 488 (1601)               | 1FN6003-1LL35-0FA1                             |                   |                 |                                                             |             |
| 294 ... 716<br>(66 ... 161)                             | 398 (89.5)                                 | 945 (212)            | 57.9(190)                      | 155 (509)                | 1FN6003-1LN10-0FA1                             | 12.2 (26.9)       |                 |                                                             |             |
|                                                         |                                            |                      | 169 (554)                      | 402 (1319)               | 1FN6003-1LN28-0FA1                             |                   |                 |                                                             |             |
| 98 ... 239<br>(22 ... 54)                               | 133 (29.9)                                 | 315 (70.8)           | 187 (614)                      | 386 (1266)               | 1FN6007-1LC31-0KA1                             | 1FN6007-1S00-0AA0 | 5.08 (11.2)     | 1.61/4.03<br>(3.55/8.89)                                    |             |
|                                                         |                                            |                      | 276 (906)                      | 562 (1844)               | 1FN6007-1LC46-0KA1                             |                   |                 |                                                             |             |
| 196 ... 477<br>(44 ... 107)                             | 265 (59.6)                                 | 630 (142)            | 120 (394)                      | 265 (869)                | 1FN6007-1LE20-0KA1                             |                   |                 |                                                             | 8.39 (18.5) |
|                                                         |                                            |                      | 315 (1034)                     | 668 (2192)               | 1FN6007-1LE53-0KA1                             |                   |                 |                                                             |             |
| 294 ... 716<br>(66 ... 161)                             | 398 (89.5)                                 | 945 (212)            | 71.7(235)                      | 169 (554)                | 1FN6007-1LG12-0KA1                             |                   |                 |                                                             | 11.7 (25.8) |
|                                                         |                                            |                      | 200 (656)                      | 435 (1427)               | 1FN6007-1LG33-0KA1                             |                   |                 |                                                             |             |
| 392 ... 955<br>(88 ... 215)                             | 531 (119)                                  | 1260 (283)           | 47.4(156)                      | 122 (400)                | 1FN6007-1LJ08-0KA1                             |                   |                 |                                                             | 15 (33.1)   |
|                                                         |                                            |                      | 143 (469)                      | 320 (1050)               | 1FN6007-1LJ24-0KA1                             |                   |                 |                                                             |             |
| 490 ... 1190<br>(110 ... 268)                           | 663 (149)                                  | 1570 (353)           | 32.4(106)                      | 93.9 (308)               | 1FN6007-1LL05-0KA1                             | 18.3 (40.4)       |                 |                                                             |             |
|                                                         |                                            |                      | 110 (361)                      | 251 (824)                | 1FN6007-1LL18-0KA1                             |                   |                 |                                                             |             |
| 588 ... 1430<br>(132 ... 321)                           | 796 (179)                                  | 1890 (425)           | 87.9(288)                      | 206 (676)                | 1FN6007-1LN15-0KA1                             | 21.6 (47.6)       |                 |                                                             |             |
|                                                         |                                            |                      | 194 (637)                      | 429 (1408)               | 1FN6007-1LN32-0KA1                             |                   |                 |                                                             |             |

#### Type of connection:

1FN6003 motors

Permanently connected power and signal cables pre-assembled with connectors  
Length: 0.5 m (1.64 ft)

F

1FN6007 motors

Two separate integrated sockets, for power and signal cable

K

#### Secondary section:

Length: 200 mm (7.87 in)  
Length: 500 mm (19.69 in)

C  
F

| Description                                     | Order No.                 |
|-------------------------------------------------|---------------------------|
| <b>Signal cable, pre-assembled<sup>7)</sup></b> | <b>6FX7002-2SL10-....</b> |
| For SIMOTICS L-1FN6 linear motors               |                           |

## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN6 synchronous linear motors  
Natural cooling

| Motor type<br>Primary section<br>(repeated) | Continuous<br>thermal<br>current<br>range <sup>1)3)</sup> | Rated<br>cur-<br>rent,<br>typ. <sup>2)3)</sup> | Maxi-<br>mum<br>current | Calculated<br>power | SINAMICS S120 Motor Module                                                       |                                                                                                                       | Power cable with complete shield                                                          |                                          |                           |
|---------------------------------------------|-----------------------------------------------------------|------------------------------------------------|-------------------------|---------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------|---------------------------|
|                                             |                                                           |                                                |                         |                     | Required<br>rated<br>current <sup>5)</sup>                                       | <b>Booksized format</b><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Pre-assembled cable<br>to the drive system                                                |                                          | Order No.                 |
|                                             |                                                           |                                                |                         |                     |                                                                                  |                                                                                                                       | Power<br>connector                                                                        | Cable<br>cross-<br>section <sup>6)</sup> |                           |
|                                             | $I_{rated, th}$                                           | $I_{rated}$                                    | $I_{MAX}$               | $P_{el, max}$       | $I_{rated} / I_{MAX}$                                                            | Order No.                                                                                                             | Size                                                                                      | mm <sup>2</sup>                          |                           |
|                                             | A                                                         | A                                              | A                       | kW (HP)             | A                                                                                |                                                                                                                       |                                                                                           |                                          |                           |
| 1FN6003-1LC57-....                          | 1.17 ... 3.2                                              | 1.61                                           | 5.18                    | 1.29 (1.73)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LC84-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 1.71 (2.29)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LE38-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 1.97 (2.64)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LE88-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 3.86 (5.18)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LG24-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.28 (3.06)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LG61-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 4.16 (5.58)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LJ17-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.61 (3.50)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LJ44-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 4.49 (6.02)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LL12-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.93 (3.93)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LL35-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 4.84 (6.49)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LN10-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 3.25 (4.36)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6003-1LN28-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 5.2 (6.97)          | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LC31-....                          | 1.17 ... 3.2                                              | 1.61                                           | 5.18                    | 1.59 (2.13)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LC46-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.07 (2.78)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LE20-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.5 (3.35)          | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LE53-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 4.65 (6.24)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LG12-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 2.98 (4.00)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LG33-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 5.14 (6.89)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LJ08-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 3.46 (4.64)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LJ24-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 5.67 (7.60)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LL05-....                          | 1.69 ... 4.6                                              | 2.31                                           | 7.45                    | 3.93 (5.27)         | 5/10                                                                             | <b>6SL312-1-TE15-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LL18-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 6.21 (8.33)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LN15-....                          | 4.11 ... 11.2                                             | 5.63                                           | 18.2                    | 6.74 (9.04)         | 9/18                                                                             | <b>6SL312-1-TE21-0AA3</b>                                                                                             | 1                                                                                         | 4 × 1.5                                  | <b>6FX8002-5CN01-....</b> |
| 1FN6007-1LN32-....                          | 8.22 ... 21                                               | 11.3                                           | 36.3                    | 10.1 (13.5)         | 18/36                                                                            | <b>6SL312-1-TE21-8AA3</b>                                                                                             | 1                                                                                         | 4 × 2.5                                  | <b>6FX8002-5CN11-....</b> |
|                                             |                                                           |                                                |                         |                     | <b>Cooling:</b><br>Internal air cooling      0<br>External air cooling      1    |                                                                                                                       | Length code <sup>7)</sup> ....                                                            |                                          |                           |
|                                             |                                                           |                                                |                         |                     | <b>Motor Module:</b><br>Single Motor Module      1<br>Double Motor Module      2 |                                                                                                                       | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems. |                                          |                           |

<sup>1)</sup> The continuous thermal feedrate force  $F_{rated, th}$ , that the linear motor can achieve, depends on the installation position and ambient conditions and the cooling efficiency that is achieved. Large cooling surfaces and/or high air flow speeds ensure that the linear motors achieve a higher continuous thermal current  $I_{rated, th}$  and therefore a higher feedrate force. The winding is protected against overloading by means of temperature monitoring circuits. Selection of the Motor Modules and power cables is based on increased continuous current. If a lower continuous current is required in the application, where necessary, a Motor Module with a lower rating and the appropriate power cable can be used.

<sup>2)</sup> The rated feedrate force  $F_{rated}$  and the corresponding rated current  $I_{rated}$  specify values that are typically achieved. The values refer to a black aluminum plate to which the motor is bolted. The radiation surface of the plate is three times the size of the area to which the primary section is bolted.

<sup>3)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

<sup>4)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.

<sup>5)</sup> The Motor Module is selected on the basis of the maximum current  $I_{MAX}$ . In some cases, to fully utilize the feedrate force  $F_{MAX}$  the next largest Motor Module must be used. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to it.

<sup>6)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>7)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN6 synchronous linear motors Natural cooling

#### Selection and ordering data

| Continuous thermal feedrate force range <sup>1)3)</sup> | Rated feedrate force, typ. <sup>2)3)</sup> | Feedrate-force, max. | Maximum velocity <sup>4)</sup> |                          | SIMOTICS L-1FN6 linear motors<br>Standard type |                           | Weight, approx. |                          |
|---------------------------------------------------------|--------------------------------------------|----------------------|--------------------------------|--------------------------|------------------------------------------------|---------------------------|-----------------|--------------------------|
|                                                         |                                            |                      | $v_{MAX}$ at $F_{MAX}$         | $V_{MAX}$ at $F_{rated}$ | Primary section                                | Secondary section         | Primary section | Secondary section 200 mm |
|                                                         |                                            |                      |                                |                          |                                                |                           |                 |                          |
| $F_{rated}$ , th                                        | $F_{rated}$                                | $F_{MAX}$            | $v_{MAX}$ at $F_{MAX}$         | $V_{MAX}$ at $F_{rated}$ | Order No.                                      | Order No.                 | kg (lb)         | kg (lb)                  |
| N (lb <sub>f</sub> )                                    | N (lb <sub>f</sub> )                       | N (lb <sub>f</sub> ) | m/min (ft/min)                 | m/min (ft/min)           |                                                |                           |                 |                          |
| <b>Natural cooling</b>                                  |                                            |                      |                                |                          |                                                |                           |                 |                          |
| <b>309 ... 572 (69 ... 129)</b>                         | 374 (84.1)                                 | 898 (202)            | 98.5 (323)                     | 218 (715)                | <b>1FN6008-1LC17-0KA1</b>                      | <b>1FN6008-1SC00-0AA0</b> | 16.3 (35.9)     | 2.81 (6.20)              |
|                                                         |                                            |                      | 224 (735)                      | 473 (1552)               | <b>1FN6008-1LC37-0KA1</b>                      |                           |                 |                          |
| <b>617 ... 1140 (139 ... 256)</b>                       | 749 (168)                                  | 1800 (405)           | 96.8 (318)                     | 221 (725)                | <b>1FN6008-1LE16-0KA1</b>                      |                           | 27.9 (61.5)     |                          |
|                                                         |                                            |                      | 207 (679)                      | 456 (1496)               | <b>1FN6008-1LE34-0KA1</b>                      |                           |                 |                          |
| <b>926 ... 1720 (208 ... 387)</b>                       | 1120 (252)                                 | 2690 (605)           | 96.7 (317)                     | 224 (735)                | <b>1FN6008-1LG16-0KA1</b>                      |                           | 39.6 (87.3)     |                          |
|                                                         |                                            |                      | 200 (656)                      | 449 (1473)               | <b>1FN6008-1LG33-0KA1</b>                      |                           |                 |                          |
| <b>543 ... 1140 (122 ... 256)</b>                       | 692 (156)                                  | 1800 (405)           | 110 (361)                      | 241 (791)                | <b>1FN6016-1LC18-0KA1</b>                      | <b>1FN6016-1SC00-0AA0</b> | 27.6 (60.9)     | 5.42 (11.9)              |
|                                                         |                                            |                      | 176 (577)                      | 377 (1237)               | <b>1FN6016-1LC30-0KA1</b>                      |                           |                 |                          |
| <b>1090 ... 2290 (245 ... 515)</b>                      | 1380 (310)                                 | 3590 (807)           | 101 (331)                      | 233 (764)                | <b>1FN6016-1LE17-0KA1</b>                      |                           | 48.2 (106)      |                          |
|                                                         |                                            |                      | 162 (532)                      | 365 (1198)               | <b>1FN6016-1LE27-0KA1</b>                      |                           |                 |                          |
| <b>1630 ... 3430 (366 ... 771)</b>                      | 2070 (465)                                 | 5390 (1212)          | 98.2 (322)                     | 230 (755)                | <b>1FN6016-1LG16-0KA1</b>                      |                           | 68.5 (151)      |                          |
|                                                         |                                            |                      | 156 (512)                      | 360 (1181)               | <b>1FN6016-1LG26-0KA1</b>                      |                           |                 |                          |
| <b>758 ... 1720 (170 ... 387)</b>                       | 1000 (225)                                 | 2690 (605)           | 70.1 (230)                     | 160 (525)                | <b>1FN6024-1LC12-0KA1</b>                      | <b>1FN6024-1SC00-0AA0</b> | 39.9 (88.0)     | 7.96 (17.6)              |
|                                                         |                                            |                      | 115 (377)                      | 252 (827)                | <b>1FN6024-1LC20-0KA1</b>                      |                           |                 |                          |
| <b>1520 ... 3430 (342 ... 771)</b>                      | 2000 (450)                                 | 5390 (1212)          | 64.8 (213)                     | 155 (509)                | <b>1FN6024-1LE11-0KA1</b>                      |                           | 69.5 (153)      |                          |
|                                                         |                                            |                      | 106 (348)                      | 244 (801)                | <b>1FN6024-1LE18-0KA1</b>                      |                           |                 |                          |
| <b>2270 ... 5140 (510 ... 1156)</b>                     | 3000 (674)                                 | 8080 (1816)          | 62.8 (206)                     | 153 (502)                | <b>1FN6024-1LG10-0KA1</b>                      |                           | 99.2 (219)      |                          |
|                                                         |                                            |                      | 102 (335)                      | 241 (791)                | <b>1FN6024-1LG17-0KA1</b>                      |                           |                 |                          |

#### Type of connection:

1FN6008 to 1FN6024 motors

Two separate integrated sockets, for power and signal cable

**K**

| Description                                     | Order No.                 |
|-------------------------------------------------|---------------------------|
| <b>Signal cable, pre-assembled<sup>7)</sup></b> | <b>6FX7002-2SL10-....</b> |
| For SIMOTICS L-1FN6 linear motors               |                           |

## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN6 synchronous linear motors  
Natural cooling

| Motor type<br>Primary section<br>(repeated) | Continuous<br>thermal cur-<br>rent range <sup>1)3)</sup><br><br>$I_{rated, th}$ | Rated cur-<br>rent <sup>2)3)</sup><br><br>$I_{rated}$ | Maxi-<br>mum<br>current<br><br>$I_{MAX}$ | Calculated<br>power<br><br>$P_{el, max}$ | SINAMICS S120 Motor Module                                                  |                                                                                                               | Power cable with complete shield           |                                                                 |                    |
|---------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------|--------------------|
|                                             |                                                                                 |                                                       |                                          |                                          | Required<br>rated<br>current <sup>5)</sup><br><br>$I_{rated} / I_{MA}$<br>X | Booksize format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Pre-assembled cable<br>to the drive system |                                                                 | Order No.          |
|                                             |                                                                                 |                                                       |                                          |                                          |                                                                             |                                                                                                               | Power<br>connector                         | Cable<br>cross-<br>section <sup>6)</sup><br><br>mm <sup>2</sup> |                    |
|                                             |                                                                                 | A                                                     | A                                        | kW (HP)                                  | A                                                                           | Order No.                                                                                                     | Size                                       |                                                                 |                    |
| 1FN6008-1LC17-...                           | 2.22 ... 4.32                                                                   | 2.71                                                  | 8.64                                     | 3.09 (4.14)                              | 5/10                                                                        | 6SL312-1-TE15-0AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6008-1LC37-...                           | 4.62 ... 9                                                                      | 5.65                                                  | 18                                       | 4.88 (6.54)                              | 9/18                                                                        | 6SL312-1-TE21-0AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6008-1LE16-...                           | 4.62 ... 9                                                                      | 5.65                                                  | 18                                       | 5.93 (7.95)                              | 9/18                                                                        | 6SL312-1-TE21-0AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6008-1LE34-...                           | 9.24 ... 18                                                                     | 11.3                                                  | 36                                       | 9.28 (12.4)                              | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 2.5                                                         | 6FX8002-5CN11-.... |
| 1FN6008-1LG16-...                           | 7.11 ... 13.8                                                                   | 8.69                                                  | 27.7                                     | 8.87 (11.9)                              | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6008-1LG33-...                           | 13.9 ... 27                                                                     | 17                                                    | 54                                       | 13.7 (18.4)                              | 30/56                                                                       | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                        | 4 × 4                                                           | 6FX8002-5CN41-.... |
| 1FN6016-1LC18-...                           | 4.05 ... 9                                                                      | 5.2                                                   | 18                                       | 5.77 (7.74)                              | 9/18                                                                        | 6SL312-1-TE21-0AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6016-1LC30-...                           | 6.23 ... 13.8                                                                   | 8                                                     | 27.7                                     | 7.75 (10.4)                              | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6016-1LE17-...                           | 8.11 ... 18                                                                     | 10.4                                                  | 36                                       | 11.1 (14.9)                              | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 2.5                                                         | 6FX8002-5CN11-.... |
| 1FN6016-1LE27-...                           | 12.5 ... 27.7                                                                   | 16                                                    | 55.4                                     | 14.8 (19.8)                              | 30/56                                                                       | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                        | 4 × 4                                                           | 6FX8002-5CN41-.... |
| 1FN6016-1LG16-...                           | 12.2 ... 27                                                                     | 15.6                                                  | 54.1                                     | 16.4 (22.0)                              | 30/56                                                                       | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                        | 4 × 4                                                           | 6FX8002-5CN41-.... |
| 1FN6016-1LG26-...                           | 18.7 ... 41.5                                                                   | 24                                                    | 83.1                                     | 21.9 (29.4)                              | 45/85                                                                       | 6SL312-1-TE24-5AA3                                                                                            | 1.5                                        | 4 × 10                                                          | 6FX8002-5CN64-.... |
| 1FN6024-1LC12-...                           | 3.76 ... 9                                                                      | 5                                                     | 18                                       | 6.59 (8.84)                              | 9/18                                                                        | 6SL312-1-TE21-0AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6024-1LC20-...                           | 5.79 ... 13.8                                                                   | 7.69                                                  | 27.7                                     | 8.6 (11.5)                               | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 1.5                                                         | 6FX8002-5CN01-.... |
| 1FN6024-1LE11-...                           | 7.53 ... 18                                                                     | 10                                                    | 36                                       | 12.8 (17.2)                              | 18/36                                                                       | 6SL312-1-TE21-8AA3                                                                                            | 1                                          | 4 × 2.5                                                         | 6FX8002-5CN11-.... |
| 1FN6024-1LE18-...                           | 11.6 ... 27.7                                                                   | 15.4                                                  | 55.4                                     | 16.5 (22.1)                              | 30/56                                                                       | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                        | 4 × 4                                                           | 6FX8002-5CN41-.... |
| 1FN6024-1LG10-...                           | 11.3 ... 27                                                                     | 15                                                    | 54.1                                     | 18.9 (25.3)                              | 30/56                                                                       | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                        | 4 × 4                                                           | 6FX8002-5CN41-.... |
| 1FN6024-1LG17-...                           | 17.4 ... 41.5                                                                   | 23.1                                                  | 83.1                                     | 24.5 (32.9)                              | 45/85                                                                       | 6SL312-1-TE24-5AA3                                                                                            | 1.5                                        | 4 × 10                                                          | 6FX8002-5CN64-.... |
| Cooling:                                    |                                                                                 |                                                       |                                          |                                          |                                                                             | Length code <sup>7)</sup>                                                                                     |                                            |                                                                 |                    |
| Internal air cooling                        |                                                                                 |                                                       |                                          |                                          |                                                                             | 0                                                                                                             |                                            |                                                                 |                    |
| External air cooling                        |                                                                                 |                                                       |                                          |                                          |                                                                             | 1                                                                                                             |                                            |                                                                 |                    |
| Motor Module:                               |                                                                                 |                                                       |                                          |                                          |                                                                             | 1                                                                                                             |                                            |                                                                 |                    |
| Single Motor Module                         |                                                                                 |                                                       |                                          |                                          |                                                                             | 2                                                                                                             |                                            |                                                                 |                    |
| Double Motor Module                         |                                                                                 |                                                       |                                          |                                          |                                                                             |                                                                                                               |                                            |                                                                 |                    |

More information about cables can be found under MOTION-CONNECT connection systems.

<sup>1)</sup> The continuous thermal feedrate force  $F_{rated, th}$ , that the linear motor can achieve, depends on the installation position and ambient conditions and the cooling efficiency that is achieved. Large cooling surfaces and/or high air flow speeds ensure that the linear motors achieve a higher continuous thermal current  $I_{rated, th}$  and therefore a higher feedrate force. The winding is protected against overloading by means of temperature monitoring circuits. Selection of the Motor Modules and power cables is based on increased continuous current. If a lower continuous current is required in the application, where necessary, a Motor Module with a lower rating and the appropriate power cable can be used.

<sup>2)</sup> The rated feedrate force  $F_{rated}$  and the corresponding rated current  $I_{rated}$  specify values that are typically achieved. The values refer to a black aluminum plate to which the motor is bolted. The radiation surface of the plate is three times the size of the area to which the primary section is bolted.

<sup>3)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

<sup>4)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.

<sup>5)</sup> The Motor Module is selected on the basis of the maximum current  $I_{MAX}$ . In some cases, to fully utilize the feedrate force  $F_{MAX}$  the next largest Motor Module must be used. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to it.

<sup>6)</sup> The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

<sup>7)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS L linear motors for SINAMICS S120

### Standard-type SIMOTICS L-1FN6 synchronous linear motors Water cooling

#### Selection and ordering data

| Feedrate <sup>1)2)</sup> |                         | Maximum velocity <sup>3)</sup> |                          | SIMOTICS L-1FN6 linear motors<br>Standard type         |                          | Weight, approx. |                                        |
|--------------------------|-------------------------|--------------------------------|--------------------------|--------------------------------------------------------|--------------------------|-----------------|----------------------------------------|
| $F_{rated}$              | $F_{MAX}$               | $v_{MAX}$ at $F_{MAX}$         | $v_{MAX}$ at $F_{rated}$ | Primary section                                        | Secondary section        | Primary section | Secondary section<br>200 mm/<br>500 mm |
| N<br>(lb <sub>f</sub> )  | N<br>(lb <sub>f</sub> ) | m/min<br>(ft/min)              | m/min<br>(ft/min)        | Order No.                                              | Order No.                | kg<br>(lb)      | kg<br>(lb)                             |
| <b>Water cooling</b>     |                         |                                |                          |                                                        |                          |                 |                                        |
| <b>119 (27)</b>          | 157 (35.3)              | 345 (1132)<br>503 (1650)       | 509 (1670)<br>740 (2428) | <b>1FN6003-1WC57-0FA1</b><br><b>1FN6003-1WC84-0FA1</b> | <b>1FN6003-1S00-0AA0</b> | 3.19 (7.03)     | 0.76/1.89<br>(1.68/4.17)               |
| <b>239 (54)</b>          | 315 (70.8)              | 226 (742)<br>572 (1877)        | 339 (1112)<br>852 (2795) | <b>1FN6003-1WE38-0FA1</b><br><b>1FN6003-1WE88-0FA1</b> |                          | 4.99 (11.0)     |                                        |
| <b>358 (80)</b>          | 472 (106)               | 141 (463)<br>366 (1201)        | 215 (705)<br>549 (1801)  | <b>1FN6003-1WG24-0FA1</b><br><b>1FN6003-1WG61-0FA1</b> |                          | 6.79 (15.0)     |                                        |
| <b>477 (107)</b>         | 630 (142)               | 99.6 (327)<br>267 (876)        | 155 (509)<br>402 (1319)  | <b>1FN6003-1WJ17-0FA1</b><br><b>1FN6003-1WJ44-0FA1</b> |                          | 8.59 (18.9)     |                                        |
| <b>597 (134)</b>         | 787 (177)               | 74.7 (245)<br>208 (682)        | 119 (390)<br>316 (1037)  | <b>1FN6003-1WL12-0FA1</b><br><b>1FN6003-1WL35-0FA1</b> |                          | 10.4 (22.9)     |                                        |
| <b>716 (161)</b>         | 945 (212)               | 57.9 (190)<br>169 (554)        | 95.1 (312)<br>258 (846)  | <b>1FN6003-1WN10-0FA1</b><br><b>1FN6003-1WN28-0FA1</b> |                          | 12.2 (26.9)     |                                        |
| <b>239 (54)</b>          | 315 (70.8)              | 187 (614)<br>276 (906)         | 272 (892)<br>399 (1309)  | <b>1FN6007-1WC31-0KA1</b><br><b>1FN6007-1WC46-0KA1</b> | <b>1FN6007-1S00-0AA0</b> | 5.08 (11.2)     | 1.61/4.03<br>(3.55/8.89)               |
| <b>477 (107)</b>         | 630 (142)               | 120 (394)<br>315 (1034)        | 180 (591)<br>462 (1516)  | <b>1FN6007-1WE20-0KA1</b><br><b>1FN6007-1WE53-0KA1</b> |                          | 8.39 (18.5)     |                                        |
| <b>716 (161)</b>         | 945 (212)               | 71.7 (235)<br>200 (656)        | 111 (364)<br>296 (971)   | <b>1FN6007-1WG12-0KA1</b><br><b>1FN6007-1WG33-0KA1</b> |                          | 11.7 (25.8)     |                                        |
| <b>955 (215)</b>         | 1260 (283)              | 47.4 (156)<br>143 (469)        | 77.6 (255)<br>215 (705)  | <b>1FN6007-1WJ08-0KA1</b><br><b>1FN6007-1WJ24-0KA1</b> |                          | 15 (33.1)       |                                        |
| <b>1190 (268)</b>        | 1570 (353)              | 32.4 (106)<br>110 (361)        | 57.5 (189)<br>167 (548)  | <b>1FN6007-1WL05-0KA1</b><br><b>1FN6007-1WL18-0KA1</b> |                          | 18.3 (40.4)     |                                        |
| <b>1430 (321)</b>        | 1890 (425)              | 87.9 (288)<br>194 (637)        | 135 (443)<br>288 (879)   | <b>1FN6007-1WN15-0KA1</b><br><b>1FN6007-1WN32-0KA1</b> |                          | 21.6 (47.6)     |                                        |

#### Type of connection:

##### 1FN6003 motors

Permanently connected power and signal cables pre-assembled with connectors Length: 0.5 m (1.64 ft)

F

##### 1FN6007 motors

Two separate integrated sockets, for power and signal cable

K

#### Secondary section:

Length: 200 mm (7.87 in)

Length: 500 mm (19.69 in)

C  
F

Description

Order No.

#### Signal cable, pre-assembled<sup>5)</sup>

For SIMOTICS L-1FN6  
linear motors

6FX7002-2SL10-....



## SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN6 synchronous linear motors  
Water cooling

| Motor type<br>Primary section<br>(repeated) | Rated<br>current,<br>typ. <sup>1)</sup> | Maximum<br>current | Calculated<br>power  | SINAMICS S120 Motor Module        |                                                                                                             | Power cable with complete shield           |                                          |                    |
|---------------------------------------------|-----------------------------------------|--------------------|----------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------|--------------------|
|                                             | $I_{\text{rated}}$                      | $I_{\text{MAX}}$   | $P_{\text{el, max}}$ | Required rated<br>current         | Booksize format                                                                                             | Pre-assembled cable<br>to the drive system |                                          |                    |
|                                             | A                                       | A                  | kW (HP)              | $I_{\text{rated}}/I_{\text{MAX}}$ | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system<br><br>Order No. | Power<br>connector                         | Cable<br>cross-<br>section <sup>4)</sup> | Order No.          |
|                                             |                                         |                    |                      |                                   |                                                                                                             | Size                                       | mm <sup>2</sup>                          |                    |
| 1FN6003-1WC57-...                           | 3.2                                     | 5.18               | 1.29 (1.73)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WC84-...                           | 4.6                                     | 7.45               | 1.71 (2.29)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WE38-...                           | 4.6                                     | 7.45               | 1.97 (2.64)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WE88-...                           | 11.2                                    | 18.2               | 3.86 (5.18)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WG24-...                           | 4.6                                     | 7.45               | 2.28 (3.06)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WG61-...                           | 11.2                                    | 18.2               | 4.16 (5.58)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WJ17-...                           | 4.6                                     | 7.45               | 2.61 (3.5)           | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WJ44-...                           | 11.2                                    | 18.2               | 4.49 (6.02)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WL12-...                           | 4.6                                     | 7.45               | 2.93 (3.93)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WL35-...                           | 11.2                                    | 18.2               | 4.84 (6.49)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WN10-...                           | 4.6                                     | 7.45               | 3.25 (4.36)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6003-1WN28-...                           | 11.2                                    | 18.2               | 5.2 (6.97)           | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WC31-...                           | 3.2                                     | 5.18               | 1.59 (2.13)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WC46-...                           | 4.6                                     | 7.45               | 2.07 (2.78)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WE20-...                           | 4.6                                     | 7.45               | 2.5 (3.35)           | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WE53-...                           | 11.2                                    | 18.2               | 4.65 (6.24)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WG12-...                           | 4.6                                     | 7.45               | 2.98 (4.0)           | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WG33-...                           | 11.2                                    | 18.2               | 5.14 (6.89)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WJ08-...                           | 4.6                                     | 7.45               | 3.46 (4.64)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WJ24-...                           | 11.2                                    | 18.2               | 5.67 (7.6)           | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WL05-...                           | 4.6                                     | 7.45               | 3.93 (5.27)          | 5/10                              | 6SL312-1-TE15-0AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WL18-...                           | 11.2                                    | 18.2               | 6.21 (8.33)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WN15-...                           | 11.2                                    | 18.2               | 6.74 (9.04)          | 18/36                             | 6SL312-1-TE21-8AA3                                                                                          | 1                                          | 4 × 1.5                                  | 6FX8002-5CN01-.... |
| 1FN6007-1WN32-...                           | 21                                      | 36.3               | 10.1 (13.54)         | 30/56                             | 6SL312-1-TE23-0AA3                                                                                          | 1                                          | 4 × 2.5                                  | 6FX8002-5CN11-.... |

**Cooling:**  
Internal air cooling 0  
External air cooling 1

**Motor Module:**  
Single Motor Module 1  
Double Motor Module 2

Length code<sup>5)</sup> ....  
More information about cables can be found under MOTION-CONNECT connection systems.

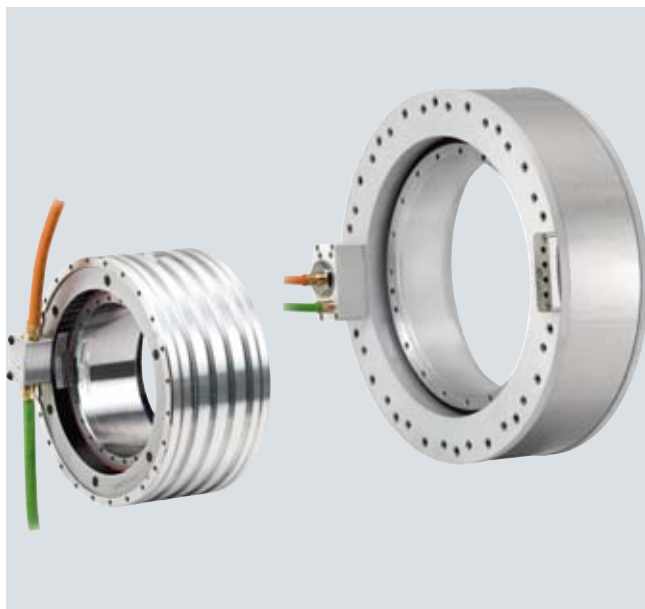
<sup>1)</sup> For water cooling with inlet temperature 35 °C (95 °F).<sup>2)</sup> A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.<sup>3)</sup> Velocity values refer to a DC link voltage of the drive system of 600 V DC.<sup>4)</sup> The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).<sup>5)</sup> For length code, refer to section MOTION-CONNECT connection systems.

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors

#### Overview



Built-in torque motors SIMOTICS T-1FW6 are liquid-cooled, multi-pole permanent-magnet AC synchronous motors with hollow-shaft rotor. The SIMOTICS T-1FW6 motors are supplied as built-in components that are held together in the delivered state by transport locks. For a complete drive unit, an additional bearing and shaft encoder are required.

Each frame size is available in different axis lengths. Most stators and rotors are equipped with flanges at each end with centering surfaces and threaded holes for installation in the machine.

**Please note that when SIMOTICS T-1FW6 direct motors (torque motors) are used in fork heads for machine tools or robots, a license for US patent US5584621 and the associated international patent protection may be required. Please observe the national and international licensing conditions when using direct motors so that no infringements of industrial property rights occur.**

#### Application

In conjunction with the SINAMICS S120 drive system, the built-in torque motors can be used as direct drive for the following machine applications:

- Rotary indexing machines, rotary tables, swivel axes
- Rotary axes (A, B, C axis in 5-axis machine tools)
- Turret indexing and cylinder indexing for single-spindle and multi-spindle machines
- Dynamic tool magazines
- Rotating spindles in milling machines
- Roller and cylinder drives
- Infeed and handling axes

#### Benefits

- No elasticity in the drive train
- High availability, since there are no gear components subject to wear in the drive train
- High torque, compact design and low construction volume
- Low moment of inertia
- Direct coupling to the machine using flanges

#### Design

The SIMOTICS T-1FW6 built-in torque motor comprises the following components:

##### Stator

Iron core with a 3-phase AC winding. To improve dissipation of the heat loss, the motor can be force-cooled by means of a liquid cooler (main cooler).

##### Rotor

Cylindrical hollow shaft made of steel with permanent magnets fixed to the circumference.

If the main cooler and precision cooler are used together in a cooling unit, a cooling connection adapter (accessory) can be ordered separately for simpler connection.

##### Cooler types

The design of the cooling system is dependent on the size (external diameter) of the motor.

| SIMOTICS T-1FW6 motor Type | Type of cooling                         |
|----------------------------|-----------------------------------------|
| 1FW6050 and 1FW6060        | Integrated cooling (1 cooling circuit)  |
| 1FW6090 to 1FW6150         | Jacket cooling                          |
| 1FW6160 to 1FW6290         | Integrated cooling (2 cooling circuits) |

##### Motors with jacket cooling

The coolant inlet/return flow circuit must be provided by the machine manufacturer in the surrounding construction.



Motor components of sizes 1FW6090 to 1FW6150 with jacket cooling (rotor, stator)

## SIMOTICS T torque motors for SINAMICS S120

## SIMOTICS T-1FW6 synchronous built-in torque motors

## Design (continued)

Motors with integrated single-circuit cooling

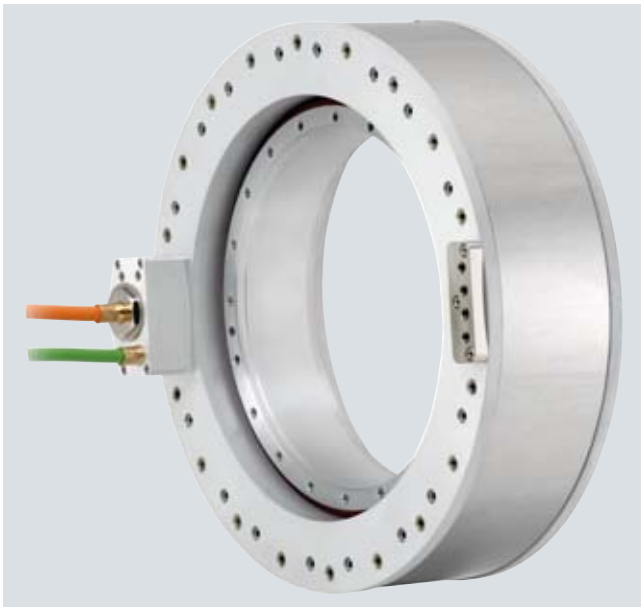
These motors have a ready-to-connect, integrated single-circuit cooling system; they are compact and therefore suitable for easy integration in a machine.



Motor components of sizes 1FW6050 and 1FW6060 with integrated single-circuit cooling (rotor, stator)

Motors with integrated dual-circuit cooling

These motors feature a ready-to-connect, integrated dual-circuit cooling system and are therefore thermally insulated against the mechanical axis construction to a considerable extent.



Motor components of sizes 1FW6160 to 1FW6290 with integrated dual-circuit cooling (rotor, stator)

## Integration

The 1FW6 motors which must be fed from the SINAMICS S120 drive system are designed for operation on a 600 V DC link voltage level and require a sinusoidal current.

The cable connection is brought out of the front face of the stator and the free cable end must be connected to a terminal box provided by the machine manufacturer. The length of the power and signal cables from the motor to the drive system must not exceed 50 m (164 ft).

## Technical specifications

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                             | SIMOTICS T-1FW6 built-in torque motors                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Type of motor</b>                                            | Synchronous motor with permanent magnet rotor multi-pole (number of rotor poles 22 ... 98)                                                                                                                                                                                                                                                                                                                                               |
| <b>Torque ripple</b>                                            | ≤ 1.5 % $M_0$                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Coolant inlet temperature, max.</b>                          | 35 °C (95 °F)                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Pressure in cooling circuit, max.</b>                        | 10 bar (static)                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Temperature monitoring</b>                                   | 1FW6050 and 1FW6060:<br>1 × PTC thermistor triplet with response threshold +130 °C (266 °F) (according to DIN 44081/44082)<br>1FW6090 to 1FW629:<br>2 × PTC thermistor triplet with response threshold +130/150 °C (266/302 °F) (according to DIN 44081/44082)<br>All motors:<br>1 × KTY84 thermistor (according to DIN EN 60034-11) in the stator<br>Evaluation via Sensor Module: SME120/SME125/TM120 (see SINAMICS S120 drive system) |
| <b>Insulation of stator winding according to DIN EN 60034-1</b> | Temperature class 155 (F)                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Type of construction</b>                                     | Individual components: Stator, rotor                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Degree of protection to DIN EN 60034-5</b>                   | IP23<br>The final degree of protection (minimum degree of protection is IP54) for the installed motor is determined by the machine manufacturer. Protection against touch, foreign bodies and water for electrical equipment is specified in accordance with IEC 60034-5.                                                                                                                                                                |
| <b>Encoder system</b><br>(not included in scope of supply)      | Select according to basic conditions specific to the application and the drive                                                                                                                                                                                                                                                                                                                                                           |
| <b>Connection, electrical</b>                                   | Permanently connected power and signal cables                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Paint finish</b>                                             | Unpainted                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Rating plate</b>                                             | 1 unit enclosed separately                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Approvals, according to</b>                                  | cURus                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                                                                                                                                                                                                                                      | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>            | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | <b>SIMOTICS T-1FW6 built-in torque motors Standard type</b> | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{max}$<br>Nm (lb <sub>f</sub> -ft)                                                                                                                                                                                                               | $M_0$<br>Nm (lb <sub>f</sub> -ft) | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $n_{max}$ at $M_{max}$<br>rpm              | $n_{max}$ at $M_{rated}$<br>rpm          | Order No.                                                   | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| <b>1FW6, standard type, water cooling</b>                                                                                                                                                                                                           |                                   |                                         |                                            |                                          |                                                             |                                                                                   |                                |
| <b>34.4 (25.4)</b>                                                                                                                                                                                                                                  | 24.2 (17.8)                       | 22.3 (16.4)                             | 670                                        | 940                                      | <b>1FW6050-0B03-0F1</b>                                     | 0.139 (0.012)                                                                     | 3.1 (6.84)                     |
| <b>57.5 (54.4)</b>                                                                                                                                                                                                                                  | 40.4 (29.8)                       | 38.6 (28.5)                             | 360                                        | 520                                      | <b>1FW6050-0B05-0F1</b>                                     | 0.267 (0.024)                                                                     | 5.9 (13.01)                    |
| <b>80.6 (59.5)</b>                                                                                                                                                                                                                                  | 56.6 (41.7)                       | 54.9 (40.5)                             | 220                                        | 340                                      | <b>1FW6050-0B07-0F1</b>                                     | 0.39 (0.035)                                                                      | 7.9 (17.42)                    |
| <b>81.2 (59.9)</b>                                                                                                                                                                                                                                  | 53 (39.1)                         | 48.8 (36)                               | 660                                        | 880                                      | <b>1FW6050-0B07-0K1</b>                                     |                                                                                   |                                |
| <b>116 (85.6)</b>                                                                                                                                                                                                                                   | 75.8 (55.9)                       | 71.8 (53)                               | 420                                        | 570                                      | <b>1FW6050-0B10-0K1</b>                                     | 0.488 (0.043)                                                                     | 11.4 (25.14)                   |
| <b>174 (128.3)</b>                                                                                                                                                                                                                                  | 114 (84.1)                        | 110 (81.1)                              | 220                                        | 340                                      | <b>1FW6050-0B15-0K1</b>                                     | 0.691 (0.061)                                                                     | 19.2 (42.34)                   |
|                                                                                                                                                                                                                                                     |                                   | 105 (77.4)                              | 640                                        | 840                                      | <b>1FW6050-0B15-1J1</b>                                     |                                                                                   |                                |
| <b>64.5 (47.6)</b>                                                                                                                                                                                                                                  | 33.3 (24.6)                       | 30.7 (22.6)                             | 340                                        | 660                                      | <b>1FW6060-0B03-0F1</b>                                     | 0.347 (0.031)                                                                     | 7.1 (15.66)                    |
| <b>123 (90.7)</b>                                                                                                                                                                                                                                   | 63.1 (46.5)                       | 60.7 (44.8)                             | 130                                        | 320                                      | <b>1FW6060-0B05-0F1</b>                                     | 0.665 (0.059)                                                                     | 9.9 (21.83)                    |
|                                                                                                                                                                                                                                                     |                                   | 57.9 (42.7)                             | 410                                        | 690                                      | <b>1FW6060-0B05-0K1</b>                                     |                                                                                   |                                |
| <b>166 (122.4)</b>                                                                                                                                                                                                                                  | 85.4 (63)                         | 83.2 (61.4)                             | 46                                         | 210                                      | <b>1FW6060-0B07-0F1</b>                                     | 0.904 (0.080)                                                                     | 12.5 (27.56)                   |
|                                                                                                                                                                                                                                                     |                                   | 80.5 (59.4)                             | 260                                        | 480                                      | <b>1FW6060-0B07-0K1</b>                                     |                                                                                   |                                |
| <b>231 (170.4)</b>                                                                                                                                                                                                                                  | 119 (87.8)                        | 114 (84.1)                              | 140                                        | 310                                      | <b>1FW6060-0B10-0K1</b>                                     | 1.21 (0.107)                                                                      | 16.2 (35.72)                   |
| <b>226 (166.7)</b>                                                                                                                                                                                                                                  | 116 (85.6)                        | 106 (78.2)                              | 500                                        | 740                                      | <b>1FW6060-0B10-1J1</b>                                     |                                                                                   |                                |
| <b>339 (250)</b>                                                                                                                                                                                                                                    | 174 (128.3)                       | 171 (126.1)                             | 31                                         | 180                                      | <b>1FW6060-0B15-0K1</b>                                     | 1.72 (0.152)                                                                      | 22.4 (49.39)                   |
| <b>332 (244.9)</b>                                                                                                                                                                                                                                  | 171 (126.1)                       | 161 (118.8)                             | 270                                        | 460                                      | <b>1FW6060-0B15-1J1</b>                                     |                                                                                   |                                |
| <b>Cable outlet</b> only for 1FW6050 and 1FW6060:<br>Axial<br>Tangential                                                                                                                                                                            |                                   |                                         |                                            |                                          | <b>W</b><br><b>T</b>                                        |                                                                                   |                                |
| <b>Type of connection:</b><br>Permanently connected power and signal cables with exposed core ends <sup>5)</sup><br>Length: 2 m (6.56 ft)<br>Permanently connected power and signal cables pre-assembled with connectors<br>Length: 0.5 m (1.64 ft) |                                   |                                         |                                            |                                          |                                                             | <b>C</b><br><b>D</b>                                                              |                                |

## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3) | Maxi-<br>mum<br>current <sup>2)</sup> | Calculated<br>power | SINAMICS S120 Motor Module   |                                                                                                                | Power cable with complete shield<br>Motor connection via power connector <sup>5)</sup> |                                          |                                                     |
|--------------------------|--------------------------|--------------------------|---------------------------------------|---------------------|------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
|                          | $I_0$                    | $I_{rated}$              | $I_{max}$                             | $P_{el, max}$       | Required<br>rated<br>current | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                | Cable<br>cross-<br>section <sup>6)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                          | A                        | A                        | A                                     | kW (HP)             | $I_{rated}/I_{max}$<br>A     | Order No.                                                                                                      | Size                                                                                   | mm <sup>2</sup>                          | Order No.                                           |
| 1FW6050-0.B03-0F..       | 5                        | 4.6                      | 7.6                                   | 4.18 (5.61)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B05-0F..       | 5                        | 4.8                      | 7.6                                   | 4.54 (6.09)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B07-0F..       | 5.1                      | 4.9                      | 7.6                                   | 4.82 (6.46)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B07-0K..       | 9.3                      | 8.6                      | 14                                    | 8.68 (11.64)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B10-0K..       | 9.3                      | 8.8                      | 14                                    | 9.06 (12.15)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B15-0K..       | 9.3                      | 9                        | 14                                    | 9.58 (12.85)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6050-0.B15-1J..       | 18                       | 17                       | 29                                    | 17.2 (22.8)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B03-0F..       | 4.5                      | 4.1                      | 9.8                                   | 5.85 (7.84)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B05-0F..       | 4.5                      | 4.3                      | 9.8                                   | 6.62 (8.88)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B05-0K..       | 8.1                      | 7.4                      | 17                                    | 10.2 (13.68)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B07-0F..       | 4.5                      | 4.3                      | 9.8                                   | 7.06 (9.47)         | 5/10                         | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B07-0K..       | 8.1                      | 7.6                      | 17                                    | 10.8 (14.48)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B10-0K..       | 8.1                      | 7.8                      | 17                                    | 11.7 (15.69)        | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B10-1J..       | 15                       | 13                       | 31                                    | 19.4 (26.02)        | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B15-0K..       | 8.1                      | 7.9                      | 17                                    | 12.9 (17.3)         | 9/18                         | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6060-0.B15-1J..       | 15                       | 14                       | 31                                    | 20.6 (27.62)        | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| Cooling:                 |                          |                          |                                       |                     |                              | Length code                                                                                                    |                                                                                        |                                          |                                                     |
| Internal air cooling     |                          |                          |                                       |                     |                              | 0                                                                                                              |                                                                                        |                                          |                                                     |
| External air cooling     |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Motor Module:            |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Single Motor Module      |                          |                          |                                       |                     |                              | 2                                                                                                              |                                                                                        |                                          |                                                     |
| Double Motor Module      |                          |                          |                                       |                     |                              | 2                                                                                                              |                                                                                        |                                          |                                                     |

More information about cables can be found under MOTION-CONNECT connection systems.

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ±10 % (drive system DC link voltage 600 V DC).

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) Selection optimized to size of the Motor Module. The next higher Motor Module offers 100 % torque utilization.

5) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

6) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                            | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>            | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | <b>SIMOTICS T-1FW6 built-in torque motors Standard type</b> | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{max}$<br>Nm (lb <sub>f</sub> -ft)     | $M_0$<br>Nm (lb <sub>f</sub> -ft) | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $n_{max}$ at $M_{max}$<br>rpm              | $n_{max}$ at $M_{rated}$<br>rpm          | Order No.                                                   | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| <b>1FW6, standard type, water cooling</b> |                                   |                                         |                                            |                                          |                                                             |                                                                                   |                                |
| <b>179 (132)</b>                          | 119 (87.8)                        | 113 (83.3)                              | 46                                         | 140                                      | <b>1FW6090-0B05-0F2</b>                                     | 1.52 (0.13)                                                                       | 9.2 (20.3)                     |
|                                           |                                   | 109 (80.4)                              | 140                                        | 250                                      | <b>1FW6090-0B05-0K2</b>                                     |                                                                                   |                                |
| <b>251 (185)</b>                          | 166 (122)                         | 154 (114)                               | 120                                        | 220                                      | <b>1FW6090-0B07-0K2</b>                                     | 2.2 (0.19)                                                                        | 12.2 (27)                      |
|                                           |                                   | 142 (105)                               | 270                                        | 430                                      | <b>1FW6090-0B07-1J2</b>                                     |                                                                                   |                                |
| <b>358 (264)</b>                          | 238 (176)                         | 231 (170)                               | 8.7                                        | 82                                       | <b>1FW6090-0B10-0K2</b>                                     | 3.09 (0.27)                                                                       | 17.2 (37.9)                    |
|                                           |                                   | 216 (159)                               | 170                                        | 270                                      | <b>1FW6090-0B10-1J2</b>                                     |                                                                                   |                                |
| <b>537 (396)</b>                          | 357 (263)                         | 338 (249)                               | 78                                         | 150                                      | <b>1FW6090-0B15-1J2</b>                                     | 4.65 (0.41)                                                                       | 27.2 (60)                      |
|                                           |                                   | 319 (235)                               | 200                                        | 310                                      | <b>1FW6090-0B15-2J2</b>                                     |                                                                                   |                                |
| <b>439 (324)</b>                          | 258 (190)                         | 241 (178)                               | 47                                         | 130                                      | <b>1FW6130-0B05-0K2</b>                                     | 6.37 (0.56)                                                                       | 13.2 (29.1)                    |
|                                           |                                   | 217 (160)                               | 180                                        | 310                                      | <b>1FW6130-0B05-1J2</b>                                     |                                                                                   |                                |
| <b>614 (453)</b>                          | 361 (266)                         | 344 (254)                               | 21                                         | 96                                       | <b>1FW6130-0B07-0K2</b>                                     | 8.92 (0.79)                                                                       | 18.2 (40.1)                    |
|                                           |                                   | 324 (239)                               | 110                                        | 200                                      | <b>1FW6130-0B07-1J2</b>                                     |                                                                                   |                                |
| <b>878 (648)</b>                          | 516 (381)                         | 484 (357)                               | 50                                         | 120                                      | <b>1FW6130-0B10-1J2</b>                                     | 12.7 (1.12)                                                                       | 25.2 (55.6)                    |
|                                           |                                   | 450 (332)                               | 150                                        | 250                                      | <b>1FW6130-0B10-2J2</b>                                     |                                                                                   |                                |
| <b>1320 (974)</b>                         | 775 (572)                         | 744 (549)                               | 14                                         | 78                                       | <b>1FW6130-0B15-1J2</b>                                     | 19.1 (1.69)                                                                       | 38.2 (84.2)                    |
|                                           |                                   | 714 (527)                               | 77                                         | 150                                      | <b>1FW6130-0B15-2J2</b>                                     |                                                                                   |                                |
| <b>710 (524)</b>                          | 360 (266)                         | 338 (249)                               | 110                                        | 230                                      | <b>1FW6150-0B05-1J2</b>                                     | 10.1 (0.8939)                                                                     | 21.7 (47.8)                    |
|                                           |                                   | 298 (220)                               | 330                                        | 650                                      | <b>1FW6150-0B05-4F2</b>                                     |                                                                                   |                                |
| <b>994 (733)</b>                          | 504 (372)                         | 470 (347)                               | 130                                        | 260                                      | <b>1FW6150-0B07-2J2</b>                                     | 14.2 (1.2568)                                                                     | 33.5 (73.9)                    |
|                                           |                                   | 445 (327)                               | 230                                        | 450                                      | <b>1FW6150-0B07-4F2</b>                                     |                                                                                   |                                |
| <b>1420 (1047)</b>                        | 720 (531)                         | 688 (507)                               | 76                                         | 170                                      | <b>1FW6150-0B10-2J2</b>                                     | 20.9 (1.8498)                                                                     | 47.5 (104.7)                   |
|                                           |                                   | 664 (489)                               | 150                                        | 300                                      | <b>1FW6150-0B10-4F2</b>                                     |                                                                                   |                                |
| <b>2130 (1571)</b>                        | 1080 (797)                        | 1050 (774)                              | 32                                         | 100                                      | <b>1FW6150-0B15-2J2</b>                                     | 31.3 (2.7703)                                                                     | 70.8 (156)                     |
|                                           |                                   | 1030 (760)                              | 89                                         | 190                                      | <b>1FW6150-0B15-4F2</b>                                     |                                                                                   |                                |

**Cable outlet** only for 1FW6090/1FW6130/1FW6150:

Axial  
Radially outwards  
Tangential

P  
Q  
N

#### Type of connection:

Permanently connected power and signal cables with exposed core ends<sup>5)</sup>

Length: 2 m (6.56 ft)

Permanently connected power and signal cables pre-assembled with connectors

Length: 0.5 m (1.64 ft)

C  
D



## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3) | Maxi-<br>mum<br>current <sup>2)</sup> | Calculated<br>power | SINAMICS S120 Motor Module                                  |                                                                                                                | Power cable with complete shield<br>Motor connection via power connector <sup>5)</sup>    |                                          |                                                     |
|--------------------------|--------------------------|--------------------------|---------------------------------------|---------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
|                          | $I_0$                    | $I_{rated}$              | $I_{max}$                             | $P_{el, max}$       | Required<br>rated<br>current                                | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                   | Cable<br>cross-<br>section <sup>6)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                          | A                        | A                        | A                                     | kW (HP)             | $I_{rated}/I_{max}$                                         | Order No.                                                                                                      | Size                                                                                      | mm <sup>2</sup>                          | Order No.                                           |
| 1FW6090-0.B05-0F..       | 5.9                      | 5.6                      | 9.5                                   | 6.55 (8.78)         | 5/10 <sup>4)</sup>                                          | 6SL312-1-TE15-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B05-0K..       | 8.2                      | 7.4                      | 13                                    | 8.12 (10.88)        | 9/18                                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B07-0K..       | 10                       | 9.5                      | 16                                    | 10.3 (13.8)         | 9/18 <sup>4)</sup>                                          | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B07-1J..       | 16                       | 13                       | 26                                    | 14.1 (18.9)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B10-0K..       | 8.2                      | 7.9                      | 13                                    | 9.43 (12.6)         | 9/18                                                        | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B10-1J..       | 16                       | 14                       | 26                                    | 15.3 (20.5)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B15-1J..       | 16                       | 15                       | 26                                    | 17.1 (22.9)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6090-0.B15-2J..       | 26                       | 23                       | 43                                    | 24.1 (32.3)         | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6130-0.B05-0K..       | 9.7                      | 9                        | 18                                    | 12.2 (16.4)         | 9/18 <sup>4)</sup>                                          | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B05-1J..       | 17                       | 14                       | 32                                    | 18.3 (24.5)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B07-0K..       | 10                       | 10                       | 20                                    | 14.2 (19)           | 9/18 <sup>4)</sup>                                          | 6SL312-1-TE21-0AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B07-1J..       | 17                       | 15                       | 32                                    | 19.7 (26.4)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B10-1J..       | 17                       | 16                       | 32                                    | 21.4 (28.7)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B10-2J..       | 28                       | 24                       | 53                                    | 30.6 (41)           | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6130-0.B15-1J..       | 19                       | 18                       | 36                                    | 25.4 (34.1)         | 18/36 <sup>4)</sup>                                         | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6130-0.B15-2J..       | 28                       | 26                       | 54                                    | 34.1 (45.7)         | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6150-0.B05-1J..       | 18                       | 17                       | 44                                    | 22.8 (30.6)         | 18/36                                                       | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                         | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6150-0.B05-4F..       | 44                       | 36                       | 100                                   | 39.4 (52.8)         | 45/85                                                       | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                       | 4 × 10                                   | 6FX8002-5CS64-....                                  |
| 1FW6150-0.B07-2J..       | 27                       | 25                       | 66                                    | 32.0 (42.9)         | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6150-0.B07-4F..       | 44                       | 38                       | 100                                   | 42.7 (57.3)         | 45/85                                                       | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                       | 4 × 10                                   | 6FX8002-5CS64-....                                  |
| 1FW6150-0.B10-2J..       | 27                       | 26                       | 66                                    | 36.2 (48.5)         | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6150-0.B10-4F..       | 44                       | 40                       | 100                                   | 47.3 (63.4)         | 45/85                                                       | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                       | 4 × 10                                   | 6FX8002-5CS64-....                                  |
| 1FW6150-0.B15-2J..       | 27                       | 26                       | 66                                    | 42.4 (56.9)         | 30/56                                                       | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                       | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6150-0.B15-4F..       | 44                       | 41                       | 100                                   | 54.5 (73.1)         | 45/85                                                       | 6SL312-1-TE24-5AA3                                                                                             | 1.5                                                                                       | 4 × 10                                   | 6FX8002-5CS64-....                                  |
|                          |                          |                          |                                       |                     | Cooling:<br>Internal air cooling<br>External air cooling    |                                                                                                                | Length code                                                                               |                                          |                                                     |
|                          |                          |                          |                                       |                     |                                                             |                                                                                                                | 0<br>1                                                                                    |                                          |                                                     |
|                          |                          |                          |                                       |                     | Motor Module:<br>Single Motor Module<br>Double Motor Module |                                                                                                                | 1<br>2                                                                                    |                                          |                                                     |
|                          |                          |                          |                                       |                     |                                                             |                                                                                                                | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems. |                                          |                                                     |

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ±10 % (drive system DC link voltage 600 V DC).

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) Selection optimized to size of the Motor Module. The next higher Motor Module offers 100 % torque utilization.

5) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

6) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).



# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                                                                                                                                                                        | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>                   | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | SIMOTICS T-1FW6 built-in torque motors<br>Standard type | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------|--------------------------------------------|------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{\max}$<br>Nm (lb <sub>f</sub> -ft)                                                                                                                                                | $M_0$<br>Nm (lb <sub>f</sub> -ft) | $M_{\text{rated}}$<br>Nm (lb <sub>f</sub> -ft) | $n_{\max}$ at $M_{\max}$<br>rpm            | $n_{\max}$ at $M_{\text{rated}}$<br>rpm  | Order No.                                               | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| 1FW6, standard type, water cooling                                                                                                                                                    |                                   |                                                |                                            |                                          |                                                         |                                                                                   |                                |
| 716 (528)                                                                                                                                                                             | 467 (344)                         | 431 (318)                                      | 84                                         | 140                                      | 1FW6160-0■B05-1J ■ 2                                    | 19.0 (1.68)                                                                       | 36.3 (80.0)                    |
|                                                                                                                                                                                       |                                   | 404 (298)                                      | 150                                        | 250                                      | 1FW6160-0■B05-2J ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 314 (232)                                      | 320                                        | 590                                      | 1FW6160-0■B05-5G ■ 2                                    |                                                                                   |                                |
| 1000 (738)                                                                                                                                                                            | 653 (482)                         | 620 (457)                                      | 53                                         | 96                                       | 1FW6160-0■B07-1J ■ 2                                    | 25.8 (2.28)                                                                       | 48.3 (107)                     |
|                                                                                                                                                                                       |                                   | 594 (438)                                      | 100                                        | 170                                      | 1FW6160-0■B07-2J ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 514 (379)                                      | 230                                        | 390                                      | 1FW6160-0■B07-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 432 (319)                                      | 330                                        | 610                                      | 1FW6160-0■B07-8F B 2                                    |                                                                                   |                                |
| 1430 (1055)                                                                                                                                                                           | 933 (688)                         | 903 (666)                                      | 29                                         | 60                                       | 1FW6160-0■B10-1J ■ 2                                    | 36.0 (3.19)                                                                       | 66.3 (146)                     |
|                                                                                                                                                                                       |                                   | 878 (648)                                      | 65                                         | 110                                      | 1FW6160-0■B10-2J ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 804 (593)                                      | 160                                        | 260                                      | 1FW6160-0■B10-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 732 (540)                                      | 230                                        | 390                                      | 1FW6160-0■B10-8F B 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 622 (459)                                      | 330                                        | 600                                      | 1FW6160-0■B10-2PB 2                                     |                                                                                   | 67.4 (149)                     |
| 2150 (1586)                                                                                                                                                                           | 1400 (1033)                       | 1350 (996)                                     | 34                                         | 66                                       | 1FW6160-0■B15-2J ■ 2                                    | 53.1 (4.70)                                                                       | 95.3 (210)                     |
|                                                                                                                                                                                       |                                   | 1280 (944)                                     | 97                                         | 160                                      | 1FW6160-0■B15-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1220 (900)                                     | 150                                        | 240                                      | 1FW6160-0■B15-8F B 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1120 (826)                                     | 220                                        | 360                                      | 1FW6160-0■B15-2PB 2                                     |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 961 (709)                                      | 320                                        | 560                                      | 1FW6160-0■B15-0WB 2                                     |                                                                                   |                                |
| 2860 (2110)                                                                                                                                                                           | 1870 (1379)                       | 1750 (1291)                                    | 68                                         | 110                                      | 1FW6160-0■B20-5G ■ 2                                    | 70.1 (6.20)                                                                       | 124.3 (274)                    |
|                                                                                                                                                                                       |                                   | 1690 (1247)                                    | 110                                        | 170                                      | 1FW6160-0■B20-8F B 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1600 (1180)                                    | 160                                        | 260                                      | 1FW6160-0■B20-2PB 2                                     |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1460 (1077)                                    | 240                                        | 400                                      | 1FW6160-0■B20-0WB 2                                     |                                                                                   |                                |
| Cable outlet <u>only</u> for 1FW6160 to 1FW6290:<br>Axial<br>Radially outwards<br>Tangential ( <u>only</u> for types of connection C and D)                                           |                                   |                                                |                                            |                                          | W<br>V<br>T                                             |                                                                                   |                                |
| Type of connection:<br>Permanently connected power and signal cables with exposed core ends <sup>4)</sup><br>Length: 2 m (6.56 ft)                                                    |                                   |                                                |                                            |                                          |                                                         | C                                                                                 |                                |
| Permanently connected power and signal cables pre-assembled with connectors<br>Length: 0.5 m (1.64 ft)                                                                                |                                   |                                                |                                            |                                          |                                                         | D                                                                                 |                                |
| Type of connection <u>only</u> for specific motors (Not configurable):<br>Permanently connected power and signal cables with exposed core ends <sup>4)</sup><br>Length: 1 m (3.28 ft) |                                   |                                                |                                            |                                          |                                                         | B                                                                                 |                                |

## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3) | Maxi-<br>mum<br>current <sup>2)</sup> | Calculated<br>power | SINAMICS S120 Motor Module   |                                                                                                                | Power cable with complete shield<br>Motor connection via power connector <sup>4)</sup> |                                          |                                                     |
|--------------------------|--------------------------|--------------------------|---------------------------------------|---------------------|------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
|                          | $I_0$                    | $I_{rated}$              | $I_{max}$                             | $P_{el, max}$       | Required<br>rated<br>current | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                | Cable<br>cross-<br>section <sup>5)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                          | A                        | A                        | A                                     | kW (HP)             | $I_{rated}/I_{max}$          | Order No.                                                                                                      | Size                                                                                   | mm <sup>2</sup>                          | Order No.                                           |
| 1FW6160-0.B05-1J..       | 17                       | 16                       | 31                                    | 15.1 (20.2)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6160-0.B05-2J..       | 28                       | 24                       | 49                                    | 20 (26.8)           | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6160-0.B05-5G..       | 56                       | 36                       | 98                                    | 33.1 (44.4)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6160-0.B07-1J..       | 17                       | 16                       | 31                                    | 16.7 (22.4)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6160-0.B07-2J..       | 28                       | 25                       | 49                                    | 21.8 (29.2)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6160-0.B07-5G..       | 56                       | 43                       | 98                                    | 35.2 (47.2)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6160-0.B07-8FB.       | 80                       | 51                       | 140                                   | 46.7 (62.6)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B10-1J..       | 17                       | 17                       | 31                                    | 19 (25.5)           | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6160-0.B10-2J..       | 28                       | 26                       | 49                                    | 24.4 (32.7)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6160-0.B10-5G..       | 56                       | 47                       | 98                                    | 38.1 (51.1)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6160-0.B10-8FB.       | 80                       | 61                       | 140                                   | 49.8 (66.8)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B10-2PB.       | 110                      | 73                       | 190                                   | 64.6 (86.6)         | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B15-2J..       | 28                       | 26                       | 49                                    | 28.2 (37.8)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6160-0.B15-5G..       | 56                       | 50                       | 98                                    | 42.6 (57.1)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6160-0.B15-8FB.       | 80                       | 68                       | 140                                   | 54.6 (73.2)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B15-2PB.       | 110                      | 88                       | 190                                   | 69.5 (93.2)         | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B15-0WB.       | 160                      | 100                      | 280                                   | 92.8 (124)          | 200/282                      | 6SL312-1-TE32-0AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B20-5G..       | 56                       | 52                       | 98                                    | 46.9 (62.9)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6160-0.B20-8FB.       | 80                       | 72                       | 140                                   | 59.2 (79.4)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B20-2PB.       | 110                      | 95                       | 190                                   | 74.2 (99.5)         | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6160-0.B20-0WB.       | 160                      | 120                      | 280                                   | 97.7 (131)          | 200/282                      | 6SL312-1-TE32-0AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| Cooling:                 |                          |                          |                                       |                     |                              | Length code                                                                                                    |                                                                                        |                                          |                                                     |
| Internal air cooling     |                          |                          |                                       |                     |                              | 0                                                                                                              |                                                                                        |                                          |                                                     |
| External air cooling     |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Motor Module:            |                          |                          |                                       |                     |                              | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems.                      |                                                                                        |                                          |                                                     |
| Single Motor Module      |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Double Motor Module      |                          |                          |                                       |                     |                              | 2                                                                                                              |                                                                                        |                                          |                                                     |

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ±10 % (drive system DC link voltage 600 V DC).\*

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

5) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                                                                                                                                                                        | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>                   | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | SIMOTICS T-1FW6 built-in torque motors<br>Standard type | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------|--------------------------------------------|------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{\max}$<br>Nm (lb <sub>F</sub> -ft)                                                                                                                                                | $M_0$<br>Nm (lb <sub>F</sub> -ft) | $M_{\text{rated}}$<br>Nm (lb <sub>F</sub> -ft) | $n_{\max}$ at $M_{\max}$<br>rpm            | $n_{\max}$ at $M_{\text{rated}}$<br>rpm  | Order No.                                               | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>F</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| 1FW6, standard type, water cooling                                                                                                                                                    |                                   |                                                |                                            |                                          |                                                         |                                                                                   |                                |
| 990 (730)                                                                                                                                                                             | 672 (496)                         | 633 (467)                                      | 54                                         | 97                                       | 1FW6190-0■B05-1 J ■ 2                                   | 35.8 (3.17)                                                                       | 42.8 (94.4)                    |
|                                                                                                                                                                                       |                                   | 605 (446)                                      | 96                                         | 160                                      | 1FW6190-0■B05-2 J ■ 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 509 (375)                                      | 210                                        | 380                                      | 1FW6190-0■B05-5G ■ 2                                    |                                                                                   |                                |
| 1390 (1025)                                                                                                                                                                           | 941 (694)                         | 905 (668)                                      | 33                                         | 63                                       | 1FW6190-0■B07-1 J ■ 2                                   | 48.6 (4.30)                                                                       | 55.8 (123)                     |
|                                                                                                                                                                                       |                                   | 879 (648)                                      | 64                                         | 110                                      | 1FW6190-0■B07-2 J ■ 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 791 (583)                                      | 150                                        | 250                                      | 1FW6190-0■B07-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 704 (519)                                      | 220                                        | 390                                      | 1FW6190-0■B07-8 F B 2                                   |                                                                                   |                                |
| 1980 (1460)                                                                                                                                                                           | 1340 (988)                        | 1310 (966)                                     | 14                                         | 38                                       | 1FW6190-0■B10-1 J ■ 2                                   | 67.8 (6.0)                                                                        | 75.8 (167)                     |
|                                                                                                                                                                                       |                                   | 1290 (952)                                     | 39                                         | 70                                       | 1FW6190-0■B10-2 J ■ 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1210 (892)                                     | 100                                        | 170                                      | 1FW6190-0■B10-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1130 (833)                                     | 150                                        | 260                                      | 1FW6190-0■B10-8 F B 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 955 (704)                                      | 250                                        | 450                                      | 1FW6190-0■B10-2 P B 2                                   |                                                                                   | 77.1 (170)                     |
| 2970 (2191)                                                                                                                                                                           | 2020 (1490)                       | 1970 (1453)                                    | 17                                         | 40                                       | 1FW6190-0■B15-2 J ■ 2                                   | 99.8 (8.83)                                                                       | 107.8 (238)                    |
|                                                                                                                                                                                       |                                   | 1890 (1394)                                    | 62                                         | 100                                      | 1FW6190-0■B15-5G ■ 2                                    |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1820 (1342)                                    | 97                                         | 160                                      | 1FW6190-0■B15-8 F B 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 1670 (1232)                                    | 160                                        | 270                                      | 1FW6190-0■B15-2 P B 2                                   |                                                                                   | 109.1 (241)                    |
|                                                                                                                                                                                       |                                   | 1540 (1136)                                    | 210                                        | 370                                      | 1FW6190-0■B15-0 W B 2                                   |                                                                                   |                                |
| 3960 (2921)                                                                                                                                                                           | 2690 (1984)                       | 2570 (1896)                                    | 42                                         | 73                                       | 1FW6190-0■B20-5G ■ 2                                    | 132.0 (11.68)                                                                     | 136.2 (300)                    |
|                                                                                                                                                                                       |                                   | 2500 (1844)                                    | 68                                         | 110                                      | 1FW6190-0■B20-8 F B 2                                   |                                                                                   |                                |
|                                                                                                                                                                                       |                                   | 2360 (1741)                                    | 120                                        | 200                                      | 1FW6190-0■B20-2 P B 2                                   |                                                                                   | 137.5 (303)                    |
|                                                                                                                                                                                       |                                   | 2250 (1660)                                    | 160                                        | 260                                      | 1FW6190-0■B20-0 W B 2                                   |                                                                                   |                                |
| Cable outlet <u>only</u> for 1FW6160 to 1FW6290:<br>Axial<br>Radially outwards<br>Tangential ( <u>only</u> for types of connection C and D)                                           |                                   |                                                |                                            |                                          | W<br>V<br>T                                             |                                                                                   |                                |
| Type of connection:<br>Permanently connected power and signal cables with exposed core ends <sup>4)</sup><br>Length: 2 m (6.56 ft)                                                    |                                   |                                                |                                            |                                          |                                                         | C                                                                                 |                                |
| Permanently connected power and signal cables pre-assembled with connectors<br>Length: 0.5 m (1.64 ft)                                                                                |                                   |                                                |                                            |                                          |                                                         | D                                                                                 |                                |
| Type of connection <u>only</u> for specific motors (Not configurable):<br>Permanently connected power and signal cables with exposed core ends <sup>4)</sup><br>Length: 1 m (3.28 ft) |                                   |                                                |                                            |                                          |                                                         | B                                                                                 |                                |

## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3) | Maxi-<br>mum<br>current <sup>2)</sup> | Calculated<br>power | SINAMICS S120 Motor Module   |                                                                                                                | Power cable with complete shield<br>Motor connection via power connector <sup>4)</sup> |                                          |                                                     |
|--------------------------|--------------------------|--------------------------|---------------------------------------|---------------------|------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
|                          | $I_0$                    | $I_{rated}$              | $I_{max}$                             | $P_{el, max}$       | Required<br>rated<br>current | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                | Cable<br>cross-<br>section <sup>5)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                          | A                        | A                        | A                                     | kW (HP)             | $I_{rated}/I_{max}$          | Order No.                                                                                                      | Size                                                                                   | mm <sup>2</sup>                          | Order No.                                           |
| 1FW6190-0.B05-1J..       | 18                       | 17                       | 31                                    | 16.3 (21.9)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6190-0.B05-2J..       | 27                       | 24                       | 47                                    | 20.6 (27.6)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6190-0.B05-5G..       | 54                       | 40                       | 95                                    | 32.9 (44.1)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6190-0.B07-1J..       | 18                       | 17                       | 31                                    | 18.2 (24.4)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6190-0.B07-2J..       | 27                       | 25                       | 47                                    | 22.7 (30.4)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6190-0.B07-5G..       | 54                       | 44                       | 95                                    | 35.4 (47.5)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6190-0.B07-8FB.       | 78                       | 56                       | 130                                   | 46.3 (62.1)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B10-1J..       | 18                       | 17                       | 31                                    | 20.7 (27.8)         | 18/36                        | 6SL312-1-TE21-8AA3                                                                                             | 1                                                                                      | 4 × 2.5                                  | 6FX8002-5CS11-....                                  |
| 1FW6190-0.B10-2J..       | 27                       | 26                       | 47                                    | 25.7 (34.5)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6190-0.B10-5G..       | 54                       | 48                       | 95                                    | 38.7 (51.9)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6190-0.B10-8FB.       | 78                       | 64                       | 130                                   | 49.9 (66.9)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B10-2PB.       | 120                      | 84                       | 210                                   | 69.9 (93.7)         | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B15-2J..       | 27                       | 26                       | 47                                    | 30.1 (40.4)         | 30/56                        | 6SL312-1-TE23-0AA3                                                                                             | 1.5                                                                                    | 4 × 4                                    | 6FX8002-5CS41-....                                  |
| 1FW6190-0.B15-5G..       | 54                       | 50                       | 95                                    | 44.1 (59.1)         | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6190-0.B15-8FB.       | 78                       | 69                       | 130                                   | 55.6 (74.6)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B15-2PB.       | 120                      | 99                       | 210                                   | 75.8 (102)          | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B15-0WB.       | 150                      | 110                      | 270                                   | 91.5 (123)          | 200/282                      | 6SL312-1-TE32-0AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B20-5G..       | 54                       | 51                       | 95                                    | 49 (54.7)           | 60/113                       | 6SL312-1-TE26-0AA3                                                                                             | 1.5                                                                                    | 4 × 16                                   | 6FX8002-5CS24-....                                  |
| 1FW6190-0.B20-8FB.       | 78                       | 71                       | 130                                   | 61.1 (81.9)         | 85/141                       | 6SL312-1-TE28-5AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B20-2PB.       | 120                      | 100                      | 210                                   | 81.5 (109)          | 132/210                      | 6SL312-1-TE31-3AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| 1FW6190-0.B20-0WB.       | 150                      | 120                      | 270                                   | 97.4 (131)          | 200/282                      | 6SL312-1-TE32-0AA3                                                                                             | –                                                                                      | –                                        | –                                                   |
| Cooling:                 |                          |                          |                                       |                     |                              | Length code                                                                                                    |                                                                                        |                                          |                                                     |
| Internal air cooling     |                          |                          |                                       |                     |                              | 0                                                                                                              |                                                                                        |                                          |                                                     |
| External air cooling     |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Motor Module:            |                          |                          |                                       |                     |                              | 1                                                                                                              |                                                                                        |                                          |                                                     |
| Single Motor Module      |                          |                          |                                       |                     |                              | 2                                                                                                              |                                                                                        |                                          |                                                     |
| Double Motor Module      |                          |                          |                                       |                     |                              | 2                                                                                                              |                                                                                        |                                          |                                                     |

More information about cables can be found under MOTION-CONNECT connection systems.

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ± 10 % (drive system DC link voltage 600 V DC).\*

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

5) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                            | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>            | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | <b>SIMOTICS T-1FW6 built-in torque motors Standard type</b> | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{max}$<br>Nm (lb <sub>f</sub> -ft)     | $M_0$<br>Nm (lb <sub>f</sub> -ft) | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $n_{max}$ at $M_{max}$<br>rpm              | $n_{max}$ at $M_{rated}$<br>rpm          | Order No.                                                   | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| <b>1FW6, standard type, water cooling</b> |                                   |                                         |                                            |                                          |                                                             |                                                                                   |                                |
| <b>1320 (974)</b>                         | 841 (620)                         | 799 (589)                               | 34                                         | 69                                       | <b>1FW6230-0B05-1J 2</b>                                    | 62.2 (5.51)                                                                       | 44.8 (98.8)                    |
|                                           |                                   | 774 (571)                               | 59                                         | 110                                      | <b>1FW6230-0B05-2J 2</b>                                    |                                                                                   |                                |
|                                           |                                   | 660 (487)                               | 160                                        | 290                                      | <b>1FW6230-0B05-5G 2</b>                                    |                                                                                   |                                |
| <b>1840 (1357)</b>                        | 1180 (870)                        | 1140 (841)                              | 19                                         | 45                                       | <b>1FW6230-0B07-1J 2</b>                                    | 84.3 (7.46)                                                                       | 58.8 (130)                     |
|                                           |                                   | 1120 (826)                              | 38                                         | 73                                       | <b>1FW6230-0B07-2J 2</b>                                    |                                                                                   |                                |
|                                           |                                   | 1010 (745)                              | 110                                        | 190                                      | <b>1FW6230-0B07-5G 2</b>                                    |                                                                                   |                                |
|                                           |                                   | 923 (681)                               | 160                                        | 290                                      | <b>1FW6230-0B07-8FB 2</b>                                   |                                                                                   |                                |
| <b>2630 (1940)</b>                        | 1680 (1239)                       | 1630 (1202)                             | 21                                         | 46                                       | <b>1FW6230-0B10-2J 2</b>                                    | 118.0 (10.4)                                                                      | 81.8 (180)                     |
|                                           |                                   | 1520 (1121)                             | 74                                         | 130                                      | <b>1FW6230-0B10-5G 2</b>                                    |                                                                                   |                                |
|                                           |                                   | 1450 (1070)                             | 110                                        | 190                                      | <b>1FW6230-0B10-8FB 2</b>                                   |                                                                                   |                                |
|                                           |                                   | 1320 (974)                              | 160                                        | 290                                      | <b>1FW6230-0B10-2PB 2</b>                                   |                                                                                   |                                |
| <b>3950 (2914)</b>                        | 2520 (1859)                       | 2440 (1800)                             | 19                                         | 43                                       | <b>1FW6230-0B15-4C 2</b>                                    | 173.0 (15.3)                                                                      | 117.8 (260)                    |
|                                           |                                   | 2380 (1755)                             | 44                                         | 80                                       | <b>1FW6230-0B15-5G 2</b>                                    |                                                                                   |                                |
|                                           |                                   | 2310 (1704)                             | 67                                         | 120                                      | <b>1FW6230-0B15-8FB 2</b>                                   |                                                                                   |                                |
|                                           |                                   | 2190 (1615)                             | 100                                        | 180                                      | <b>1FW6230-0B15-2PB 2</b>                                   |                                                                                   |                                |
|                                           |                                   | 2020 (1490)                             | 150                                        | 270                                      | <b>1FW6230-0B15-0WB 2</b>                                   |                                                                                   | 119.4 (263)                    |
| <b>5260 (3880)</b>                        | 3360 (2478)                       | 3230 (2382)                             | 29                                         | 56                                       | <b>1FW6230-0B20-5G 2</b>                                    | 228.0 (20.2)                                                                      | 153.8 (339)                    |
|                                           |                                   | 3160 (2331)                             | 47                                         | 84                                       | <b>1FW6230-0B20-8FB 2</b>                                   |                                                                                   |                                |
|                                           |                                   | 3050 (2250)                             | 74                                         | 130                                      | <b>1FW6230-0B20-2PB 2</b>                                   |                                                                                   |                                |
|                                           |                                   | 2890 (2132)                             | 110                                        | 190                                      | <b>1FW6230-0B20-0WB 2</b>                                   |                                                                                   | 155.4 (343)                    |

**Cable outlet** only for 1FW6160 to 1FW6290:

Axial

Radially outwards

Tangential (only for types of connection C and D)

W  
V  
T

#### Type of connection:

Permanently connected power and signal cables with exposed core ends<sup>4)</sup>

Length: 2 m (6.56 ft)

Permanently connected power and signal cables pre-assembled with connectors

Length: 0.5 m (1.64 ft)

C  
D

#### Type of connection only for specific motors (Not configurable):

Permanently connected power and signal cables with exposed core ends<sup>4)</sup>

Length: 1 m (3.28 ft)

B

## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3)  | Maximum<br>current <sup>2)</sup> | Calculated<br>power         | SINAMICS S120 Motor Module                          |                                                                                                               | Power cable with complete shield<br>Motor connection via power connector <sup>4)</sup> |                                                                                           |                                                     |           |
|--------------------------|--------------------------|---------------------------|----------------------------------|-----------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------|
|                          | <i>I</i> <sub>0</sub>    | <i>I</i> <sub>rated</sub> | <i>I</i> <sub>max</sub>          | <i>P</i> <sub>el, max</sub> | Required<br>rated<br>current                        | Booksize format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                | Cable<br>cross-<br>section <sup>5)</sup>                                                  | Pre-assembled<br>basic cable to the<br>drive system |           |
|                          |                          |                           |                                  |                             | <i>I</i> <sub>rated</sub> / <i>I</i> <sub>max</sub> |                                                                                                               |                                                                                        |                                                                                           |                                                     | Order No. |
|                          | A                        | A                         | A                                | kW (HP)                     | A                                                   |                                                                                                               | Size                                                                                   | mm <sup>2</sup>                                                                           | Order No.                                           |           |
|                          |                          |                           |                                  |                             |                                                     |                                                                                                               |                                                                                        |                                                                                           |                                                     |           |
| 1FW6230-0.B05-1J..       | 16                       | 15                        | 31                               | 17.3 (23.2)                 | 18/36                                               | 6SL312-1-TE21-8AA3                                                                                            | 1                                                                                      | 4 × 2.5                                                                                   | 6FX8002-5CS11-....                                  |           |
| 1FW6230-0.B05-2J..       | 24                       | 22                        | 45                               | 21 (28.2)                   | 30/56                                               | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                                                                    | 4 × 4                                                                                     | 6FX8002-5CS41-....                                  |           |
| 1FW6230-0.B05-5G..       | 53                       | 40                        | 100                              | 34.1 (45.7)                 | 60/113                                              | 6SL312-1-TE26-0AA3                                                                                            | 1.5                                                                                    | 4 × 16                                                                                    | 6FX8002-5CS24-....                                  |           |
| 1FW6230-0.B07-1J..       | 16                       | 16                        | 31                               | 19.4 (26.0)                 | 18/36                                               | 6SL312-1-TE21-8AA3                                                                                            | 1                                                                                      | 4 × 2.5                                                                                   | 6FX8002-5CS11-....                                  |           |
| 1FW6230-0.B07-2J..       | 24                       | 22                        | 45                               | 23.6 (31.6)                 | 30/56                                               | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                                                                    | 4 × 4                                                                                     | 6FX8002-5CS41-....                                  |           |
| 1FW6230-0.B07-5G..       | 53                       | 44                        | 100                              | 36.9 (49.5)                 | 60/113                                              | 6SL312-1-TE26-0AA3                                                                                            | 1.5                                                                                    | 4 × 16                                                                                    | 6FX8002-5CS24-....                                  |           |
| 1FW6230-0.B07-8FB.       | 74                       | 56                        | 130                              | 46.3 (62.1)                 | 85/141                                              | 6SL312-1-TE28-5AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B10-2J..       | 24                       | 23                        | 45                               | 27.1 (36.3)                 | 30/56                                               | 6SL312-1-TE23-0AA3                                                                                            | 1.5                                                                                    | 4 × 4                                                                                     | 6FX8002-5CS41-....                                  |           |
| 1FW6230-0.B10-5G..       | 54                       | 48                        | 100                              | 42 (56.3)                   | 60/113                                              | 6SL312-1-TE26-0AA3                                                                                            | 1.5                                                                                    | 4 × 16                                                                                    | 6FX8002-5CS24-....                                  |           |
| 1FW6230-0.B10-8FB.       | 74                       | 62                        | 130                              | 50.6 (67.9)                 | 85/141                                              | 6SL312-1-TE28-5AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B10-2PB.       | 100                      | 80                        | 190                              | 65.4 (87.7)                 | 132/210                                             | 6SL312-1-TE31-3AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B15-4C..       | 33                       | 32                        | 63                               | 38 (50.9)                   | 45/85                                               | 6SL312-1-TE24-5AA3                                                                                            | 1.5                                                                                    | 4 × 6                                                                                     | 6FX8002-5CS54-....                                  |           |
| 1FW6230-0.B15-5G..       | 53                       | 49                        | 100                              | 47.4 (63.5)                 | 60/113                                              | 6SL312-1-TE26-0AA3                                                                                            | 1.5                                                                                    | 4 × 16                                                                                    | 6FX8002-5CS24-....                                  |           |
| 1FW6230-0.B15-8FB.       | 74                       | 66                        | 130                              | 57.3 (76.8)                 | 85/141                                              | 6SL312-1-TE28-5AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B15-2PB.       | 100                      | 90                        | 190                              | 72.5 (97.2)                 | 132/210                                             | 6SL312-1-TE31-3AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B15-0WB.       | 140                      | 110                       | 270                              | 91.2 (122)                  | 200/282                                             | 6SL312-1-TE32-0AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B20-5G..       | 53                       | 51                        | 100                              | 53.5 (71.7)                 | 60/113                                              | 6SL312-1-TE26-0AA3                                                                                            | 1.5                                                                                    | 4 × 16                                                                                    | 6FX8002-5CS24-....                                  |           |
| 1FW6230-0.B20-8FB.       | 74                       | 69                        | 130                              | 63.7 (85.4)                 | 85/141                                              | 6SL312-1-TE28-5AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B20-2PB.       | 100                      | 94                        | 190                              | 79.4 (106)                  | 132/210                                             | 6SL312-1-TE31-3AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| 1FW6230-0.B20-0WB.       | 140                      | 120                       | 270                              | 98.1 (132)                  | 200/282                                             | 6SL312-1-TE32-0AA3                                                                                            | –                                                                                      | –                                                                                         | –                                                   |           |
| Cooling:                 |                          |                           |                                  |                             |                                                     |                                                                                                               |                                                                                        | Length code                                                                               |                                                     | ....      |
| Internal air cooling     |                          |                           |                                  |                             |                                                     | 0                                                                                                             |                                                                                        |                                                                                           |                                                     |           |
| External air cooling     |                          |                           |                                  |                             |                                                     | 1                                                                                                             |                                                                                        |                                                                                           |                                                     |           |
| Motor Module:            |                          |                           |                                  |                             |                                                     |                                                                                                               |                                                                                        | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems. |                                                     |           |
| Single Motor Module      |                          |                           |                                  |                             |                                                     | 1                                                                                                             |                                                                                        |                                                                                           |                                                     |           |
| Double Motor Module      |                          |                           |                                  |                             |                                                     | 2                                                                                                             |                                                                                        |                                                                                           |                                                     |           |

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ±10 % (drive system DC link voltage 600 V DC).<sup>4)</sup>

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

5) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

# Direct drives

## SIMOTICS T torque motors for SINAMICS S120

### SIMOTICS T-1FW6 synchronous built-in torque motors Water cooling

#### Selection and ordering data

| Maximum torque                            | Static torque <sup>1)3)</sup>     | Rated torque <sup>2)3)</sup>            | Max. speed at maximum torque <sup>2)</sup> | Max. speed at rated torque <sup>2)</sup> | <b>SIMOTICS T-1FW6 built-in torque motors Standard type</b> | Moment of inertia of rotor                                                        | Weight, approx. stator + rotor |
|-------------------------------------------|-----------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------|
| $M_{max}$<br>Nm (lb <sub>f</sub> -ft)     | $M_0$<br>Nm (lb <sub>f</sub> -ft) | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $n_{max}$ at $M_{max}$<br>rpm              | $n_{max}$ at $M_{rated}$<br>rpm          | Order No.                                                   | $J$<br>10 <sup>-2</sup> kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)                 |
| <b>1FW6, standard type, water cooling</b> |                                   |                                         |                                            |                                          |                                                             |                                                                                   |                                |
| <b>4000 (2950)</b>                        | 2220 (1637)                       | 2060 (1519)                             | 59                                         | 110                                      | <b>1FW6290-0 B07-5G 2</b>                                   | 228 (20.2)                                                                        | 103.6 (228)                    |
|                                           |                                   | 1910 (1409)                             | 110                                        | 210                                      | <b>1FW6290-0 B07-0L B2</b>                                  |                                                                                   |                                |
|                                           |                                   | 1810 (1335)                             | 150                                        | 270                                      | <b>1FW6290-0 B07-2PB2</b>                                   |                                                                                   | 108.8 (240)                    |
| <b>6280 (4632)</b>                        | 3490 (2574)                       | 3320 (2449)                             | 40                                         | 73                                       | <b>1FW6290-0 B11-7A 2</b>                                   | 334 (29.6)                                                                        | 159 (351)                      |
|                                           |                                   | 3200 (2360)                             | 71                                         | 130                                      | <b>1FW6290-0 B11-0L B2</b>                                  |                                                                                   |                                |
|                                           |                                   | 3100 (2287)                             | 93                                         | 170                                      | <b>1FW6290-0 B11-2PB2</b>                                   |                                                                                   | 164.2 (362)                    |
| <b>8570 (6321)</b>                        | 4760 (3511)                       | 4590 (3386)                             | 28                                         | 53                                       | <b>1FW6290-0 B15-7A 2</b>                                   | 440 (38.9)                                                                        | 214.6 (473)                    |
|                                           |                                   | 4480 (3304)                             | 50                                         | 89                                       | <b>1FW6290-0 B15-0L B2</b>                                  |                                                                                   |                                |
|                                           |                                   | 4390 (3238)                             | 67                                         | 120                                      | <b>1FW6290-0 B15-2PB2</b>                                   |                                                                                   | 219.8 (485)                    |
| <b>10900 (8040)</b>                       | 6030 (4448)                       | 5760 (4249)                             | 38                                         | 68                                       | <b>1FW6290-0 B20-0L B2</b>                                  | 546 (48.3)                                                                        | 260.6 (575)                    |
|                                           |                                   | 5670 (4182)                             | 51                                         | 91                                       | <b>1FW6290-0 B20-2PB2</b>                                   |                                                                                   | 265.8 (586)                    |

**Cable outlet only** for 1FW6160 to 1FW6290:

Axial  
Radially outwards  
Tangential (only for types of connection C and D)

W  
V  
T

#### Type of connection:

Permanently connected power and signal cables with exposed core ends<sup>4)</sup>  
Length: 2 m (6.56 ft)  
Permanently connected power and signal cables pre-assembled with connectors  
Length: 0.5 m (1.64 ft)

C  
D  
B

#### Type of connection only for specific motors (Not configurable):

Permanently connected power and signal cables with exposed core ends<sup>4)</sup>  
Length: 1 m (3.28 ft)



## SIMOTICS T torque motors for SINAMICS S120

SIMOTICS T-1FW6 synchronous built-in torque motors  
Water cooling

| Motor type<br>(repeated) | Stall<br>current<br>1)3) | Rated<br>current<br>2)3) | Maxi-<br>mum<br>current <sup>2)</sup> | Calculated<br>power | SINAMICS S120 Motor Module   |                                                                                                                | Power cable with complete shield<br>Motor connection via power connector <sup>4)</sup>    |                                          |                                                     |
|--------------------------|--------------------------|--------------------------|---------------------------------------|---------------------|------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
|                          | $I_0$                    | $I_{rated}$              | $I_{max}$                             | $P_{el, max}$       | Required<br>rated<br>current | Booksized format<br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system | Power<br>connec-<br>tor                                                                   | Cable<br>cross-<br>section <sup>5)</sup> | Pre-assembled<br>basic cable to the<br>drive system |
|                          | A                        | A                        | A                                     | kW (HP)             | $I_{rated}/I_{max}$          | Order No.                                                                                                      | Size                                                                                      | mm <sup>2</sup>                          | Order No.                                           |
| 1FW6290-0.B07-5G..       | 56                       | 52                       | 110                                   | 47.7 (64.0)         | 60/113                       | <b>6SL312-1-1TE26-0AA3</b>                                                                                     | 1.5                                                                                       | 4 × 16                                   | <b>6FX8002-5CS24-....</b>                           |
| 1FW6290-0.B07-0LB.       | 100                      | 86                       | 210                                   | 70.6 (94.7)         | 132/210                      | <b>6SL312-1-1TE31-3AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B07-2PB.       | 120                      | 100                      | 270                                   | 85.4 (115)          | 200/282                      | <b>6SL312-1-1TE32-0AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B11-7A..       | 62                       | 59                       | 130                                   | 58 (77.8)           | 85/141                       | <b>6SL312-1-1TE28-5AA3</b>                                                                                     | 1.5                                                                                       | 4 × 16                                   | <b>6FX8002-5CS24-....</b>                           |
| 1FW6290-0.B11-0LB.       | 100                      | 91                       | 210                                   | 78.2 (105)          | 132/210                      | <b>6SL312-1-1TE31-3AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B11-2PB.       | 120                      | 110                      | 270                                   | 93.2 (125)          | 200/282                      | <b>6SL312-1-1TE32-0AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B15-7A..       | 64                       | 61                       | 130                                   | 65.2 (87.4)         | 85/141                       | <b>6SL312-1-1TE28-5AA3</b>                                                                                     | 1.5                                                                                       | 4 × 16                                   | <b>6FX8002-5CS24-....</b>                           |
| 1FW6290-0.B15-0LB.       | 100                      | 94                       | 210                                   | 85.2 (114)          | 132/210                      | <b>6SL312-1-1TE31-3AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B15-2PB.       | 120                      | 110                      | 270                                   | 101 (135)           | 200/282                      | <b>6SL312-1-1TE32-0AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B20-0LB.       | 100                      | 95                       | 210                                   | 91.9 (123)          | 132/210                      | <b>6SL312-1-1TE31-3AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
| 1FW6290-0.B20-2PB.       | 120                      | 120                      | 270                                   | 107 (144)           | 200/282                      | <b>6SL312-1-1TE32-0AA3</b>                                                                                     | –                                                                                         | –                                        | –                                                   |
|                          |                          |                          |                                       |                     | <b>Cooling:</b>              |                                                                                                                | Length code                                                                               |                                          |                                                     |
|                          |                          |                          |                                       |                     | Internal air cooling         | 0                                                                                                              |                                                                                           |                                          |                                                     |
|                          |                          |                          |                                       |                     | External air cooling         | 1                                                                                                              |                                                                                           |                                          |                                                     |
|                          |                          |                          |                                       |                     | <b>Motor Module:</b>         |                                                                                                                | More information about cables can be<br>found under MOTION-CONNECT<br>connection systems. |                                          |                                                     |
|                          |                          |                          |                                       |                     | Single Motor Module          | 1                                                                                                              |                                                                                           |                                          |                                                     |

## Accessories

| Description                           | Order No.                 | Description                                             | Order No.                 |
|---------------------------------------|---------------------------|---------------------------------------------------------|---------------------------|
| <b>Cooling connection adapter</b> for |                           | <b>Power connector<sup>4)</sup></b>                     |                           |
| • Torque motors<br>1FW6160 to 1FW6230 | <b>1FW6160-1BA00-0AA0</b> | • Size 1<br>for 4 × 2.5 mm <sup>2</sup>                 | <b>6FX2003-0LA00</b>      |
| • Torque motors<br>1FW6290            | <b>1FW6290-1BA00-0AA0</b> | • Size 1.5<br>for 4 × 4/4 × 10/4 × 16 mm <sup>2</sup>   | <b>6FX2003-0LA10</b>      |
|                                       |                           | <b>Signal connector<sup>4)</sup></b>                    |                           |
|                                       |                           | • M17 (socket)<br>for 6 × 0.5 + 1 × 1.0 mm <sup>2</sup> | <b>6FX2003-0SU07</b>      |
|                                       |                           | <b>Signal cable, pre-assembled</b>                      | <b>6FX7002-2SL10-....</b> |
|                                       |                           | For built-in torque motors<br>SIMOTICS T-1FW6           |                           |

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ±10 % (drive system DC link voltage 600 V DC).

3) In case of water cooling with inlet temperature of 35 °C (95 °F) and maximum rotor flange temperature of 60 °C (140 °F).

4) For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor and must be ordered separately (see Accessories).

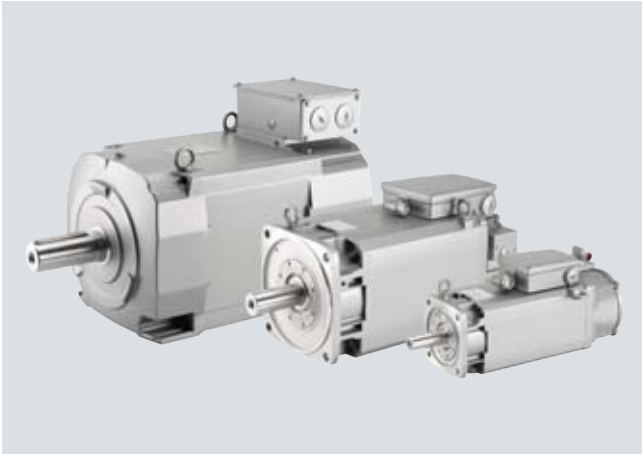
5) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

## Main spindle motors

### SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

#### SIMOTICS M-1PH8 asynchronous motors

##### Overview



SIMOTICS M-1PH8 motors are compact squirrel-cage asynchronous motors with IP55/IP65 degree of protection and they extend or replace the current range of the well-proven 1PH/1PM series. SIMOTICS M-1PH8 motors are available in two different cooling types:

- Forced ventilation
- Water cooling

The motors have been designed specifically for use in conjunction with the SINAMICS S120 drive system. Depending on the control requirements, appropriate encoder systems are available for the motors for sensing the motor speed and indirect position.

For machine tools, the encoder system is capable of C-axis operation as standard – i.e. an additional encoder is not required for C-axis operation.

##### Benefits

- Wide range of power ratings
- The right design for any application
  - Forced ventilation or water cooling
  - Solid or hollow shaft
  - Various bearing concepts
  - Different encoder types for speed control and high-precision positioning
- Excellent performance features
  - Maximum speeds up to 20000 rpm
  - Excellent rotational accuracy of up to 10  $\mu$ m
  - Excellent vibration severity
  - High dynamic response (short acceleration times)
- Low noise emissions
- Simple and flexible connection system
- Commissioning with electronic rating plate and DRIVE-CLiQ interface

Water cooling always brings benefits:

- With applications in which extreme ambient conditions, such as high temperatures, dust, dirt, or a corrosive atmosphere, do not permit air cooling
- In processes in which the environment must not be heated

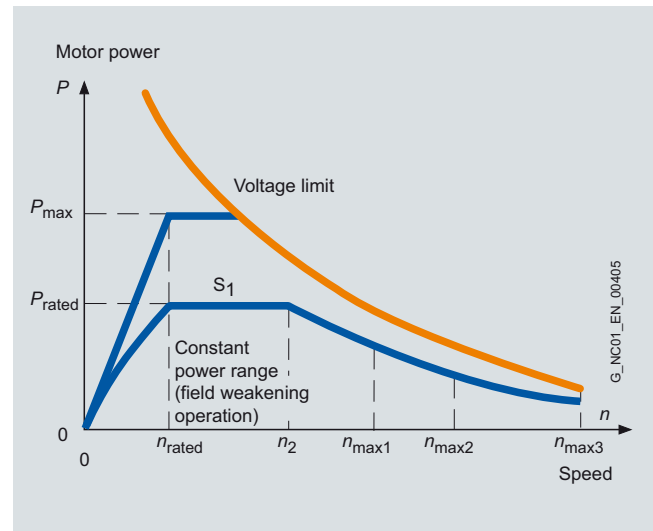
## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

## SIMOTICS M-1PH8 asynchronous motors

## Application

- Compact machine tools
- Complex machining centers and turning machines
- Fully encapsulated milling machines
- High-load milling spindles
- Counterspindles or power tools for turning machines
- Direct power tools with internal cooling
- Special-purpose machines

## Characteristic curves



Typical speed/power graph for SIMOTICS M-1PH8 motors<sup>1)</sup>

The graph shows the typical relationship between motor speed and drive power for SIMOTICS M-1PH8 motors for duty type S1 (continuous duty) in accordance with IEC 60034-1.

Data for short-time duty S2 and continuous duty S6 is listed in the 1PH8 Motors Configuration Manual.

<sup>1)</sup> For further configuration information, see the 1PH8 Motors Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors

#### Technical specifications

| Product name                                                                                                                                                                                                              |                                 | SIMOTICS M-1PH8 motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cooling</b><br><br>• Cooling water pressure at inlet, max.<br><br><br>- 1PH808<br><br>- 1PH810<br><br>- 1PH813<br><br>- 1PH816<br><br>- 1PH818<br><br>- 1PH822<br><br>- 1PH828                                         | Forced ventilation              | Water cooling                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                           | –                               | 6 bar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Connecting thread at NDE <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                           |                                 | Cooling water flow volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                           | –                               | 6 l/min (1.59 US gallons/min.)                                                                                                                                                                                                                                                                                                                                                                                                                                                              | G 1/8"                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                           | –                               | 8 l/min (2.11 US gallons/min.)                                                                                                                                                                                                                                                                                                                                                                                                                                                              | G 1/4"                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                           | –                               | 12 l/min (3.17 US gallons/min.)                                                                                                                                                                                                                                                                                                                                                                                                                                                             | G 3/8"                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                           | –                               | 15 l/min (3.96 US gallons/min.)                                                                                                                                                                                                                                                                                                                                                                                                                                                             | G 1/2"                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                           | –                               | 15 l/min (3.96 US gallons/min.)                                                                                                                                                                                                                                                                                                                                                                                                                                                             | G 3/8"                                                                                                                                                                                                                                                                                                                                                                                               |
| –                                                                                                                                                                                                                         | 20 l/min (5.28 US gallons/min.) | G 3/8"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      |
| –                                                                                                                                                                                                                         | 35 l/min (9.25 US gallons/min.) | G 1/2"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Ambient temperature, permissible</b>                                                                                                                                                                                   |                                 | -15 ... +40 °C (5 ... 104 °F)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Coolant inlet temperature</b>                                                                                                                                                                                          |                                 | – ≤ 30 °C (86 °F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Temperature monitoring</b><br>• 1PH818/1PH822/1PH828                                                                                                                                                                   |                                 | KTY84 temperature sensor in stator winding<br>Additional KTY 84 as reserve                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</b>                                                                                                                                       |                                 | For an ambient temperature of up to 40 °C (104°F)<br>Temperature class 180 (H)                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Motor fan ratings</b><br>• 1PH808<br>• 1PH810 to 1PH816<br>• 1PH818/1PH822<br>• 1PH828                                                                                                                                 |                                 | –<br>230 V 1 AC 50/60 Hz, 265 V 1 AC 60 Hz<br>400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz<br>200 V ... 277 V 1 AC, 50/60 Hz (EC fan)<br>400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz                                                                                                                                                                                                                                                                                                                     | –<br>–<br>–<br>–<br>–                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Encoder system, built-in</b>                                                                                                                                                                                           |                                 | Without DRIVE-CLiQ interface or with DRIVE-CLiQ interface                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Sound pressure level <math>L_{pA}</math> (1 m) in accordance with DIN EN ISO 1680</b><br>max. tolerance +3 dB<br><br>• 1PH808 to 1PH813<br><br><br>• 1PH816<br><br><br>• 1PH818/1PH822<br><br><br><br><br><br>• 1PH828 |                                 | <br><br>70 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm<br><br><br>73 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm<br><br><br>73 dB at a rated pulse frequency of 2 kHz and a speed range:<br><u>Forced ventilation (IP55)</u><br>• 1PH818 up to 5000 rpm<br>• 1PH822 up to 3500 rpm<br><br>74 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm<br><u>Forced ventilation (IP55)</u><br>• 1PH828 up to 3300 rpm | <br><br>68 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm<br><br><br>69 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm<br><br><br>70 dB at a rated pulse frequency of 2 kHz or 4 kHz and speed ranges:<br>• 1PH818 up to 5000 rpm<br>• 1PH822 up to 4500 rpm<br><br><br>72 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm |
| <b>Connection</b><br>• 1PH808/1PH810/1PH813<br>• 1PH816/1PH818/1PH822/1PH828<br>• Fan<br>- 1PH808<br>- 1PH810/1PH813<br>- 1PH816/1PH818/1PH822/1PH828<br>• Encoder system                                                 |                                 | Power connector or terminal box<br>Terminal box<br><br>Power connector<br>Power connector or terminal box<br>Terminal box<br><br>Connector for signals (without mating connector) or DRIVE-CLiQ                                                                                                                                                                                                                                                                                             | Terminal box<br><br>–<br>–<br>–                                                                                                                                                                                                                                                                                                                                                                      |

S/R = signals/revolution

<sup>1)</sup> DE is the drive end with shaft. NDE is the non-drive end.

<sup>2)</sup> Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

## SIMOTICS M-1PH8 asynchronous motors

## Technical data (continued)

|                                                                                          |                                                                   |      |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------|
| <b>Product name</b>                                                                      | SIMOTICS M-1PH8 motor                                             |      |
| <b>Vibration severity</b>                                                                | In accordance with Siemens/EN 60034-14 (IEC 60034-14)             |      |
| <b>Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)<sup>2)</sup></b> | Tolerance R                                                       |      |
| <b>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</b>                  |                                                                   |      |
| • 1PH808/1PH810/1PH813/1PH16                                                             | IP55                                                              | IP65 |
| • 1PH818/1PH822/1PH828                                                                   | IP55                                                              | IP55 |
| <b>Rating plate</b>                                                                      | 1 unit attached to motor<br>1 unit supplied loose in terminal box |      |
| <b>Paint finish</b>                                                                      | Anthracite RAL 7016                                               |      |
| <b>Approvals, according to</b>                                                           | cURus                                                             |      |

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 80 to SH 160 – Forced ventilation

#### Selection and ordering data

| Rated speed                                                                                      | Continuous speed, max. <sup>1)</sup> |                          |                          | Operating speed during field weakening <sup>1)5)</sup> | Rated power | Rated torque             | Static torque            | SIMOTICS M-1PH8 asynchronous motor |
|--------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------|--------------------------|--------------------------------------------------------|-------------|--------------------------|--------------------------|------------------------------------|
| $n_{rated}$                                                                                      | $n_{max1}$ <sup>2)</sup>             | $n_{max2}$ <sup>3)</sup> | $n_{max3}$ <sup>4)</sup> | $n_2$                                                  | $P_{rated}$ | $M_{rated}$              | $M_0$                    |                                    |
| rpm                                                                                              | rpm                                  | rpm                      | rpm                      | rpm                                                    | kW (HP)     | Nm (lb <sub>F</sub> -ft) | Nm (lb <sub>F</sub> -ft) |                                    |
| Order No.                                                                                        |                                      |                          |                          |                                                        |             |                          |                          |                                    |
| Shaft height 80 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module  |                                      |                          |                          |                                                        |             |                          |                          |                                    |
| 1500                                                                                             | 10000                                | 12000                    | –                        | 6200                                                   | 2.8 (3.75)  | 18 (13.3)                | 21 (15.5)                | 1PH8083-1 F ■■■-■■■1               |
| 2000                                                                                             | 10000                                | 15000                    | 17000                    | 11350                                                  | 3.7 (4.96)  | 18 (13.3)                | 21 (15.5)                | 1PH8083-1 G ■■■-■■■1               |
| 3000                                                                                             | 10000                                | 15000                    | 20000                    | 17300                                                  | 4.1 (5.50)  | 13 (9.59)                | 21 (15.5)                | 1PH8083-1 M ■■■-■■■1               |
| 4500                                                                                             | 10000                                | 15000                    | 20000                    | 20000                                                  | 4.8 (6.44)  | 10 (7.38)                | 19 (14.0)                | 1PH8083-1 N ■■■-■■■1               |
| 1500                                                                                             | 10000                                | 14000                    | –                        | 6750                                                   | 3.7 (4.96)  | 24 (17.7)                | 27 (19.9)                | 1PH8087-1 F ■■■-■■■1               |
| 2000                                                                                             | 10000                                | 15000                    | 18000                    | 10450                                                  | 4.9 (6.57)  | 23 (17.0)                | 27 (19.9)                | 1PH8087-1 G ■■■-■■■1               |
| 3000                                                                                             | 10000                                | 15000                    | 20000                    | 20000                                                  | 4.8 (6.44)  | 15 (11.1)                | 27 (19.9)                | 1PH8087-1 M ■■■-■■■1               |
| 4500                                                                                             | 10000                                | 15000                    | 20000                    | 20000                                                  | 5.8 (7.78)  | 12 (8.85)                | 25 (18.4)                | 1PH8087-1 N ■■■-■■■1               |
| Shaft height 100 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                          |                          |                                                        |             |                          |                          |                                    |
| 1500                                                                                             | 9000                                 | 12000                    | –                        | 8350                                                   | 3.7 (4.96)  | 24 (17.7)                | 29 (21.4)                | 1PH8101-1 F ■■■-■■■1               |
| 1000                                                                                             | 9000                                 | 12000                    | –                        | 3800                                                   | 3.7 (4.96)  | 35 (25.8)                | 38 (28.0)                | 1PH8103-1 D ■■■-■■■1               |
| 1500                                                                                             | 9000                                 | 12000                    | –                        | 5200                                                   | 5.5 (7.38)  | 35 (25.8)                | 38 (28.0)                | 1PH8103-1 F ■■■-■■■1               |
| 2000                                                                                             | 9000                                 | 12000                    | –                        | 7200                                                   | 7 (9.39)    | 33 (24.3)                | 38 (28.0)                | 1PH8103-1 G ■■■-■■■1               |
| 3000                                                                                             | 9000                                 | 12000                    | 18000                    | 17100                                                  | 8.4 (11.3)  | 27 (19.9)                | 38 (28.0)                | 1PH8103-1 M ■■■-■■■1               |
| 1500                                                                                             | 9000                                 | 12000                    | –                        | 6700                                                   | 7 (9.39)    | 45 (33.2)                | 52 (38.4)                | 1PH8105-1 F ■■■-■■■1               |
| 1000                                                                                             | 9000                                 | 12000                    | –                        | 5450                                                   | 6.3 (8.45)  | 60 (44.3)                | 63 (46.5)                | 1PH8107-1 D ■■■-■■■1               |
| 1500                                                                                             | 9000                                 | 12000                    | –                        | 6250                                                   | 9 (12.1)    | 57 (42.0)                | 63 (46.5)                | 1PH8107-1 F ■■■-■■■1               |
| 2000                                                                                             | 9000                                 | 12000                    | –                        | 7500                                                   | 10.5 (14.1) | 50 (36.9)                | 63 (46.5)                | 1PH8107-1 G ■■■-■■■1               |
| 3000                                                                                             | 9000                                 | 12000                    | 18000                    | 18000                                                  | 12 (16.1)   | 38 (28.0)                | 59 (43.5)                | 1PH8107-1 M ■■■-■■■1               |
| Shaft height 132 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                          |                          |                                                        |             |                          |                          |                                    |
| 1500                                                                                             | 8000                                 | 10000                    | 11000                    | 6050                                                   | 11 (14.8)   | 70 (51.6)                | 96 (70.8)                | 1PH8131-1 F ■■■-■■■1               |
| 1000                                                                                             | 8000                                 | 10000                    | –                        | 4600                                                   | 12 (16.1)   | 115 (84.8)               | 128 (94.4)               | 1PH8133-1 D ■■■-■■■1               |
| 1500                                                                                             | 8000                                 | 10000                    | 13000                    | 6900                                                   | 15 (20.1)   | 96 (70.8)                | 126 (92.9)               | 1PH8133-1 F ■■■-■■■1               |
| 2000                                                                                             | 8000                                 | 10000                    | 15000                    | 6500                                                   | 20 (26.8)   | 96 (70.8)                | 126 (92.9)               | 1PH8133-1 G ■■■-■■■1               |
| 1500                                                                                             | 8000                                 | 10000                    | 14000                    | 7500                                                   | 18.5 (24.8) | 118 (87.0)               | 157 (116)                | 1PH8135-1 F ■■■-■■■1               |
| 1000                                                                                             | 8000                                 | 10000                    | 12000                    | 5400                                                   | 17 (22.8)   | 162 (119)                | 183 (135)                | 1PH8137-1 D ■■■-■■■1               |
| 1500                                                                                             | 8000                                 | 10000                    | 15000                    | 7000                                                   | 22 (29.5)   | 140 (103)                | 172 (127)                | 1PH8137-1 F ■■■-■■■1               |
| 2000                                                                                             | 8000                                 | 10000                    | 15000                    | 5500                                                   | 28 (37.5)   | 134 (98.8)               | 176 (130)                | 1PH8137-1 G ■■■-■■■1               |
| Shaft height 160 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                          |                          |                                                        |             |                          |                          |                                    |
| 400                                                                                              | 6500                                 | –                        | –                        | 2750                                                   | 9.5 (12.74) | 227 (167.4)              | 239 (176.3)              | 1PH8163-1 B ■■■-■■■1               |
| 1000                                                                                             | 6500                                 | 9000                     | 10000                    | 5050                                                   | 22 (29.50)  | 210 (154.9)              | 243 (179.2)              | 1PH8163-1 D ■■■-■■■1               |
| 1500                                                                                             | 6500                                 | 9000                     | 10000                    | 5000                                                   | 30 (40.23)  | 191 (140.9)              | 252 (185.9)              | 1PH8163-1 F ■■■-■■■1               |
| 2000                                                                                             | 6500                                 | 9000                     | 10000                    | 3500                                                   | 36 (48.28)  | 172 (126.9)              | 254 (187.4)              | 1PH8163-1 G ■■■-■■■1               |
| 400                                                                                              | 6500                                 | –                        | –                        | 2300                                                   | 13 (17.43)  | 310 (228.7)              | 329 (242.7)              | 1PH8165-1 B ■■■-■■■1               |
| 1000                                                                                             | 6500                                 | 9000                     | 10000                    | 5550                                                   | 28 (37.55)  | 267 (196.9)              | 302 (222.8)              | 1PH8165-1 D ■■■-■■■1               |
| 1500                                                                                             | 6500                                 | 9000                     | 10000                    | 4550                                                   | 37 (49.62)  | 236 (174.1)              | 304 (224.2)              | 1PH8165-1 F ■■■-■■■1               |
| 2000                                                                                             | 6500                                 | 9000                     | 10000                    | 3200                                                   | 41 (54.98)  | 196 (144.6)              | 302 (222.8)              | 1PH8165-1 G ■■■-■■■1               |

For versions, see Order No. supplement and options.

The values in the selection and ordering data, particularly for the constant power range with speed  $n_2$ , apply when using an Active Line Module with 400 V 3 AC.  
When using a Smart Line Module, proceed according to 1PH8 Motors Configuration Manual.

<sup>1)</sup> Speed data are based on an infeed with Active Line Module (see characteristic curves); the maximum speed of the encoders must be observed.

<sup>2)</sup> Bearing version for Standard (14th data position B to D).

<sup>3)</sup> Bearing version for Performance (14th data position L).

<sup>4)</sup> Bearing version for High Performance (14th data position M).

<sup>5)</sup>  $n_2$ : max. permissible thermal speed at constant output or speed, which is at the voltage limit when  $P = P_{rated}$ .

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 80 to SH 160 – Forced ventilation

| Motor type<br>(repeated) | Efficiency | Moment of<br>inertia                                      | Weight,<br>approx. <sup>6)</sup> | Rated<br>current | Stall<br>current | Terminal<br>box | SINAMICS S120 Motor Module            |                                                                                                             |
|--------------------------|------------|-----------------------------------------------------------|----------------------------------|------------------|------------------|-----------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------|
|                          | $\eta$     | $J$                                                       | $m$                              | $I_{rated}$      | $I_0$            |                 | Rated output<br>current <sup>7)</sup> | Booksiz format                                                                                              |
|                          | %          | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                          | A                | A                | Type            | $I_{rated}$<br><br>A                  | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system<br><br>Order No. |
| 1PH8083-1.F...           | 80.9       | 0.0064 (0.06)                                             | 32 (70.6)                        | 7.5              | 8                | gk803           | 9                                     | 6SL312-1-TE21-0AA3                                                                                          |
| 1PH8083-1.G...           | 83.2       |                                                           |                                  | 11.6             | 12               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8083-1.M...           | 86.9       |                                                           |                                  | 13.6             | 17               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8083-1.N...           | 86.4       |                                                           |                                  | 17               | 23               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8087-1.F...           | 81.7       | 0.0089 (0.08)                                             | 39 (86.0)                        | 10               | 11               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8087-1.G...           | 85.3       |                                                           |                                  | 14.1             | 15               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8087-1.M...           | 87.1       |                                                           |                                  | 17.3             | 23               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8087-1.N...           | 86.8       |                                                           |                                  | 19.5             | 28               | gk803           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8101-1.F...           | 83.5       | 0.0138 (0.12)                                             | 42 (92.6)                        | 12.5             | 14               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8103-1.D...           | 81.4       | 0.0172 (0.15)                                             | 51 (112)                         | 10               | 11               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8103-1.F...           | 85.2       |                                                           |                                  | 13.5             | 14               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8103-1.G...           | 87.7       |                                                           |                                  | 17.5             | 19               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8103-1.M...           | 90.0       |                                                           |                                  | 25.7             | 31               | gk813           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8105-1.F...           | 86.7       | 0.0252 (0.22)                                             | 65 (143)                         | 17.5             | 20               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8107-1.D...           | 83.4       | 0.0289 (0.26)                                             | 73 (161)                         | 17.5             | 25               | gk813           | 18                                    | 6SL312-1-TE21-8AA3                                                                                          |
| 1PH8107-1.F...           | 86.9       |                                                           |                                  | 23.5             | 25               | gk813           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8107-1.G...           | 89.7       |                                                           |                                  | 26               | 29               | gk813           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8107-1.M...           | 90.0       |                                                           |                                  | 38               | 48               | gk813           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8131-1.F...           | 89.9       | 0.059 (0.52)                                              | 89 (196)                         | 24               | 30               | gk833           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8133-1.D...           | 87.1       | 0.076 (0.67)                                              | 106 (234)                        | 30               | 32               | gk833           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8133-1.F...           | 89.9       |                                                           |                                  | 34               | 42               | gk833           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8133-1.G...           | 91.9       |                                                           |                                  | 45               | 54               | gk833           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8135-1.F...           | 89.8       | 0.094 (0.83)                                              | 125 (276)                        | 43               | 53               | gk833           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8137-1.D...           | 88.1       | 0.109 (0.96)                                              | 141 (311)                        | 43               | 47               | gk833           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8137-1.F...           | 90.4       |                                                           |                                  | 56               | 68               | gk833           | 60                                    | 6SL312-1-TE26-0AA3                                                                                          |
| 1PH8137-1.G...           | 92.4       |                                                           |                                  | 60               | 73               | gk833           | 60                                    | 6SL312-1-TE26-0AA3                                                                                          |
| 1PH8163-1.B...           | 82.3       | 0.216 (1.91)                                              | 196 (432)                        | 30               | 30               | gk863           | 30                                    | 6SL312-1-TE23-0AA3                                                                                          |
| 1PH8163-1.D...           | 90.9       | 0.216 (1.91)                                              | 196 (432)                        | 55               | 60               | gk863           | 60                                    | 6SL312-1-TE26-0AA3                                                                                          |
| 1PH8163-1.F...           | 92.3       | 0.216 (1.91)                                              | 196 (432)                        | 71               | 87               | gk863           | 85                                    | 6SL312-1-TE28-5AA3                                                                                          |
| 1PH8163-1.G...           | 92.9       | 0.216 (1.91)                                              | 196 (432)                        | 83               | 111              | gk863           | 85                                    | 6SL312-1-TE28-5AA3                                                                                          |
| 1PH8165-1.B...           | 82.6       | 0.232 (2.83)                                              | 230 (507)                        | 36               | 37               | gk863           | 45                                    | 6SL312-1-TE24-5AA3                                                                                          |
| 1PH8165-1.D...           | 91.4       | 0.232 (2.83)                                              | 230 (507)                        | 71               | 77               | gk863           | 85                                    | 6SL312-1-TE28-5AA3                                                                                          |
| 1PH8165-1.F...           | 92.6       | 0.232 (2.83)                                              | 230 (507)                        | 78               | 95               | gk863           | 85                                    | 6SL312-1-TE28-5AA3                                                                                          |
| 1PH8165-1.G...           | 92.7       | 0.232 (2.83)                                              | 230 (507)                        | 88               | 122              | gk863           | 85 <sup>8)</sup>                      | 6SL312-1-TE28-5AA3                                                                                          |
|                          |            |                                                           |                                  |                  |                  |                 | Cooling:                              |                                                                                                             |
|                          |            |                                                           |                                  |                  |                  |                 | Internal air cooling                  | 0                                                                                                           |
|                          |            |                                                           |                                  |                  |                  |                 | External air cooling                  | 1                                                                                                           |
|                          |            |                                                           |                                  |                  |                  |                 | Motor Module:                         |                                                                                                             |
|                          |            |                                                           |                                  |                  |                  |                 | Single Motor Module                   | 1                                                                                                           |
|                          |            |                                                           |                                  |                  |                  |                 | Double Motor Module                   | 2                                                                                                           |

<sup>6)</sup> Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).<sup>7)</sup> Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz.<sup>8)</sup> The rated output current of the Motor Module is lower than the rated motor current at 4 kHz.



# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 100/SH 132 – Forced ventilation

#### Selection and ordering data

| Rated speed                                                                                                           | Continuous speed, max. <sup>1)</sup> |                        |                        | Operating speed during field weakening <sup>1)5)</sup> | Rated power              | Rated torque             | Static torque            | SIMOTICS M-1PH8 asynchronous motor |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------|------------------------|--------------------------------------------------------|--------------------------|--------------------------|--------------------------|------------------------------------|
| Y/Δ                                                                                                                   | Y/Δ                                  | Y/Δ                    | Δ                      | Y/Δ                                                    | Y/Δ                      | Y/Δ                      | Y/Δ                      |                                    |
| $n_{\text{rated}}$                                                                                                    | $n_{\text{max1}}^{2)}$               | $n_{\text{max2}}^{3)}$ | $n_{\text{max3}}^{4)}$ | $n_2$                                                  | $P_{\text{rated}}$       | $M_{\text{rated}}$       | $M_0$                    |                                    |
| rpm                                                                                                                   | rpm                                  | rpm                    | rpm                    | rpm                                                    | kW (HP)                  | Nm (lb <sub>f</sub> -ft) | Nm (lb <sub>f</sub> -ft) |                                    |
| Shaft height 100 – Forced ventilation – Star delta circuit – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                        |                                                        |                          |                          |                          | Order No.                          |
| <b>2000/5000</b>                                                                                                      | 9000                                 | 12000                  | 18000                  | 8950/10000                                             | 4.9/4.9<br>(6.57/6.57)   | 23/9<br>(17.0/6.64)      | 29/19<br>(21.4/14.0)     | <b>1PH8101-1 S ■ ■ ■ ■ ■ 1</b>     |
|                                                                                                                       | 9000                                 | 12000                  | 18000                  | 7650/10000                                             | 10/9.3<br>(13.4/12.5)    | 48/18<br>(35.4/13.3)     | 55/36<br>(40.6/26.6)     | <b>1PH8105-1 S ■ ■ ■ ■ ■ 1</b>     |
|                                                                                                                       | 9000                                 | 12000                  | 18000                  | 8550/10000                                             | 11/11<br>(14.8/14.8)     | 53/21<br>(39.1/15.5)     | 63/42<br>(46.5/31.0)     | <b>1PH8107-1 S ■ ■ ■ ■ ■ 1</b>     |
| Shaft height 132 – Forced ventilation – Star delta circuit – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                        |                                                        |                          |                          |                          |                                    |
| <b>2000/5000</b>                                                                                                      | 8000                                 | 10000                  | 15000                  | 8000/10000                                             | 14.6/14.6<br>(19.6/19.6) | 70/28<br>(51.6/20.7)     | 94/55<br>(69.3/40.6)     | <b>1PH8131-1 S ■ ■ ■ ■ ■ 1</b>     |
|                                                                                                                       | 8000                                 | 10000                  | 15000                  | 6500/10000                                             | 24.5/24.5<br>(32.9/32.9) | 117/47<br>(86.3/34.7)    | 157/94<br>(116/69.3)     | <b>1PH8135-1 S ■ ■ ■ ■ ■ 1</b>     |
|                                                                                                                       | 8000                                 | 10000                  | 15000                  | 3000/6000                                              | 29/27.5<br>(38.9/36.9)   | 138/53<br>(102/39.1)     | 185/105<br>(136/77.4)    | <b>1PH8137-1 S ■ ■ ■ ■ ■ 1</b>     |

For versions, see Order No.  
supplement and options.

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The values in the selection and ordering data, particularly for the constant power range with speed  $n_2$ , apply when using an Active Line Module with 400 V 3 AC.  
When using a Smart Line Module, proceed according to 1PH8 Motors Configuration Manual.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 100/SH 132 – Forced ventilation

| Motor type<br>(repeated) | Efficiency | Moment of<br>inertia                                      | Weight, approx. <sup>6)</sup> | Rated<br>current   | Stall<br>current | Terminal<br>box | SINAMICS S120 Motor Module            |                                                                                            |
|--------------------------|------------|-----------------------------------------------------------|-------------------------------|--------------------|------------------|-----------------|---------------------------------------|--------------------------------------------------------------------------------------------|
|                          | Y/Δ        |                                                           |                               | Y/Δ                | Y/Δ              |                 | Rated output<br>current <sup>7)</sup> | Booksiz format                                                                             |
|                          | $\eta$     | $J$                                                       | $m$                           | $I_{\text{rated}}$ | $I_0$            |                 | $I_{\text{rated}}$                    | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system |
|                          | %          | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                       | A                  | A                | Type            | A                                     | Order No.                                                                                  |
| 1PH8101-1.S...           | 87.2/90.2  | 0.0138 (0.12)                                             | 42 (92.6)                     | 13.2/13.5          | 15/20            | gk826           | 18                                    | 6SL312-1 TE21-8AA3                                                                         |
| 1PH8105-1.S...           | 89.1/91.4  | 0.0252 (0.22)                                             | 65 (143)                      | 23/24              | 25/34            | gk826           | 30                                    | 6SL312-1 TE23-0AA3                                                                         |
| 1PH8107-1.S...           | 89.4/90.9  | 0.0289 (0.26)                                             | 73 (161)                      | 26.7/28            | 30/40            | gk826           | 30                                    | 6SL312-1 TE23-0AA3                                                                         |
| 1PH8131-1.S...           | 90.8/89.7  | 0.059 (0.52)                                              | 89 (196)                      | 39/40              | 47/56            | gk846           | 45                                    | 6SL312-1 TE24-5AA3                                                                         |
| 1PH8135-1.S...           | 91.7/93.9  | 0.094 (0.83)                                              | 125 (276)                     | 51/52              | 62/78            | gk846           | 60                                    | 6SL312-1 TE26-0AA3                                                                         |
| 1PH8137-1.S...           | 93.1/91.9  | 0.109 (0.96)                                              | 141 (311)                     | 56/56              | 68/87            | gk846           | 60                                    | 6SL312-1 TE26-0AA3                                                                         |
|                          |            |                                                           |                               |                    |                  |                 | Cooling:                              |                                                                                            |
|                          |            |                                                           |                               |                    |                  |                 | Internal air cooling                  | 0                                                                                          |
|                          |            |                                                           |                               |                    |                  |                 | External air cooling                  | 1                                                                                          |
|                          |            |                                                           |                               |                    |                  |                 | Motor Module:                         |                                                                                            |
|                          |            |                                                           |                               |                    |                  |                 | Single Motor Module                   | 1                                                                                          |
|                          |            |                                                           |                               |                    |                  |                 | Double Motor Module                   | 2                                                                                          |

<sup>1)</sup> Speed data are based on an infeed with Active Line Module (see characteristic curves); the maximum speed of the encoders must be observed.

<sup>2)</sup> Bearing version for Standard (14th data position B to D).

<sup>3)</sup> Bearing version for Performance (14th data position L).

<sup>4)</sup> Bearing version for high performance (14th data position M).

<sup>5)</sup>  $n_2$ : max. permissible thermal speed at constant output or speed, which is at the voltage limit when  $P = P_{\text{rated}}$ .

<sup>6)</sup> Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).

<sup>7)</sup> Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 to SH 280 – Forced ventilation

#### Selection and ordering data

| Rated speed                                                                                      | Continuous speed, max. <sup>1)</sup> |                        | Operating speed during field weakening <sup>14)</sup> | Rated power        | Rated torque             | Static torque            | SIMOTICS M-1PH8 asynchronous motor |
|--------------------------------------------------------------------------------------------------|--------------------------------------|------------------------|-------------------------------------------------------|--------------------|--------------------------|--------------------------|------------------------------------|
| $n_{\text{rated}}$                                                                               | $n_{\text{max1}}^{2)}$               | $n_{\text{max2}}^{3)}$ | $n_2$                                                 | $P_{\text{rated}}$ | $M_{\text{rated}}$       | $M_0$                    |                                    |
| rpm                                                                                              | rpm                                  | rpm                    | rpm                                                   | kW (HP)            | Nm (lb <sub>r</sub> -ft) | Nm (lb <sub>r</sub> -ft) |                                    |
| Order No.                                                                                        |                                      |                        |                                                       |                    |                          |                          |                                    |
| Shaft height 180 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                       |                    |                          |                          |                                    |
| 400                                                                                              | 5000                                 | 7500                   | 3700                                                  | 16.3 (21.9)        | 389 (287)                | 389 (287)                | 1PH8184-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 5000                                 | 7500                   | 4300                                                  | 27 (36.2)          | 368 (271)                | 368 (271)                | 1PH8184-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 5000                                 | 7500                   | 5100                                                  | 39 (52.3)          | 372 (274)                | 372 (274)                | 1PH8184-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 5000                                 | 7500                   | 5600                                                  | 51 (68.4)          | 325 (240)                | 325 (240)                | 1PH8184-1 F ■ ■ ■ ■ ■ 1            |
| 2500                                                                                             | 5000                                 | 7500                   | 5100                                                  | 78 (104.6)         | 298 (220)                | 298 (220)                | 1PH8184-1 L ■ ■ ■ ■ ■ 1            |
| 400                                                                                              | 5000                                 | 7500                   | 4100                                                  | 21.2 (28.4)        | 506 (373)                | 506 (373)                | 1PH8186-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 5000                                 | 7500                   | 4700                                                  | 35 (46.9)          | 478 (353)                | 478 (353)                | 1PH8186-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 5000                                 | 7500                   | 5400                                                  | 51 (68.4)          | 487 (359)                | 487 (359)                | 1PH8186-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 5000                                 | 7500                   | 5400                                                  | 74 (99.2)          | 471 (347)                | 471 (347)                | 1PH8186-1 F ■ ■ ■ ■ ■ 1            |
| 2500                                                                                             | 5000                                 | 7500                   | 5000                                                  | 106 (142.1)        | 405 (299)                | 405 (299)                | 1PH8186-1 L ■ ■ ■ ■ ■ 1            |
| Shaft height 225 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                       |                    |                          |                          |                                    |
| 400                                                                                              | 4500                                 | 6000                   | 3100                                                  | 30.4 (40.8)        | 726 (535)                | 726 (535)                | 1PH8224-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 4500                                 | 6000                   | 3900                                                  | 55 (73.8)          | 750 (553)                | 750 (553)                | 1PH8224-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 4500                                 | 6000                   | 4400                                                  | 71 (95.2)          | 678 (500)                | 678 (500)                | 1PH8224-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 4500                                 | 6000                   | 4400                                                  | 95 (127.4)         | 605 (446)                | 605 (446)                | 1PH8224-1 F ■ ■ ■ ■ ■ 1            |
| 2500                                                                                             | 4500                                 | 6000                   | 3400                                                  | 142 (190.4)        | 542 (400)                | 542 (400)                | 1PH8224-1 L ■ ■ ■ ■ ■ 1            |
| 400                                                                                              | 4500                                 | 6000                   | 3500                                                  | 39.2 (52.6)        | 936 (690)                | 936 (690)                | 1PH8226-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 4500                                 | 6000                   | 4300                                                  | 68 (91.2)          | 928 (684)                | 928 (684)                | 1PH8226-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 4500                                 | 6000                   | 5800                                                  | 92 (123.4)         | 879 (648)                | 879 (648)                | 1PH8226-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 4500                                 | 6000                   | 3500                                                  | 130 (174.3)        | 828 (611)                | 828 (611)                | 1PH8226-1 F ■ ■ ■ ■ ■ 1            |
| 2500                                                                                             | 4500                                 | 6000                   | 3500                                                  | 168 (225.3)        | 642 (474)                | 642 (474)                | 1PH8226-1 L ■ ■ ■ ■ ■ 1            |
| 400                                                                                              | 4500                                 | 6000                   | 3600                                                  | 48 (64.4)          | 1146 (845)               | 1146 (845)               | 1PH8228-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 4500                                 | 6000                   | 4300                                                  | 82 (110)           | 1119 (825)               | 1119 (825)               | 1PH8228-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 4500                                 | 6000                   | 4200                                                  | 113 (151.5)        | 1079 (796)               | 1079 (796)               | 1PH8228-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 4500                                 | 6000                   | 4200                                                  | 160 (214.6)        | 1019 (752)               | 1019 (752)               | 1PH8228-1 F ■ ■ ■ ■ ■ 1            |
| 2500                                                                                             | 4500                                 | 6000                   | 3400                                                  | 205 (274.9)        | 783 (578)                | 783 (578)                | 1PH8228-1 L ■ ■ ■ ■ ■ 1            |
| Shaft height 280 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                       |                    |                          |                          |                                    |
| 400                                                                                              | 3300                                 | –                      | 2100                                                  | 63 (84.5)          | 1504 (1109)              | 1504 (1109)              | 1PH8284-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 3300                                 | –                      | 3000                                                  | 110 (147.5)        | 1501 (1107)              | 1501 (1107)              | 1PH8284-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 3300                                 | –                      | 3300                                                  | 150 (201.2)        | 1433 (1057)              | 1433 (1057)              | 1PH8284-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 3300                                 | –                      | 3100                                                  | 196 (262.8)        | 1248 (921)               | 1248 (921)               | 1PH8284-1 F ■ ■ ■ ■ ■ 1            |
| 400                                                                                              | 3300                                 | –                      | 2100                                                  | 80 (107.3)         | 1910 (1409)              | 1910 (1409)              | 1PH8286-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 3300                                 | –                      | 3000                                                  | 138 (185.1)        | 1883 (1389)              | 1883 (1389)              | 1PH8286-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 3300                                 | –                      | 3300                                                  | 182 (244.1)        | 1738 (1282)              | 1738 (1282)              | 1PH8286-1 D ■ ■ ■ ■ ■ 1            |
| 1500                                                                                             | 3300                                 | –                      | 2700                                                  | 250 (335.3)        | 1592 (1174)              | 1592 (1174)              | 1PH8286-1 F ■ ■ ■ ■ ■ 1            |
| 400                                                                                              | 3300                                 | –                      | 2100                                                  | 103 (138.1)        | 2459 (1814)              | 2459 (1814)              | 1PH8288-1 B ■ ■ ■ ■ ■ 1            |
| 700                                                                                              | 3300                                 | –                      | 3100                                                  | 166 (222.6)        | 2265 (1671)              | 2268 (1673)              | 1PH8288-1 C ■ ■ ■ ■ ■ 1            |
| 1000                                                                                             | 3300                                 | –                      | 3300                                                  | 226 (303.1)        | 2158 (1592)              | 2158 (1592)              | 1PH8288-1 D ■ ■ ■ ■ ■ 1            |

For versions, see Order No. supplement and options.

The values in the selection and ordering data, particularly for the constant power range with speed  $n_2$ , apply when using an Active Line Module with 400 V 3 AC.

When using a Smart Line Module, proceed according to 1PH8 Motors Configuration Manual.

<sup>1)</sup> Speed data are based on an infeed with Active Line Module (see characteristic curves); the maximum speed of the encoders must be observed.

<sup>2)</sup> Bearing version for Standard (14th data position B to D).

<sup>3)</sup> Bearing version for Performance (14th data position L).

<sup>4)</sup>  $n_2$ : max. permissible thermal speed at constant output or speed, which is at the voltage limit when  $P = P_{\text{rated}}$ .

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 to SH 280 – Forced ventilation

| Motor type<br>(repeated) | Efficiency | Moment of<br>inertia                                      | Weight,<br>approx. | Rated<br>current   | Stall<br>current | Terminal<br>box | SINAMICS S120 Motor Module            |                                                                                            |
|--------------------------|------------|-----------------------------------------------------------|--------------------|--------------------|------------------|-----------------|---------------------------------------|--------------------------------------------------------------------------------------------|
|                          | $\eta$     | $J$                                                       | $m$                | $I_{\text{rated}}$ | $I_0$            |                 | Rated output<br>current <sup>5)</sup> | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system |
|                          | %          | kgm <sup>2</sup><br>(lb <sub>r</sub> -in-s <sup>2</sup> ) | kg (lb)            | A                  | A                | Type            | $I_{\text{rated}}$                    | Order No.                                                                                  |
|                          |            |                                                           |                    |                    |                  |                 | A                                     |                                                                                            |
| 1PH8184-1.B...           | 83.4       | 0.489 (4.33)                                              | 350 (772)          | 49                 | 49               | 1XB7322         | 60                                    | 6SL312-1 TE26-0AA3                                                                         |
| 1PH8184-1.C...           | 88.9       | 0.489 (4.33)                                              | 350 (772)          | 65                 | 65               | 1XB7322         | 85                                    | 6SL312-1 TE28-5AA3                                                                         |
| 1PH8184-1.D...           | 92.0       | 0.489 (4.33)                                              | 350 (772)          | 87                 | 87               | 1XB7322         | 85 <sup>6)</sup>                      | 6SL312-1 TE28-5AA3                                                                         |
| 1PH8184-1.F...           | 94.0       | 0.489 (4.33)                                              | 350 (772)          | 116                | 116              | 1XB7322         | 132                                   | 6SL312-1 TE31-3AA3                                                                         |
| 1PH8184-1.L...           | 95.2       | 0.489 (4.33)                                              | 350 (772)          | 166                | 166              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8186-1.B...           | 85.0       | 0.652 (5.77)                                              | 422 (931)          | 65                 | 65               | 1XB7322         | 85                                    | 6SL312-1 TE28-5AA3                                                                         |
| 1PH8186-1.C...           | 90.9       | 0.652 (5.77)                                              | 422 (931)          | 83                 | 83               | 1XB7322         | 85                                    | 6SL312-1 TE28-5AA3                                                                         |
| 1PH8186-1.D...           | 92.6       | 0.652 (5.77)                                              | 422 (931)          | 112                | 112              | 1XB7322         | 132                                   | 6SL312-1 TE31-3AA3                                                                         |
| 1PH8186-1.F...           | 94.5       | 0.652 (5.77)                                              | 422 (931)          | 166                | 166              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8186-1.L...           | 95.5       | 0.652 (5.77)                                              | 422 (931)          | 230                | 230              | 1XB7422         | 260                                   | 6SL312-1 TE32-6AA3                                                                         |
| 1PH8224-1.B...           | 87.2       | 1.48 (13.10)                                              | 610 (1345)         | 86                 | 86               | 1XB7322         | 85 <sup>6)</sup>                      | 6SL312-1 TE28-5AA3                                                                         |
| 1PH8224-1.C...           | 92.5       | 1.48 (13.10)                                              | 610 (1345)         | 136                | 136              | 1XB7322         | 132 <sup>6)</sup>                     | 6SL312-1 TE31-3AA3                                                                         |
| 1PH8224-1.D...           | 94.2       | 1.48 (13.10)                                              | 610 (1345)         | 158                | 158              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8224-1.F...           | 95.3       | 1.48 (13.10)                                              | 610 (1345)         | 200                | 200              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8224-1.L...           | 95.8       | 1.48 (13.10)                                              | 610 (1345)         | 295                | 295              | 1XB7700         | 310                                   | 6SL332-1 TE33-1AA3                                                                         |
| 1PH8226-1.B...           | 88.7       | 1.93 (17.08)                                              | 740 (1632)         | 112                | 112              | 1XB7322         | 132                                   | 6SL312-1 TE31-3AA3                                                                         |
| 1PH8226-1.C...           | 93.2       | 1.93 (17.08)                                              | 740 (1632)         | 162                | 162              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8226-1.D...           | 94.4       | 1.93 (17.08)                                              | 740 (1632)         | 194                | 194              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8226-1.F...           | 95.7       | 1.93 (17.08)                                              | 740 (1632)         | 270                | 270              | 1XB7422         | 310                                   | 6SL332-1 TE33-1AA3                                                                         |
| 1PH8226-1.L...           | 96.1       | 1.93 (17.08)                                              | 740 (1632)         | 350                | 350              | 1XB7700         | 380                                   | 6SL332-1 TE33-8AA3                                                                         |
| 1PH8228-1.B...           | 89.6       | 2.33 (20.62)                                              | 870 (1918)         | 132                | 132              | 1XB7322         | 132                                   | 6SL312-1 TE31-3AA3                                                                         |
| 1PH8228-1.C...           | 93.3       | 2.33 (20.62)                                              | 870 (1918)         | 188                | 188              | 1XB7322         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8228-1.D...           | 94.8       | 2.33 (20.62)                                              | 870 (1918)         | 235                | 235              | 1XB7422         | 260                                   | 6SL312-1 TE32-6AA3                                                                         |
| 1PH8228-1.F...           | 95.9       | 2.33 (20.62)                                              | 870 (1918)         | 340                | 340              | 1XB7700         | 380                                   | 6SL332-1 TE33-8AA3                                                                         |
| 1PH8228-1.L...           | 96.3       | 2.33 (20.62)                                              | 870 (1918)         | 420                | 420              | 1XB7700         | 490                                   | 6SL332-1 TE35-0AA3                                                                         |
| 1PH8284-1.B...           | 92.4       | 4.20 (37.17)                                              | 1200 (2646)        | 154                | 154              | 1XB7700         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8284-1.C...           | 94.7       | 4.20 (37.17)                                              | 1200 (2646)        | 240                | 240              | 1XB7700         | 260                                   | 6SL332-1 TE32-6AA3                                                                         |
| 1PH8284-1.D...           | 95.8       | 4.20 (37.17)                                              | 1200 (2646)        | 315                | 315              | 1XB7700         | 310 <sup>6)</sup>                     | 6SL332-1 TE33-1AA3                                                                         |
| 1PH8284-1.F...           | 96.3       | 4.20 (37.17)                                              | 1200 (2646)        | 390                | 390              | 1XB7700         | 490                                   | 6SL332-1 TE35-0AA3                                                                         |
| 1PH8286-1.B...           | 92.8       | 5.20 (46.03)                                              | 1400 (3087)        | 186                | 186              | 1XB7700         | 200                                   | 6SL312-1 TE32-0AA3                                                                         |
| 1PH8286-1.C...           | 94.9       | 5.20 (46.03)                                              | 1400 (3087)        | 295                | 295              | 1XB7700         | 310                                   | 6SL332-1 TE33-1AA3                                                                         |
| 1PH8286-1.D...           | 96.0       | 5.20 (46.03)                                              | 1400 (3087)        | 410                | 410              | 1XB7700         | 490                                   | 6SL332-1 TE35-0AA3                                                                         |
| 1PH8286-1.F...           | 96.5       | 5.20 (46.03)                                              | 1400 (3087)        | 490                | 490              | 1XB7700         | 490                                   | 6SL332-1 TE35-0AA3                                                                         |
| 1PH8288-1.B...           | 93.1       | 6.30 (55.76)                                              | 1650 (3638)        | 245                | 245              | 1XB7700         | 260                                   | 6SL332-1 TE32-6AA3                                                                         |
| 1PH8288-1.C...           | 95.3       | 6.30 (55.76)                                              | 1650 (3638)        | 365                | 365              | 1XB7700         | 380                                   | 6SL332-1 TE33-8AA3                                                                         |
| 1PH8288-1.D...           | 96.2       | 6.30 (55.76)                                              | 1650 (3638)        | 495                | 495              | 1XB7700         | 490 <sup>6)</sup>                     | 6SL332-1 TE35-0AA3                                                                         |

|                      |   |
|----------------------|---|
| <b>Format:</b>       |   |
| Booksize             | 1 |
| Chassis              | 3 |
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |

<sup>5)</sup> Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz or 2 kHz.

<sup>6)</sup> The rated output current of the Motor Module is lower than the rated motor current at 4 kHz or 2 kHz.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 80 to SH 160 – Water cooling

#### Selection and ordering data

| Rated speed                                                                                 | Continuous speed, max. <sup>1)</sup> |                 |                 | Operating speed during field weakening <sup>1)5)</sup> | Rated power | Rated torque             | Static torque            | SIMOTICS M-1PH8 asynchronous motor |                    |
|---------------------------------------------------------------------------------------------|--------------------------------------|-----------------|-----------------|--------------------------------------------------------|-------------|--------------------------|--------------------------|------------------------------------|--------------------|
|                                                                                             | $n_{rated}$                          | $n_{max1}^{2)}$ | $n_{max2}^{3)}$ |                                                        |             |                          |                          |                                    | $n_{max3}^{4)}$    |
| rpm                                                                                         | rpm                                  | rpm             | rpm             | rpm                                                    | kW (HP)     | Nm (lb <sub>F</sub> -ft) | Nm (lb <sub>F</sub> -ft) |                                    | Order No.          |
| Shaft height 80 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module  |                                      |                 |                 |                                                        |             |                          |                          |                                    |                    |
| 1500                                                                                        | 10000                                | 12000           | –               | 4850                                                   | 3.5 (4.69)  | 22 (16.2)                | 23 (17.0)                |                                    | 1PH8083-1 F2 ■■■■1 |
| 2000                                                                                        | 10000                                | 15000           | 16000           | 9150                                                   | 4.3 (5.77)  | 21 (15.5)                | 23 (17.0)                | 1PH8083-1 G2 ■■■■1                 |                    |
| 4500                                                                                        | 10000                                | 15000           | 20000           | 18950                                                  | 6.7 (8.98)  | 14 (10.3)                | 23 (17.0)                | 1PH8083-1 N2 ■■■■1                 |                    |
| 1500                                                                                        | 10000                                | 15000           | –               | 7700                                                   | 4.6 (6.17)  | 29 (21.4)                | 34 (25.1)                | 1PH8087-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 10000                                | 15000           | 19000           | 10000                                                  | 6.1 (8.18)  | 29 (21.4)                | 34 (25.1)                | 1PH8087-1 G2 ■■■■1                 |                    |
| 4500                                                                                        | 10000                                | 15000           | 20000           | 20000                                                  | 8.5 (11.4)  | 18 (13.3)                | 27 (19.9)                | 1PH8087-1 N2 ■■■■1                 |                    |
| Shaft height 100 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                 |                 |                                                        |             |                          |                          |                                    |                    |
| 1500                                                                                        | 9000                                 | –               | –               | 4200                                                   | 5 (6.7)     | 32 (24)                  | 34 (25.1)                | 1PH8101-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 9000                                 | 12000           | –               | 6800                                                   | 6.4 (8.58)  | 31 (22.9)                | 34 (25.1)                | 1PH8101-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 9000                                 | –               | –               | 6400                                                   | 7.1 (9.5)   | 45 (33.2)                | 48 (35.4)                | 1PH8103-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 9000                                 | 12000           | –               | 5300                                                   | 9.5 (12.7)  | 45 (33.2)                | 48 (35.4)                | 1PH8103-1 G2 ■■■■1                 |                    |
| 3000                                                                                        | 9000                                 | 12000           | 18000           | 14600                                                  | 10.6 (14.2) | 34 (25.1)                | 46 (33.9)                | 1PH8103-1 M2 ■■■■1                 |                    |
| 1500                                                                                        | 9000                                 | –               | –               | 5000                                                   | 11 (14.8)   | 70 (51.6)                | 74 (54.6)                | 1PH8105-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 9000                                 | 12000           | –               | 6750                                                   | 13 (17.4)   | 62 (45.7)                | 74 (54.6)                | 1PH8105-1 G2 ■■■■1                 |                    |
| 3000                                                                                        | 9000                                 | 12000           | 18000           | 11700                                                  | 16.8 (22.5) | 53 (39.1)                | 71 (52.4)                | 1PH8105-1 M2 ■■■■1                 |                    |
| 1500                                                                                        | 9000                                 | 12000           | –               | 6400                                                   | 14 (18.8)   | 89 (65.6)                | 94 (69.3)                | 1PH8107-1 F2 ■■■■1                 |                    |
| 3000                                                                                        | 9000                                 | 12000           | 18000           | 18050                                                  | 18 (24.1)   | 57 (42.0)                | 82 (60)                  | 1PH8107-1 M2 ■■■■1                 |                    |
| Shaft height 132 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                 |                 |                                                        |             |                          |                          |                                    |                    |
| 1500                                                                                        | 8000                                 | 10000           | 11000           | 3200                                                   | 15 (20.1)   | 96 (70.8)                | 96 (70.8)                | 1PH8131-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 8000                                 | 10000           | 14000           | 5500                                                   | 18 (24.1)   | 86 (63.4)                | 101 (74.5)               | 1PH8131-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 8000                                 | 10000           | 13000           | 4500                                                   | 17 (22.8)   | 108 (79.7)               | 136 (100)                | 1PH8133-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 8000                                 | 10000           | 15000           | 7000                                                   | 22 (29.5)   | 105 (77.4)               | 134 (98.8)               | 1PH8133-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 8000                                 | 10000           | 14000           | 5250                                                   | 22 (29.5)   | 140 (103)                | 172 (127)                | 1PH8135-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 8000                                 | 10000           | 15000           | 5250                                                   | 29 (38.9)   | 138 (102)                | 170 (125)                | 1PH8135-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 8000                                 | 10000           | 15000           | 6500                                                   | 27 (36.2)   | 172 (127)                | 202 (149)                | 1PH8137-1 F2 ■■■■1                 |                    |
| 1500                                                                                        | 8000                                 | 10000           | 15000           | 7000                                                   | 30 (40.2)   | 191 (141)                | 223 (164)                | 1PH8138-1 F2 ■■■■1                 |                    |
| Shaft height 160 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                 |                 |                                                        |             |                          |                          |                                    |                    |
| 1500                                                                                        | 6500                                 | 9000            | 10000           | 5000                                                   | 37 (49.6)   | 236 (174)                | 288 (212.4)              | 1PH8163-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 6500                                 | 9000            | 10000           | 5800                                                   | 42 (56.3)   | 201 (148)                | 281 (207.3)              | 1PH8163-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 6500                                 | 9000            | 10000           | 4150                                                   | 46 (61.7)   | 293 (216)                | 334 (246.4)              | 1PH8165-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 6500                                 | 9000            | 10000           | 3900                                                   | 53 (71.1)   | 253 (187)                | 306 (225.7)              | 1PH8165-1 G2 ■■■■1                 |                    |
| 1500                                                                                        | 6500                                 | 9000            | 10000           | 4050                                                   | 52 (69.7)   | 331 (244)                | 353 (260.4)              | 1PH8166-1 F2 ■■■■1                 |                    |
| 2000                                                                                        | 6500                                 | 9000            | 10000           | 4000                                                   | 64 (85.8)   | 306 (225.7)              | 353 (260.4)              | 1PH8166-1 G2 ■■■■1                 |                    |

For versions, see Order No. supplement and options.

The values in the selection and ordering data, particularly for the constant power range with speed  $n_2$ , apply when using an Active Line Module with 400 V 3 AC.  
When using a Smart Line Module, proceed according to 1PH8 Motors Configuration Manual.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 80 to SH 160 – Water cooling

| Motor type<br>(repeated) | Efficiency | Moment of<br>inertia                                      | Weight,<br>approx. <sup>6)</sup> | Rated<br>current   | Stall<br>current | Terminal<br>box | SINAMICS S120 Motor Module            |                                                                                            |
|--------------------------|------------|-----------------------------------------------------------|----------------------------------|--------------------|------------------|-----------------|---------------------------------------|--------------------------------------------------------------------------------------------|
|                          |            |                                                           |                                  |                    |                  |                 | Rated output<br>current <sup>7)</sup> | Booksiz format                                                                             |
|                          | $\eta$     | $J$                                                       | $m$                              | $I_{\text{rated}}$ | $I_0$            |                 | $I_{\text{rated}}$                    | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system |
|                          | %          | kgm <sup>2</sup><br>(lb <sub>F</sub> -in-s <sup>2</sup> ) | kg (lb)                          | A                  | A                | Type            | A                                     | Order No.                                                                                  |
| 1PH8083-1.F2...          | 78.4       | 0.0064 (0.06)                                             | 36 (79.4)                        | 8.9                | 9                | gk803           | 9                                     | 6SL312-1-TE21-0AA3                                                                         |
| 1PH8083-1.G2...          | 83.3       |                                                           |                                  | 12.0               | 13               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8083-1.N2...          | 87.7       |                                                           |                                  | 18.0               | 23               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8087-1.F2...          | 81.4       | 0.0089 (0.08)                                             | 44 (97.0)                        | 13.7               | 15               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8087-1.G2...          | 84.3       |                                                           |                                  | 17.5               | 19               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8087-1.N2...          | 89.1       |                                                           |                                  | 24.0               | 31               | gk803           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8101-1.F2...          | 81.3       | 0.0138 (0.12)                                             | 51 (113)                         | 12.8               | 13               | gk823           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8101-1.G2...          | 85.7       |                                                           |                                  | 16.8               | 18               | gk803           | 18                                    | 6SL312-1-TE21-8AA3                                                                         |
| 1PH8103-1.F2...          | 82.7       | 0.0172 (0.15)                                             | 60 (132)                         | 19.7               | 20               | gk823           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8103-1.G2...          | 85.7       |                                                           |                                  | 23.8               | 24               | gk823           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8103-1.M2...          | 90.0       |                                                           |                                  | 30                 | 35               | gk823           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8105-1.F2...          | 84.3       | 0.0252 (0.22)                                             | 74 (163)                         | 28.5               | 29               | gk823           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8105-1.G2...          | 87.9       |                                                           |                                  | 34.5               | 38               | gk823           | 45                                    | 6SL312-1-TE24-5AA3                                                                         |
| 1PH8105-1.M2...          | 90.0       |                                                           |                                  | 45                 | 52               | gk823           | 45                                    | 6SL312-1-TE24-5AA3                                                                         |
| 1PH8107-1.F2...          | 82.9       | 0.0289 (0.26)                                             | 83 (183)                         | 43.7               | 44               | gk823           | 45                                    | 6SL312-1-TE24-5AA3                                                                         |
| 1PH8107-1.M2...          | 90.0       |                                                           |                                  | 60                 | 73               | gk823           | 60                                    | 6SL312-1-TE26-0AA3                                                                         |
| 1PH8131-1.F2...          | 88.3       | 0.059 (0.52)                                              | 105 (232)                        | 30                 | 30               | gk843           | 30                                    | 6SL312-1-TE23-0AA3                                                                         |
| 1PH8131-1.G2...          | 90.8       |                                                           |                                  | 40                 | 44               | gk843           | 45                                    | 6SL312-1-TE24-5AA3                                                                         |
| 1PH8133-1.F2...          | 89.7       | 0.076 (0.67)                                              | 123 (271)                        | 38                 | 45               | gk843           | 45                                    | 6SL312-1-TE24-5AA3                                                                         |
| 1PH8133-1.G2...          | 90.9       |                                                           |                                  | 52                 | 61               | gk843           | 60                                    | 6SL312-1-TE26-0AA3                                                                         |
| 1PH8135-1.F2...          | 90.1       | 0.094 (0.83)                                              | 141 (311)                        | 51                 | 58               | gk843           | 60                                    | 6SL312-1-TE26-0AA3                                                                         |
| 1PH8135-1.G2...          | 92.4       |                                                           |                                  | 64                 | 73               | gk843           | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8137-1.F2...          | 90.0       | 0.109 (0.96)                                              | 157 (346)                        | 67                 | 73               | gk843           | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8138-1.F2...          | 88.2       | 0.109 (0.96)                                              | 160 (353)                        | 80                 | 88               | gk843           | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8163-1.F2...          | 91.6       | 0.216 (1.91)                                              | 229 (505)                        | 84                 | 96               | gk873           | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8163-1.G2...          | 93.7       | 0.216 (1.91)                                              | 229 (505)                        | 93                 | 120              | gk873           | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8165-1.F2...          | 93.0       | 0.232 (2.05)                                              | 264 (582)                        | 104                | 112              | gk873           | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8165-1.G2...          | 93.8       | 0.232 (2.05)                                              | 264 (582)                        | 110                | 135              | gk873           | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8166-1.F2...          | 93.6       | 0.232 (2.05)                                              | 269 (593)                        | 116                | 127              | gk873           | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8166-1.G2...          | 93.7       | 0.232 (2.05)                                              | 269 (593)                        | 125                | 147              | gk873           | 132                                   | 6SL312-1-TE31-3AA3                                                                         |

## Cooling:

Internal air cooling  
External air cooling0  
1

## Motor Module:

Single Motor Module  
Double Motor Module1  
2

<sup>1)</sup> Speed data are based on an infeed with Active Line Module (see characteristic curves); the maximum speed of the encoders must be observed.

<sup>2)</sup> Bearing version for Standard (14th data position B to D).

<sup>3)</sup> Bearing version for Performance (14th data position L).

<sup>4)</sup> Bearing version for High-Performance (14th data position M).

<sup>5)</sup>  $n_2$ : max. permissible thermal speed at constant output or speed, which is at the voltage limit when  $P = P_{\text{rated}}$ .

<sup>6)</sup> Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).

<sup>7)</sup> Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 to SH 280 – Water cooling

#### Selection and ordering data

| Rated speed                                                                                 | Continuous speed, max. <sup>1)</sup> |                        | Operating speed during field weakening <sup>1)4)</sup> | Rated power        | Rated torque             | Static torque            | SIMOTICS M-1PH8 asynchronous motor |
|---------------------------------------------------------------------------------------------|--------------------------------------|------------------------|--------------------------------------------------------|--------------------|--------------------------|--------------------------|------------------------------------|
| $n_{\text{rated}}$                                                                          | $n_{\text{max1}}^{2)}$               | $n_{\text{max2}}^{3)}$ | $n_2$                                                  | $P_{\text{rated}}$ | $M_{\text{rated}}$       | $M_0$                    |                                    |
| rpm                                                                                         | rpm                                  | rpm                    | rpm                                                    | kW (HP)            | Nm (lb <sub>F</sub> -ft) | Nm (lb <sub>F</sub> -ft) |                                    |
| Shaft height 180 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                        |                    |                          |                          |                                    |
| 400                                                                                         | 5000                                 | 7500                   | 2500                                                   | 17 (22.8)          | 406 (299)                | 406 (299)                | 1PH8184-1 B2 ■■■■1                 |
| 700                                                                                         | 5000                                 | 7500                   | 3300                                                   | 33 (44.3)          | 450 (332)                | 450 (332)                | 1PH8184-1 C2 ■■■■1                 |
| 1000                                                                                        | 5000                                 | 7500                   | 5500                                                   | 47 (63)            | 449 (331)                | 449 (331)                | 1PH8184-1 D2 ■■■■1                 |
| 1500                                                                                        | 5000                                 | 7500                   | 5000                                                   | 70 (93.9)          | 446 (329)                | 446 (329)                | 1PH8184-1 F2 ■■■■1                 |
| 2500                                                                                        | 5000                                 | 7500                   | 5700                                                   | 95 (127)           | 363 (268)                | 363 (268)                | 1PH8184-1 L2 ■■■■1                 |
| 400                                                                                         | 5000                                 | 7500                   | 2900                                                   | 23 (30.8)          | 549 (405)                | 549 (405)                | 1PH8186-1 B2 ■■■■1                 |
| 700                                                                                         | 5000                                 | 7500                   | 3900                                                   | 43 (57.7)          | 587 (433)                | 587 (433)                | 1PH8186-1 C2 ■■■■1                 |
| 1000                                                                                        | 5000                                 | 7500                   | 6000                                                   | 64 (85.8)          | 611 (451)                | 611 (451)                | 1PH8186-1 D2 ■■■■1                 |
| 1500                                                                                        | 5000                                 | 7500                   | 6000                                                   | 93 (125)           | 592 (437)                | 592 (437)                | 1PH8186-1 F2 ■■■■1                 |
| 2500                                                                                        | 5000                                 | 7500                   | 5700                                                   | 120 (161)          | 458 (338)                | 458 (338)                | 1PH8186-1 L2 ■■■■1                 |
| Shaft height 225 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                        |                    |                          |                          |                                    |
| 400                                                                                         | 4500                                 | 6000                   | 1750                                                   | 36 (48.3)          | 860 (634)                | 860 (634)                | 1PH8224-1 B2 ■■■■1                 |
| 700                                                                                         | 4500                                 | 6000                   | 2500                                                   | 61 (81.8)          | 832 (614)                | 832 (614)                | 1PH8224-1 C2 ■■■■1                 |
| 1000                                                                                        | 4500                                 | 6000                   | 3700                                                   | 89 (119)           | 850 (627)                | 850 (627)                | 1PH8224-1 D2 ■■■■1                 |
| 1500                                                                                        | 4500                                 | 6000                   | 4600                                                   | 119 (160)          | 758 (559)                | 758 (559)                | 1PH8224-1 F2 ■■■■1                 |
| 2500                                                                                        | 4500                                 | 6000                   | 4500                                                   | 153 (205)          | 584 (431)                | 584 (431)                | 1PH8224-1 L2 ■■■■1                 |
| 400                                                                                         | 4500                                 | 6000                   | 2000                                                   | 47 (63)            | 1122 (828)               | 1122 (828)               | 1PH8226-1 B2 ■■■■1                 |
| 700                                                                                         | 4500                                 | 6000                   | 2700                                                   | 81 (109)           | 1105 (815)               | 1105 (815)               | 1PH8226-1 C2 ■■■■1                 |
| 1000                                                                                        | 4500                                 | 6000                   | 3500                                                   | 115 (154)          | 1098 (810)               | 1098 (810)               | 1PH8226-1 D2 ■■■■1                 |
| 1500                                                                                        | 4500                                 | 6000                   | 4500                                                   | 145 (194)          | 923 (681)                | 923 (681)                | 1PH8226-1 F2 ■■■■1                 |
| 2500                                                                                        | 4500                                 | 6000                   | 4500                                                   | 185 (248)          | 707 (521)                | 707 (521)                | 1PH8226-1 L2 ■■■■1                 |
| 400                                                                                         | 4500                                 | 6000                   | 2100                                                   | 58 (77.8)          | 1385 (1022)              | 1385 (1022)              | 1PH8228-1 B2 ■■■■1                 |
| 700                                                                                         | 4500                                 | 6000                   | 2850                                                   | 96 (129)           | 1310 (966)               | 1310 (966)               | 1PH8228-1 C2 ■■■■1                 |
| 1000                                                                                        | 4500                                 | 6000                   | 2350                                                   | 141 (189)          | 1347 (994)               | 1347 (994)               | 1PH8228-1 D2 ■■■■1                 |
| 1500                                                                                        | 4500                                 | 6000                   | 4500                                                   | 192 (257)          | 1222 (901)               | 1222 (901)               | 1PH8228-1 F2 ■■■■1                 |
| 2500                                                                                        | 4500                                 | 6000                   | 4500                                                   | 226 (303)          | 863 (637)                | 863 (637)                | 1PH8228-1 L2 ■■■■1                 |
| Shaft height 280 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |                                      |                        |                                                        |                    |                          |                          |                                    |
| 400                                                                                         | 3300                                 | –                      | 3100                                                   | 71 (95.2)          | 1695 (1250)              | 1695 (1250)              | 1PH8284-1 B2 ■■■■1                 |
| 700                                                                                         | 3300                                 | –                      | 3100                                                   | 123 (165)          | 1678 (1238)              | 1678 (1238)              | 1PH8284-1 C2 ■■■■1                 |
| 1000                                                                                        | 3300                                 | –                      | 2800                                                   | 172 (231)          | 1643 (1212)              | 1643 (1212)              | 1PH8284-1 D2 ■■■■1                 |
| 1500                                                                                        | 3300                                 | –                      | 2700                                                   | 227 (304)          | 1445 (1066)              | 1445 (1066)              | 1PH8284-1 F2 ■■■■1                 |
| 400                                                                                         | 3300                                 | –                      | 3300                                                   | 89 (119)           | 2125 (1567)              | 2125 (1567)              | 1PH8286-1 B2 ■■■■1                 |
| 700                                                                                         | 3300                                 | –                      | 3100                                                   | 153 (205)          | 2087 (1539)              | 2087 (1539)              | 1PH8286-1 C2 ■■■■1                 |
| 1000                                                                                        | 3300                                 | –                      | 2800                                                   | 214 (287)          | 2044 (1508)              | 2044 (1508)              | 1PH8286-1 D2 ■■■■1                 |
| 400                                                                                         | 3300                                 | –                      | 3300                                                   | 109 (146)          | 2602 (1919)              | 2602 (1919)              | 1PH8288-1 B2 ■■■■1                 |
| 700                                                                                         | 3300                                 | –                      | 3100                                                   | 188 (252)          | 2565 (1892)              | 2565 (1892)              | 1PH8288-1 C2 ■■■■1                 |

For versions, see Order No. supplement and options.

The values in the selection and ordering data, particularly for the constant power range with speed  $n_2$ , apply when using an Active Line Module with 380 V 3 AC.  
When using a Smart Line Module, proceed according to 1PH8 Motors Configuration Manual.



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 to SH 280 – Water cooling

| Motor type<br>(repeated) | Efficiency | Moment of<br>inertia                                      | Weight,<br>approx. | Rated<br>current   | Stall<br>current | Terminal box | SINAMICS S120 Motor Module            |                                                                                            |
|--------------------------|------------|-----------------------------------------------------------|--------------------|--------------------|------------------|--------------|---------------------------------------|--------------------------------------------------------------------------------------------|
|                          | $\eta$     | $J$                                                       | $m$                | $I_{\text{rated}}$ | $I_0$            |              | Rated output<br>current <sup>5)</sup> | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system |
|                          | %          | kgm <sup>2</sup><br>(lb <sub>r</sub> -in-s <sup>2</sup> ) | kg (lb)            | A                  | A                | Type         | A                                     | Order No.                                                                                  |
| 1PH8184-1.B2...          | 83.1       | 0.489 (4.33)                                              | 340 (750)          | 50                 | 50               | 1XB7322-P05  | 60                                    | 6SL312-1-TE26-0AA3                                                                         |
| 1PH8184-1.C2...          | 87.2       |                                                           |                    | 77                 | 77               | 1XB7322-P05  | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8184-1.D2...          | 90.4       |                                                           |                    | 114                | 114              | 1XB7322-P05  | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8184-1.F2...          | 92.8       |                                                           |                    | 150                | 150              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8184-1.L2...          | 94.5       |                                                           |                    | 196                | 196              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8186-1.B2...          | 84.5       | 0.652 (5.77)                                              | 410 (904)          | 68                 | 68               | 1XB7322-P05  | 85                                    | 6SL312-1-TE28-5AA3                                                                         |
| 1PH8186-1.C2...          | 89.8       |                                                           |                    | 97                 | 97               | 1XB7322-P05  | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8186-1.D2...          | 92.0       |                                                           |                    | 148                | 148              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8186-1.F2...          | 93.5       |                                                           |                    | 198                | 198              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8186-1.L2...          | 94.8       |                                                           |                    | 250                | 250              | 1XB7422-P06  | 260                                   | 6SL3320-1-TE32-6AA3                                                                        |
| 1PH8224-1.B2...          | 85.8       | 1.45 (12.83)                                              | 610 (1345)         | 100                | 100              | 1XB7322-P05  | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8224-1.C2...          | 91.4       |                                                           |                    | 128                | 128              | 1XB7322-P05  | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8224-1.D2...          | 93.7       |                                                           |                    | 188                | 188              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8224-1.F2...          | 95.1       |                                                           |                    | 240                | 240              | 1XB7422-P06  | 260                                   | 6SL3320-1-TE32-6AA3                                                                        |
| 1PH8224-1.L2...          | 96.1       |                                                           |                    | 310                | 310              | 1XB7700-P02  | 310                                   | 6SL3320-1-TE33-1AA3                                                                        |
| 1PH8226-1.B2...          | 87.5       | 1.90 (16.82)                                              | 740 (1632)         | 130                | 130              | 1XB7322-P05  | 132                                   | 6SL312-1-TE31-3AA3                                                                         |
| 1PH8226-1.C2...          | 92.8       |                                                           |                    | 184                | 184              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8226-1.D2...          | 93.8       |                                                           |                    | 235                | 235              | 1XB7422-P06  | 260                                   | 6SL3320-1-TE32-6AA3                                                                        |
| 1PH8226-1.F2...          | 95.7       |                                                           |                    | 295                | 295              | 1XB7700-P02  | 310                                   | 6SL3320-1-TE33-1AA3                                                                        |
| 1PH8226-1.L2...          | 96.3       |                                                           |                    | 380                | 380              | 1XB7700-P02  | 380                                   | 6SL3320-1-TE33-8AA3                                                                        |
| 1PH8228-1.B2...          | 88.6       | 2.35 (20.8)                                               | 870 (1918)         | 154                | 154              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8228-1.C2...          | 93.0       |                                                           |                    | 210                | 210              | 1XB7322-P05  | 210                                   | 6SL3320-1-TE32-1AA3                                                                        |
| 1PH8228-1.D2...          | 94.3       |                                                           |                    | 280                | 280              | 1XB7700-P02  | 310                                   | 6SL3320-1-TE33-1AA3                                                                        |
| 1PH8228-1.F2...          | 95.9       |                                                           |                    | 390                | 390              | 1XB7700-P02  | 380 <sup>6)</sup>                     | 6SL3320-1-TE33-8AA3                                                                        |
| 1PH8228-1.L2...          | 96.4       |                                                           |                    | 455                | 455              | 1XB7700-P02  | 490                                   | 6SL3320-1-TE35-0AA3                                                                        |
| 1PH8284-1.B2...          | 91.4       | 4.21 (37.26)                                              | 1280 (2822)        | 170                | 170              | 1XB7322-P05  | 200                                   | 6SL312-1-TE32-0AA3                                                                         |
| 1PH8284-1.C2...          | 94.5       |                                                           |                    | 260                | 260              | 1XB7700-P02  | 260                                   | 6SL3320-1-TE32-6AA3                                                                        |
| 1PH8284-1.D2...          | 95.7       |                                                           |                    | 350                | 350              | 1XB7700-P02  | 380                                   | 6SL3320-1-TE33-8AA3                                                                        |
| 1PH8284-1.F2...          | 96.4       |                                                           |                    | 445                | 445              | 1XB7700-P02  | 490                                   | 6SL3320-1-TE35-0AA3                                                                        |
| 1PH8286-1.B2...          | 91.6       | 5.16 (45.67)                                              | 1490 (3285)        | 210                | 210              | 1XB7322-P05  | 210                                   | 6SL3320-1-TE32-1AA3                                                                        |
| 1PH8286-1.C2...          | 94.8       |                                                           |                    | 320                | 320              | 1XB7700-P02  | 380                                   | 6SL3320-1-TE33-8AA3                                                                        |
| 1PH8286-1.D2...          | 96.0       |                                                           |                    | 460                | 460              | 1XB7700-P02  | 490                                   | 6SL3320-1-TE35-0AA3                                                                        |
| 1PH8288-1.B2...          | 92.5       | 6.29 (55.67)                                              | 1750 (3859)        | 260                | 260              | 1XB7700-P02  | 260                                   | 6SL3320-1-TE32-6AA3                                                                        |
| 1PH8288-1.C2...          | 95.2       |                                                           |                    | 400                | 400              | 1XB7700-P02  | 490                                   | 6SL3320-1-TE35-0AA3                                                                        |

## Format:

Booksize  
Chassis1  
3

## Cooling:

Internal air cooling  
External air cooling0  
1

## Motor Module:

Single Motor Module

1

1) Speed data are based on an infeed with Active Line Module (see characteristic curves); the maximum speed of the encoders must be observed.

2) Bearing version for Standard (14th data position B to D).

3) Bearing version for Performance (14th data position L).

4)  $n_2$ : max. permissible thermal speed at constant output or speed, which is at the voltage limit when  $P = P_{\text{rated}}$ .

5) Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz or 2 kHz.

6) The rated output current of the Motor Module is lower than the rated motor current at 4 kHz or 2 kHz.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors – Order No. supplement SH 80/SH 100/SH 132/SH 160 – Forced ventilation/Water cooling

#### Selection and ordering data

| Data position of the Order No.                                                                                                  | 1 | 2 | 3 | 4                                                             | 5 | 6 | 7 | 8                         | 9 | 10                    | 11 | 12 | 13 | 14 | 15 | 16 |   |   |   |   |  |  |
|---------------------------------------------------------------------------------------------------------------------------------|---|---|---|---------------------------------------------------------------|---|---|---|---------------------------|---|-----------------------|----|----|----|----|----|----|---|---|---|---|--|--|
| Shaft height 80                                                                                                                 | 1 | P | H | 8                                                             | 0 | 8 | . | –                         | 1 | ■                     | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |
| Shaft height 100                                                                                                                | 1 | P | H | 8                                                             | 1 | 0 | . | –                         | 1 | ■                     | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |
| Shaft height 132                                                                                                                | 1 | P | H | 8                                                             | 1 | 3 | . | –                         | 1 | ■                     | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |
| Shaft height 160                                                                                                                | 1 | P | H | 8                                                             | 1 | 6 | . | –                         | 1 | ■                     | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |
| Overall length                                                                                                                  |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Asynchronous version without brake                                                                                              |   |   |   |                                                               |   |   |   |                           | 1 |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Encoder systems for motors <u>without</u> DRIVE-CLiQ interface                                                                  |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Without encoder                                                                                                                 |   |   |   |                                                               |   |   |   |                           |   | A<br>M<br>T<br>L<br>E |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks (encoder IC2048S/R) <sup>1)</sup>                    |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 512 S/R without C and D tracks (encoder IN512S/R) <sup>2)</sup>                   |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 256 S/R without C and D tracks (encoder IN256S/R) <sup>3)</sup>                   |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R) <sup>1)</sup>                  |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Encoder systems for motors <u>with</u> DRIVE-CLiQ interface <sup>8)</sup>                                                       |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ) <sup>1)</sup> |   |   |   |                                                               |   |   |   |                           |   | D                     |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder, 20 bit (resolution 1048576, internal 512 S/R) <sup>2)</sup> without commutation position (encoder IN20DQ)  |   |   |   |                                                               |   |   |   |                           |   | U                     |    |    |    |    |    |    |   |   |   |   |  |  |
| Incremental encoder, 19 bit (resolution 524288, internal 256 S/R) without commutation position (encoder IN19DQ) <sup>3)</sup>   |   |   |   |                                                               |   |   |   |                           |   | V                     |    |    |    |    |    |    |   |   |   |   |  |  |
| Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ) <sup>1)</sup>                                                      |   |   |   |                                                               |   |   |   |                           |   | F                     |    |    |    |    |    |    |   |   |   |   |  |  |
| Rated speed (winding version)                                                                                                   |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Cooling                                                                                                                         |   |   |   | Degree of protection                                          |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Forced ventilation DE → NDE                                                                                                     |   |   |   | IP55                                                          |   |   |   |                           |   |                       |    |    | 0  |    |    |    |   |   |   |   |  |  |
| Forced ventilation NDE → DE                                                                                                     |   |   |   | IP55                                                          |   |   |   |                           |   |                       |    |    | 1  |    |    |    |   |   |   |   |  |  |
| Water cooling                                                                                                                   |   |   |   | IP65                                                          |   |   |   |                           |   |                       |    |    | 2  |    |    |    |   |   |   |   |  |  |
| Type of construction                                                                                                            |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| IM B3 (IM V5, IM V6)                                                                                                            |   |   |   |                                                               |   |   |   |                           |   |                       |    |    | 0  |    |    |    |   |   |   |   |  |  |
| IM B5 (IM V1, IM V3) (not possible with SH 160 and 14th data position L or M)                                                   |   |   |   |                                                               |   |   |   |                           |   |                       |    |    | 2  |    |    |    |   |   |   |   |  |  |
| IM B35 (IM V15, IM V35) (only possible for 1PH810/1PH813/1PH816)                                                                |   |   |   |                                                               |   |   |   |                           |   |                       |    |    | 3  |    |    |    |   |   |   |   |  |  |
| Shaft extension DE                                                                                                              |   |   |   | Balancing                                                     |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Plain shaft                                                                                                                     |   |   |   | –                                                             |   |   |   |                           |   |                       |    |    | 0  |    |    |    |   |   |   |   |  |  |
| Feather key (not possible with 14th data position M)                                                                            |   |   |   | Full-key                                                      |   |   |   |                           |   |                       |    |    | 1  |    |    |    |   |   |   |   |  |  |
| Feather key (not possible with 14th data position M)                                                                            |   |   |   | Half-key                                                      |   |   |   |                           |   |                       |    |    | 2  |    |    |    |   |   |   |   |  |  |
| Plain hollow shaft <sup>3)</sup>                                                                                                |   |   |   | –                                                             |   |   |   |                           |   |                       |    |    | 3  |    |    |    |   |   |   |   |  |  |
| Bearing version                                                                                                                 |   |   |   | Vibration severity acc. to Siemens <sup>4)</sup> /EN 60034-14 |   |   |   | Shaft and flange accuracy |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Standard                                                                                                                        |   |   |   | R/A                                                           |   |   |   | R                         |   |                       |    |    |    |    |    |    | B |   |   |   |  |  |
| Standard                                                                                                                        |   |   |   | S/A                                                           |   |   |   | R                         |   |                       |    |    |    |    |    |    | C |   |   |   |  |  |
| Standard                                                                                                                        |   |   |   | SR/A                                                          |   |   |   | R                         |   |                       |    |    |    |    |    |    | D |   |   |   |  |  |
| Performance <sup>5)6)</sup>                                                                                                     |   |   |   | SPECIAL/B                                                     |   |   |   | SPECIAL                   |   |                       |    |    |    |    |    |    | L |   |   |   |  |  |
| High Performance <sup>6)7)</sup>                                                                                                |   |   |   | SPECIAL/B                                                     |   |   |   | SPECIAL                   |   |                       |    |    |    |    |    |    | M |   |   |   |  |  |
| Advanced Lifetime <sup>9)</sup>                                                                                                 |   |   |   | S/A                                                           |   |   |   | R                         |   |                       |    |    |    |    |    |    | Q |   |   |   |  |  |
| Power connection (DE view)                                                                                                      |   |   |   | Cable entry                                                   |   |   |   | Signal connection         |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |
| Terminal box top                                                                                                                |   |   |   | Right                                                         |   |   |   | DE                        |   |                       |    |    |    |    |    |    |   | A |   |   |  |  |
| Terminal box top                                                                                                                |   |   |   | Left                                                          |   |   |   | DE                        |   |                       |    |    |    |    |    |    |   | B |   |   |  |  |
| Terminal box top                                                                                                                |   |   |   | NDE                                                           |   |   |   | Left                      |   |                       |    |    |    |    |    |    |   | C |   |   |  |  |
| Power connector top <sup>8)10)</sup>                                                                                            |   |   |   | Right                                                         |   |   |   | DE                        |   |                       |    |    |    |    |    |    |   | E |   |   |  |  |
| Power connector top <sup>8)10)</sup>                                                                                            |   |   |   | Left                                                          |   |   |   | DE                        |   |                       |    |    |    |    |    |    |   | F |   |   |  |  |
| Power connector top <sup>8)10)</sup>                                                                                            |   |   |   | NDE                                                           |   |   |   | Left                      |   |                       |    |    |    |    |    |    |   | G |   |   |  |  |
| Power connector top <sup>8)10)</sup>                                                                                            |   |   |   | DE                                                            |   |   |   | Right                     |   |                       |    |    |    |    |    |    |   | H |   |   |  |  |
| Version status                                                                                                                  |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   | 1 |   |  |  |
| Special version (order codes are required for options)                                                                          |   |   |   |                                                               |   |   |   |                           |   |                       |    |    |    |    |    |    |   |   |   |   |  |  |

<sup>1)</sup> Limited to  $n_{\max} = 12000$  rpm.

<sup>2)</sup> Limited to  $n_{\max} = 15000$  rpm.

<sup>3)</sup> Only possible with 14th data position L or M and 9th data position L or V.

<sup>4)</sup> For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

<sup>5)</sup> For 1PH808 limited to  $n_{\max} = 15000$  rpm.  
For 1PH810 limited to  $n_{\max} = 12000$  rpm.  
For 1PH813 limited to  $n_{\max} = 10000$  rpm.  
For 1PH816 limited to  $n_{\max} = 9000$  rpm.

<sup>6)</sup> With 1PH816 not possible with 12th data position 2 (IM B5 type of construction).

<sup>7)</sup> For 1PH808 limited to  $n_{\max} = 20000$  rpm. For 1PH810 limited to  $n_{\max} = 18000$  rpm. For 1PH813 limited to  $n_{\max} = 15000$  rpm. For 1PH816 limited to  $n_{\max} = 10000$  rpm.

<sup>8)</sup> Not possible with 10th data position S (star delta circuit).

<sup>9)</sup> For 1PH808/1PH810 limited to  $n_{\max} = 5000$  rpm.  
For 1PH813 limited to  $n_{\max} = 4500$  rpm.  
For 1PH816 limited to  $n_{\max} = 4000$  rpm.

<sup>10)</sup> For 1PH810, power connector is only possible up to a maximum stall current of  $I_0 = 36$  A.  
For 1PH813, power connector is only possible up to a maximum stall current of  $I_0 = 85$  A. Power connector not possible for 1PH816.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – Order No. supplement  
SH 180/SH 225/SH 280 – Forced ventilation/Water cooling

## Selection and ordering data

| Data position of the Order No.                                                                                    | 1 | 2 | 3                                              | 4 | 5 | 6                                                | 7 | 8 | 9 | 10                                                            | 11 | 12 | 13 | 14 | 15 | 16 |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
|-------------------------------------------------------------------------------------------------------------------|---|---|------------------------------------------------|---|---|--------------------------------------------------|---|---|---|---------------------------------------------------------------|----|----|----|----|----|----|---|---|---|---------------------------|--|--|--|--|--|--|--|--|--|------------------|--|--|--|--|--|---|---|
| Shaft height 180                                                                                                  | 1 | P | H                                              | 8 | 1 | 8                                                | . | - | 1 | ■                                                             | .  | ■  | ■  | -  | ■  | ■  | ■ | 1 | - | Z                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Shaft height 225                                                                                                  | 1 | P | H                                              | 8 | 2 | 2                                                | . | - | 1 | ■                                                             | .  | ■  | ■  | -  | ■  | ■  | ■ | 1 | - | Z                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Shaft height 280 (Only water cooling)                                                                             | 1 | P | H                                              | 8 | 2 | 8                                                | . | - | 1 | ■                                                             | .  | 2  | ■  | -  | ■  | ■  | ■ | 1 | - | Z                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Overall length                                                                                                    |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Asynchronous version without brake                                                                                |   |   |                                                |   |   |                                                  |   |   | 1 |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Encoder systems for motors <u>without</u> DRIVE-CLiQ interface                                                    |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Without encoder                                                                                                   |   |   |                                                |   |   |                                                  |   |   |   | A<br>M<br>E                                                   |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks (encoder IC2048S/R)                    |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)                  |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Encoder systems for motors <u>with</u> DRIVE-CLiQ interface                                                       |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ) |   |   |                                                |   |   |                                                  |   |   |   | D<br><br>F                                                    |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)                                                      |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Rated speed (winding version)                                                                                     |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Cooling                                                                                                           |   |   |                                                |   |   |                                                  |   |   |   | Degree of protection                                          |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Forced ventilation DE → NDE                                                                                       |   |   |                                                |   |   |                                                  |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   | 0<br>1<br>2               |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Forced ventilation NDE → DE                                                                                       |   |   |                                                |   |   |                                                  |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Water cooling                                                                                                     |   |   |                                                |   |   |                                                  |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Type of construction                                                                                              |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| 1PH818                                                                                                            |   |   | 1PH822                                         |   |   | 1PH828                                           |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| • IM B3 (IM B6/IM B7/IM B8/IM V6)                                                                                 |   |   | • IM B3 (IM B6/IM B7/IM B8/IM V6)              |   |   | • IM B3 (IM V6)                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| • IM V5                                                                                                           |   |   | • IM V5                                        |   |   | • IM V5 <sup>4)</sup>                            |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| • IM B5 with A450 flange (IM V3) <sup>1)</sup>                                                                    |   |   | • IM B5 with A550 flange (IM V3) <sup>2)</sup> |   |   | • IM B5 with A660 flange (IM V3) <sup>3)4)</sup> |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| • IM B35 with A450 flange (IM V35)                                                                                |   |   | • IM B35 with A550 flange (IM V35)             |   |   | • IM B35 with A660 flange (IM V35)               |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| • IM V15 with A450 flange                                                                                         |   |   | • IM V15 with A550 flange                      |   |   | • IM V15 with A660 flange <sup>4)</sup>          |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Shaft extension DE                                                                                                |   |   |                                                |   |   |                                                  |   |   |   | Balancing                                                     |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Plain shaft                                                                                                       |   |   |                                                |   |   |                                                  |   |   |   | –                                                             |    |    |    |    |    |    |   |   |   | 0<br>1<br>2               |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Feather key                                                                                                       |   |   |                                                |   |   |                                                  |   |   |   | Full-key                                                      |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Feather key                                                                                                       |   |   |                                                |   |   |                                                  |   |   |   | Half-key                                                      |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Bearing version                                                                                                   |   |   |                                                |   |   |                                                  |   |   |   | Vibration severity acc. to Siemens <sup>5)</sup> /EN 60034-14 |    |    |    |    |    |    |   |   |   | Shaft and flange accuracy |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Standard                                                                                                          |   |   |                                                |   |   |                                                  |   |   |   | R/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  |  |  |  |  |  |  |  |  | B<br>E<br>F      |  |  |  |  |  |   |   |
| Increased radial forces                                                                                           |   |   |                                                |   |   |                                                  |   |   |   | A                                                             |    |    |    |    |    |    |   |   |   | N                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Increased radial forces                                                                                           |   |   |                                                |   |   |                                                  |   |   |   | R/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Also possible with 1PH818/1PH822:                                                                                 |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Standard                                                                                                          |   |   |                                                |   |   |                                                  |   |   |   | S/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  |  |  |  |  |  |  |  |  | C<br>D<br>L      |  |  |  |  |  |   |   |
| Standard                                                                                                          |   |   |                                                |   |   |                                                  |   |   |   | SR/A                                                          |    |    |    |    |    |    |   |   |   | R                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Performance <sup>6)</sup>                                                                                         |   |   |                                                |   |   |                                                  |   |   |   | SR/A                                                          |    |    |    |    |    |    |   |   |   | R                         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Power connection (DE view)                                                                                        |   |   |                                                |   |   |                                                  |   |   |   | Cable entry                                                   |    |    |    |    |    |    |   |   |   | Signal connection         |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Terminal box top                                                                                                  |   |   |                                                |   |   |                                                  |   |   |   | Right                                                         |    |    |    |    |    |    |   |   |   | DE                        |  |  |  |  |  |  |  |  |  | A<br>B<br>C<br>D |  |  |  |  |  |   |   |
| Terminal box top                                                                                                  |   |   |                                                |   |   |                                                  |   |   |   | Left                                                          |    |    |    |    |    |    |   |   |   | DE                        |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Terminal box top                                                                                                  |   |   |                                                |   |   |                                                  |   |   |   | NDE                                                           |    |    |    |    |    |    |   |   |   | Right                     |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Terminal box top                                                                                                  |   |   |                                                |   |   |                                                  |   |   |   | DE                                                            |    |    |    |    |    |    |   |   |   | Right                     |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   |   |
| Version status                                                                                                    |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  | 1 |   |
| Special version (order codes are required for options)                                                            |   |   |                                                |   |   |                                                  |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |  |  |  |  |  |  |  |  |                  |  |  |  |  |  |   | Z |

1) Limited to  $n_{\max} = 3000$  rpm. Not possible with 14th data position L (Performance bearing).2) Limited to  $n_{\max} = 2500$  rpm. Not possible with 14th data position L (Performance bearing).3) Limited to  $n_{\max} = 2000$  rpm. Not possible with 14th data position L (Performance bearing).

4) Only possible with 14th data position B (Standard bearing).

5) For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

6) For 1PH818 limited to  $n_{\max} = 7500$  rpm. Not possible with 12th data position 2 (IM B5 type of construction).  
For 1PH822 limited to  $n_{\max} = 6000$  rpm. Not possible with 12th data position 2 (IM B5 type of construction).

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors – Order No. supplement SH 280 – Forced ventilation

#### Selection and ordering data

| Data position of the Order No.                                                                                    | 1 | 2                                                             | 3                 | 4 | 5                                                                                                                          | 6 | 7                         | 8 | 9           | 10 | 11 | 12 | 13 | 14 | 15          | 16 |   |   |   |   |   |  |  |   |
|-------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------|-------------------|---|----------------------------------------------------------------------------------------------------------------------------|---|---------------------------|---|-------------|----|----|----|----|----|-------------|----|---|---|---|---|---|--|--|---|
| Shaft height 280 (Only forced ventilation)                                                                        | 1 | P                                                             | H                 | 8 | 2                                                                                                                          | 8 | .                         | - | 1           | ■  | .  | 1  | ■  | -  | ■           | ■  | ■ | 1 | - | Z |   |  |  |   |
| Overall length                                                                                                    |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Asynchronous version without brake                                                                                |   |                                                               |                   |   |                                                                                                                            |   |                           | 1 |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Encoder systems for motors without DRIVE-CLiQ interface                                                           |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Without encoder                                                                                                   |   |                                                               |                   |   |                                                                                                                            |   |                           |   | A<br>M<br>E |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks (encoder IC2048S/R)                    |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)                  |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Encoder systems for motors with DRIVE-CLiQ interface                                                              |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ) |   |                                                               |                   |   |                                                                                                                            |   |                           |   | D<br><br>F  |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)                                                      |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Rated speed (winding version)                                                                                     |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Cooling                                                                                                           |   | Degree of protection                                          |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Forced ventilation                                                                                                |   | IP55                                                          |                   |   |                                                                                                                            |   |                           |   |             |    |    | 1  |    |    |             |    |   |   |   |   |   |  |  |   |
| Type of construction                                                                                              |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| IM B3 (IM V6)                                                                                                     |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    | 0  |    |    |             |    |   |   |   |   |   |  |  |   |
| IM V5 <sup>1)</sup>                                                                                               |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    | 1  |    |    |             |    |   |   |   |   |   |  |  |   |
| IM B35 with A660 flange (IM V35)                                                                                  |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    | 3  |    |    |             |    |   |   |   |   |   |  |  |   |
| IM V15 with A660 flange <sup>1)</sup>                                                                             |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    | 5  |    |    |             |    |   |   |   |   |   |  |  |   |
| Shaft extension DE                                                                                                |   | Balancing                                                     |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Plain shaft                                                                                                       |   | –                                                             |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    | 0           |    |   |   |   |   |   |  |  |   |
| Feather key                                                                                                       |   | Full-key                                                      |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    | 1           |    |   |   |   |   |   |  |  |   |
| Feather key                                                                                                       |   | Half-key                                                      |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    | 2           |    |   |   |   |   |   |  |  |   |
| Bearing version                                                                                                   |   | Vibration severity acc. to Siemens <sup>2)</sup> /EN 60034-14 |                   |   |                                                                                                                            |   | Shaft and flange accuracy |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Standard                                                                                                          |   | R/A                                                           |                   |   |                                                                                                                            |   | R                         |   |             |    |    |    |    |    | B           |    |   |   |   |   |   |  |  |   |
| Increased radial forces                                                                                           |   | A                                                             |                   |   |                                                                                                                            |   | N                         |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Increased radial forces                                                                                           |   | R/A                                                           |                   |   |                                                                                                                            |   | R                         |   |             |    |    |    |    |    | F           |    |   |   |   |   |   |  |  |   |
| Power connection (DE view)                                                                                        |   | Cable entry                                                   | Signal connection |   | External fan NDE<br>Air inlet from NDE, air-flow direction NDE → DE                                                        |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  |   |
| Terminal box NDE right                                                                                            |   | Bottom                                                        | DE                |   | Top<br>Left<br>(order code G00 required)                                                                                   |   |                           |   |             |    |    |    |    |    | U<br>U      |    |   | – |   | Z |   |  |  |   |
| Terminal box NDE left                                                                                             |   | Bottom                                                        | DE                |   | Top<br>Right<br>(order code G02 required)                                                                                  |   |                           |   |             |    |    |    |    |    | V<br>V      |    |   | – |   | Z |   |  |  |   |
| Terminal box NDE top                                                                                              |   | Right                                                         | DE                |   | Left<br>Right<br>(order code G00 required)<br>(order code G02 required)                                                    |   |                           |   |             |    |    |    |    |    | W<br>W      |    |   | – |   | Z |   |  |  |   |
| Terminal box DE top <sup>3)</sup>                                                                                 |   | Right                                                         | NDE               |   | Top <sup>3)4)</sup><br>Left <sup>3)</sup><br>Right <sup>3)</sup><br>(order code G00 required)<br>(order code G02 required) |   |                           |   |             |    |    |    |    |    | X<br>X<br>X |    |   | – |   | Z |   |  |  |   |
| Version status                                                                                                    |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   | 1 |  |  |   |
| Special version (order codes are required for options)                                                            |   |                                                               |                   |   |                                                                                                                            |   |                           |   |             |    |    |    |    |    |             |    |   |   |   |   |   |  |  | Z |

<sup>1)</sup> Only possible with 14th data position B (Standard bearing).

<sup>2)</sup> For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

<sup>3)</sup> Only possible with 12th data position 0 (IM B3 type of construction) and 1 (IM V5 type of construction).

<sup>4)</sup> Only possible for assignment with terminal box 1XB7712-P...

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
Forced ventilation/Water cooling

## Options

| Order code | Description of option<br>When ordering a motor with options, <b>-Z</b> should be added to the order number. The order code should also be specified for each additional required option. Order codes must not be repeated in plain text in the order. | For use with SIMOTICS M motors               |                                 |                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------|---------------------------------------------------------------------|
|            |                                                                                                                                                                                                                                                       | Shaft heights 80 to 160                      | Shaft heights 180 to 280        | Shaft height 280 for forced ventilation only (11th data position 1) |
| <b>A12</b> | Additional PTC thermistor chain for alarm and tripping (Only possible for version with terminal box)                                                                                                                                                  | ✓                                            | ✓                               | ✓                                                                   |
| <b>A25</b> | Additional KTY84 temperature sensor as reserve connected to signal terminal strip (Only possible for version with terminal box)                                                                                                                       | ✓                                            | Standard                        | Standard                                                            |
| <b>G00</b> | External fan NDE left (Possible if 15th data position is U, W or X)                                                                                                                                                                                   | –                                            | –                               | ✓                                                                   |
| <b>G02</b> | External fan NDE right (Possible if 15th data position is V, W or X)                                                                                                                                                                                  | –                                            | –                               | ✓                                                                   |
| <b>G14</b> | With air filter (Only possible with 10th data position 1)                                                                                                                                                                                             | ✓<br>Only for SH 132 to SH 160               | ✓                               | ✓                                                                   |
| <b>K08</b> | Encoder connector mounted opposite (Not possible if 15th data position is X)                                                                                                                                                                          | –                                            | ✓                               | ✓                                                                   |
| <b>K09</b> | Terminal box or power connector NDE <u>on the right</u>                                                                                                                                                                                               | ✓<br>Only for SH 100 <sup>1)</sup> to SH 160 | –                               | –                                                                   |
|            | Terminal box NDE right, cable entry DE, signal connection <u>top</u> (Possible if 15th data position is A)                                                                                                                                            | –                                            | ✓                               | –                                                                   |
| <b>K10</b> | Terminal box or power connector NDE <u>on the left</u>                                                                                                                                                                                                | ✓<br>Only for SH 100 <sup>1)</sup> to SH 160 | –                               | –                                                                   |
|            | Terminal box NDE left, cable entry DE, signal connection <u>top</u> (Possible if 15th data position is A)                                                                                                                                             | –                                            | ✓                               | –                                                                   |
| <b>K16</b> | Second shaft extension (SH 280 $d \times l$ : 95 mm (3.74 in) x 170 mm (6.69 in)) (Possible if 9th data position is A or G and 12th data position is 0 or 3)                                                                                          | –                                            | –                               | ✓                                                                   |
| <b>K18</b> | Radial shaft sealing ring DE <sup>2)</sup>                                                                                                                                                                                                            | ✓                                            | ✓                               | –                                                                   |
| <b>K40</b> | Regreasing system, DE and NDE                                                                                                                                                                                                                         | –                                            | ✓<br>Only for SH 180 and SH 225 | Standard                                                            |
| <b>K45</b> | Anti-condensation heating 230 V AC                                                                                                                                                                                                                    | –                                            | –                               | ✓                                                                   |
| <b>K69</b> | Pipe connection with pipe socket NDE <u>right</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)                                                                                                                                  | –                                            | –                               | ✓                                                                   |
| <b>K70</b> | Pipe connection with pipe socket NDE <u>left</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)                                                                                                                                   | –                                            | –                               | ✓                                                                   |
| <b>K71</b> | Pipe connection with pipe socket NDE <u>top</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)                                                                                                                                    | –                                            | –                               | ✓                                                                   |
| <b>K80</b> | Axial pipe connection NDE (Only possible with forced ventilation)                                                                                                                                                                                     | ✓                                            | ✓<br>Only for SH 180 and SH 225 | Options K69, K70, K71                                               |

✓ Option possible

– Options not possible

<sup>1)</sup> Not possible with 12th data position 2 (IM B5 type of construction)

<sup>2)</sup> Only appropriate if oil spray or oil vapor is occasionally deposited on the sealing ring. Radial shaft sealing ring not possible if 14th data position is E, F or L

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors Forced ventilation/Water cooling

#### Options (continued)

| Order code       | Description of option<br>When ordering a motor with options, -Z should be added to the order number. The order code should also be specified for each additional required option. Order codes must not be repeated in plain text in the order. | For use with SIMOTICS M motors |                                          |                                                                     |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------|---------------------------------------------------------------------|
|                  |                                                                                                                                                                                                                                                | Shaft heights 80 to 160        | Shaft heights 180 to 280                 | Shaft height 280 for forced ventilation only (11th data position 1) |
| <b>K83</b>       | Rotation of the terminal box by + 90° (possible in combination with options K09 or K10 or if 15th data position is U, V or W)                                                                                                                  | –                              | ✓<br>4)                                  | ✓                                                                   |
| <b>K84</b>       | Rotation of the terminal box by - 90° (possible in combination with options K09 or K10 or if 15th data position is U, V or W)                                                                                                                  | –                              | ✓<br>4)                                  | ✓                                                                   |
| <b>K85</b>       | Rotation of the terminal box by + 180° (possible in combination with options K09 or K10 or if 15th data position is U, V or W)                                                                                                                 | –                              | ✓                                        | ✓                                                                   |
| <b>K90</b>       | Version with flange size A400 (Possible if 12th data position is 2, 3 or 5)                                                                                                                                                                    | –                              | ✓<br>Only for SH 180                     | –                                                                   |
| <b>L00</b>       | Replace terminal box (standard) with the next largest terminal box (Note dimension implications in CAD CREATOR.)                                                                                                                               | –                              | ✓                                        | ✓                                                                   |
| <b>L27</b>       | NDE bearing in insulated version                                                                                                                                                                                                               | –                              | ✓<br>Only for SH 180                     | Standard                                                            |
| <b>L74</b>       | Fan version with IP65 degree of protection <sup>3)</sup>                                                                                                                                                                                       | ✓                              | –                                        | –                                                                   |
| <b>M83</b>       | Additional back-off thread on motor feet (Only possible if 12th data position is 0 or 3)                                                                                                                                                       | –                              | –                                        | ✓                                                                   |
| <b>P00</b>       | Undrilled cable entry plate                                                                                                                                                                                                                    | –                              | ✓                                        | ✓<br>Not for 1XB7820-P00                                            |
| <b>P01</b>       | Cable entry plate 3 x M63 x 1.5                                                                                                                                                                                                                | –                              | ✓<br>Only for 1XB7700-P02<br>1XB7712-P03 | ✓<br>Only for 1XB7712-P03                                           |
| <b>P02</b>       | Cable entry plate 3 x M75 x 1.5                                                                                                                                                                                                                | –                              | ✓<br>Only for 1XB7712-P03                | ✓<br>Only for 1XB7712-P01<br>1XB7712-P03                            |
| <b>P03</b>       | Cable entry plate 4 x M75 x 1.5                                                                                                                                                                                                                | –                              | –                                        | ✓<br>Only for 1XB7712-P01                                           |
| <b>P04</b>       | Cable entry plate 4 x M63 x 1.5                                                                                                                                                                                                                | –                              | ✓<br>Only for 1XB7712-P03                | ✓<br>Only for 1XB7712-P01<br>1XB7712-P03                            |
| <b>V90</b>       | 1PH7-compatible shaft extension (d x l: 42 mm (1.65 in) x 110 mm (4.33 in) (Note reduced radial forces!))                                                                                                                                      | ✓<br>Only for SH 132           | –                                        | –                                                                   |
| <b>V92</b>       | 1PH7184-/1PL6184-compatible shaft extension (d x l: 60 mm (2.36 in) x 140 mm (5.51 in))                                                                                                                                                        | –                              | ✓<br>Only for 1PH8184                    | –                                                                   |
|                  | <b>Paint finish</b> (anthracite RAL 7016)                                                                                                                                                                                                      | Standard                       | Standard                                 | Standard                                                            |
| <b>X01</b>       | Paint finish in RAL 9005 (jet black)                                                                                                                                                                                                           | ✓                              | ✓                                        | ✓                                                                   |
| <b>X02</b>       | Paint finish in RAL 9001 (cream white)                                                                                                                                                                                                         | ✓                              | ✓                                        | ✓                                                                   |
| <b>X03</b>       | Paint finish in RAL 6011 (reseda green)                                                                                                                                                                                                        | ✓                              | ✓                                        | ✓                                                                   |
| <b>X04</b>       | Paint finish in RAL 7032 (pebble gray)                                                                                                                                                                                                         | ✓                              | ✓                                        | ✓                                                                   |
| <b>X05</b>       | Paint finish in RAL 5015 (sky blue)                                                                                                                                                                                                            | ✓                              | ✓                                        | ✓                                                                   |
| <b>X06</b>       | Paint finish in RAL 1015 (light ivory)                                                                                                                                                                                                         | ✓                              | ✓                                        | ✓                                                                   |
| <b>X08</b>       | Paint finish in RAL 9006 (white aluminum)                                                                                                                                                                                                      | ✓                              | ✓                                        | ✓                                                                   |
| <b>K24</b>       | Primer                                                                                                                                                                                                                                         | ✓<br>Pale green                | ✓<br>Red brown                           | ✓<br>Red brown                                                      |
| <b>K23</b>       | Special paint finish worldwide (anthracite RAL 7016)                                                                                                                                                                                           | ✓                              | ✓                                        | ✓                                                                   |
| <b>K23 + X..</b> | Special finish worldwide in another color (X01 to X08)                                                                                                                                                                                         | ✓                              | ✓                                        | ✓                                                                   |
| <b>Y64</b>       | Hollow shaft prepared for bearingless rotary unions with flange diameter 114 H6                                                                                                                                                                | ✓                              | –                                        | –                                                                   |
| <b>Y84</b>       | Customer specifications on rating plate (max. 30 characters)                                                                                                                                                                                   | ✓                              | ✓                                        | ✓                                                                   |

✓ Option possible  
– Options not possible

<sup>3)</sup> Regardless of the degree of protection, at high levels of atmospheric pollution, the fan must be cleaned.

<sup>4)</sup> Not possible for 1PH822 and terminal box 1XB7712-P03

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

## SIMOTICS M-1PH8 asynchronous motors – Terminal box assignment, max. connectable cross-sections

## More information

| Terminal box type<br>(See selection and ordering data for assignment) | Cable entry<br>Power | External signals            | Max. outer cable diameter <sup>3)</sup><br>mm (in) | Number of main terminals                            | Max. cross-section per terminal<br>mm <sup>2</sup> | Max. rated current <sup>4)</sup><br>A |
|-----------------------------------------------------------------------|----------------------|-----------------------------|----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------|
| gk803                                                                 | 1 × M25 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 20 (0.79)                                          | Phases: 3 × M5<br>Grounding: 2 × M5                 | 1 × 10                                             | 52                                    |
| gk813                                                                 | 1 × M32 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 24.2 (0.95)                                        | Phases: 3 × M5<br>Grounding: 2 × M5                 | 1 × 16                                             | 70                                    |
| gk823                                                                 | 1 × M32 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 24.2 (0.95)                                        | Phases: 3 × M5<br>Grounding: 2 × M5                 | 1 × 16                                             | 70                                    |
| gk826                                                                 | 1 × M32 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 24.2 (0.95)                                        | Phases: 6 × M5<br>Grounding: 2 × M5                 | 1 × 10                                             | 52                                    |
| gk833                                                                 | 1 × M40 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 32 (1.26)                                          | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 35                                             | 110                                   |
| gk843                                                                 | 1 × M50 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 38 (1.50)                                          | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 50                                             | 133                                   |
| gk846                                                                 | 1 × M50 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 38 (1.50)                                          | Phases: 6 × M6<br>Grounding: 2 × M6                 | 1 × 25                                             | 88                                    |
| gk863                                                                 | 1 × M50 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 38 (1.50)                                          | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 50                                             | 133                                   |
| gk873                                                                 | 1 × M63 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 42.6 (1.68)                                        | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 50                                             | 133                                   |
| 1XB7322-P05                                                           | 2 × M50 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 38 (1.50)                                          | Phases: 3 × M12<br>Grounding: 4 × M6                | 2 × 50                                             | 210                                   |
| 1XB7422-P06                                                           | 2 × M63 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 53 (2.09)                                          | Phases: 3 × M12<br>Grounding: 4 × M8                | 2 × 70                                             | 270                                   |
| 1XB7700-P02                                                           | 3 × M75 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 68 (2.68)                                          | Phases: 3 × 2 × M12<br>Grounding: 3 × Fixing eyelet | 3 × 150                                            | 700                                   |

For terminal box type **1XB7700-P02** other cable entries (power) can be ordered via P options, depending on the standard:

**P00** Undrilled cable entry plate  
**P01** Cable entry plate 3 × M63 × 1.5

For terminal box types **1XB7322-P05** and **1XB7422-P06**, another cable entry (power) can be ordered via the P option, depending on the standard:

**P00** Undrilled cable entry plate

For options **K09** and **K10**, instead of terminal box **gk863**, terminal box **gk873** is used mounted on the side.

For options **K09** or **K10**, instead of terminal box **gk833**, terminal box **gk843** is used mounted on the side.

For options **K09** and **K10**, instead of terminal box **gk813**, terminal box **gk823** is used mounted on the side.

<sup>1)</sup> Thread M16 × 1.5 arranged with 90° to signal connection; thread only for options A12, A25 and 9th data position A (without encoder).

<sup>2)</sup> Thread M16 × 1.5 arranged opposite to the signal connection (lateral to the cable entry plate); thread only for option A12 and encoder version A (without encoder).

<sup>3)</sup> Dependent on the design of the metric cable gland.

<sup>4)</sup> Current-carrying capacity based on EN 60204-1/IEC 60364-5-52 with installation type E.

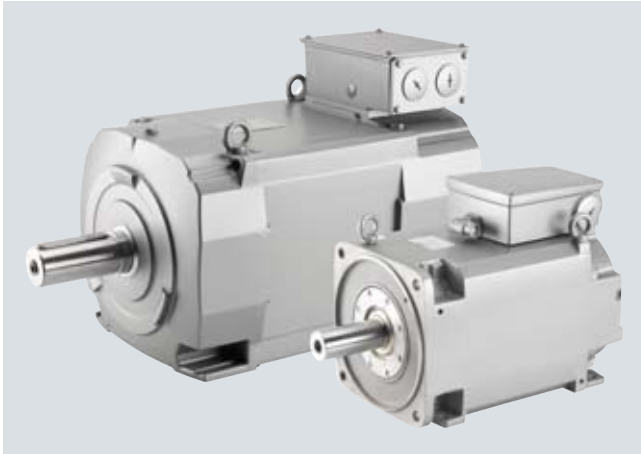


# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors

#### Overview

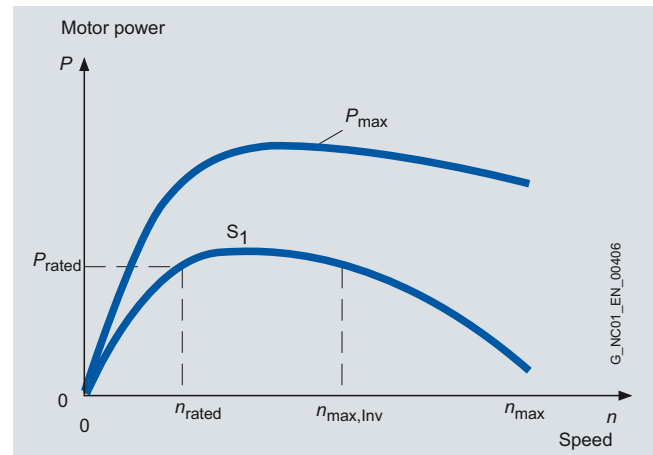


SIMOTICS M-1PH8 motors are compact permanent-magnet synchronous motors with IP55/IP65 degree of protection and they extend/replace the current range of the well-proven 1FT series. The motors are available in different cooling types:

- Forced ventilation for SH 132 to SH 225
- Water cooling for SH 132 to SH 225

The motors have been designed specifically for use in conjunction with the SINAMICS S120 drive system. Depending on the control requirements, appropriate encoder systems are available for the motors for sensing the motor speed and indirect position.

#### Characteristic curves



Typical speed/power graph for synchronous motors SIMOTICS M-1PH8<sup>1)</sup>

The graph shows the typical relationship between motor speed and drive power for SIMOTICS M-1PH8 motors for duty type S1 (continuous duty) in accordance with IEC 60034-1.

Data for short-time duty S2 and continuous duty S6 is listed in the 1PH8 Motors Configuration Manual.

6

#### Benefits

- Wide range of power ratings
- Different bearing designs
- Different encoder types for speed control and high-precision positioning
- Excellent performance features
  - Excellent rotational accuracy
  - Excellent vibration severity
  - High dynamic response (short acceleration times)
- Low noise emissions
- Simple, flexible connection system
- Commissioning with electronic rating plate and DRIVE-CLiQ interface

#### Application

- As feed motors in machine tools
- Machines with high requirements in terms of dynamic performance and precision, e.g.:
  - Packaging machines
  - Servo presses
  - Printing machines
  - Cross cutters

<sup>1)</sup> For further configuration information, see the 1PH8 Motors Configuration Manual.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

## SIMOTICS M-1PH8 synchronous motors

## Technical specifications

|                                                                                                              |                                                                                                |                                 |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Product name</b>                                                                                          | SIMOTICS M-1PH8 motor                                                                          |                                 |
| <b>Cooling</b>                                                                                               | Forced ventilation                                                                             | Water cooling                   |
| • Cooling water pressure at inlet, max.                                                                      | –                                                                                              | 6 bar                           |
| • Cooling water flow volume                                                                                  |                                                                                                |                                 |
| - 1PH813                                                                                                     | –                                                                                              | 12 l/min (3.17 US gallons/min.) |
| - 1PH816                                                                                                     | –                                                                                              | 15 l/min (3.96 US gallons/min.) |
| - 1PH818                                                                                                     | –                                                                                              | 15 l/min (3.96 US gallons/min.) |
| - 1PH822                                                                                                     | –                                                                                              | 25 l/min (6.61 US gallons/min.) |
| • Connecting thread at NDE <sup>1)</sup>                                                                     |                                                                                                |                                 |
| - 1PH813                                                                                                     | –                                                                                              | G 3/8"                          |
| - 1PH816                                                                                                     | –                                                                                              | G 1/2"                          |
| - 1PH818/1PH822                                                                                              | –                                                                                              | G 3/8"                          |
| <b>Permissible ambient temperature</b>                                                                       | -15 ... +40 °C (5 ... 104 °F) <sup>2)</sup>                                                    |                                 |
| <b>Coolant inlet temperature</b>                                                                             | –                                                                                              | < 30 °C (86 °F)                 |
| <b>Temperature monitoring</b>                                                                                | KTY84 temperature sensor in stator winding                                                     |                                 |
| • 1PH818/1PH822                                                                                              | –                                                                                              | Additional KTY 84 as reserve    |
| <b>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</b>                          | For an ambient temperature of up to +40 °C (104 °F)<br>Temperature class 180 (H) <sup>3)</sup> |                                 |
| <b>Motor fan ratings</b>                                                                                     |                                                                                                |                                 |
| • 1PH813/1PH816                                                                                              | 400 V 3 AC ± 10 %, 50/60 Hz<br>480 V 3 AC ± 10 %, 60 Hz                                        |                                 |
| • 1PH818/1PH822                                                                                              | EC fan:<br>200 ... 277 V AC ± 10 %, 50/60 Hz                                                   |                                 |
| <b>Encoder systems, built-in</b>                                                                             | Without DRIVE-CLiQ interface or with DRIVE-CLiQ interface                                      |                                 |
| <b>Sound pressure level <math>L_{pA}</math> (1 m) in accordance with DIN EN ISO 1680</b><br>Tolerance + 3 dB |                                                                                                |                                 |
| • 1PH813                                                                                                     | 70 dB <sup>4)</sup>                                                                            | 68 dB <sup>4)</sup>             |
| • 1PH816                                                                                                     | 73 dB <sup>4)</sup>                                                                            | 69 dB <sup>4)</sup>             |
| • 1PH818/1PH822                                                                                              | 73 dB <sup>5)</sup>                                                                            | 70 dB <sup>6)</sup>             |
| <b>Connection</b>                                                                                            |                                                                                                |                                 |
| • 1PH813                                                                                                     | Power connector or terminal box                                                                |                                 |
| • 1PH816 to 1PH822                                                                                           | Terminal box                                                                                   | Terminal box                    |
| • Fan for 1PH813                                                                                             | Power connector or terminal box                                                                | –                               |
| • Fan for 1PH816 to 1PH822                                                                                   | Terminal box                                                                                   | –                               |
| • Encoder system                                                                                             | Connector for signals (without mating connector) or DRIVE-CLiQ                                 |                                 |
| <b>Vibration severity</b>                                                                                    | In accordance with Siemens/EN 60034-14 (IEC 60034-14)                                          |                                 |
| <b>Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)<sup>7)</sup></b>                     | Tolerance R                                                                                    |                                 |
| <b>Degree of protection in accordance with EN 60034-5 (IEC 60034-5)</b>                                      |                                                                                                |                                 |
| • 1PH813/1PH816                                                                                              | IP55                                                                                           | IP65                            |
| • 1PH818/1PH822                                                                                              | IP55                                                                                           | IP55                            |
| <b>Rating plate</b>                                                                                          | 1 unit attached to motor<br>1 unit supplied loose in terminal box                              |                                 |
| <b>Paint finish</b>                                                                                          | Anthracite RAL 7016                                                                            |                                 |
| <b>Approvals, according to</b>                                                                               | cURus                                                                                          |                                 |

<sup>1)</sup> DE is the drive end with shaft. NDE is the non-drive end.

<sup>2)</sup> With water cooling – due to the formation of condensation – the ambient temperature may be a maximum of 5K above that of the coolant inlet temperature.

<sup>3)</sup> The following motors are designed to conform to temperature class 155 (F):

1PH8138-2.F2/1PH8138-2.G2  
1PH8164/1PH8166/1PH8168

<sup>4)</sup> For rated pulse frequency of 4 kHz and speed range up to 5000 rpm.

<sup>5)</sup> For rated pulse frequency of 4 kHz or 2 kHz and speed range up to 5000 rpm (1PH818) or 3500 rpm (1PH822).

<sup>6)</sup> For rated pulse frequency of 4 kHz or 2 kHz and speed range up to 5000 rpm (1PH818) or 4500 rpm (1PH822).

<sup>7)</sup> Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 132 – Forced ventilation/Water cooling

#### Selection and ordering data

| Rated speed                                                                                             | Speed, max. <sup>1)</sup> | Operating speed, max. <sup>2)</sup> | Rated power <sup>3)</sup> | Rated torque <sup>3)</sup>              | Static torque                     | Synchronous motors<br>SIMOTICS M-1PH8 |
|---------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|---------------------------|-----------------------------------------|-----------------------------------|---------------------------------------|
| $n_{rated}$<br>rpm                                                                                      | $n_{max}$<br>rpm          | $n_{max, Inv}$<br>rpm               | $P_{rated}$<br>kW (HP)    | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $M_0$<br>Nm (lb <sub>f</sub> -ft) | Order No.                             |
| <b>Shaft height 132 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| 1500                                                                                                    | 4500                      | 2550                                | 15.7 (21.1)               | 100 (73.8)                              | 105 (77.4)                        | 1PH8131-2 F ■■■-■■■1                  |
| 2500                                                                                                    | 4500                      | 4050                                | 25 (33.5)                 | 96 (70.8)                               | 105 (77.4)                        | 1PH8131-2 L ■■■-■■■1                  |
| 1500                                                                                                    | 4500                      | 3050                                | 19.9 (26.7)               | 127 (93.7)                              | 131 (96.6)                        | 1PH8133-2 F ■■■-■■■1                  |
| 2500                                                                                                    | 4500                      | 3950                                | 31.7 (42.5)               | 121 (89.2)                              | 131 (96.6)                        | 1PH8133-2 L ■■■-■■■1                  |
| 1500                                                                                                    | 4500                      | 2450                                | 23.7 (31.8)               | 151 (111)                               | 158 (117)                         | 1PH8135-2 F ■■■-■■■1                  |
| 2000                                                                                                    | 4500                      | 3500                                | 31.4 (42.1)               | 150 (111)                               | 158 (117)                         | 1PH8135-2 G ■■■-■■■1                  |
| 1500                                                                                                    | 4500                      | 2700                                | 30.6 (41.0)               | 195 (144)                               | 203 (150)                         | 1PH8137-2 F ■■■-■■■1                  |
| 2500                                                                                                    | 4500                      | 3900                                | 48.4 (64.9)               | 185 (136)                               | 203 (150)                         | 1PH8137-2 L ■■■-■■■1                  |
| 3000                                                                                                    | 4500                      | 4500                                | 57.5 (77.1)               | 183 (135)                               | 203 (150)                         | 1PH8137-2 M ■■■-■■■1                  |
| <b>Shaft height 132 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module</b>      |                           |                                     |                           |                                         |                                   |                                       |
| 1500                                                                                                    | 4500                      | 3150                                | 17.6 (23.6)               | 112 (82.6)                              | 115 (84.8)                        | 1PH8131-2 F 2 ■■■-■■■1                |
| 2500                                                                                                    | 4500                      | 4500                                | 28.5 (38.2)               | 109 (80.4)                              | 115 (84.8)                        | 1PH8131-2 L 2 ■■■-■■■1                |
| 1500                                                                                                    | 4500                      | 2450                                | 23.1 (31.0)               | 147 (108)                               | 155 (114)                         | 1PH8133-2 F 2 ■■■-■■■1                |
| 2000                                                                                                    | 4500                      | 3450                                | 30.6 (41.0)               | 146 (108)                               | 155 (114)                         | 1PH8133-2 G 2 ■■■-■■■1                |
| 1500                                                                                                    | 4500                      | 2650                                | 29.7 (39.8)               | 189 (139)                               | 196 (145)                         | 1PH8135-2 F 2 ■■■-■■■1                |
| 2000                                                                                                    | 4500                      | 3800                                | 39 (52.3)                 | 186 (137)                               | 196 (145)                         | 1PH8135-2 G 2 ■■■-■■■1                |
| 1500                                                                                                    | 4500                      | 2350                                | 34.1 (45.7)               | 217 (160)                               | 226 (167)                         | 1PH8137-2 F 2 ■■■-■■■1                |
| 2000                                                                                                    | 4500                      | 3500                                | 44.4 (59.5)               | 212 (156)                               | 226 (167)                         | 1PH8137-2 G 2 ■■■-■■■1                |
| 1500                                                                                                    | 4500                      | 3500                                | 44.9 (60.2)               | 286 (211)                               | 290 (214)                         | 1PH8138-2 F 2 ■■■-■■■1                |
| 2000                                                                                                    | 4500                      | 3900                                | 59.7 (79.5)               | 285 (209)                               | 290 (214)                         | 1PH8138-2 G 2 ■■■-■■■1                |

For versions, see Order No.  
supplement and options.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 132 – Forced ventilation/Water cooling

| Motor type<br>(repeated) | Efficiency  | Moment of inertia                                             | Weight, approx. | Rated current <sup>3)</sup> | Stall current     | Terminal box | SINAMICS S120 Motor Module                                   |                                                                                                 |
|--------------------------|-------------|---------------------------------------------------------------|-----------------|-----------------------------|-------------------|--------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|                          | $\eta$<br>% | $J$<br>kgm <sup>2</sup> (lb <sub>r</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)  | $I_{rated}$<br>A            | $I_0$<br>A        | Type         | Rated output current <sup>3)4)</sup><br><br>$I_{rated}$<br>A | For additional versions and components, see chapter SINAMICS S120 drive system<br><br>Order No. |
| 1PH8131-2.F...           | 94.4        | 0.0446 (0.39)                                                 | 85 (187)        | 29                          | 30                | gk833        | 30                                                           | 6SL312-1TE23-0AA3                                                                               |
| 1PH8131-2.L...           | 94.8        | 0.0446 (0.39)                                                 | 85 (187)        | 44                          | 48                | gk833        | 45                                                           | 6SL312-1TE24-5AA3                                                                               |
| 1PH8133-2.F...           | 94.8        | 0.0600 (0.53)                                                 | 103 (227)       | 44                          | 45                | gk833        | 45                                                           | 6SL312-1TE24-5AA3                                                                               |
| 1PH8133-2.L...           | 95.1        | 0.0600 (0.53)                                                 | 103 (227)       | 55                          | 59                | gk833        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8135-2.F...           | 95.2        | 0.0750 (0.66)                                                 | 120 (265)       | 43                          | 44                | gk833        | 45                                                           | 6SL312-1TE24-5AA3                                                                               |
| 1PH8135-2.G...           | 95.3        | 0.0750 (0.66)                                                 | 120 (265)       | 59                          | 63                | gk833        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8137-2.F...           | 95.2        | 0.0885 (0.78)                                                 | 136 (300)       | 60                          | 62                | gk833        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8137-2.L...           | 95.4        | 0.0885 (0.78)                                                 | 136 (300)       | 83                          | 89 <sup>5)</sup>  | gk833        | 85                                                           | 6SL312-1TE28-5AA3                                                                               |
| 1PH8137-2.M...           | 95.3        | 0.0885 (0.78)                                                 | 136 (300)       | 104                         | 115 <sup>5)</sup> | gk833        | 132                                                          | 6SL312-1TE31-3AA3                                                                               |
| 1PH8131-2.F2...          | 94.6        | 0.0446 (0.39)                                                 | 102 (225)       | 40                          | 41                | gk843        | 45                                                           | 6SL312-1TE24-5AA3                                                                               |
| 1PH8131-2.L2...          | 94.8        | 0.0446 (0.39)                                                 | 102 (225)       | 57                          | 60                | gk843        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8133-2.F2...          | 94.7        | 0.0600 (0.53)                                                 | 120 (265)       | 42                          | 43                | gk843        | 45                                                           | 6SL312-1TE24-5AA3                                                                               |
| 1PH8133-2.G2...          | 95.0        | 0.0600 (0.53)                                                 | 120 (265)       | 57                          | 61                | gk843        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8135-2.F2...          | 95.0        | 0.0750 (0.66)                                                 | 138 (304)       | 57                          | 59                | gk843        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8135-2.G2...          | 95.2        | 0.0750 (0.66)                                                 | 138 (304)       | 81                          | 85 <sup>5)</sup>  | gk843        | 85                                                           | 6SL312-1TE28-5AA3                                                                               |
| 1PH8137-2.F2...          | 95.1        | 0.0885 (0.78)                                                 | 153 (337)       | 58                          | 60                | gk843        | 60                                                           | 6SL312-1TE26-0AA3                                                                               |
| 1PH8137-2.G2...          | 95.4        | 0.0885 (0.78)                                                 | 153 (337)       | 85                          | 90 <sup>5)</sup>  | gk843        | 85                                                           | 6SL312-1TE28-5AA3                                                                               |
| 1PH8138-2.F2...          | 95.8        | 0.0885 (0.78)                                                 | 156 (344)       | 118                         | 120 <sup>5)</sup> | gk843        | 132                                                          | 6SL312-1TE31-3AA3                                                                               |
| 1PH8138-2.G2...          | 96.0        | 0.0885 (0.78)                                                 | 156 (344)       | 131                         | 133 <sup>5)</sup> | gk843        | 132                                                          | 6SL312-1TE31-3AA3                                                                               |

## Format:

Booksize

1

## Cooling:

Internal air cooling  
External air cooling

0

1

## Motor Module:

Single Motor Module

1

1) Maximum speed that must not be exceeded.

2) Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the Motor Module (without protective circuit).

3) For duty type S1.

4) The rated pulse frequencies must be taken into account. The rated motor data is valid for 4 kHz.

5) Above approx. 85 A, connection type "Power connector top" is not possible (15th data position E to H).

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 160 – Forced ventilation/Water cooling

#### Selection and ordering data

| Rated speed                                                                                             | Speed, max. <sup>1)</sup> | Operating speed, max. <sup>2)</sup> | Rated power <sup>3)</sup> | Rated torque <sup>3)</sup>              | Static torque                     | Synchronous motors<br>SIMOTICS M-1PH8 |
|---------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|---------------------------|-----------------------------------------|-----------------------------------|---------------------------------------|
| $n_{rated}$<br>rpm                                                                                      | $n_{max}$<br>rpm          | $n_{max, Inv}$<br>rpm               | $P_{rated}$<br>kW (HP)    | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $M_0$<br>Nm (lb <sub>f</sub> -ft) | Order No.                             |
| <b>Shaft height 160 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| <b>1500</b>                                                                                             | 4000                      | 2600                                | 61 (81.8)                 | 390 (288)                               | 440 (325)                         | <b>1PH8165-2 F - - - - 1</b>          |
| <b>2500</b>                                                                                             | 4000                      | 3900                                | 84 (112.6)                | 320 (236)                               | 440 (325)                         | <b>1PH8165-2 L - - - - 1</b>          |
| <b>1500</b>                                                                                             | 4000                      | 2600                                | 69 (92.5)                 | 435 (321)                               | 500 (369)                         | <b>1PH8167-2 F - - - - 1</b>          |
| <b>2500</b>                                                                                             | 4000                      | 4000                                | 95 (127.4)                | 360 (266)                               | 500 (369)                         | <b>1PH8167-2 L - - - - 1</b>          |
| <b>Shaft height 160 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module</b>      |                           |                                     |                           |                                         |                                   |                                       |
| <b>1500</b>                                                                                             | 4000                      | 2400                                | 59 (79.1)                 | 375 (277)                               | 440 (325)                         | <b>1PH8164-2 F 2 - - - - 1</b>        |
| <b>2500</b>                                                                                             | 4000                      | 4000                                | 88 (118)                  | 335 (247)                               | 440 (325)                         | <b>1PH8164-2 L 2 - - - - 1</b>        |
| <b>1500</b>                                                                                             | 4000                      | 2600                                | 74 (99.2)                 | 475 (350)                               | 550 (406)                         | <b>1PH8166-2 F 2 - - - - 1</b>        |
| <b>2500</b>                                                                                             | 4000                      | 3900                                | 102 (136.8)               | 390 (288)                               | 550 (406)                         | <b>1PH8166-2 L 2 - - - - 1</b>        |
| <b>1500</b>                                                                                             | 4000                      | 2600                                | 84 (112.6)                | 530 (391)                               | 620 (457)                         | <b>1PH8168-2 F 2 - - - - 1</b>        |
| <b>2500</b>                                                                                             | 4000                      | 4000                                | 119 (159.6)               | 455 (336)                               | 520 (384)                         | <b>1PH8168-2 L 2 - - - - 1</b>        |

For versions, see Order No.  
supplement and options.

## Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 160 – Forced ventilation/Water cooling

| Motor type<br>(repeated) | Efficiency | Moment of inertia                                      | Weight, approx. | Rated current      | Stall current <sup>3)</sup> | Terminal box | <b>SINAMICS S120 Motor Module</b>    |                                                                                |
|--------------------------|------------|--------------------------------------------------------|-----------------|--------------------|-----------------------------|--------------|--------------------------------------|--------------------------------------------------------------------------------|
|                          | $\eta$     | $J$                                                    | $m$             | $I_{\text{rated}}$ | $I_0$                       |              | Rated output current <sup>3)4)</sup> | For additional versions and components, see chapter SINAMICS S120 drive system |
|                          | %          | kgm <sup>2</sup> (lb <sub>F</sub> -in-s <sup>2</sup> ) | kg (lb)         | A                  | A                           | Type         | $I_{\text{rated}}$<br>A              | Order No.                                                                      |
| 1PH8165-2.F...           | 94         | 0.216 (1.91)                                           | 218 (481)       | 119                | 126                         | gk874        | 132                                  | <b>6SL312 ■ -1TE31-3AA3</b>                                                    |
| 1PH8165-2.L...           | 95.5       | 0.216 (1.91)                                           | 218 (481)       | 148                | 188                         | gk874        | 200                                  | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8167-2.F...           | 94         | 0.244 (2.16)                                           | 240 (529)       | 133                | 143                         | gk874        | 132 <sup>5)</sup>                    | <b>6SL312 ■ -1TE31-3AA3</b>                                                    |
| 1PH8167-2.L...           | 95.5       | 0.244 (2.16)                                           | 240 (529)       | 177                | 230                         | gk874        | 200 <sup>5)</sup>                    | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8164-2.F2...          | 94         | 0.175 (1.55)                                           | 224 (494)       | 111                | 118                         | gk874        | 132                                  | <b>6SL312 ■ -1TE31-3AA3</b>                                                    |
| 1PH8164-2.L2...          | 95.5       | 0.175 (1.55)                                           | 224 (494)       | 165                | 205                         | gk874        | 200 <sup>5)</sup>                    | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8166-2.F2...          | 94         | 0.216 (1.91)                                           | 257 (567)       | 148                | 159                         | gk874        | 200                                  | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8166-2.L2...          | 95.5       | 0.216 (1.91)                                           | 257 (567)       | 188                | 240                         | gk874        | 200 <sup>5)</sup>                    | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8168-2.F2...          | 94         | 0.244 (2.16)                                           | 279 (615)       | 169                | 179                         | gk874        | 200                                  | <b>6SL312 ■ -1TE32-0AA4</b>                                                    |
| 1PH8168-2.L2...          | 95.5       | 0.244 (2.16)                                           | 279 (615)       | 225                | 240                         | gk874        | 260 <sup>5)</sup>                    | <b>6SL332 0 -1TE32-6AA3</b>                                                    |
| <b>Format:</b>           |            |                                                        |                 |                    |                             |              |                                      |                                                                                |
| Booksize                 |            |                                                        |                 |                    |                             |              | 1                                    |                                                                                |
| Chassis                  |            |                                                        |                 |                    |                             |              | 3                                    |                                                                                |
| <b>Cooling:</b>          |            |                                                        |                 |                    |                             |              |                                      |                                                                                |
| Internal air cooling     |            |                                                        |                 |                    |                             |              |                                      | 0                                                                              |
| External air cooling     |            |                                                        |                 |                    |                             |              |                                      | 1                                                                              |
| <b>Motor Module:</b>     |            |                                                        |                 |                    |                             |              |                                      |                                                                                |
| Single Motor Module      |            |                                                        |                 |                    |                             |              |                                      | 1                                                                              |

1) Maximum speed that must not be exceeded.

2) Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the Motor Module (without protective circuit).

3) For duty type S1.

4) The rated pulse frequencies must be taken into account. The rated motor data is valid for 4 kHz.

5) At 4 kHz, the rated output current of the Motor Module is lower than the rated motor current or the motor stall current.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180/SH 225 – Forced ventilation

#### Selection and ordering data

| Rated speed                                                                                             | Speed, max. <sup>1)</sup> | Operating speed, max. <sup>2)</sup> | Rated power <sup>3)</sup> | Rated torque <sup>3)</sup>              | Static torque                     | Synchronous motors<br>SIMOTICS M-1PH8 |
|---------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|---------------------------|-----------------------------------------|-----------------------------------|---------------------------------------|
| $n_{rated}$<br>rpm                                                                                      | $n_{max}$<br>rpm          | $n_{max, Inv}$<br>rpm               | $P_{rated}$<br>kW (HP)    | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $M_0$<br>Nm (lb <sub>f</sub> -ft) | Order No.                             |
| <b>Shaft height 180 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| <b>700</b>                                                                                              | 3800                      | 1450                                | 33 (44.3)                 | 450 (332)                               | 480 (354)                         | <b>1PH8184-2 C ■ ■ ■ ■ 1</b>          |
| <b>1000</b>                                                                                             | 3800                      | 1950                                | 46 (61.7)                 | 439 (324)                               | 480 (354)                         | <b>1PH8184-2 D ■ ■ ■ ■ 1</b>          |
| <b>1500</b>                                                                                             | 3800                      | 2700                                | 70 (93.9)                 | 446 (329)                               | 480 (354)                         | <b>1PH8184-2 F ■ ■ ■ ■ 1</b>          |
| <b>700</b>                                                                                              | 3800                      | 1450                                | 44 (59)                   | 600 (443)                               | 640 (472)                         | <b>1PH8186-2 C ■ ■ ■ ■ 1</b>          |
| <b>1000</b>                                                                                             | 3800                      | 2050                                | 62 (83.1)                 | 592 (437)                               | 640 (472)                         | <b>1PH8186-2 D ■ ■ ■ ■ 1</b>          |
| <b>1500</b>                                                                                             | 3800                      | 2950                                | 93 (125)                  | 592 (437)                               | 640 (472)                         | <b>1PH8186-2 F ■ ■ ■ ■ 1</b>          |
| <b>Shaft height 225 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| <b>700</b>                                                                                              | 3500                      | 1450                                | 48 (64.4)                 | 655 (483)                               | 708 (522)                         | <b>1PH8224-2 C ■ ■ ■ ■ 1</b>          |
| <b>1000</b>                                                                                             | 3500                      | 2050                                | 68 (91.2)                 | 649 (479)                               | 708 (522)                         | <b>1PH8224-2 D ■ ■ ■ ■ 1</b>          |
| <b>1500</b>                                                                                             | 3500                      | 2900                                | 101 (135)                 | 643 (474)                               | 708 (522)                         | <b>1PH8224-2 F ■ ■ ■ ■ 1</b>          |
| <b>700</b>                                                                                              | 3500                      | 1550                                | 64 (85.8)                 | 873 (644)                               | 944 (696)                         | <b>1PH8226-2 C ■ ■ ■ ■ 1</b>          |
| <b>1000</b>                                                                                             | 3500                      | 1950                                | 91 (122)                  | 869 (641)                               | 944 (696)                         | <b>1PH8226-2 D ■ ■ ■ ■ 1</b>          |
| <b>1500</b>                                                                                             | 3500                      | 2700                                | 134 (180)                 | 853 (629)                               | 944 (696)                         | <b>1PH8226-2 F ■ ■ ■ ■ 1</b>          |
| <b>700</b>                                                                                              | 3500                      | 1450                                | 80 (107)                  | 1091 (805)                              | 1180 (870)                        | <b>1PH8228-2 C ■ ■ ■ ■ 1</b>          |
| <b>1000</b>                                                                                             | 3500                      | 1950                                | 113 (152)                 | 1079 (796)                              | 1180 (870)                        | <b>1PH8228-2 D ■ ■ ■ ■ 1</b>          |
| <b>1500</b>                                                                                             | 3500                      | 2900                                | 168 (225)                 | 1070 (789)                              | 1180 (870)                        | <b>1PH8228-2 F ■ ■ ■ ■ 1</b>          |

For versions, see Order No.  
supplement and options.



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180/SH 225 – Forced ventilation

| Motor type<br>(repeated) | Efficiency | Moment of inertia                                      | Weight, approx. | Rated current      | Stall current <sup>3)</sup> | Terminal box | <b>SINAMICS S120 Motor Module</b>    |                                                                                |
|--------------------------|------------|--------------------------------------------------------|-----------------|--------------------|-----------------------------|--------------|--------------------------------------|--------------------------------------------------------------------------------|
|                          | $\eta$     | $J$                                                    | $m$             | $I_{\text{rated}}$ | $I_0$                       |              | Rated output current <sup>3)4)</sup> | For additional versions and components, see chapter SINAMICS S120 drive system |
|                          | %          | kgm <sup>2</sup> (lb <sub>F</sub> -in-s <sup>2</sup> ) | kg (lb)         | A                  | A                           | Type         | $I_{\text{rated}}$<br>A              | Order No.                                                                      |
| 1PH8184-2.C...           | 93.2       | 0.46 (4.07)                                            | 330 (728)       | 80                 | 84                          | 1XB7322-P05  | 85                                   | <b>6SL312-1TE28-5AA3</b>                                                       |
| 1PH8184-2.D...           | 93.7       | 0.46 (4.07)                                            | 330 (728)       | 106                | 115                         | 1XB7322-P05  | 132                                  | <b>6SL312-1TE31-3AA3</b>                                                       |
| 1PH8184-2.F...           | 95.1       | 0.46 (4.07)                                            | 330 (728)       | 148                | 157                         | 1XB7322-P05  | 200                                  | <b>6SL312-1TE32-0AA4</b>                                                       |
| 1PH8186-2.C...           | 92.4       | 0.60 (5.31)                                            | 400 (882)       | 108                | 115                         | 1XB7322-P05  | 132                                  | <b>6SL312-1TE31-3AA3</b>                                                       |
| 1PH8186-2.D...           | 94.3       | 0.60 (5.31)                                            | 400 (882)       | 148                | 157                         | 1XB7322-P05  | 200                                  | <b>6SL312-1TE32-0AA4</b>                                                       |
| 1PH8186-2.F...           | 95.2       | 0.60 (5.31)                                            | 405 (893)       | 215                | 229                         | 1XB7422-P06  | 260                                  | <b>6SL3320-1TE32-6AA3</b>                                                      |
| 1PH8224-2.C...           | 96.1       | 1.28 (11.3)                                            | 580 (1279)      | 120                | 128                         | 1XB7322-P05  | 132                                  | <b>6SL312-1TE31-3AA3</b>                                                       |
| 1PH8224-2.D...           | 96.4       | 1.28 (11.3)                                            | 580 (1279)      | 170                | 183                         | 1XB7322-P05  | 200                                  | <b>6SL312-1TE32-0AA4</b>                                                       |
| 1PH8224-2.F...           | 96.5       | 1.28 (11.3)                                            | 580 (1279)      | 235                | 256                         | 1XB7422-P06  | 260                                  | <b>6SL3320-1TE32-6AA3</b>                                                      |
| 1PH8226-2.C...           | 96.3       | 1.66 (14.7)                                            | 700 (1544)      | 170                | 183                         | 1XB7322-P05  | 200                                  | <b>6SL312-1TE32-0AA4</b>                                                       |
| 1PH8226-2.D...           | 96.7       | 1.66 (14.7)                                            | 700 (1544)      | 215                | 233                         | 1XB7422-P06  | 260                                  | <b>6SL3320-1TE32-6AA3</b>                                                      |
| 1PH8226-2.F...           | 96.7       | 1.66 (14.7)                                            | 700 (1544)      | 295                | 320                         | 1XB7700-P02  | 310 <sup>5)</sup>                    | <b>6SL3320-1TE33-1AA3</b>                                                      |
| 1PH8228-2.C...           | 96.5       | 2.02 (17.9)                                            | 810 (1786)      | 200                | 213                         | 1XB7322-P05  | 200 <sup>5)</sup>                    | <b>6SL312-1TE32-0AA4</b>                                                       |
| 1PH8228-2.D...           | 96.8       | 2.02 (17.9)                                            | 810 (1786)      | 265                | 284                         | 1XB7422-P06  | 310                                  | <b>6SL3320-1TE33-1AA3</b>                                                      |
| 1PH8228-2.F...           | 96.7       | 2.02 (17.9)                                            | 810 (1786)      | 395                | 427                         | 1XB7700-P02  | 490                                  | <b>6SL3320-1TE35-0AA3</b>                                                      |

|                      |   |
|----------------------|---|
| <b>Format:</b>       |   |
| Booksize             | 1 |
| Chassis              | 3 |
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |

<sup>1)</sup> Maximum speed that must not be exceeded.

<sup>2)</sup> Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the Motor Module (without protective circuit).

<sup>3)</sup> For duty type S1.

<sup>4)</sup> The rated pulse frequencies must be taken into account. The rated motor data is valid for 4 kHz (booksize format) or 2 kHz (chassis format).

<sup>5)</sup> At 2 kHz, the rated output current of the Motor Module is lower than the rated motor current or the motor stall current.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180/SH 225 – Water cooling

#### Selection and ordering data

| Rated speed                                                                                        | Speed, max. <sup>1)</sup> | Operating speed, max. <sup>2)</sup> | Rated power <sup>3)</sup> | Rated torque <sup>3)</sup>              | Static torque                     | Synchronous motors<br>SIMOTICS M-1PH8 |
|----------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|---------------------------|-----------------------------------------|-----------------------------------|---------------------------------------|
| $n_{rated}$<br>rpm                                                                                 | $n_{max}$<br>rpm          | $n_{max, Inv}$<br>rpm               | $P_{rated}$<br>kW (HP)    | $M_{rated}$<br>Nm (lb <sub>f</sub> -ft) | $M_0$<br>Nm (lb <sub>f</sub> -ft) | Order No.                             |
| <b>Shaft height 180 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| <b>700</b>                                                                                         | 3800                      | 1450                                | 42 (56.3)                 | 573 (423)                               | 590 (435)                         | <b>1PH8184-2 C2 - - - - 1</b>         |
| <b>1000</b>                                                                                        | 3800                      | 1950                                | 61 (81.8)                 | 583 (430)                               | 600 (443)                         | <b>1PH8184-2 D2 - - - - 1</b>         |
| <b>1500</b>                                                                                        | 3800                      | 2700                                | 90 (121)                  | 573 (423)                               | 600 (443)                         | <b>1PH8184-2 F2 - - - - 1</b>         |
| <b>2500</b>                                                                                        | 3800                      | 3800                                | 127 (170)                 | 485 (358)                               | 530 (391)                         | <b>1PH8184-2 L2 - - - - 1</b>         |
| <b>700</b>                                                                                         | 3800                      | 1450                                | 58 (77.8)                 | 791 (583)                               | 800 (590)                         | <b>1PH8186-2 C2 - - - - 1</b>         |
| <b>1000</b>                                                                                        | 3800                      | 2050                                | 80 (107)                  | 764 (564)                               | 800 (590)                         | <b>1PH8186-2 D2 - - - - 1</b>         |
| <b>1500</b>                                                                                        | 3800                      | 2950                                | 119 (160)                 | 758 (559)                               | 800 (590)                         | <b>1PH8186-2 F2 - - - - 1</b>         |
| <b>2500</b>                                                                                        | 3800                      | 3800                                | 168 (225)                 | 642 (474)                               | 720 (531)                         | <b>1PH8186-2 L2 - - - - 1</b>         |
| <b>Shaft height 225 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module</b> |                           |                                     |                           |                                         |                                   |                                       |
| <b>700</b>                                                                                         | 3500                      | 1450                                | 72 (96.6)                 | 982 (724)                               | 1007 (743)                        | <b>1PH8224-2 C2 - - - - 1</b>         |
| <b>1000</b>                                                                                        | 3500                      | 2050                                | 101 (135)                 | 964 (711)                               | 1007 (743)                        | <b>1PH8224-2 D2 - - - - 1</b>         |
| <b>1500</b>                                                                                        | 3500                      | 2900                                | 151 (203)                 | 961 (709)                               | 1007 (743)                        | <b>1PH8224-2 F2 - - - - 1</b>         |
| <b>2500</b>                                                                                        | 3500                      | 3500                                | 182 (244)                 | 695 (513)                               | 885 (631)                         | <b>1PH8224-2 L2 - - - - 1</b>         |
| <b>700</b>                                                                                         | 3500                      | 1550                                | 95 (127)                  | 1296 (956)                              | 1330 (981)                        | <b>1PH8226-2 C2 - - - - 1</b>         |
| <b>1000</b>                                                                                        | 3500                      | 1950                                | 135 (181)                 | 1289 (951)                              | 1330 (981)                        | <b>1PH8226-2 D2 - - - - 1</b>         |
| <b>1500</b>                                                                                        | 3500                      | 2700                                | 201 (270)                 | 1280 (944)                              | 1330 (981)                        | <b>1PH8226-2 F2 - - - - 1</b>         |
| <b>2500</b>                                                                                        | 3500                      | 3500                                | 228 (306)                 | 871 (642)                               | 1170 (863)                        | <b>1PH8226-2 L2 - - - - 1</b>         |
| <b>700</b>                                                                                         | 3500                      | 1450                                | 121 (162)                 | 1651 (1218)                             | 1680 (1239)                       | <b>1PH8228-2 C2 - - - - 1</b>         |
| <b>1000</b>                                                                                        | 3500                      | 1950                                | 169 (227)                 | 1614 (1190)                             | 1680 (1239)                       | <b>1PH8228-2 D2 - - - - 1</b>         |

For versions, see Order No.  
supplement and options.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180/SH 225 – Water cooling

| Motor type<br>(repeated) | Efficiency  | Moment of<br>inertia                                          | Weight,<br>approx. | Rated<br>current <sup>3)</sup> | Stall<br>current <sup>3)</sup> | Terminal box | <b>SINAMICS S120 Motor Module</b>                               |                                                                                                             |
|--------------------------|-------------|---------------------------------------------------------------|--------------------|--------------------------------|--------------------------------|--------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|                          | $\eta$<br>% | $J$<br>kgm <sup>2</sup> (lb <sub>r</sub> -in-s <sup>2</sup> ) | $m$<br>kg (lb)     | $I_{rated}$<br>A               | $I_0$<br>A                     | Type         | Rated output<br>current <sup>3)4)</sup><br><br>$I_{rated}$<br>A | For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system<br><br>Order No. |
| 1PH8184-2.C2...          | 91.9        | 0.457 (4.04)                                                  | 330 (728)          | 100                            | 103                            | 1XB7322-P05  | 132                                                             | <b>6SL312-1TE31-3AA3</b>                                                                                    |
| 1PH8184-2.D2...          | 93.7        | 0.457 (4.04)                                                  | 330 (728)          | 140                            | 143                            | 1XB7322-P05  | 200                                                             | <b>6SL312-1TE32-0AA4</b>                                                                                    |
| 1PH8184-2.F2...          | 95.1        | 0.457 (4.04)                                                  | 330 (728)          | 190                            | 196                            | 1XB7322-P05  | 200                                                             | <b>6SL312-1TE32-0AA4</b>                                                                                    |
| 1PH8184-2.L2...          | 95.7        | 0.457 (4.04)                                                  | 330 (728)          | 260                            | 278                            | 1XB7700-P02  | 260 <sup>5)</sup>                                               | <b>6SL3320-1TE32-6AA0</b>                                                                                   |
| 1PH8186-2.C2...          | 92.4        | 0.599 (5.30)                                                  | 400 (882)          | 142                            | 143                            | 1XB7322-P05  | 200                                                             | <b>6SL312-1TE32-0AA4</b>                                                                                    |
| 1PH8186-2.D2...          | 94.3        | 0.599 (5.30)                                                  | 400 (882)          | 190                            | 196                            | 1XB7322-P05  | 200                                                             | <b>6SL312-1TE32-0AA4</b>                                                                                    |
| 1PH8186-2.F2...          | 95.2        | 0.599 (5.30)                                                  | 400 (882)          | 275                            | 285                            | 1XB7700-P02  | 310                                                             | <b>6SL3320-1TE33-1AA0</b>                                                                                   |
| 1PH8186-2.L2...          | 95.7        | 0.599 (5.30)                                                  | 400 (882)          | 370                            | 405                            | 1XB7700-P02  | 380 <sup>5)</sup>                                               | <b>6SL3320-1TE33-8AA0</b>                                                                                   |
| 1PH8224-2.C2...          | 94.7        | 1.28 (11.3)                                                   | 580 (1279)         | 180                            | 183                            | 1XB7322-P05  | 200                                                             | <b>6SL312-1TE32-0AA4</b>                                                                                    |
| 1PH8224-2.D2...          | 95.6        | 1.28 (11.3)                                                   | 580 (1279)         | 255                            | 262                            | 1XB7700-P02  | 260 <sup>5)</sup>                                               | <b>6SL3320-1TE32-6AA0</b>                                                                                   |
| 1PH8224-2.F2...          | 96.2        | 1.28 (11.3)                                                   | 580 (1279)         | 355                            | 367                            | 1XB7700-P02  | 380                                                             | <b>6SL3320-1TE33-8AA0</b>                                                                                   |
| 1PH8224-2.L2...          | 96.1        | 1.28 (11.3)                                                   | 580 (1279)         | 365                            | 460                            | 1XB7700-P02  | 380 <sup>5)</sup>                                               | <b>6SL3320-1TE33-8AA0</b>                                                                                   |
| 1PH8226-2.C2...          | 95.2        | 1.66 (14.7)                                                   | 700 (1544)         | 255                            | 260                            | 1XB7700-P02  | 260                                                             | <b>6SL3320-1TE32-6AA0</b>                                                                                   |
| 1PH8226-2.D2...          | 96.0        | 1.66 (14.7)                                                   | 700 (1544)         | 325                            | 330                            | 1XB7700-P02  | 380                                                             | <b>6SL3320-1TE33-8AA0</b>                                                                                   |
| 1PH8226-2.F2...          | 96.5        | 1.66 (14.7)                                                   | 700 (1544)         | 445                            | 454                            | 1XB7700-P02  | 490                                                             | <b>6SL3320-1TE35-0AA0</b>                                                                                   |
| 1PH8226-2.L2...          | 96.2        | 1.66 (14.7)                                                   | 700 (1544)         | 400                            | 532                            | 1XB7700-P02  | 490                                                             | <b>6SL3320-1TE35-0AA0</b>                                                                                   |
| 1PH8228-2.C2...          | 95.5        | 2.02 (17.9)                                                   | 810 (1786)         | 305                            | 306                            | 1XB7700-P02  | 310                                                             | <b>6SL3320-1TE33-1AA0</b>                                                                                   |
| 1PH8228-2.D2...          | 96.2        | 2.02 (17.9)                                                   | 810 (1786)         | 395                            | 408                            | 1XB7700-P02  | 490                                                             | <b>6SL3320-1TE35-0AA0</b>                                                                                   |

|                      |   |  |
|----------------------|---|--|
| <b>Format:</b>       |   |  |
| Booksize             | 1 |  |
| Chassis              | 3 |  |
| <b>Cooling:</b>      |   |  |
| Internal air cooling | 0 |  |
| External air cooling | 1 |  |
| <b>Motor Module:</b> |   |  |
| Single Motor Module  | 1 |  |

1) Maximum speed that must not be exceeded.

2) Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the Motor Module (without protective circuit).

3) For duty type S1.

4) The rated pulse frequencies must be taken into account. The rated motor data is valid for 4 kHz (booksize format) or 2 kHz (chassis format).

5) At 2 kHz, the rated output current of the Motor Module is lower than the rated motor current or the motor stall current.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors – Order No. supplement SH 132/SH 160 – Forced ventilation/Water cooling

#### Selection and ordering data

| Data position of the Order No.                                                                                    | 1 | 2                                                             | 3 | 4 | 5 | 6 | 7 | 8                         | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |   |   |   |   |  |  |  |   |  |  |   |
|-------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------|---|---|---|---|---|---------------------------|---|----|----|----|----|----|----|----|---|---|---|---|--|--|--|---|--|--|---|
| Shaft height 132                                                                                                  | 1 | P                                                             | H | 8 | 1 | 3 | . | –                         | 2 | ■  | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |  |   |  |  |   |
| Shaft height 160                                                                                                  | 1 | P                                                             | H | 8 | 1 | 6 | . | –                         | 2 | ■  | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z |  |  |  |   |  |  |   |
| Overall length                                                                                                    |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Synchronous version without brake                                                                                 |   |                                                               |   |   |   |   |   |                           | 2 |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Encoder systems for motors without DRIVE-CLiQ interface                                                           |   |                                                               |   |   |   |   |   |                           |   | M  | E  |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks (encoder IC2048S/R)                    |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)                  |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Encoder systems for motors with DRIVE-CLiQ interface                                                              |   |                                                               |   |   |   |   |   |                           |   | D  | F  |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ) |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)                                                      |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Rated speed (winding version)                                                                                     |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Cooling                                                                                                           |   | Degree of protection                                          |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Forced ventilation DE → NDE                                                                                       |   | IP55                                                          |   |   |   |   |   |                           |   |    |    |    | 0  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Forced ventilation NDE → DE                                                                                       |   | IP55                                                          |   |   |   |   |   |                           |   |    |    |    | 1  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Water cooling                                                                                                     |   | IP65                                                          |   |   |   |   |   |                           |   |    |    |    | 2  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Type of construction                                                                                              |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| IM B3 (IM V5, IM V6)                                                                                              |   |                                                               |   |   |   |   |   |                           |   |    |    |    | 0  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| IM B5 (IM V1, IM V3)                                                                                              |   |                                                               |   |   |   |   |   |                           |   |    |    |    | 2  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| IM B35 (IM V15, IM V35)                                                                                           |   |                                                               |   |   |   |   |   |                           |   |    |    |    | 3  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Shaft extension DE                                                                                                |   | Balancing                                                     |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Plain shaft                                                                                                       |   | –                                                             |   |   |   |   |   |                           |   |    |    |    | 0  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Feather key                                                                                                       |   | Full-key                                                      |   |   |   |   |   |                           |   |    |    |    | 1  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Feather key                                                                                                       |   | Half-key                                                      |   |   |   |   |   |                           |   |    |    |    | 2  |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Bearing version                                                                                                   |   | Vibration severity acc. to Siemens <sup>1)</sup> /EN 60034-14 |   |   |   |   |   | Shaft and flange accuracy |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Standard                                                                                                          |   | R/A                                                           |   |   |   |   |   | R                         |   |    |    |    |    |    | B  |    |   |   |   |   |  |  |  |   |  |  |   |
| Standard                                                                                                          |   | S/A                                                           |   |   |   |   |   | R                         |   |    |    |    |    |    | C  |    |   |   |   |   |  |  |  |   |  |  |   |
| Advanced Lifetime <sup>2)</sup>                                                                                   |   | S/A                                                           |   |   |   |   |   | R                         |   |    |    |    |    |    | Q  |    |   |   |   |   |  |  |  |   |  |  |   |
| Power connection (DE view)                                                                                        |   | Cable entry                                                   |   |   |   |   |   | Signal connection         |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  |   |
| Terminal box top                                                                                                  |   | Right                                                         |   |   |   |   |   | DE                        |   |    |    |    |    |    | A  |    |   |   |   |   |  |  |  |   |  |  |   |
| Terminal box top                                                                                                  |   | Left                                                          |   |   |   |   |   | DE                        |   |    |    |    |    |    | B  |    |   |   |   |   |  |  |  |   |  |  |   |
| Terminal box top                                                                                                  |   | NDE                                                           |   |   |   |   |   | Left                      |   |    |    |    |    |    | C  |    |   |   |   |   |  |  |  |   |  |  |   |
| Power connector top <sup>3)</sup>                                                                                 |   | Right                                                         |   |   |   |   |   | DE                        |   |    |    |    |    |    | E  |    |   |   |   |   |  |  |  |   |  |  |   |
| Power connector top <sup>3)</sup>                                                                                 |   | Left                                                          |   |   |   |   |   | DE                        |   |    |    |    |    |    | F  |    |   |   |   |   |  |  |  |   |  |  |   |
| Power connector top <sup>3)</sup>                                                                                 |   | NDE                                                           |   |   |   |   |   | Left                      |   |    |    |    |    |    | G  |    |   |   |   |   |  |  |  |   |  |  |   |
| Power connector top <sup>3)</sup>                                                                                 |   | DE                                                            |   |   |   |   |   | Left                      |   |    |    |    |    |    | H  |    |   |   |   |   |  |  |  |   |  |  |   |
| Version status                                                                                                    |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  | 1 |  |  |   |
| Special version (order codes are required for options)                                                            |   |                                                               |   |   |   |   |   |                           |   |    |    |    |    |    |    |    |   |   |   |   |  |  |  |   |  |  | Z |

<sup>1)</sup> For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

<sup>2)</sup> For 1PH813 limited to  $n_{\max} = 4500$  rpm.  
For 1PH816 limited to  $n_{\max} = 4000$  rpm.

<sup>3)</sup> For the 1PH813, power connector only possible up to a maximum stall current of  $I_0 = 85$  A.  
Power connector not possible for 1PH816.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors – Order No. supplement  
SH 180/SH 225 – Forced ventilation/Water cooling

## Selection and ordering data

| Data position of the Order No.                                                                                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                                                            | 11 | 12 | 13 | 14 | 15 | 16 |   |   |   |                           |  |   |
|-------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---------------------------------------------------------------|----|----|----|----|----|----|---|---|---|---------------------------|--|---|
| Shaft height 180                                                                                                  | 1 | P | H | 8 | 1 | 8 | . | – | 2 | ■                                                             | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z                         |  |   |
| Shaft height 225                                                                                                  | 1 | P | H | 8 | 2 | 2 | . | – | 2 | ■                                                             | .  | ■  | ■  | –  | ■  | ■  | ■ | 1 | – | Z                         |  |   |
| Overall length                                                                                                    |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Synchronous version without brake                                                                                 |   |   |   |   |   |   |   |   | 2 |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Encoder systems for motors without DRIVE-CLiQ interface                                                           |   |   |   |   |   |   |   |   |   | M<br>E                                                        |    |    |    |    |    |    |   |   |   |                           |  |   |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks (encoder IC2048S/R)                    |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)                  |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Encoder systems for motors with DRIVE-CLiQ interface                                                              |   |   |   |   |   |   |   |   |   | D<br><br>F                                                    |    |    |    |    |    |    |   |   |   |                           |  |   |
| Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ) |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)                                                      |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Rated speed (winding version)                                                                                     |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| Cooling                                                                                                           |   |   |   |   |   |   |   |   |   | Degree of protection                                          |    |    |    |    |    |    |   |   |   |                           |  |   |
| Forced ventilation DE → NDE                                                                                       |   |   |   |   |   |   |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   | 0                         |  |   |
| Forced ventilation NDE → DE                                                                                       |   |   |   |   |   |   |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   | 1                         |  |   |
| Water cooling                                                                                                     |   |   |   |   |   |   |   |   |   | IP55                                                          |    |    |    |    |    |    |   |   |   | 2                         |  |   |
| Type of construction                                                                                              |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   |                           |  |   |
| IM B3 (IM B6, IM B7, IM B8, IM V6)                                                                                |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | 0                         |  |   |
| IM V5                                                                                                             |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | 1                         |  |   |
| IM B5 (IM V3) <sup>1)2)</sup>                                                                                     |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | 2                         |  |   |
| IM B35 (IM V35) <sup>2)</sup>                                                                                     |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | 3                         |  |   |
| IM V15 (Not possible for belt coupling) <sup>2)</sup>                                                             |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | 5                         |  |   |
| Shaft extension DE                                                                                                |   |   |   |   |   |   |   |   |   | Balancing                                                     |    |    |    |    |    |    |   |   |   |                           |  |   |
| Plain shaft                                                                                                       |   |   |   |   |   |   |   |   |   | –                                                             |    |    |    |    |    |    |   |   |   | 0                         |  |   |
| Feather key                                                                                                       |   |   |   |   |   |   |   |   |   | Full-key                                                      |    |    |    |    |    |    |   |   |   | 1                         |  |   |
| Feather key                                                                                                       |   |   |   |   |   |   |   |   |   | Half-key                                                      |    |    |    |    |    |    |   |   |   | 2                         |  |   |
| Bearing version                                                                                                   |   |   |   |   |   |   |   |   |   | Vibration severity acc. to Siemens <sup>3)</sup> /EN 60034-14 |    |    |    |    |    |    |   |   |   | Shaft and flange accuracy |  |   |
| Standard                                                                                                          |   |   |   |   |   |   |   |   |   | R/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  | B |
| Standard                                                                                                          |   |   |   |   |   |   |   |   |   | S/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  | C |
| Increased radial forces                                                                                           |   |   |   |   |   |   |   |   |   | R/A                                                           |    |    |    |    |    |    |   |   |   | R                         |  | F |
| Power connection (DE view)                                                                                        |   |   |   |   |   |   |   |   |   | Cable entry                                                   |    |    |    |    |    |    |   |   |   | Signal connection         |  |   |
| Terminal box top                                                                                                  |   |   |   |   |   |   |   |   |   | Right                                                         |    |    |    |    |    |    |   |   |   | DE                        |  | A |
| Terminal box top                                                                                                  |   |   |   |   |   |   |   |   |   | Left                                                          |    |    |    |    |    |    |   |   |   | DE                        |  | B |
| Terminal box top                                                                                                  |   |   |   |   |   |   |   |   |   | NDE                                                           |    |    |    |    |    |    |   |   |   | Right                     |  | C |
| Terminal box top                                                                                                  |   |   |   |   |   |   |   |   |   | DE                                                            |    |    |    |    |    |    |   |   |   | Right                     |  | D |
| Version status                                                                                                    |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    | 1  |   |   |   |                           |  |   |
| Special version (order codes are required for options)                                                            |   |   |   |   |   |   |   |   |   |                                                               |    |    |    |    |    |    |   |   |   | Z                         |  |   |

1) For 1PH818 continuous speed  $n_{\max} = 3000$  rpm.  
For 1PH822 continuous speed  $n_{\max} = 2500$  rpm.

2) For 1PH818 with flange A450.  
For 1PH822 with flange A550.

3) For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors

#### Options

#### Options

| Order code     | Description of option<br>When ordering a motor with options, <b>-Z</b> should be added to the order number.<br>The order code should also be specified for each additional required option.<br>Order codes must not be repeated in plain text in the order. | For use with SIMOTICS M motors |                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|
|                |                                                                                                                                                                                                                                                             | 1PH813<br>1PH816               | 1PH818<br>1PH822      |
| <b>A12</b>     | Additional PTC thermistor chain for alarm and tripping<br>(Only possible for versions with terminal box)                                                                                                                                                    | ✓                              | ✓                     |
| <b>A25</b>     | Additional KTY84 temperature sensor as reserve connected to signal terminal strip<br>(Only possible for versions with terminal box).                                                                                                                        | ✓                              | Standard              |
| <b>G14</b>     | Fan unit with air filter (Only possible if 10th data position 1)                                                                                                                                                                                            | ✓                              | ✓                     |
| <b>K08</b>     | Encoder connector mounted opposite                                                                                                                                                                                                                          | –                              | ✓                     |
| <b>K09</b>     | Terminal box or power connector NDE <u>right</u><br>(For terminal box type, see selection guides or CAD CREATOR)                                                                                                                                            | ✓<br>1)                        | –                     |
|                | Terminal box NDE <u>right</u> , cable infeed DE/signal connection <u>top</u><br>(Only possible if 15th data position A)                                                                                                                                     | –                              | ✓                     |
| <b>K10</b>     | Terminal box or power connector NDE <u>left</u><br>(For terminal box type, see selection guides or CAD CREATOR)                                                                                                                                             | ✓<br>1)                        | –                     |
|                | Terminal box NDE <u>left</u> , cable infeed DE/signal connection <u>top</u><br>(Only possible if 15th data position A)                                                                                                                                      | –                              | ✓                     |
| <b>K18</b>     | Radial shaft seal ring DE <sup>2)</sup><br>(Not possible if 14th data position F)                                                                                                                                                                           | ✓                              | ✓                     |
| <b>K40</b>     | Regreasing system, DE and NDE                                                                                                                                                                                                                               | –                              | ✓                     |
| <b>K83</b>     | Rotation of the terminal box by + 90°<br>(Only possible in combination with options K09 or K10)                                                                                                                                                             | –                              | ✓                     |
| <b>K84</b>     | Rotation of the terminal box by – 90°<br>(Only possible in combination with options K09 or K10)                                                                                                                                                             | –                              | ✓                     |
| <b>K85</b>     | Rotation of the terminal box by + 180°<br>(Only possible in combination with options K09 or K10)                                                                                                                                                            | –                              | ✓                     |
| <b>K90</b>     | Version with flange size A400<br>(Possible <u>only</u> if 12th data position is 2, 3 or 5)                                                                                                                                                                  | –                              | ✓<br>With 1PH818 only |
| <b>L00</b>     | Replace terminal box (standard) with the next largest terminal box<br>(note dimension implications, see CAD CREATOR.)                                                                                                                                       | –                              | ✓                     |
| <b>P00</b>     | Undrilled cable entry plate                                                                                                                                                                                                                                 | –                              | ✓                     |
| <b>P01</b>     | Cable entry plate 3 × M63 × 1.5<br>(Only with terminal box type 1XB7700-P02)                                                                                                                                                                                | –                              | ✓                     |
| <b>L27</b>     | NDE bearing in insulated version                                                                                                                                                                                                                            | –                              | ✓<br>With 1PH818 only |
|                |                                                                                                                                                                                                                                                             |                                | Standard for 1PH822   |
| <b>L74</b>     | Fan version with IP65 degree of protection <sup>3)</sup>                                                                                                                                                                                                    | ✓                              | –                     |
| <b>V91</b>     | 1FT6-compatible shaft extension ( $d \times l$ : 48 mm (1.89 in) × 82 mm (3.23 in))<br>(Only possible for 1PH813)                                                                                                                                           | ✓                              | –                     |
| <b>Y84</b>     | Customer specifications on rating plate (max. 30 characters)                                                                                                                                                                                                | ✓                              | ✓                     |
| –              | <b>Paint finish</b> (anthracite RAL 7016)                                                                                                                                                                                                                   | Standard                       | Standard              |
| <b>X01</b>     | Normal paint finish: Jet black RAL 9005                                                                                                                                                                                                                     | ✓                              | ✓                     |
| <b>X02</b>     | Normal paint finish: Cream white RAL 9001                                                                                                                                                                                                                   | ✓                              | ✓                     |
| <b>X03</b>     | Normal paint finish: Reseda green RAL 6011                                                                                                                                                                                                                  | ✓                              | ✓                     |
| <b>X04</b>     | Normal paint finish: Pebble gray RAL 7032                                                                                                                                                                                                                   | ✓                              | ✓                     |
| <b>X05</b>     | Normal paint finish: Sky blue RAL 5015                                                                                                                                                                                                                      | ✓                              | ✓                     |
| <b>X06</b>     | Normal paint finish: Light ivory RAL 1015                                                                                                                                                                                                                   | ✓                              | ✓                     |
| <b>X08</b>     | Normal paint finish: White aluminum RAL 9006                                                                                                                                                                                                                | ✓                              | ✓                     |
| <b>K24</b>     | Primer                                                                                                                                                                                                                                                      | ✓                              | ✓                     |
|                |                                                                                                                                                                                                                                                             | Pale green                     | Red brown             |
| <b>K23</b>     | Special paint finish "Worldwide"<br>Primer and paint finish in anthracite RAL 7016                                                                                                                                                                          | ✓                              | ✓                     |
| <b>K23+X..</b> | Special paint finish "Worldwide"<br>Primer and paint finish can be selected from X01 to X08                                                                                                                                                                 | ✓                              | ✓                     |

<sup>1)</sup> With options K09 or K10, a different terminal box type is used for side mounting. gk843 is used instead of gk833.  
Only possible for IM B3 or IM B35 types of construction.

<sup>2)</sup> Only appropriate if oil spray or oil vapor is occasionally deposited on the sealing ring.

<sup>3)</sup> Regardless of the degree of protection, at high levels of atmospheric pollution, the fan must be cleaned.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors – Terminal box assignment, max. connectable cross-sections

## More information

| Terminal box type<br>(See selection and ordering data for assignment) | Cable entry<br>Power | External signals            | Max. outer cable diameter <sup>3)</sup><br>mm (in) | Number of main terminals                            | Max. cross-section per terminal<br>mm <sup>2</sup> | Max. rated current <sup>4)</sup><br>A |
|-----------------------------------------------------------------------|----------------------|-----------------------------|----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------|
| gk833                                                                 | 1 × M40 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 32 (1.26)                                          | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 35                                             | 110                                   |
| gk843                                                                 | 1 × M50 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 38 (1.50)                                          | Phases: 3 × M6<br>Grounding: 2 × M6                 | 1 × 50                                             | 133                                   |
| gk874                                                                 | 1 × M63 × 1.5        | 1 × M16 × 1.5 <sup>1)</sup> | 42.6 (1.68)                                        | Phases: 3 × M10<br>Grounding: 2 × M6                | 2 × 70                                             | 240                                   |
| 1XB7322-P05                                                           | 2 × M50 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 38 (1.50)                                          | Phases: 3 × M12<br>Grounding: 2 × Fixing eyelet     | 2 × 50                                             | 210                                   |
| 1XB7422-P06                                                           | 2 × M63 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 53 (2.09)                                          | Phases: 3 × M12<br>Grounding: 2 × Fixing eyelet     | 2 × 70                                             | 270                                   |
| 1XB7700-P02                                                           | 3 × M75 × 1.5        | 1 × M16 × 1.5 <sup>2)</sup> | 68 (2.68)                                          | Phases: 3 × 2 × M12<br>Grounding: 2 × Fixing eyelet | 3 × 150                                            | 700                                   |

For terminal box type **1XB7700-P02** other cable entries (power) can be ordered via P options, depending on the standard:

**P00** Undrilled cable entry plate  
**P01** Cable entry plate 3 × M63 × 1.5

For terminal box types **1XB7322-P05** and **1XB7422-P06**, another cable entry (power) can be ordered via the P option, depending on the standard:

**P00** Undrilled cable entry plate

For options **K09** or **K10**, instead of terminal box **gk833**, terminal box **gk843** is used mounted on the side.

<sup>1)</sup> Thread M16 × 1.5 arranged with 90° to signal connection. Thread only for option A12, A25 and 9th data position A (without encoder).

<sup>2)</sup> Thread M16 × 1.5 arranged opposite to the signal connection (lateral to the cable entry plate); thread only for option A12 and 9th data position A (without encoder).

<sup>3)</sup> Dependent on the design of the metric cable gland.

<sup>4)</sup> Current-carrying capacity based on EN 60204-1/IEC 60364-5-52 with installation type E.



# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1FE1 synchronous built-in motors

#### Overview



The SIMOTICS M-1FE1 built-in motors are water-cooled synchronous motors that are supplied as stator and rotor components. When the stator and rotor have been mounted to the spindle in the spindle box, a complete spindle unit is created.

#### Benefits

- Compact design (e.g. for turning machines and vertical milling machines) by dispensing with mechanical components, such as motor switch armature, belt drive, gearbox and spindle encoder
- High power density thanks to water cooling
- Maximum speed up to 40000 rpm, torque values up to 820 Nm for S1 duty
- Higher torque – up to 60 % – with the same active component volume, consequently more compact machine design compared to SIMOTICS M-1PH2
- Extremely short ramp-up and braking times (50 %) thanks to higher torque compared to SIMOTICS M-1PH2
- Cold rotor due to excitation using permanent magnets in the lower speed range and less power loss in the rotor and therefore less bearing heating and spindle expansion
- The stator and rotor are **ready to install**, no finishing is necessary.
- The absence of drive transverse forces permits extremely high accuracy on the workpiece thanks to smooth, accurate spindle motion even at very low speeds.
- Larger rotor inner bore than squirrel-cage rotor of asynchronous motors, but with the same outer diameter, which is an advantage with regard to the bar capacity of automatic turning machines and results in higher spindle stiffness due to larger shaft diameters for milling spindles
- Increased rigidity of the spindle drive, achieved by mounting the motor components between the main spindle bearings
- Less cooling capacity required for the same power compared to SIMOTICS M-1PH2, i.e. greater efficiency
- Only one encoder (hollow-shaft measuring system) for sensing motor speed and spindle position
- Simple servicing by replacing complete motor spindles

#### Benefits (continued)

- Compatible system of SINUMERIK, SINAMICS S120 and motor, therefore fast commissioning is ensured
- Higher machine productivity:  
The permanently excited motor spindles (PE spindles) increase the power density and economic efficiency of CNC machines. The optimized combination of SIMOTICS M-1FE1 built-in motor, drive control and CNC offers further opportunities for rationalization, such as lower workpiece machining times and fewer clamping faces.

#### Application

The water-cooled SIMOTICS M-1FE1 built-in motors are used in combination with the SINAMICS S120 drive system for applications that require highest standards of machining, accuracy and running smoothness, as well as shortest ramp-up times.

The SIMOTICS M-1FE1 built-in motors are offered in two main versions:

- High-Torque series  
6-pole/8-pole synchronous motors are available that have been developed for turning and grinding machines with moderate maximum speeds.  
These motors are characterized by an extremely high torque utilization. In this case, the speed range is approximately 1:2.
- High-Speed series  
In this series, 4-pole synchronous motors are available for milling. These motors are optimized for high maximum speeds and a speed range of over 1:4. These motors require a Voltage Protection Module VPM when operated up to maximum speed.

#### Design

The SIMOTICS M-1FE1 built-in motor comprises:

- A laminated, permanent-field rotor, which, as an option, can be designed with a sleeve for simple mounting and removal.
- A wound stator core with cooling jacket and encapsulated winding overhang
  - Free cable ends with length 0.5 m/1.5 m
  - Two integral PTC thermistors (incl. 1 spare), optionally with full or universal protection
  - A cooling jacket into which the stator has been inserted.

#### Rotor with sleeve

Torque is transmitted to the spindle mechanically without backlash by means of a cylindrical stepped press fit. The rotor is mounted on the spindle by thermal shrinking.

The rotor with sleeve is pre-balanced and can be removed and subsequently remounted. The bond can be released by pressure-oil injection without affecting the joint surfaces.

#### Rotor without sleeve

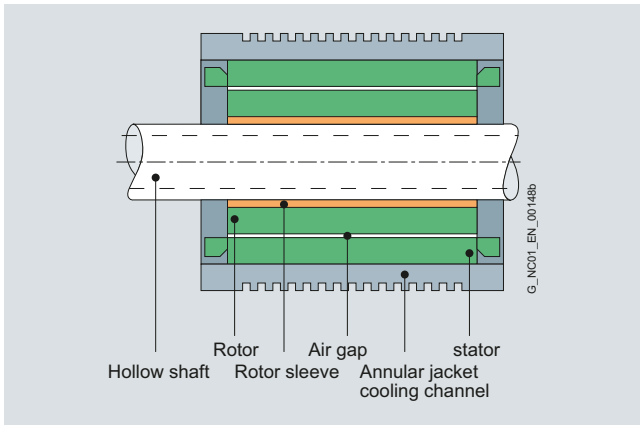
Torque is transmitted to the spindle mechanically without backlash by means of a cylindrical stepped press fit. The rotor is mounted on the spindle by thermal shrinking.

Removal of the rotor is not possible with this type of mounting. Rotors without sleeves are not pre-balanced.

# SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

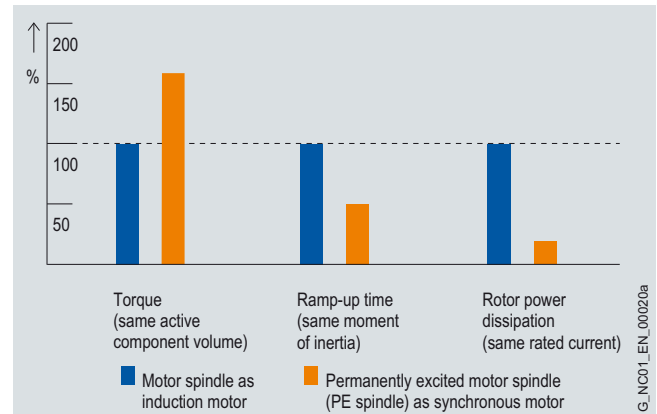
## SIMOTICS M-1FE1 synchronous built-in motors

### Design (continued)



### Characteristic curves

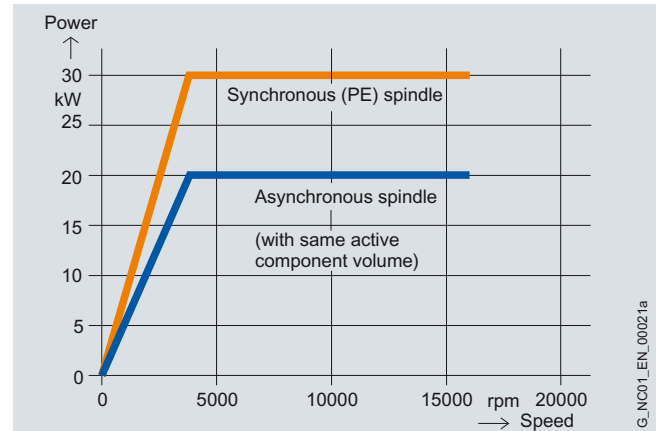
#### Comparison of synchronous/asynchronous spindle



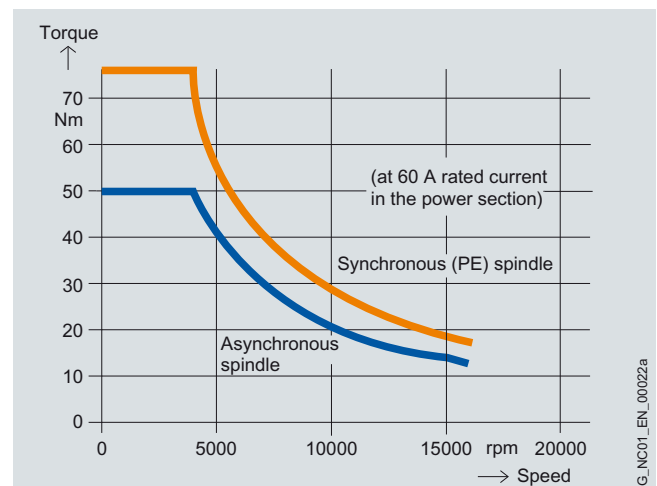
### Technical specifications

|                                                                                                                    |                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                                                | SIMOTICS M-1FE1 built-in motors                                                                                                                               |
| <b>Type of machine</b>                                                                                             | Synchronous spindle with permanent-field rotor                                                                                                                |
| <b>Constant power range</b>                                                                                        | 1:2 (6-/8-pole)/1:4 (4-pole)                                                                                                                                  |
| <b>Recommended coolant inlet temperature, approx.</b>                                                              | 25 °C (77 °F)                                                                                                                                                 |
| <b>Standard protection – temperature monitoring</b>                                                                | 2 KTY thermistors in the stator winding, 1 x spare                                                                                                            |
| <b>Full protection optional</b><br>Application example:<br>Processing at motor standstill                          | In addition to standard protection<br>3 x PTC thermistor triplet<br>Evaluation possibility e.g. using thermal motor protection:<br>Order No.: 3RN1013-1GW10   |
| <b>Universal protection optional</b>                                                                               | Full protection + NTC PT3-51F + NTC K227                                                                                                                      |
| <b>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</b>                                | Temperature class 155 (F) for a coolant inlet temperature of 25 °C (77 °F)                                                                                    |
| <b>Type of construction (cf. ISO)</b>                                                                              | Individual components:<br>Stator, rotor, motor encoder                                                                                                        |
| <b>Degree of protection in accordance with IEC 60034-5</b>                                                         | IP00                                                                                                                                                          |
| <b>Balance quality of rotor in accordance with ISO 1940-1</b><br>• Rotor with sleeve<br><br>• Rotor without sleeve | Version specific<br>- Pre-balanced, balance quality G 2.5<br>Reference speed 3600 rpm<br>- Non-balanced for full balancing after assembly<br><br>Non-balanced |
| <b>Encoder system</b><br>(not included in scope of supply)                                                         | Hollow-shaft measuring system sinusoidal voltage signals 1 V <sub>pp</sub> and with zero mark                                                                 |
| <b>Motor connection</b>                                                                                            | Free cable ends with length l = 0.5/1.5 m (1.64 ft/4.92 ft)                                                                                                   |
| <b>Rating plate</b>                                                                                                | 2 units enclosed separately                                                                                                                                   |

Advantages of SIMOTICS M-1FE1 synchronous spindle over asynchronous spindle



Comparison of power/speed characteristics



Comparison of torque/speed characteristics

Power/speed and torque/speed characteristics of PE spindles compared to the asynchronous version under the following supplementary conditions: identical active part volume and identical rated current (60 A) of the Motor Module.

### More information

For a list of cooling unit manufacturers, please refer to Main spindle motors – Liquid cooling.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### Standard-type SIMOTICS M-1FE1 synchronous built-in motors Water cooling

#### Selection and ordering data

| Rated output<br>for duty type <sup>1)</sup>            |              | Rated torque <sup>1)</sup> |                          | Rated<br>speed | Speed,<br>max. | SIMOTICS M-1FE1<br>built-in motors<br>Standard type | Moment<br>of inertia<br>of rotor<br>without sleeve <sup>8)</sup> | Weight,<br>approx.<br>stator + rotor<br>without<br>sleeve |
|--------------------------------------------------------|--------------|----------------------------|--------------------------|----------------|----------------|-----------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------|
| $P_{rated}$                                            |              | $M_{rated}$                |                          | $n_{rated}$    | $n_{max}$      |                                                     |                                                                  |                                                           |
| S1                                                     | S6-40 %      | S1                         | S6-40 %                  |                |                |                                                     |                                                                  |                                                           |
| kW (HP)                                                | kW (HP)      | Nm (lb <sub>r</sub> -ft)   | Nm (lb <sub>r</sub> -ft) | rpm            | rpm            | Order No.                                           | kgm <sup>2</sup><br>(lb <sub>r</sub> -in-s <sup>2</sup> )        | kg (lb)                                                   |
| <b>1FE1 High-Torque series, 6-pole – Water cooling</b> |              |                            |                          |                |                |                                                     |                                                                  |                                                           |
| <b>7.4 (9.9)</b>                                       | 10 (13.4)    | 4.5 (39.8)                 | 6 (53.1)                 | 15800          | 18000          | <b>1FE1041-6WM</b> ■ 0- 1 B A ■                     | 0.00019 (0.0017)                                                 | 2.8 (6.2)                                                 |
| <b>14.4 (19.3)</b>                                     | 18 (24.1)    | 11 (97)                    | 14 (124)                 | 12500          | 18000          | <b>1FE1042-6WN</b> ■ 0- 1 B A ■                     | 0.00033 (0.0029)                                                 | 6.5 (14.3)                                                |
| <b>11.5 (15.4)</b>                                     | 14.7 (19.7)  | 11 (97)                    | 14 (124)                 | 10000          | 15000          | <b>1FE1042-6WR</b> ■ 0- 1 B A ■                     | 0.00033 (0.0029)                                                 | 6.5 (14.3)                                                |
| <b>8.3 (11.1)</b>                                      | 10.4 (13.9)  | 10 (89)                    | 12.4 (110)               | 8000           | 15000          | <b>1FE1051-6WK</b> ■ 0- 1 B ■ ■                     | 0.00106 (0.0094)                                                 | 5.5 (12.1)                                                |
| <b>6.3 (8.5)</b>                                       | 7.9 (10.6)   | 10 (89)                    | 12.5 (111)               | 6000           | 12000          | <b>1FE1051-6WN</b> ■ 0- 1 B ■ ■                     | 0.00106 (0.0094)                                                 | 5.5 (12.1)                                                |
| <b>14 (18.8)</b>                                       | 18 (24.1)    | 18 (159)                   | 23 (204)                 | 7500           | 15000          | <b>1FE1052-6WK</b> ■ 0- 1 B ■ ■                     | 0.00195 (0.0173)                                                 | 8.2 (18.1)                                                |
| <b>11.5 (15.4)</b>                                     | 14.5 (19.4)  | 20 (187)                   | 25.4 (225)               | 5500           | 12000          | <b>1FE1052-6WN</b> ■ 0- 1 B ■ ■                     | 0.00195 (0.0173)                                                 | 8.2 (18.1)                                                |
| <b>23 (30.8)</b>                                       | 28.9 (38.8)  | 37 (328)                   | 46 (407)                 | 6000           | 12000          | <b>1FE1054-6WN</b> ■ 0- 1 B A ■                     | 0.0038 (0.0336)                                                  | 14.3 (31.5)                                               |
| <b>11.6 (15.6)</b>                                     | 15 (20.1)    | 13 (115)                   | 17 (151)                 | 8500           | 12000          | <b>1FE1061-6WH</b> ■ 0- 1 B ■ ■                     | 0.00141 (0.0125)                                                 | 5.5 (12.1)                                                |
| <b>4 (5.4)</b>                                         | 5.3 (7.1)    | 13 (115)                   | 17 (151)                 | 3000           | 5000           | <b>1FE1061-6WY</b> ■ 0- 1 B ■ ■                     | 0.00141 (0.0125)                                                 | 5.5 (12.1)                                                |
| <b>25 (33.5)</b>                                       | 36.5 (48.9)  | 56 (496)                   | 81 (717)                 | 4300           | 12000          | <b>1FE1064-6WN</b> ■ 1- 1 B A ■                     | 0.00553 (0.0489)                                                 | 14.5 (32)                                                 |
| <b>20 (26.8)</b>                                       | 29 (38.9)    | 56 (496)                   | 81 (717)                 | 3400           | 10000          | <b>1FE1064-6WQ</b> ■ 1- 1 B A ■                     | 0.00553 (0.0489)                                                 | 14.5 (32)                                                 |
| <b>34 (45.6)</b>                                       | 42 (56.3)    | 65 (575)                   | 81 (717)                 | 5000           | 8500           | <b>1FE1082-6WP</b> ■ 0- 1 B ■ ■                     | 0.01048 (0.0927)                                                 | 14 (30.9)                                                 |
| <b>29.3 (39.3)</b>                                     | 36.5 (48.9)  | 65 (575)                   | 81 (717)                 | 4300           | 9000           | <b>1FE1082-6WQ</b> ■ 1- 1 B ■ ■                     | 0.01048 (0.0927)                                                 | 14 (30.9)                                                 |
| <b>24.5 (32.8)</b>                                     | 30.5 (40.9)  | 65 (575)                   | 81 (717)                 | 3600           | 6000           | <b>1FE1082-6WS</b> ■ 0- 1 B ■ ■                     | 0.01048 (0.0927)                                                 | 14 (30.9)                                                 |
| <b>15 (20.1)</b>                                       | 18.7 (25.1)  | 65 (575)                   | 81 (717)                 | 2200           | 9000           | <b>1FE1082-6WW</b> ■ 1- 1 B ■ ■                     | 0.01048 (0.0927)                                                 | 14 (30.9)                                                 |
| <b>35.5 (47.61)</b>                                    | 46.5 (62.36) | 97 (858.5)                 | 127 (1124)               | 3500           | 5500           | <b>1FE1083-6WP</b> ■ 0- 1 B ■ ■                     | 0.016 (0.0142)                                                   | 24 (52.9)                                                 |
| <b>31 (41.6)</b>                                       | 42 (56.3)    | 130 (1151)                 | 175 (1549)               | 2300           | 9000           | <b>1FE1084-6WR</b> ■ 1- 1 B ■ ■                     | 0.02067 (0.1829)                                                 | 30 (66.2)                                                 |
| <b>23.1 (31)</b>                                       | 31.1 (41.7)  | 130 (1151)                 | 175 (1549)               | 1700           | 7000           | <b>1FE1084-6WU</b> ■ 1- 1 B ■ ■                     | 0.02067 (0.1829)                                                 | 30 (66.2)                                                 |
| <b>15 (20.1)</b>                                       | 19 (25.5)    | 130 (1151)                 | 175 (1549)               | 1100           | 4500           | <b>1FE1084-6WX</b> ■ 1- 1 B ■ ■                     | 0.02067 (0.1829)                                                 | 30 (66.2)                                                 |
| <b>10 (13.4)</b>                                       | 13.2 (17.7)  | 28 (248)                   | 36 (319)                 | 3500           | 7000           | <b>1FE1091-6WN</b> ■ 0- 1 B ■ ■                     | 0.00814 (0.0720)                                                 | 17 (37.5)                                                 |
| <b>6.3 (8.5)</b>                                       | 7.5 (10.1)   | 30 (266)                   | 36 (319)                 | 2000           | 4000           | <b>1FE1091-6WS</b> ■ 0- 1 B ■ ■                     | 0.00814 (0.0720)                                                 | 17 (37.5)                                                 |
| <b>24.2 (32.4)</b>                                     | 31 (41.6)    | 66 (584)                   | 85 (752)                 | 3500           | 7000           | <b>1FE1092-6WN</b> ■ 0- 1 B ■ ■                     | 0.01566 (0.1386)                                                 | 26 (57.3)                                                 |
| <b>22 (29.5)</b>                                       | 28.5 (38.2)  | 66 (584)                   | 85 (752)                 | 3200           | 7000           | <b>1FE1092-6WR</b> ■ 1- 1 B ■ ■                     | 0.01566 (0.1386)                                                 | 26 (57.3)                                                 |
| <b>36.6 (49.1)</b>                                     | 47 (63)      | 100 (885)                  | 128 (1133)               | 3500           | 7000           | <b>1FE1093-6WN</b> ■ 0- 1 B ■ ■                     | 0.02317 (0.2051)                                                 | 36 (79.4)                                                 |
| <b>21 (28.2)</b>                                       | 27 (36.2)    | 100 (885)                  | 128 (1133)               | 2000           | 4000           | <b>1FE1093-6WS</b> ■ 0- 1 B ■ ■                     | 0.02317 (0.2051)                                                 | 36 (79.4)                                                 |
| <b>16.8 (22.5)</b>                                     | 21.5 (28.8)  | 100 (885)                  | 128 (1133)               | 1600           | 7000           | <b>1FE1093-6WV</b> ■ 1- 1 B ■ ■                     | 0.02317 (0.2051)                                                 | 36 (79.4)                                                 |

- Standard protection: 2 × KTY<sup>2)</sup>
- Full protection: 2 × KTY + 3 × PTC thermistor triplet<sup>6)</sup>
- Universal protection<sup>7)</sup>

1  
3  
5

- Delivery of stator + rotor<sup>2)4)5)</sup>

1

- Stator with cooling jacket<sup>2)3)</sup>

B

- Without rotor sleeve, for  $d_f$  see dimensions table
- With rotor sleeve, for  $d^*$  see dimensions table  
(only for 1FE1061/1FE1082/1FE1091/1FE1092/1FE1093)
- With rotor sleeve, for  $d^{**}$  see dimensions table (only for 1FE1051/1FE1052/1FE108/1FE109)
- With rotor sleeve, for  $d^{**}$  see dimensions table (only for 1FE1082)

A  
B  
C  
D

- Free cable ends, 1.5 m (4.92 ft) in length<sup>9)</sup>  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)
- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)

0  
1  
2  
3

S1 = Continuous duty

S6 = Intermittent duty:

Type 1FE104/1FE105/1FE106/1FE1082: Duty cycle time 1 min

Type 1FE1084/1FE109: Duty cycle time 2 min

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors  
Water cooling

| Motor type<br>(repeated) | Rated current for duty type <sup>1)</sup> |              | Voltage Protection<br>Module | SINAMICS S120 Motor Module                                    |                                                                                                                            |
|--------------------------|-------------------------------------------|--------------|------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
|                          | $I_{rated}$<br>S1<br>A                    | S6-40 %<br>A |                              | Required rated current<br>$I_{rated}$<br>S1 to $n_{max}$<br>A | Booksiz format<br>For additional versions<br>and components, see<br>chapter SINAMICS S120<br>drive system<br><br>Order No. |
| 1FE1041-6WM...           | 13                                        | 17.5         | —                            | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1042-6WN...           | 24                                        | 32           | —                            | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1042-6WR...           | 19                                        | 26           | —                            | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1051-6WK...           | 20                                        | 29           | —                            | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1051-6WN...           | 15                                        | 22           | —                            | 18                                                            | 6SL312 ■ - ■ TE21-8AA3                                                                                                     |
| 1FE1052-6WK...           | 37                                        | 54           | —                            | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1052-6WN...           | 30                                        | 44           | —                            | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1054-6WN...           | 60                                        | 89           | —                            | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1061-6WH...           | 21                                        | 30           | —                            | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1061-6WY...           | 8                                         | 11.5         | —                            | 9                                                             | 6SL312 ■ - ■ TE21-0AA3                                                                                                     |
| 1FE1064-6WN...           | 56                                        | 80           | VPM 120                      | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1064-6WQ...           | 43                                        | 61           | VPM 120                      | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1082-6WP...           | 65                                        | 91           | —                            | 85                                                            | 6SL312 ■ - 1 TE28-5AA3                                                                                                     |
| 1FE1082-6WQ...           | 60                                        | 84           | VPM 120                      | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1082-6WS...           | 45                                        | 62           | —                            | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1082-6WW...           | 30                                        | 42           | VPM 120                      | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1083-6WP...           | 66                                        | 92           | —                            | 85                                                            | 6SL312 ■ - 1 TE28-5AA3                                                                                                     |
| 1FE1084-6WR...           | 60                                        | 84           | VPM 120                      | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1084-6WU...           | 45                                        | 64           | VPM 120                      | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1084-6WX...           | 30                                        | 42           | VPM 120                      | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1091-6WN...           | 24                                        | 35           | —                            | 30                                                            | 6SL312 ■ - 1 TE23-0AA3                                                                                                     |
| 1FE1091-6WS...           | 15                                        | 19           | —                            | 18                                                            | 6SL312 ■ - ■ TE21-8AA3                                                                                                     |
| 1FE1092-6WN...           | 58                                        | 84           | —                            | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1092-6WR...           | 41                                        | 58           | VPM 120                      | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |
| 1FE1093-6WN...           | 83                                        | 120          | —                            | 85                                                            | 6SL312 ■ - 1 TE28-5AA3                                                                                                     |
| 1FE1093-6WS...           | 53                                        | 76           | —                            | 60                                                            | 6SL312 ■ - 1 TE26-0AA3                                                                                                     |
| 1FE1093-6WV...           | 43                                        | 60           | VPM 120                      | 45                                                            | 6SL312 ■ - 1 TE24-5AA3                                                                                                     |

|                      |   |
|----------------------|---|
| <b>Cooling:</b>      |   |
| Internal air cooling | 0 |
| External air cooling | 1 |
| <b>Motor Module:</b> |   |
| Single Motor Module  | 1 |
| Double Motor Module  | 2 |

<sup>1)</sup> Data for  $\Delta T = 105$  K, special windings on request.

<sup>2)</sup> Standard scope of supply: Encapsulated winding with  $2 \times KTY$  ( $1 \times$  spare).

<sup>3)</sup> Stator without cooling jacket, with impregnated winding on request.

<sup>4)</sup> Ordering spare parts: Stator: 1FE1...-.....-2.W.

<sup>5)</sup> Ordering spare parts: Rotor: 1FE1...-.....-3W..

<sup>6)</sup> Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.

<sup>7)</sup> Universal protection option: Full protection + NTC PT3-51F + NTC K227

<sup>8)</sup> For moment of inertia with sleeve, see Configuration Manual.

<sup>9)</sup> For cable design, see Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### Standard-type SIMOTICS M-1FE1 synchronous built-in motors Water cooling

#### Selection and ordering data

| Rated output<br>for duty type <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         | Rated torque <sup>1)</sup> |                           | Rated<br>speed | Speed,<br>max. | SIMOTICS M-1FE1<br>built-in motors<br>Standard type | Moment<br>of inertia<br>of rotor<br>without sleeve <sup>9)</sup> | Weight,<br>approx.<br>stator + rotor<br>without<br>sleeve |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------|---------------------------|----------------|----------------|-----------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------|
| $P_{rated}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         | $M_{rated}$                |                           | $n_{rated}$    | $n_{max}$      |                                                     |                                                                  |                                                           |
| S1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | S6-40 %                 | S1                         | S6-40 %                   |                |                |                                                     |                                                                  |                                                           |
| kW (HP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | kW (HP)                 | Nm (lb <sub>r</sub> -ft)   | Nm (lb <sub>r</sub> -ft)  | rpm            | rpm            |                                                     |                                                                  |                                                           |
| Order No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |                            |                           |                |                |                                                     | kgm <sup>2</sup><br>(lb <sub>r</sub> -in-s <sup>2</sup> )        | kg (lb)                                                   |
| <b>1FE1 High-Torque series, 6-pole – Water cooling</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |                            |                           |                |                |                                                     |                                                                  |                                                           |
| <b>33 (44.2)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 35 (46.9)               | 150 (1328)                 | 190 (1682)                | 2100           | 6500           | <b>1FE1113-6WU</b> ■ 1- 1 B ■ ■                     | 0.0470 (0.4160)                                                  | 53 (117)                                                  |
| <b>22 (29.5)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 24 (32.2)               | 150 (1328)                 | 190 (1682)                | 1400           | 5700           | <b>1FE1113-6WX</b> ■ 1- 1 B ■ ■                     | 0.0470 (0.4160)                                                  | 53 (117)                                                  |
| <b>41.9 (56.2)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 53.6 (71.9)             | 200 (1770)                 | 257 (2275)                | 2000           | 6500           | <b>1FE1114-6WR</b> ■ 1- 1 B ■ ■                     | 0.06239 (0.5522)                                                 | 67 (148)                                                  |
| <b>29.3 (39.3)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 37.5 (50.3)             | 200 (1770)                 | 257 (2275)                | 1400           | 6500           | <b>1FE1114-6WT</b> ■ 1- 1 B ■ ■                     | 0.06239 (0.5522)                                                 | 67 (148)                                                  |
| <b>20.9 (28.0)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 26.8 (35.9)             | 200 (1770)                 | 257 (2275)                | 1000           | 6000           | <b>1FE1114-6WW</b> ■ 1- 1 B ■ ■                     | 0.06239 (0.5522)                                                 | 67 (148)                                                  |
| <b>41.6 (55.8)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 45.0 (60.4)             | 265 (2345)                 | 340 (3009)                | 1500           | 6500           | <b>1FE1115-6WT</b> ■ 1- 1 B C ■                     | 0.078 (0.690)                                                    | 81 (179)                                                  |
| <b>37.7 (50.5)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 48.3 (64.8)             | 300 (2655)                 | 385 (3408)                | 1200           | 6500           | <b>1FE1116-6WR</b> ■ 1- 1 B ■ ■                     | 0.09285 (0.8218)                                                 | 92 (203)                                                  |
| <b>28.3 (37.9)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 36.2 (48.5)             | 300 (2655)                 | 385 (3408)                | 900            | 5500           | <b>1FE1116-6WT</b> ■ 1- 1 B ■ ■                     | 0.09285 (0.8218)                                                 | 92 (203)                                                  |
| <b>22 (29.5)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 28 (37.5)               | 300 (2655)                 | 385 (3408)                | 700            | 4000           | <b>1FE1116-6WW</b> ■ 1- 1 B ■ ■                     | 0.09285 (0.8218)                                                 | 92 (203)                                                  |
| <b>1FE1 High-Torque series, 8-pole – Water cooling</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |                            |                           |                |                |                                                     |                                                                  |                                                           |
| <b>63 (84.5)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 80 (107)                | 430 (3806)                 | 620 (5487)                | 1400           | 6500           | <b>1FE1144-8WL</b> ■ 1- 1 B ■ ■                     | 0.11447 (1.032)                                                  | 84.5 (186)                                                |
| <b>104 (139.4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 125 (168) <sup>2)</sup> | 585 (5188)                 | 795 (7036) <sup>2)</sup>  | 1700           | 8000           | <b>1FE1145-8WN</b> ■ 1- 1 B ■ ■                     | 0.21636 (1.9148) <sup>11)</sup>                                  | 117 (258)                                                 |
| <b>79.6 (106.7)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 97 (130)                | 585 (5188)                 | 795 (7036)                | 1300           | 6000           | <b>1FE1145-8WQ</b> ■ 1- 1 B ■ ■                     | 0.21636 (1.9148) <sup>11)</sup>                                  | 117 (258)                                                 |
| <b>67.4 (90.4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 80 (107)                | 585 (5188)                 | 795 (7036)                | 1100           | 5000           | <b>1FE1145-8WS</b> ■ 1- 1 B ■ ■                     | 0.21636 (1.9148) <sup>11)</sup>                                  | 117 (258)                                                 |
| <b>103 (138.1)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 124 (166) <sup>2)</sup> | 820 (7258)                 | 1110 (9824) <sup>2)</sup> | 1200           | 5500           | <b>1FE1147-8WN</b> ■ 1- 1 B ■ ■                     | 0.28823 (2.5508) <sup>11)</sup>                                  | 155 (342)                                                 |
| <b>81.6 (109.4)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 96 (129)                | 820 (7258)                 | 1110 (9824)               | 950            | 4200           | <b>1FE1147-8WQ</b> ■ 1- 1 B ■ ■                     | 0.28823 (2.5508) <sup>11)</sup>                                  | 155 (342)                                                 |
| <b>64.4 (86.3)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 80 (107)                | 820 (7258)                 | 1110 (9824)               | 750            | 3500           | <b>1FE1147-8WS</b> ■ 1- 1 B ■ ■                     | 0.28823 (2.5508) <sup>11)</sup>                                  | 155 (342)                                                 |
| <ul style="list-style-type: none"> <li>Standard protection: 2 × KTY<sup>3)</sup></li> <li>Full protection: 2 × KTY + 3 × PTC thermistor triplet<sup>7)</sup></li> <li>Universal protection<sup>8)</sup></li> </ul>                                                                                                                                                                                                                                                                                                                                        |                         |                            |                           |                |                | 1<br>3<br>5                                         |                                                                  |                                                           |
| • Delivery of stator + rotor <sup>3)5)6)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |                            |                           |                |                | 1                                                   |                                                                  |                                                           |
| • Stator with cooling jacket <sup>3)4)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         |                            |                           |                |                | B                                                   |                                                                  |                                                           |
| <ul style="list-style-type: none"> <li>Without rotor sleeve (only for 1FE1113/1FE1114/1FE1115/1FE1116/1FE1144)</li> <li>With rotor sleeve, for <math>\alpha^*</math> see dimensions table (only for 1FE1114/1FE1116)</li> <li>With rotor sleeve, for <math>\alpha^{**}</math> see dimensions table (not for 1FE1113)</li> <li>With rotor sleeve, for <math>\alpha^{**}</math> see dimensions table (only for 1FE1113/1FE1145/1FE1147)</li> <li>With rotor sleeve, for <math>\alpha^{**}</math> see dimensions table (only for 1FE1113/1FE1145)</li> </ul> |                         |                            |                           |                |                |                                                     | A<br>B<br>C<br>D<br>E                                            |                                                           |
| <ul style="list-style-type: none"> <li>Free cable ends, 1.5 m (4.92 ft) in length<sup>10)</sup></li> <li>Cable outlet at larger outer diameter of cooling jacket</li> <li>Cable outlet at smaller outer diameter of cooling jacket (on request)</li> </ul>                                                                                                                                                                                                                                                                                                |                         |                            |                           |                |                |                                                     | 0<br>1                                                           |                                                           |
| <ul style="list-style-type: none"> <li>Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)</li> <li>Cable outlet at larger outer diameter of cooling jacket</li> <li>Cable outlet at smaller outer diameter of cooling jacket (on request)</li> </ul>                                                                                                                                                                                                                                                                                |                         |                            |                           |                |                |                                                     | 2<br>3                                                           |                                                           |

S1 = Continuous duty

S6 = Intermittent duty:

Type 1FE111/1FE114: Duty cycle time 2 min

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors  
Water cooling

| Motor type<br>(repeated) | Rated current for duty type <sup>1)</sup> |                   | Voltage Protection<br>Module | SINAMICS S120 Motor Module |                                                                                                                |
|--------------------------|-------------------------------------------|-------------------|------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------|
|                          |                                           |                   |                              | Required rated current     | Booksize format<br><br>For additional versions<br>and components, see<br>chapter SINAMICS S120<br>drive system |
|                          | $I_{\text{rated}}$<br>S1<br>A             | S6-40 %<br>A      |                              |                            |                                                                                                                |
|                          |                                           |                   |                              |                            |                                                                                                                |
| 1FE1113-6WU...           | 60                                        | 91                | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                         |
| 1FE1113-6WX...           | 43                                        | 62                | VPM 120                      | 45                         | 6SL312 ■ - 1 TE24-5AA3                                                                                         |
| 1FE1114-6WR...           | 108                                       | 160               | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                         |
| 1FE1114-6WT...           | 84                                        | 123               | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                         |
| 1FE1114-6WW...           | 58                                        | 85                | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                         |
| 1FE1115-6WT...           | 85                                        | 123               | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                         |
| 1FE1116-6WR...           | 109                                       | 160               | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                         |
| 1FE1116-6WT...           | 84                                        | 123               | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                         |
| 1FE1116-6WW...           | 60                                        | 87                | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                         |
|                          |                                           |                   |                              |                            |                                                                                                                |
| 1FE1144-8WL...           | 133                                       | 193               | VPM 200                      | 200                        | 6SL312 ■ - 1 TE32-0AA3                                                                                         |
| 1FE1145-8WN...           | 200                                       | 290 <sup>2)</sup> | VPM 200                      | 200                        | 6SL312 ■ - 1 TE32-0AA3                                                                                         |
| 1FE1145-8WQ...           | 158                                       | 230               | VPM 200                      | 200                        | 6SL312 ■ - 1 TE32-0AA3                                                                                         |
| 1FE1145-8WS...           | 130                                       | 188               | VPM 200                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                         |
| 1FE1147-8WN...           | 200                                       | 290 <sup>2)</sup> | VPM 200                      | 200                        | 6SL312 ■ - 1 TE32-0AA3                                                                                         |
| 1FE1147-8WS...           | 158                                       | 230               | VPM 200                      | 200                        | 6SL312 ■ - 1 TE32-0AA3                                                                                         |
| 1FE1147-8WS...           | 130                                       | 190               | VPM 200                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                         |
|                          |                                           |                   |                              | Cooling:                   |                                                                                                                |
|                          |                                           |                   |                              | Internal air cooling       | 0                                                                                                              |
|                          |                                           |                   |                              | External air cooling       | 1                                                                                                              |
|                          |                                           |                   |                              | Motor Module:              |                                                                                                                |
|                          |                                           |                   |                              | Single Motor Module        | 1                                                                                                              |

<sup>1)</sup> Data for  $\Delta T = 105$  K, special windings on request.

<sup>2)</sup> Observe the Motor Module limit.

<sup>3)</sup> Standard scope of supply: Encapsulated winding with  $2 \times KTY$  ( $1 \times$  spare).

<sup>4)</sup> Stator without cooling jacket, with impregnated winding on request.

<sup>5)</sup> Ordering spare parts: Stator: 1FE1...-.....-2.W.

<sup>6)</sup> Ordering spare parts: Rotor: 1FE1...-.....-3.W..

<sup>7)</sup> Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.

<sup>8)</sup> Universal protection option: Full protection + NTC PT3-51F + NTC K227

<sup>9)</sup> For moment of inertia with sleeve, see Configuration Manual.

<sup>10)</sup> For cable design, see Configuration Manual.

<sup>11)</sup> Moment of inertia for rotor with rotor sleeve  $d^{**}$ .



# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### Standard-type SIMOTICS M-1FE1 synchronous built-in motors Water cooling

#### Selection and ordering data

| Rated output<br>for duty type <sup>1)</sup>           |             | Rated torque <sup>1)</sup> |                          | Rated<br>speed | Speed,<br>max.      | SIMOTICS M-1FE1<br>built-in motors<br>Standard type | Moment<br>of inertia<br>of rotor                          | Weight,<br>approx.<br>stator + rotor<br>without<br>sleeve |
|-------------------------------------------------------|-------------|----------------------------|--------------------------|----------------|---------------------|-----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| $P_{rated}$                                           |             | $M_{rated}$                |                          | $n_{rated}$    | $n_{max}$           |                                                     | $J$                                                       | $m$                                                       |
| S1                                                    | S6-40 %     | S1                         | S6-40 %                  |                |                     |                                                     |                                                           |                                                           |
| kW (HP)                                               | kW (HP)     | Nm (lb <sub>f</sub> -ft)   | Nm (lb <sub>f</sub> -ft) | rpm            | rpm                 | Order No.                                           | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                                                   |
| <b>1FE1 High-Speed series, 4-pole – Water cooling</b> |             |                            |                          |                |                     |                                                     |                                                           |                                                           |
| <b>12.6 (16.9)</b>                                    | 17.6 (23.6) | 5 (44.3)                   | 7 (62)                   | 24000          | 40000               | <b>1FE1051-4HC</b> ■ 0- 1 B A ■                     | 0.00045 (0.004)                                           | 4.1 (9.0)                                                 |
| <b>6.5 (8.7)</b>                                      | 8.0 (10.7)  | 6.5 (57.5)                 | 9.0 (79.7)               | 9500           | 30000               | <b>1FE1051-4WN</b> ■ 1- 1 B A ■                     | 0.00057 (0.005)                                           | 4.2 (9.3)                                                 |
| <b>31.4 (42.1)</b>                                    | 35 (46.9)   | 12 (106)                   | 15.5 (137.2)             | 25000          | 40000 <sup>8)</sup> | <b>1FE1052-4HD</b> ■ 0- 1 B A ■                     | 0.00087 (0.007)                                           | 7.15 (15.77)                                              |
| <b>23.9 (32.0)</b>                                    | 30 (40.2)   | 12 (106)                   | 15.5 (137.2)             | 19000          | 40000 <sup>8)</sup> | <b>1FE1052-4HG</b> ■ 1- 1 B A ■                     | 0.00087 (0.007)                                           | 7.15 (15.77)                                              |
| <b>17.5 (23.1)</b>                                    | 19 (25.5)   | 13 (115)                   | 17 (151)                 | 12500          | 30000               | <b>1FE1052-4WK</b> ■ 1- 1 B A ■                     | 0.00110 (0.0097)                                          | 7.35 (16.21)                                              |
| <b>11 (15)</b>                                        | 12 (16.1)   | 13 (115)                   | 18 (159)                 | 8000           | 30000               | <b>1FE1052-4WN</b> ■ 1- 1 B A ■                     | 0.00110 (0.0097)                                          | 7.35 (16.21)                                              |
| <b>25.5 (34.2)</b>                                    | 32.5 (43.6) | 18 (159)                   | 23 (204)                 | 13500          | 40000 <sup>8)</sup> | <b>1FE1053-4HH</b> ■ 1- 1 B A ■                     | 0.00128 (0.0113)                                          | 10.2 (22.5)                                               |
| <b>23 (31)</b>                                        | 25 (33.5)   | 20 (177)                   | 27 (239)                 | 11000          | 30000               | <b>1FE1053-4WJ</b> ■ 1- 1 B A ■                     | 0.00163 (0.0144)                                          | 10.5 (23.2)                                               |
| <b>16.5 (22.1)</b>                                    | 18 (24.1)   | 20 (177)                   | 27 (239)                 | 7900           | 30000               | <b>1FE1053-4WN</b> ■ 1- 1 B A ■                     | 0.00163 (0.0144)                                          | 10.5 (23.2)                                               |
| <b>28.5 (38.2)</b>                                    | 28.5 (38.2) | 28 (248)                   | 40 (354)                 | 9700           | 24000               | <b>1FE1072-4WH</b> ■ 1- 1 B A ■                     | 0.00287 (0.0254)                                          | 11.2 (24.7)                                               |
| <b>20 (27)</b>                                        | 20 (26.8)   | 28 (248)                   | 40 (354)                 | 6800           | 24000               | <b>1FE1072-4WL</b> ■ 1- 1 B A ■                     | 0.00287 (0.0254)                                          | 11.2 (24.7)                                               |
| <b>16 (21)</b>                                        | 16 (21.5)   | 28 (248)                   | 40 (354)                 | 5500           | 24000               | <b>1FE1072-4WN</b> ■ 1- 1 B A ■                     | 0.00287 (0.0254)                                          | 11.2 (24.7)                                               |
| <b>30 (40)</b>                                        | 30 (40.2)   | 42 (372)                   | 59 (522)                 | 6800           | 24000               | <b>1FE1073-4WN</b> ■ 1- 1 B A ■                     | 0.00430 (0.0381)                                          | 16 (35.3)                                                 |
| <b>15 (20)</b>                                        | 15 (20.1)   | 45 (398)                   | 64 (566)                 | 3200           | 14000               | <b>1FE1073-4WT</b> ■ 1- 1 B A ■                     | 0.00430 (0.0381)                                          | 16 (35.3)                                                 |
| <b>48 (64)</b>                                        | 51 (68.4)   | 60 (531)                   | 86 (761)                 | 7700           | 20000               | <b>1FE1074-4WM</b> ■ 1- 1 B A ■                     | 0.00573 (0.0507)                                          | 21 (46.3)                                                 |
| <b>41 (55)</b>                                        | 41 (55)     | 56 (496)                   | 79 (699)                 | 7000           | 20000               | <b>1FE1074-4WN</b> ■ 1- 1 B A ■                     | 0.00573 (0.0507)                                          | 21 (46.3)                                                 |
| <b>25.8 (34.6)</b>                                    | 28 (37.5)   | 60 (531)                   | 85 (752)                 | 4100           | 18000               | <b>1FE1074-4WT</b> ■ 1- 1 B A ■                     | 0.00573 (0.0507)                                          | 21 (46.3)                                                 |
| <b>15.5 (20.8)</b>                                    | 15.5 (20.8) | 42 (372)                   | 55 (487)                 | 3500           | 20000               | <b>1FE1082-4WN</b> ■ 1- 1 B A ■                     | 0.00559 (0.0495)                                          | 15.1 (33.3)                                               |
| <b>8.8 (11.8)</b>                                     | 8.8 (11.8)  | 42 (372)                   | 55 (487)                 | 2000           | 11000               | <b>1FE1082-4WR</b> ■ 1- 1 B A ■                     | 0.00559 (0.0495)                                          | 15.1 (33.3)                                               |
| <b>28 (38)</b>                                        | 28 (37.5)   | 63 (558)                   | 83 (735)                 | 4200           | 20000               | <b>1FE1083-4WN</b> ■ 1- 1 B A ■                     | 0.00847 (0.0750)                                          | 22 (48.5)                                                 |
| <b>38 (51)</b>                                        | 38 (51)     | 84 (744)                   | 110 (974)                | 4300           | 20000               | <b>1FE1084-4WN</b> ■ 1- 1 B A ■                     | 0.01118 (0.0989)                                          | 28.5 (62.9)                                               |
| <b>35 (47)</b>                                        | 35 (46.9)   | 78 (690)                   | 110 (974)                | 4300           | 20000               | <b>1FE1084-4WP</b> ■ 1- 1 B A ■                     | 0.01118 (0.0989)                                          | 28.5 (62.9)                                               |
| <b>30 (40)</b>                                        | 30 (40.2)   | 84 (743)                   | 110 (974)                | 3400           | 18000               | <b>1FE1084-4WQ</b> ■ 1- 1 B A ■                     | 0.01118 (0.0989)                                          | 28.5 (62.9)                                               |
| <b>26.4 (35.4)</b>                                    | 26.4 (35.4) | 84 (743)                   | 110 (974)                | 3000           | 15000               | <b>1FE1084-4WT</b> ■ 1- 1 B A ■                     | 0.01118 (0.0989)                                          | 28.5 (62.9)                                               |
| <b>38 (51)</b>                                        | 38 (51)     | 105 (929)                  | 138 (1221)               | 3500           | 18000               | <b>1FE1085-4WN</b> ■ 1- 1 B A ■                     | 0.01388 (0.1228)                                          | 35 (77.2)                                                 |
| <b>33 (44)</b>                                        | 33 (44.3)   | 105 (929)                  | 140 (1239)               | 3000           | 16000               | <b>1FE1085-4WQ</b> ■ 1- 1 B A ■                     | 0.01388 (0.1228)                                          | 35 (77.2)                                                 |
| <b>24 (32)</b>                                        | 24 (32.2)   | 105 (929)                  | 140 (1239)               | 2200           | 12000               | <b>1FE1085-4WT</b> ■ 1- 1 B A ■                     | 0.01388 (0.1228)                                          | 35 (77.2)                                                 |

- Standard protection: 2 × KTY<sup>2)</sup>
- Full protection: 2 × KTY + 3 × PTC thermistor triplet<sup>6)</sup>
- Universal protection<sup>7)</sup>

1  
3  
5

- Delivery of stator + rotor<sup>2)4)5)</sup>

1

- Stator with cooling jacket<sup>2)3)</sup>

B

- Without rotor sleeve

A

- Free cable ends, 1.5 m (4.92 ft) in length<sup>9)</sup>  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)

0  
1

- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)

2  
3

S1 = Continuous duty

S6 = Intermittent duty:

Type 1FE105/1FE107: Duty cycle time 1 min

Type 1FE108: Duty cycle time 2 min



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors  
Water cooling

| Motor type<br>(repeated) | Rated current for duty type <sup>1)</sup> |              | Voltage Protection<br>Module | SINAMICS S120 Motor Module |                                                                                                            |
|--------------------------|-------------------------------------------|--------------|------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------|
|                          |                                           |              |                              | Required rated current     | Booksize format<br>For additional versions<br>and components, see<br>chapter SINAMICS S120<br>drive system |
|                          | $I_{\text{rated}}$<br>S1<br>A             | S6-40 %<br>A |                              |                            |                                                                                                            |
|                          |                                           |              |                              |                            | Order No.                                                                                                  |
| 1FE1051-4HC...           | 25                                        | 34.5         | –                            | 45                         | 6SL312 ■ - 1 TE24-5AA3                                                                                     |
| 1FE1051-4WN...           | 12                                        | 17           | VPM 120                      | 30                         | 6SL312 ■ - 1 TE23-0AA3                                                                                     |
| 1FE1052-4HD...           | 57                                        | 75           | –                            | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1052-4HG...           | 44                                        | 59           | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1052-4WK...           | 30                                        | 39           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1052-4WN...           | 20                                        | 26           | VPM 120                      | 45                         | 6SL312 ■ - 1 TE24-5AA3                                                                                     |
| 1FE1053-4HH...           | 46                                        | 63           | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1053-4WJ...           | 36                                        | 49           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1053-4WN...           | 29                                        | 38           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1072-4WH...           | 64                                        | 96           | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1072-4WL...           | 45                                        | 68           | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1072-4WN...           | 36                                        | 54           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1073-4WN...           | 65                                        | 97           | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1073-4WT...           | 30                                        | 44           | VPM 120                      | 30                         | 6SL312 ■ - 1 TE23-0AA3                                                                                     |
| 1FE1074-4WM...           | 97                                        | 144          | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1074-4WN...           | 91                                        | 136          | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1074-4WT...           | 53                                        | 77           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1082-4WN...           | 42                                        | 60           | VPM 120                      | 45                         | 6SL312 ■ - 1 TE24-5AA3                                                                                     |
| 1FE1082-4WR...           | 24                                        | 34           | VPM 120                      | 30                         | 6SL312 ■ - 1 TE23-0AA3                                                                                     |
| 1FE1083-4WN...           | 77                                        | 110          | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1084-4WN...           | 105                                       | 150          | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1084-4WP...           | 79                                        | 120          | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1084-4WQ...           | 83                                        | 119          | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1084-4WT...           | 60                                        | 85           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
| 1FE1085-4WN...           | 105                                       | 150          | VPM 120                      | 132                        | 6SL312 ■ - 1 TE31-3AA3                                                                                     |
| 1FE1085-4WQ...           | 85                                        | 120          | VPM 120                      | 85                         | 6SL312 ■ - 1 TE28-5AA3                                                                                     |
| 1FE1085-4WT...           | 60                                        | 85           | VPM 120                      | 60                         | 6SL312 ■ - 1 TE26-0AA3                                                                                     |
|                          |                                           |              |                              | Cooling:                   |                                                                                                            |
|                          |                                           |              |                              | Internal air cooling       | 0                                                                                                          |
|                          |                                           |              |                              | External air cooling       | 1                                                                                                          |
|                          |                                           |              |                              | Motor Module:              |                                                                                                            |
|                          |                                           |              |                              | Single Motor Module        | 1                                                                                                          |

<sup>1)</sup> Data for  $\Delta T = 105 \text{ K}$ , special windings on request.

<sup>2)</sup> Standard scope of supply: Encapsulated winding with  $2 \times KTY (1 \times \text{spare})$ .

<sup>3)</sup> Stator without cooling jacket, with impregnated winding on request.

<sup>4)</sup> Ordering spare parts: Stator: 1FE1...-.....-2.W.

<sup>5)</sup> Ordering spare parts: Rotor: 1FE1...-.....-3W..

<sup>6)</sup> Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.

<sup>7)</sup> Universal protection option: Full protection + NTC PT3-51F + NTC K227

<sup>8)</sup> Series reactor required, see Configuration Manual.

<sup>9)</sup> For cable design, see Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### Standard-type SIMOTICS M-1FE1 synchronous built-in motors Water cooling

#### Selection and ordering data

| Rated output<br>for duty type <sup>1)</sup>           |                         | Rated torque <sup>1)</sup> |                          | Rated<br>speed     | Speed,<br>max.   | SIMOTICS M-1FE1<br>built-in motors<br>Standard type | Moment<br>of inertia<br>of rotor                          | Weight,<br>approx.<br>stator + rotor<br>without<br>sleeve |
|-------------------------------------------------------|-------------------------|----------------------------|--------------------------|--------------------|------------------|-----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| $P_{\text{rated}}$                                    |                         | $M_{\text{rated}}$         |                          | $n_{\text{rated}}$ | $n_{\text{max}}$ |                                                     | $J$                                                       |                                                           |
| S1                                                    | S6-40 %                 | S1                         | S6-40 %                  |                    |                  |                                                     |                                                           |                                                           |
| kW (HP)                                               | kW (HP)                 | Nm (lb <sub>f</sub> -ft)   | Nm (lb <sub>f</sub> -ft) | rpm                | rpm              | Order No.                                           | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)                                                   |
| <b>1FE1 High-Speed series, 4-pole – Water cooling</b> |                         |                            |                          |                    |                  |                                                     |                                                           |                                                           |
| <b>16 (21)</b>                                        | 16 (21)                 | 45 (398)                   | 60 (531)                 | 3400               | 18000            | <b>1FE1092-4WP</b> ■ 1- 1 B R ■                     | 0.00916 (0.0811) <sup>9)</sup>                            | 30 (66.2)                                                 |
| <b>10.5 (14.1)</b>                                    | 10.5 (14.1)             | 50 (443)                   | 64 (310)                 | 2000               | 10000            | <b>1FE1092-4WV</b> ■ 1- 1 B R ■                     | 0.00916 (0.0811) <sup>9)</sup>                            | 30 (66.2)                                                 |
| <b>27.5 (36.9)</b>                                    | 27.5 (36.9)             | 75 (664)                   | 103 (912)                | 3500               | 18000            | <b>1FE1093-4WM</b> ■ 1- 1 B ■ ■                     | 0.01350 (0.1195) <sup>9)</sup>                            | 41.6 (91.7)                                               |
| <b>26 (35)</b>                                        | 26 (35)                 | 75 (664)                   | 103 (912)                | 3300               | 16000            | <b>1FE1093-4WN</b> ■ 1- 1 B ■ ■                     | 0.01350 (0.1195) <sup>9)</sup>                            | 41.6 (91.7)                                               |
| <b>35 (47)</b>                                        | 35 (47)                 | 75 (664)                   | 103 (912)                | 4500               | 18000            | <b>1FE1093-4WH</b> ■ 1- 1 B ■ ■                     | 0.01350 (0.1195) <sup>9)</sup>                            | 41.6 (91.7)                                               |
| <b>46 (62)</b>                                        | 46 (62)                 | 100 (885)                  | 137 (1213)               | 4400               | 18000            | <b>1FE1094-4WK</b> ■ 1- 1 B ■ ■                     | 0.01808 (0.1600) <sup>9)</sup>                            | 48.5 (107)                                                |
| <b>40 (54)</b>                                        | 40 (54)                 | 100 (885)                  | 137 (1213)               | 3800               | 18000            | <b>1FE1094-4WL</b> ■ 1- 1 B ■ ■                     | 0.01808 (0.1600) <sup>9)</sup>                            | 48.5 (107)                                                |
| <b>26 (35)</b>                                        | 26 (35)                 | 100 (885)                  | 125 (1106)               | 2500               | 13000            | <b>1FE1094-4WS</b> ■ 1- 1 B ■ ■                     | 0.01808 (0.1600) <sup>9)</sup>                            | 48.5 (107)                                                |
| <b>18 (24)</b>                                        | 18 (24)                 | 95 (841)                   | 118 (1044)               | 1800               | 10000            | <b>1FE1094-4WU</b> ■ 1- 1 B ■ ■                     | 0.01808 (0.1600) <sup>9)</sup>                            | 48.5 (107)                                                |
| <b>46 (62)</b>                                        | 46 (62)                 | 125 (1106)                 | 170 (1505)               | 3500               | 18000            | <b>1FE1095-4WN</b> ■ 1- 1 B ■ ■                     | 0.02242 (0.1984) <sup>9)</sup>                            | 56.8 (125)                                                |
| <b>52 (70)</b>                                        | 52 (70)                 | 150 (1328)                 | 206 (1823)               | 3300               | 16000            | <b>1FE1096-4WN</b> ■ 1- 1 B ■ ■                     | 0.02700 (0.2390) <sup>9)</sup>                            | 64.2 (142)                                                |
| <b>38.5 (51.6)</b>                                    | 45 (60)                 | 102 (903)                  | 142 (1257)               | 3600               | 16000            | <b>1FE1103-4WN</b> ■ 1- 1 B A ■                     | 0.01589 (0.1406)                                          | 34 (75)                                                   |
| <b>54 (72)</b>                                        | 64 (86)                 | 136 (1204)                 | 190 (1682)               | 3800               | 16000            | <b>1FE1104-4WN</b> ■ 1- 1 B A ■                     | 0.02098 (0.1857)                                          | 42.5 (93.7)                                               |
| <b>53.4 (71.6)</b>                                    | 64 (86)                 | 170 (1505)                 | 236 (2089)               | 3000               | 16000            | <b>1FE1105-4WN</b> ■ 1- 1 B A ■                     | 0.02608 (0.2309)                                          | 52 (115)                                                  |
| <b>72.6 (97.3)</b>                                    | 85 (114)                | 204 (1806)                 | 283 (2505)               | 3400               | 16000            | <b>1FE1106-4WN</b> ■ 1- 1 B A ■                     | 0.03147 (0.2785)                                          | 61.5 (136)                                                |
| <b>62 (83)</b>                                        | 66 (89)                 | 204 (1806)                 | 270 (2390)               | 2900               | 14000            | <b>1FE1106-4WR</b> ■ 1- 1 B A ■                     | 0.03147 (0.2785)                                          | 61.5 (136)                                                |
| <b>56.5 (75.7)</b>                                    | 60 (80)                 | 200 (1770)                 | 270 (2390)               | 2700               | 12500            | <b>1FE1106-4WS</b> ■ 1- 1 B A ■                     | 0.03147 (0.2785)                                          | 61.5 (136)                                                |
| <b>25 (34)</b>                                        | 30 (40)                 | 200 (1770)                 | 270 (2390)               | 1200               | 6000             | <b>1FE1106-4WY</b> ■ 1- 1 B A ■                     | 0.03147 (0.2785)                                          | 61.5 (136)                                                |
| <b>63 (85)</b>                                        | 75 (101)                | 200 (1770)                 | 275 (2434)               | 3000               | 14000            | <b>1FE1124-4WN</b> ■ 1- 1 B A ■                     | 0.05112 (0.4524)                                          | 62.6 (138)                                                |
| <b>78.5 (105.2)</b>                                   | 90 (121)                | 250 (2213)                 | 345 (3054)               | 3000               | 14000            | <b>1FE1125-4WN</b> ■ 1- 1 B A ■                     | 0.06337 (0.5608)                                          | 76 (168)                                                  |
| <b>65.5 (87.8)</b>                                    | 82 (110)                | 250 (2213)                 | 345 (3054)               | 2500               | 12500            | <b>1FE1125-4WP</b> ■ 1- 1 B A ■                     | 0.06337 (0.5608)                                          | 76 (168)                                                  |
| <b>94 (126)</b>                                       | 112 (150) <sup>2)</sup> | 300 (2655)                 | 410 (3629) <sup>2)</sup> | 3000               | 14000            | <b>1FE1126-4WN</b> ■ 1- 1 B A ■                     | 0.07604 (0.6729)                                          | 90 (198)                                                  |
| <b>78.5 (105.2)</b>                                   | 100 (134) <sup>2)</sup> | 300 (2655)                 | 410 (3629) <sup>2)</sup> | 2500               | 12500            | <b>1FE1126-4WP</b> ■ 1- 1 B A ■                     | 0.07604 (0.6729)                                          | 90 (198)                                                  |
| <b>63 (85)</b>                                        | 82 (110)                | 300 (2655)                 | 410 (3629)               | 2000               | 10000            | <b>1FE1126-4WQ</b> ■ 1- 1 B A ■                     | 0.07604 (0.6729)                                          | 90 (198)                                                  |

- Standard protection: 2 × KTY<sup>3)</sup>
- Full protection: 2 × KTY + 3 × PTC thermistor triplet<sup>7)</sup>
- Universal protection<sup>8)</sup>

1  
3  
5

- Delivery of stator + rotor<sup>3)5)6)</sup>

1

- Stator with cooling jacket<sup>3)4)</sup>

B

- Without rotor sleeve
- Without rotor sleeve,  $d_f = 80$  mm (3.15 in) for 1FE109.-4W... only

A  
R

- Free cable ends, 1.5 m (4.92 ft) in length<sup>10)</sup>  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)
- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)  
Cable outlet at larger outer diameter of cooling jacket  
Cable outlet at smaller outer diameter of cooling jacket (on request)

0  
1  
2  
3

S1 = Continuous duty  
S6 = Intermittent duty:  
Type 1FE109/1FE110/1FE112: Duty cycle time 2 min

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors  
Water cooling

| Motor type<br>(repeated) | Rated current for duty type <sup>1)</sup> |                   | Voltage Protection<br>Module | SINAMICS S120 Motor Module |                                                                                         |
|--------------------------|-------------------------------------------|-------------------|------------------------------|----------------------------|-----------------------------------------------------------------------------------------|
|                          |                                           |                   |                              | Required rated current     | Booksize format                                                                         |
|                          |                                           |                   |                              | <i>I</i> <sub>rated</sub>  | For additional versions<br>and components, see<br>chapter SINAMICS S120<br>drive system |
|                          | S1                                        | S6-40 %           |                              | S1                         |                                                                                         |
| A                        | A                                         | A                 | A                            | Order No.                  |                                                                                         |
|                          |                                           |                   |                              |                            |                                                                                         |
| 1FE1092-4WP...           | 41                                        | 58                | VPM 120                      | 45                         | 6SL312 ■-1 TE24-5AA3                                                                    |
| 1FE1092-4WV...           | 24                                        | 35                | VPM 120                      | 30                         | 6SL312 ■-1 TE23-0AA3                                                                    |
| 1FE1093-4WM...           | 64                                        | 92                | VPM 120                      | 85                         | 6SL312 ■-1 TE28-5AA3                                                                    |
| 1FE1093-4WN...           | 60                                        | 86                | VPM 120                      | 60                         | 6SL312 ■-1 TE26-0AA3                                                                    |
| 1FE1093-4WH...           | 83                                        | 120               | VPM 120                      | 85                         | 6SL312 ■-1 TE28-5AA3                                                                    |
| 1FE1094-4WK...           | 108                                       | 156               | VPM 120                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1094-4WL...           | 90                                        | 130               | VPM 120                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1094-4WS...           | 60                                        | 85                | VPM 120                      | 60                         | 6SL312 ■-1 TE26-0AA3                                                                    |
| 1FE1094-4WU...           | 45                                        | 64                | VPM 120                      | 45                         | 6SL312 ■-1 TE24-5AA3                                                                    |
| 1FE1095-4WN...           | 108                                       | 156               | VPM 120                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1096-4WN...           | 120                                       | 173               | VPM 120                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1103-4WN...           | 84                                        | 127               | VPM 120                      | 85                         | 6SL312 ■-1 TE28-5AA3                                                                    |
| 1FE1104-4WN...           | 120                                       | 181               | VPM 200                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1105-4WN...           | 120                                       | 180               | VPM 200                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1106-4WN...           | 159                                       | 240               | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1106-4WR...           | 128                                       | 184               | VPM 200                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1106-4WS...           | 120                                       | 170               | VPM 200                      | 132                        | 6SL312 ■-1 TE31-3AA3                                                                    |
| 1FE1106-4WY...           | 60                                        | 85                | VPM 120                      | 60                         | 6SL312 ■-1 TE26-0AA3                                                                    |
| 1FE1124-4WN...           | 135                                       | 198               | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1125-4WN...           | 162                                       | 240               | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1125-4WP...           | 147                                       | 215               | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1126-4WN...           | 200                                       | 295 <sup>2)</sup> | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1126-4WP...           | 180                                       | 265 <sup>2)</sup> | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
| 1FE1126-4WQ...           | 147                                       | 215               | VPM 200                      | 200                        | 6SL312 ■-1 TE32-0AA3                                                                    |
|                          |                                           |                   |                              | Cooling:                   |                                                                                         |
|                          |                                           |                   |                              | Internal air cooling       | 0                                                                                       |
|                          |                                           |                   |                              | External air cooling       | 1                                                                                       |
|                          |                                           |                   |                              | Motor Module:              |                                                                                         |
|                          |                                           |                   |                              | Single Motor Module        | 1                                                                                       |

<sup>1)</sup> Data for  $\Delta T = 105$  K, special windings on request.

<sup>2)</sup> Observe the Motor Module limit.

<sup>3)</sup> Standard scope of supply: Encapsulated winding with  $2 \times KTY$  ( $1 \times$  spare).

<sup>4)</sup> Stator without cooling jacket, with impregnated winding on request.

<sup>5)</sup> Ordering spare parts: Stator: 1FE1...-.....-2.W.

<sup>6)</sup> Ordering spare parts: Rotor: 1FE1...-.....-3W..

<sup>7)</sup> Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.

<sup>8)</sup> Universal protection option: Full protection + NTC PT3-51F + NTC K227

<sup>9)</sup> For moment of inertia for version R without rotor sleeve  $d_f = 80$  mm (3.15 in), see Configuration Manual.

<sup>10)</sup> For power version, see Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH2 asynchronous built-in motors for direct drive – Water cooling

#### Overview



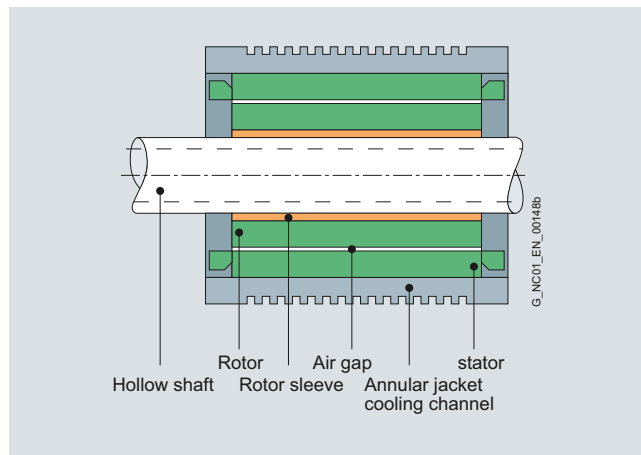
Active parts (rotor and stator) of SIMOTICS M-1PH2 asynchronous built-in motors

SIMOTICS M-1PH2 built-in motors for turning machines are liquid-cooled squirrel-cage AC asynchronous motors. These built-in motors have been specially developed for variable-speed operation of main spindles on turning machines.

#### Benefits

- Compact design obtained by dispensing with mechanical components such as coupling, belt drive, gearbox and spindle encoder
- High power density as a result of liquid cooling
- The absence of drive transverse forces permits extremely high accuracy on the workpiece thanks to smooth, accurate spindle motion even at very low speeds.
- Extremely short ramp-up and braking times
- Full rated torque is continuously available, even at standstill
- Simple servicing by replacing complete motor spindles
- Increased rigidity of the spindle drive, achieved by mounting the motor components between the main spindle bearings
- C-axis compatibility with hollow-shaft measuring system mounted on the spindle
- Low noise level due to absence of machine elements
- Torque is transmitted to the spindle mechanically without backlash by means of a cylindrical stepped press fit. The rotor is mounted on the spindle by thermal shrinking. The bond can be released by pressure-oil injection without affecting the joint surfaces.
- The rotor with sleeve is pre-balanced and can be removed and subsequently remounted
- The rotor with sleeve is finished-machined – that is, the rotor outer diameter need not be finished after mounting.

#### Design



#### Application

SIMOTICS M-1PH2 built-in motors are used for machines requiring an extremely high standard of machining quality, accuracy and running smoothness.

- Turning machines
- Grinding machines

#### Technical specifications

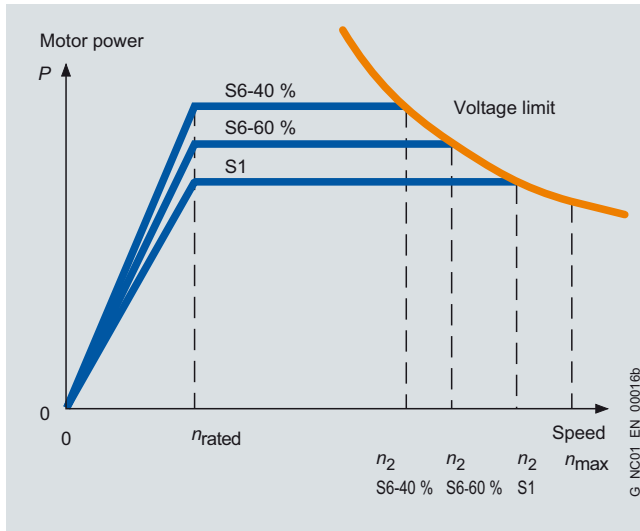
|                                                                                     |                                                                                                                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                 | SIMOTICS M-1PH2 built-in motor                                                                                                                    |
| <b>Coolant inlet temperature</b>                                                    | Because of the formation of condensation, we recommend a coolant inlet temperature of approx. 25 °C (77 °F), depending on the ambient conditions. |
| <b>Cooling water pressure at inlet, max.</b>                                        | 7 bar                                                                                                                                             |
| <b>Coolant flow rate (water)</b>                                                    | 8 l/min (2.11 US gallons/min.)                                                                                                                    |
| <b>Connection thread</b>                                                            | Dependent on cooling unit used                                                                                                                    |
| <b>Temperature monitoring</b>                                                       | 2 KTY 84 temperature sensors in the stator winding, 1 × as reserve                                                                                |
| <b>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</b> | Temperature class 155 (F) for a coolant inlet temperature up to 25 °C (77 °F)                                                                     |
| <b>Recommended motor encoder</b>                                                    | Hollow shaft system (not included in scope of supply)                                                                                             |
| <b>Type of construction (cf. ISO)</b>                                               | Individual components: Stator, rotor                                                                                                              |
| <b>Motor connection type</b>                                                        | Free cable ends with length of 0.5 m (19.7 in) m or 1.5 m (59.1 in)                                                                               |
| <b>Balance quality of rotor in accordance with ISO 1940-1</b>                       | 1PH2093 to 1PH2118: G 2.5<br>Reference speed 3600 rpm                                                                                             |
| <b>Degree of protection in accordance with IEC 60034-5</b>                          | IP00                                                                                                                                              |
| <b>Rating plate</b>                                                                 | 1 unit enclosed separately                                                                                                                        |

Refer to Liquid cooling for a list of cooling unit manufacturers.

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH2 asynchronous built-in motors  
for direct drive – Water cooling

## Characteristic curves

Typical speed/power graph for AC motors<sup>1)</sup>

The graph shows the typical relationship between motor speed and drive power for SIMOTICS M-1PH2 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent load and a relative duty factor of 60 % (S6-60 %) or 40 % (S6-40 %) with a maximum duty cycle time of 10 minutes.

| SIMOTICS M-1PH2 motor | Rated speed        | Attainable speed at rated power in duty type |                |                |
|-----------------------|--------------------|----------------------------------------------|----------------|----------------|
| Type                  | $n_{rated}$<br>rpm | $n_2^{2)}$<br>S1<br>rpm                      | S6-60 %<br>rpm | S6-40 %<br>rpm |
| 1PH2093               | 1500               | 4700                                         | 4200           | 3900           |
| 1PH2095               |                    | 4000                                         | 3600           | 3300           |
| 1PH2113               | 1500               | 5400                                         | 4800           | 4400           |
| 1PH2115               |                    | 4500                                         | 4100           | 3700           |
| 1PH2117               |                    | 4700                                         | 4200           | 3800           |
| 1PH2118               |                    | 5000                                         | 4500           | 4100           |

<sup>1)</sup> For further configuration information, see the SIMOTICS M-1PH2 Motors Configuration Manual.

<sup>2)</sup> Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system.  
If you are using a Smart Line Module, proceed in accordance with the SIMOTICS M-1PH2 Motors Configuration Manual.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH2 asynchronous built-in motors for direct drive – Water cooling

#### Selection and ordering data

| Rated speed                                                                   | Speed, max. | Rated output for duty type <sup>1)</sup> |             |             |                               | SIMOTICS M-1PH2 asynchronous built-in motor for direct drive<br>Standard type | Rated torque <sup>1)</sup> |                          |
|-------------------------------------------------------------------------------|-------------|------------------------------------------|-------------|-------------|-------------------------------|-------------------------------------------------------------------------------|----------------------------|--------------------------|
|                                                                               |             | $n_{rated}$                              | $n_{max}$   | $P_{rated}$ |                               |                                                                               | $M_{rated}$                |                          |
|                                                                               |             |                                          |             | S1          | S1<br>$\Delta T=105\text{ K}$ |                                                                               | S6-60 %                    | S6-40 %                  |
| rpm                                                                           | rpm         | kW (HP)                                  | kW (HP)     | kW (HP)     | kW (HP)                       | Order No.                                                                     | Nm (lb <sub>f</sub> -ft)   | Nm (lb <sub>f</sub> -ft) |
| 1PH2 water cooling – Line voltage 400 V 3 AC, operation on Active Line Module |             |                                          |             |             |                               |                                                                               |                            |                          |
| 1500                                                                          | 10000       | 7.5 (10.1)                               | 9.4 (12.6)  | 8.2 (11.0)  | 9 (12.1)                      | 1PH2093-6WF4                                                                  | 48 (35.4)                  | 60 (44.3)                |
|                                                                               |             | 10.1 (13.5)                              | 13 (17.4)   | 11 (14.8)   | 12 (16.1)                     | 1PH2095-6WF4                                                                  | 64 (47.2)                  | 83 (61.2)                |
| 1500                                                                          | 10000       | 15.1 (20.2)                              | 18.5 (24.8) | 17 (22.8)   | 19 (25.5)                     | 1PH2113-6WF4                                                                  | 95 (70.1)                  | 118 (87.0)               |
|                                                                               |             | 16.5 (22.1)                              | 21.5 (28.8) | 18.5 (24.8) | 21 (28.2)                     | 1PH2115-6WF4                                                                  | 105 (77.4)                 | 137 (101)                |
|                                                                               |             | 18.1 (24.3)                              | 23.7 (31.8) | 20.5 (27.5) | 23 (30.8)                     | 1PH2117-6WF4                                                                  | 115 (84.8)                 | 151 (111)                |
|                                                                               |             | 23.6 (31.6)                              | 30.9 (41.4) | 26 (34.9)   | 29.5 (39.6)                   | 1PH2118-6WF4                                                                  | 146 (108)                  | 197 (145)                |
| Free cable ends:                                                              |             |                                          |             |             |                               |                                                                               |                            |                          |
| Length: 1.5 m (59.1 in)                                                       |             |                                          |             |             |                               | 1                                                                             |                            |                          |
| Length: 0.5 m (19.7 in) (preferred type)                                      |             |                                          |             |             |                               | 2                                                                             |                            |                          |

<sup>1)</sup> Data for  $\Delta T = 70\text{ K}$ , unless specified otherwise.

# Main spindle motors

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH2 asynchronous built-in motors for direct drive – Water cooling

| Motor type<br>(repeated) | Moment of inertia<br>of rotor                             | Weight<br>(rotor and stator),<br>approx. | Rated current<br>for duty type <sup>1)</sup> |         |         | SINAMICS S120 Motor Module                                      |                                                                                                                      |
|--------------------------|-----------------------------------------------------------|------------------------------------------|----------------------------------------------|---------|---------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                          | <i>J</i>                                                  | <i>m</i>                                 | <i>I</i> <sub>rated</sub>                    |         |         | <i>I</i> <sub>rated</sub>                                       | <b>Booksize format</b><br>For additional versions<br>and components,<br>see chapter<br>SINAMICS S120<br>drive system |
|                          |                                                           |                                          | S1                                           | S6-60 % | S6-40 % |                                                                 |                                                                                                                      |
|                          | kgm <sup>2</sup><br>(lb <sub>r</sub> -in-s <sup>2</sup> ) | kg (lb)                                  | A                                            | A       | A       | A                                                               | Order No.                                                                                                            |
|                          |                                                           |                                          |                                              |         |         |                                                                 |                                                                                                                      |
| 1PH2093-6W...            | 0.028 (0.25)                                              | 33 (72.8)                                | 24                                           | 26      | 28      | 30                                                              | <b>6SL312-1TE23-0AA3</b>                                                                                             |
| 1PH2095-6W...            | 0.036 (0.32)                                              | 42 (92.6)                                | 30                                           | 32      | 34      | 30                                                              | <b>6SL312-1TE23-0AA3</b>                                                                                             |
| 1PH2113-6W...            | 0.066 (0.58)                                              | 51 (112)                                 | 56                                           | 61      | 67      | 60                                                              | <b>6SL312-1TE26-0AA3</b>                                                                                             |
| 1PH2115-6W...            | 0.073 (0.65)                                              | 56 (123)                                 | 55                                           | 60      | 66      | 60                                                              | <b>6SL312-1TE26-0AA3</b>                                                                                             |
| 1PH2117-6W...            | 0.079 (0.70)                                              | 62 (137)                                 | 60                                           | 67      | 74      | 60                                                              | <b>6SL312-1TE26-0AA3</b>                                                                                             |
| 1PH2118-6W...            | 0.100 (0.89)                                              | 78 (172)                                 | 82                                           | 90      | 100     | 85                                                              | <b>6SL312-1TE28-5AA3</b>                                                                                             |
|                          |                                                           |                                          |                                              |         |         | <b>Cooling:</b><br>Internal air cooling<br>External air cooling |                                                                                                                      |
|                          |                                                           |                                          |                                              |         |         | 0<br>1                                                          |                                                                                                                      |
|                          |                                                           |                                          |                                              |         |         | <b>Motor Module:</b><br>Single Motor Module                     |                                                                                                                      |
|                          |                                                           |                                          |                                              |         |         | 1                                                               |                                                                                                                      |



# Main spindle motors

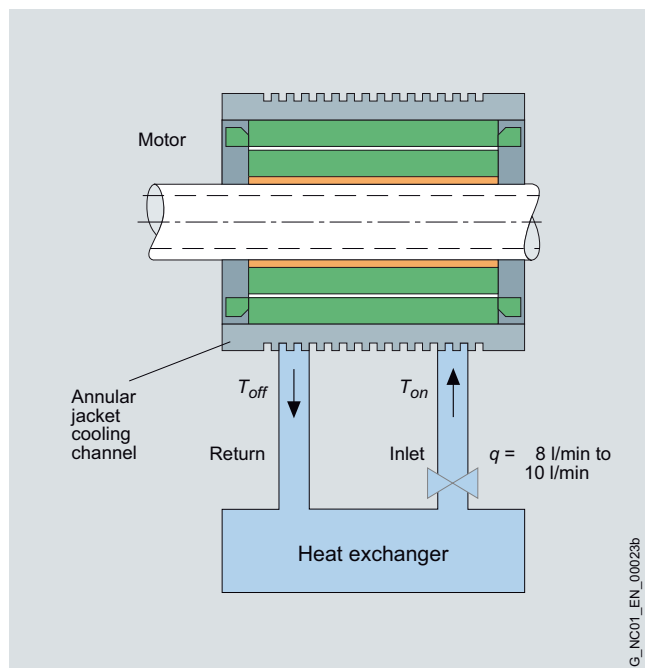
## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8, 1FE1, 1PH2 motors Water cooling

#### Overview

#### Cooling principle

For design of the cooling units, see Configuration Manual.



#### Cooling unit manufacturers

These are non-Siemens products whose fundamental suitability is familiar to us. It goes without saying that equivalent products from other manufacturers may be used. Our recommendations are to be seen as helpful information, not as requirements or dictates. We do not warrant the composition, nature, state or quality of non-Siemens products.

Please contact the companies below for technical information.

#### BKW Kälte-Wärme-Versorgungstechnik GmbH

Contact: Benzstraße 2  
Mr. Walker 72649 WOLFSCHLUGEN, Germany  
Tel.: +49 7022 5003-0  
Fax: +49 7022 5003-30  
E-mail: [info@bkw-kuema.de](mailto:info@bkw-kuema.de)  
[www.bkw-kuema.de](http://www.bkw-kuema.de)

#### DELTATHERM Hirmer GmbH

Contact: Gewerbegebiet Bövingen 122  
Mr. Hirmer 53804 MUCH, Germany  
Tel.: +49 2245 6107-0  
Fax: +49 2245 6107-10  
E-mail: [info@deltatherm.de](mailto:info@deltatherm.de)  
[www.deltatherm.com](http://www.deltatherm.com)

#### Glen Dimplex Deutschland GmbH

RIEDEL Kältetechnik Division

Contact: Am Goldenen Feld 18  
Mr. Schneider 95326 KULMBACH, Germany  
Tel.: +49 9221 709-555  
Fax: +49 9221 709-549  
E-mail: [info@riedel-cooling.com](mailto:info@riedel-cooling.com)  
[www.riedel-cooling.com](http://www.riedel-cooling.com)

#### Helmut Schimpke Industriekühlanlagen GmbH + Co. KG

Contact: Ginsterweg 25-27  
Mr. Geerkens 42781 HAAN, Germany  
Tel.: +49 2129 9438-0  
Fax: +49 2129 9438-99  
E-mail: [info@schimpke.de](mailto:info@schimpke.de)  
[www.schimpke.com](http://www.schimpke.com)

#### Hydac System GmbH

Contact: Postfach 1251  
Mr. Klein 66273 SULZBACH/SAAR, Germany  
Tel.: +49 6897 509-708  
Fax: +49 6897 509-454  
E-mail: [winfried.klein@hydac.com](mailto:winfried.klein@hydac.com)  
[www.hydac.com](http://www.hydac.com)

#### Hyfra Industriekühlanlagen GmbH

Contact: Industriepark 54  
Mr. Forberger 56593 KRUNKEL, Germany  
Tel.: +49 2687 898-0  
Fax: +49 2687 898-25  
E-mail: [infohyfra@hyfra.com](mailto:infohyfra@hyfra.com)  
[www.hyfra.com](http://www.hyfra.com)

#### KKT Kraus Kälte- und Klimatechnik GmbH

Contact: Industriestraße 23a  
Mr. Titschack 91207 LAUF A. D. PEGNITZ, Germany  
Tel.: +49 9123 174-909  
Fax: +49 9123 174-910  
E-mail: [goetz.titschack@kkt.kraus.com](mailto:goetz.titschack@kkt.kraus.com)  
[www.kkt-kraus.com](http://www.kkt-kraus.com)

#### Pfannenbergl GmbH

Contact: Werner-Witt-Strasse 1  
Mr. Hille D-21035 HAMBURG, Germany  
Tel.: +49 40 73412-127  
Fax: +49 40 73412-101  
E-mail: [werner.hille@pfannenbergl.com](mailto:werner.hille@pfannenbergl.com)  
[www.pfannenbergl.com](http://www.pfannenbergl.com)

# Main spindle motors

## Asynchronous and synchronous motors for SINAMICS S120

### 2SP1 motor spindles

#### Overview



The 2SP1 motor spindle product range comprises compact standard motor spindles for milling machines that can be used as an alternative to belt-driven spindles and can be used both for rough cutting and for precise fine machining.

The 2SP1 motor spindle contains all the classical elements of a motor spindle, such as a tool interface, tool clamping and release mechanism, spindle bearings suitable for absorbing the machining forces, water-cooled drive motor, spindle casing for fixing and sensors for indexing and monitoring tool changeover.

The motor spindles are available in 2 diameters of 200 mm (7.87 in) (2SP120) and 250 mm (9.84 in) (2SP125) and are offered with different torque and speed graduations to match the respective milling machine family. The motor spindles are ideally matched to the performance levels of SINAMICS S120.

The complete product range of 2SP1 motor spindles was developed in cooperation with and is manufactured at Weiss Spindeltechnologie GmbH.

#### Benefits

The 2SP1 motor spindles offer the user the following important advantages over conventional belt-driven solutions:

- Compact spindle solution and everything included in the spindle box
- Fewer components and easy installation
- Economical standard solution as compared with today's belt-driven solutions
- Drive train with high degree of rigidity
- High torque and speed and therefore high productivity thanks to high cutting efficiency and reduction of non-productive time
- Higher speed and shorter ramp-up times as compared with conventional belt-driven or gear solutions
- Economical pneumatic tool release mechanism or optional fast hydraulic tool release mechanism
- Worldwide system delivery including spindle mechanics from a single source – from Siemens
- Extremely short tool change times with 2SP210 thanks to 2-channel technology and clamping set with optional latching capability

#### Application

The main application area for 2SP1 motor spindles are main spindles for milling machines and machining centers in the job shop area of the machine tools sector.

The 2SP120 motor spindles are particularly suitable for the area of light metal machining at low torque and high speeds.

The 2SP125 motor spindles are characterized by a high torque. The main area of application is in the machining of steel and castings.

#### Design

The 2SP1 motor spindles are characterized by a rugged design.

Depending on the version, the following options are available for 2SP1 motor spindles:

- Various tool interfaces
- Internal tool cooling
- External tool cooling

#### Integration

The 2SP1 motor spindle can generally be used with:

- SINAMICS S120
- SINUMERIK 840Di sl
- SINUMERIK 840D sl

For 2SP1 motor spindles that use synchronous technology, a VPM Voltage Protection Module or the Internal Voltage Protection IVP must be used as integrated SINAMICS function, see Voltage Protection Module VPM.

# Main spindle motors

## Asynchronous and synchronous motors for SINAMICS S120

### 2SP1 motor spindles

#### Technical specifications

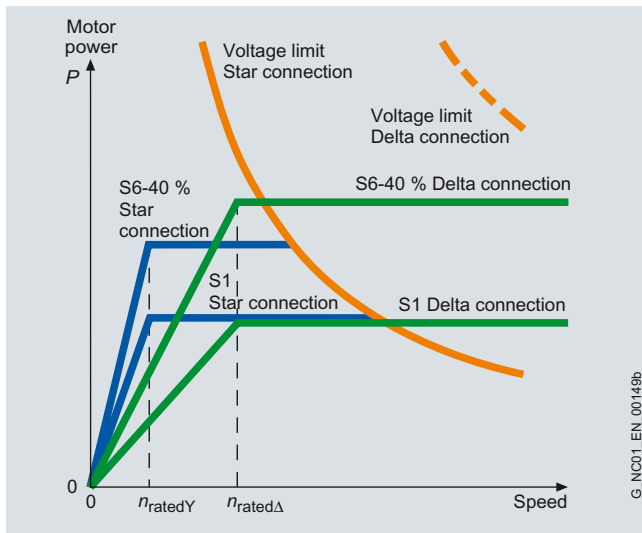
|                                                                                     | 2SP120                                                                                                                                                                                                                      | 2SP125                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product name</b>                                                                 | Motor spindles                                                                                                                                                                                                              | Motor spindles                                                                                                                                                                                                              |
| <b>Standard functions</b>                                                           |                                                                                                                                                                                                                             |                                                                                                                                                                                                                             |
| <b>Speed, max.</b>                                                                  | 15000 rpm                                                                                                                                                                                                                   | 10000 rpm                                                                                                                                                                                                                   |
| <b>Housing</b>                                                                      | Cartridge with flange mounting                                                                                                                                                                                              | Cartridge with flange mounting                                                                                                                                                                                              |
| <b>Operating position</b>                                                           | Horizontal/vertical                                                                                                                                                                                                         | Horizontal/vertical                                                                                                                                                                                                         |
| <b>Tool holder</b>                                                                  | HSK A63                                                                                                                                                                                                                     | SK 40 for tools with asymmetrical slot nuts                                                                                                                                                                                 |
| <b>Tool clamping device</b>                                                         | <ul style="list-style-type: none"> <li>Release using pneumatic cylinder, 6 bar</li> <li>Clamp using cup-spring assembly</li> </ul>                                                                                          | <ul style="list-style-type: none"> <li>Release using pneumatic cylinder, 6 bar</li> <li>Clamp using cup-spring assembly</li> </ul>                                                                                          |
| <b>Tool taper cleaning</b>                                                          | Compressed air through the draw bar 5 ... 6 bar                                                                                                                                                                             | Compressed air through the draw bar 5 ... 6 bar                                                                                                                                                                             |
| <b>Cooling with water</b>                                                           | <ul style="list-style-type: none"> <li>Max. 5 bar, 10 l/min (2.64 US gallons/min)</li> <li>Max. 25 % anti-corrosion agent Clariant Antifrogen N or Tyfocor</li> <li>Filter grade 100µm</li> </ul>                           | <ul style="list-style-type: none"> <li>Max. 5 bar, 10 l/min (2.64 US gallons/min)</li> <li>Max. 25 % anti-corrosion agent Clariant Antifrogen N or Tyfocor</li> <li>Filter grade 100µm</li> </ul>                           |
| <b>Recommended coolant inlet temperature, approx.</b>                               | 25 °C (77 °F)<br>(depending on the ambient temperature)                                                                                                                                                                     | 25 °C (77 °F)<br>(depending on the ambient temperature)                                                                                                                                                                     |
| <b>Standard protection – temperature monitoring</b>                                 | <ul style="list-style-type: none"> <li>Motor thermal sensor KTY84-130</li> <li>PTC for full thermal protection</li> <li>NTC PT3-51F</li> <li>NTC K227</li> </ul>                                                            | <ul style="list-style-type: none"> <li>Motor thermal sensor KTY84-130</li> </ul>                                                                                                                                            |
| <b>Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)</b> | Temperature class 155 (F) for a coolant inlet temperature of 25 °C (77 °F)                                                                                                                                                  | Temperature class 155 (F) for a coolant inlet temperature of 25 °C (77 °F)                                                                                                                                                  |
| <b>Degree of protection in accordance with IEC 60034-5</b>                          | IP64 (in working area)<br>IP53 (behind the spindle flange)                                                                                                                                                                  | IP64 (in working area)<br>IP53 (behind the spindle flange)                                                                                                                                                                  |
| <b>Bearing lubrication</b>                                                          | Grease, permanent lubrication                                                                                                                                                                                               | Grease, permanent lubrication                                                                                                                                                                                               |
| <b>Bearing seal at the front</b>                                                    | Sealing air 1 ... 1.5 m <sup>3</sup> /h, filter mesh 8 µm                                                                                                                                                                   | Sealing air 1 ... 1.5 m <sup>3</sup> /h, filter mesh 8 µm                                                                                                                                                                   |
| <b>Encoder system</b>                                                               | Hollow-shaft measuring system, incremental, sin/cos 1 V <sub>pp</sub> 256 S/R with zero mark                                                                                                                                | Hollow-shaft measuring system, incremental, sin/cos 1 V <sub>pp</sub> 256 S/R with zero mark                                                                                                                                |
| <b>Clamping status monitoring</b>                                                   |                                                                                                                                                                                                                             |                                                                                                                                                                                                                             |
| • Analog sensors                                                                    | <ul style="list-style-type: none"> <li>Tool clamped</li> <li>Draw bar in the release position</li> <li>Clamped without tool</li> </ul>                                                                                      | –                                                                                                                                                                                                                           |
| • Digital sensors                                                                   | <ul style="list-style-type: none"> <li>Position of release piston</li> </ul>                                                                                                                                                | <ul style="list-style-type: none"> <li>Tool clamped</li> <li>Draw bar in the release position</li> <li>Clamped without tool</li> </ul>                                                                                      |
| <b>Connections for the media</b>                                                    |                                                                                                                                                                                                                             |                                                                                                                                                                                                                             |
| • Cooling                                                                           | 2 × hose plug-in connector, Ø 12/10 mm (0.47/0.39 in)                                                                                                                                                                       | 2 × G 1/2" (Ø 9 mm (0.35 in))                                                                                                                                                                                               |
| • Sealing air                                                                       | 1 × G 1/8" radial/Ø 5 mm (0.20 in) axial                                                                                                                                                                                    | 1 × G 1/8" (Ø 8 mm (0.31 in))                                                                                                                                                                                               |
| • Air purge                                                                         | 1 × G 1/4"                                                                                                                                                                                                                  | 1 × G 1/4"                                                                                                                                                                                                                  |
| • Release tool                                                                      | 1 × G 1/4"                                                                                                                                                                                                                  | 1 × M16×1.5                                                                                                                                                                                                                 |
| • Clamp tool                                                                        | 1 × G 1/8"                                                                                                                                                                                                                  | 1 × G 1/8"                                                                                                                                                                                                                  |
| <b>Electrical connections</b>                                                       | <ul style="list-style-type: none"> <li>Power via cable 1.5 m (4.92 ft)</li> <li>Sensors through signal plug</li> </ul>                                                                                                      | <ul style="list-style-type: none"> <li>Power via cable 1.5 m (4.92 ft)</li> <li>Sensors through signal plug</li> </ul>                                                                                                      |
| <b>Options</b>                                                                      |                                                                                                                                                                                                                             |                                                                                                                                                                                                                             |
| <b>Increased max. speed</b>                                                         | 18000 rpm                                                                                                                                                                                                                   | 15.000 rpm <sup>-1</sup> (with HSK A63)                                                                                                                                                                                     |
| <b>Internal tool cooling</b>                                                        | <ul style="list-style-type: none"> <li>50 bar, up to 54 l/min (11.89 US gallons/min)</li> <li>Filter grade 50 µm according to -/16/13 ISO 4406</li> <li>1 × G 1/4" cooling lubricant</li> <li>1 × G 1/8" leakage</li> </ul> | <ul style="list-style-type: none"> <li>50 bar, up to 54 l/min (11.89 US gallons/min)</li> <li>Filter grade 50 µm according to -/16/13 ISO 4406</li> <li>1 × G 1/4" cooling lubricant</li> <li>1 × G 1/8" leakage</li> </ul> |
| <b>External tool cooling</b>                                                        | <ul style="list-style-type: none"> <li>Ring with 6 adjustable nozzles</li> <li>5 bar</li> <li>Filter grade 50 µm according to -/16/13 ISO 4406</li> </ul>                                                                   | –                                                                                                                                                                                                                           |
| <b>Tool clamping device</b>                                                         | <ul style="list-style-type: none"> <li>Release using hydraulic cylinder, 80 bar</li> <li>Clamp using cup-spring assembly</li> <li>1 × G 1/4", release the tool</li> <li>1 × G 1/4", clamp the tool</li> </ul>               | –                                                                                                                                                                                                                           |
| <b>Tool interface</b>                                                               | –                                                                                                                                                                                                                           | BT 40, CAT 40, HSK A63                                                                                                                                                                                                      |

# Main spindle motors

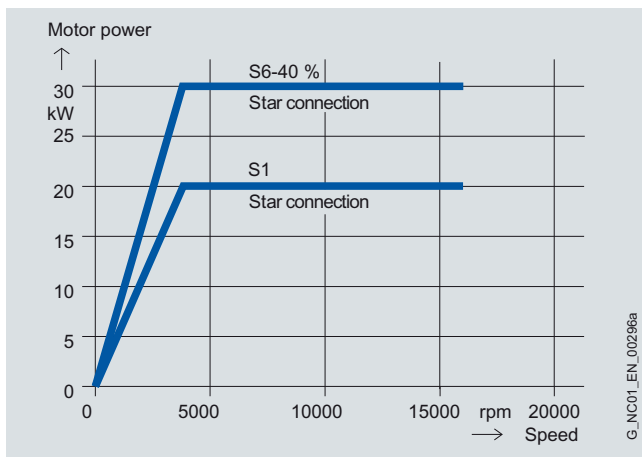
## Asynchronous and synchronous motors for SINAMICS S120

### 2SP1 motor spindles

#### Characteristic curves



2SP1 motor spindles in asynchronous design with star-delta changeover



2SP1 motor spindles in synchronous design

#### More information

Please refer to main spindle motors – Liquid cooling for a list of cooling unit manufacturers.

In addition to the standard motor spindles in the 2SP1 product range, it is also possible to use individually customized motor spindle designs.

For information about other motor spindles for turning, grinding, milling and drilling, please contact:

#### WEISS Spindeltechnologie GmbH

A Siemens Company  
Rudolf-Diesel-Straße 35  
97424 SCHWEINFURT, Germany

Tel.: +49 9721 7701-0  
Fax: +49 9721 7701-133  
[www.weissgmbh.com](http://www.weissgmbh.com)

# Main spindle motors

## Asynchronous and synchronous motors for SINAMICS S120

### 2SP1 standard type motor spindles Water cooling

#### Selection and ordering data

| Spindle diameter                                                                                          | Rated power<br>Star/delta<br>for duty type |                          | Rated torque<br>Star/delta<br>for duty type |                          | Rated speed<br>Star/delta | Maximum speed | 2SP1 motor spindles<br>Standard type |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------|---------------------------------------------|--------------------------|---------------------------|---------------|--------------------------------------|
|                                                                                                           | $P_{rated}$<br>S1                          | S6-40 %                  | $M_{rated}$<br>S1                           | S6-40 %                  | $n_{rated}$               | $n_{max}$     |                                      |
| mm (in)                                                                                                   | kW (HP)                                    | kW (HP)                  | Nm (lb <sub>f</sub> -ft)                    | Nm (lb <sub>f</sub> -ft) | rpm                       | rpm           | Order No.                            |
| 2SP1 synchronous – water cooling                                                                          |                                            |                          |                                             |                          |                           |               |                                      |
| 200                                                                                                       | 12.0/– (16.1/–)                            | 12.0/– (16.1/–)          | 42/– (372/–)                                | 55/– (487/–)             | 2700/–                    | 15000         | 2SP1202-1HA ■ ■ -1D ■ ■              |
|                                                                                                           | 15.5/– (20.8/–)                            | 15.5/– (20.8/–)          | 42/– (372/–)                                | 55/– (487/–)             | 3500/–                    | 18000         | 2SP1202-1HB ■ ■ -2D ■ ■              |
|                                                                                                           | 26.4/– (35.4/–)                            | 26.4/– (35.4/–)          | 84/– (744/–)                                | 110/– (974/–)            | 3000/–                    | 15000         | 2SP1204-1HA ■ ■ -1D ■ ■              |
|                                                                                                           | 35.0/– (46.9/–)                            | 35.0/– (46.9/–)          | 78/– (690/–)                                | 110/– (974/–)            | 4300/–                    | 18000         | 2SP1204-1HB ■ ■ -2D ■ ■              |
| 2SP1 asynchronous – water cooling                                                                         |                                            |                          |                                             |                          |                           |               |                                      |
| 250                                                                                                       | 13.2/13.2<br>(17.7/17.7)                   | 18.9/18.9<br>(25.3/25.3) | 70/32<br>(620/283)                          | 100/45<br>(885/398)      | 1800/4000                 | 10000         | 2SP1253-8HA 0 ■ -0 ■ ■ 2             |
|                                                                                                           | 13.2/13.2<br>(17.7/17.7)                   | 18.9/18.9<br>(25.3/25.3) | 70/32<br>(620/283)                          | 100/45<br>(885/398)      | 1800/4000                 | 15000         | 2SP1253-8HA 0 ■ -1D ■ 2              |
|                                                                                                           | 11.7/11.7<br>(15.7/15.7)                   | 16.7/16.7<br>(22.4/22.4) | 140/62<br>(1239/549)                        | 200/89<br>(1170/788)     | 800/1800                  | 10000         | 2SP1255-8HA 0 ■ -0 ■ ■ 2             |
|                                                                                                           | 11.7/11.7<br>(15.7/15.7)                   | 16.7/16.7<br>(22.4/22.4) | 140/62<br>(1239/549)                        | 200/89<br>(1170/788)     | 800/1800                  | 15000         | 2SP1255-8HA 0 ■ -1D ■ 2              |
| 2SP1 synchronous – water cooling                                                                          |                                            |                          |                                             |                          |                           |               |                                      |
| 250                                                                                                       | 26.0/– (34.9/–)                            | 29.0/– (38.9/–)          | 100/– (885/–)                               | 130/– (1151/–)           | 2500/–                    | 10000         | 2SP1253-1HA 0 ■ -0 ■ ■ 2             |
|                                                                                                           | 35.0/– (46.9/–)                            | 38.0/– (50.9/–)          | 100/– (885/–)                               | 130/– (1151/–)           | 3300/–                    | 15000         | 2SP1253-1HB 0 ■ -1D ■ 2              |
|                                                                                                           | 46.3/– (62.1/–)                            | 55.0/– (73.7/–)          | 170/– (1505/–)                              | 236/– (2089/–)           | 2600/–                    | 10000         | 2SP1255-1HA 0 ■ -0 ■ ■ 2             |
|                                                                                                           | 53.4/– (71.6/–)                            | 64.0/– (85.8/–)          | 170/– (1505/–)                              | 236/– (2089/–)           | 3000/–                    | 15000         | 2SP1255-1HB 0 ■ -1D ■ 2              |
| Tool clamping and release mechanism:                                                                      |                                            |                          |                                             |                          |                           |               |                                      |
| Pneumatic ( <u>only</u> for 2SP125)                                                                       |                                            |                          |                                             |                          |                           |               | 0                                    |
| Pneumatic ( <u>only</u> for 2SP120)                                                                       |                                            |                          |                                             |                          |                           |               | 2                                    |
| Hydraulic ( <u>only</u> for 2SP120)                                                                       |                                            |                          |                                             |                          |                           |               | 3                                    |
| Cooling:                                                                                                  |                                            |                          |                                             |                          |                           |               |                                      |
| Closed cooling jacket                                                                                     |                                            |                          |                                             |                          |                           |               | 1                                    |
| Closed cooling jacket and internal tool cooling                                                           |                                            |                          |                                             |                          |                           |               | 3                                    |
| Closed cooling jacket and ring for external tool cooling ( <u>only</u> for 2SP120)                        |                                            |                          |                                             |                          |                           |               | 4                                    |
| Closed cooling jacket, internal tool cooling and ring for external tool cooling ( <u>only</u> for 2SP120) |                                            |                          |                                             |                          |                           |               | 5                                    |
| Tool interfaces:                                                                                          |                                            |                          |                                             |                          |                           |               |                                      |
| Tool interface SK 40                                                                                      |                                            |                          |                                             |                          |                           |               | A<br>B<br>C<br>D<br>E<br>R           |
| Tool interface BT 40 45°                                                                                  |                                            |                          |                                             |                          |                           |               |                                      |
| Tool interface CAT 40                                                                                     |                                            |                          |                                             |                          |                           |               |                                      |
| Tool interface HSK A63                                                                                    |                                            |                          |                                             |                          |                           |               |                                      |
| Tool interface BT 40 30°                                                                                  |                                            |                          |                                             |                          |                           |               |                                      |
| Tool interface HSKA63, latching ( <u>only</u> for 2SP120)                                                 |                                            |                          |                                             |                          |                           |               |                                      |
| Sensors:                                                                                                  |                                            |                          |                                             |                          |                           |               |                                      |
| Sensor: Tool clamped/draw bar in the release position/clamped without tool                                |                                            |                          |                                             |                          |                           |               | D<br>F                               |
| As for D + sensor: Position release piston ( <u>only</u> for 2SP120)                                      |                                            |                          |                                             |                          |                           |               |                                      |
| Type of connection:                                                                                       |                                            |                          |                                             |                          |                           |               |                                      |
| Permanently connected cable, sensor cable with signal connector, length: 1.5 m (4.92 ft)                  |                                            |                          |                                             |                          |                           |               | 2<br>6                               |
| Power cable with open core ends                                                                           |                                            |                          |                                             |                          |                           |               |                                      |
| Power cable with connector (2SP1202: Connector size 1.5/2SP1204: Connector size 3)                        |                                            |                          |                                             |                          |                           |               |                                      |

# Main spindle motors

## Asynchronous and synchronous motors for SINAMICS S120

**2SP1 standard type motor spindles**  
**Water cooling**

| Motor type<br>(repeated)          | Moment of inertia Weight. <sup>1)</sup><br>approx.        |           | Rated current<br>Star/delta<br>for duty type |         | Voltage<br>Protection<br>Module | SINAMICS S120 Motor Module                                              |                      |
|-----------------------------------|-----------------------------------------------------------|-----------|----------------------------------------------|---------|---------------------------------|-------------------------------------------------------------------------|----------------------|
|                                   | <i>J</i>                                                  | <i>m</i>  | <i>I</i> <sub>rated</sub><br>S1              | S6-40 % |                                 | Required<br>rated power<br>for S1 duty<br><br><i>I</i> <sub>rated</sub> | Booksize format      |
|                                   | kgm <sup>2</sup><br>(lb <sub>f</sub> -in-s <sup>2</sup> ) | kg (lb)   | A                                            | A       |                                 | A                                                                       | Order No.            |
| 2SP1 synchronous – water cooling  |                                                           |           |                                              |         |                                 |                                                                         |                      |
| 2SP1202-1HA...                    | 0.015 (0.1327)                                            | 83 (183)  | 30/–                                         | 43/–    | VPM 120                         | 30                                                                      | 6SL312 ■ -1TE23-0AA3 |
| 2SP1202-1HB...                    | 0.015 (0.1327)                                            | 83 (183)  | 42/–                                         | 60/–    | VPM 120                         | 45                                                                      | 6SL312 ■ -1TE24-5AA3 |
| 2SP1204-1HA...                    | 0.023 (0.2035)                                            | 101 (223) | 60/–                                         | 85/–    | VPM 120                         | 60                                                                      | 6SL312 ■ -1TE26-0AA3 |
| 2SP1204-1HB...                    | 0.023 (0.2035)                                            | 101 (223) | 79/–                                         | 120/–   | VPM 120                         | 85                                                                      | 6SL312 ■ -1TE28-5AA3 |
| 2SP1 asynchronous – water cooling |                                                           |           |                                              |         |                                 |                                                                         |                      |
| 2SP1253-8HA0.-0...                | 0.037 (0.3274)                                            | 130 (287) | 28/29                                        | 39/39   | –                               | 30                                                                      | 6SL312 ■ -1TE23-0AA3 |
| 2SP1253-8HA0.-1...                | 0.037 (0.3274)                                            | 130 (287) | 28/29                                        | 39/39   | –                               | 30                                                                      | 6SL312 ■ -1TE23-0AA3 |
| 2SP1255-8HA0.-0...                | 0.055 (0.4867)                                            | 165 (364) | 30/29                                        | 40/37   | –                               | 30                                                                      | 6SL312 ■ -1TE23-0AA3 |
| 2SP1255-8HA0.-1...                | 0.055 (0.4867)                                            | 165 (364) | 30/29                                        | 40/37   | –                               | 30                                                                      | 6SL312 ■ -1TE23-0AA3 |
| 2SP1 synchronous – water cooling  |                                                           |           |                                              |         |                                 |                                                                         |                      |
| 2SP1253-1HA...                    | 0.037 (0.3274)                                            | 130 (287) | 53/–                                         | 75/–    | VPM 120                         | 60                                                                      | 6SL312 ■ -1TE26-0AA3 |
| 2SP1253-1HB...                    | 0.037 (0.3274)                                            | 130 (287) | 68/–                                         | 98/–    | VPM 120                         | 85                                                                      | 6SL312 ■ -1TE28-5AA3 |
| 2SP1255-1HA...                    | 0.055 (0.4867)                                            | 165 (364) | 95/–                                         | 135/–   | VPM 120                         | 132                                                                     | 6SL312 ■ -1TE31-3AA3 |
| 2SP1255-1HB...                    | 0.055 (0.4867)                                            | 165 (364) | 120/–                                        | 180/–   | VPM 200                         | 132                                                                     | 6SL312 ■ -1TE31-3AA3 |
|                                   |                                                           |           |                                              |         |                                 | Cooling:<br>Internal air cooling<br>External air cooling                | 0<br>1               |
|                                   |                                                           |           |                                              |         |                                 | Motor Module:<br>Single Motor Module                                    | 1                    |

<sup>1)</sup> No options included.  
 Internal tool cooling: + 1 kg (2.21 lb)  
 External tool cooling: + 8 kg (17.6 lb)

# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact without DRIVE-CLiQ – Natural cooling

#### Dimensional drawings

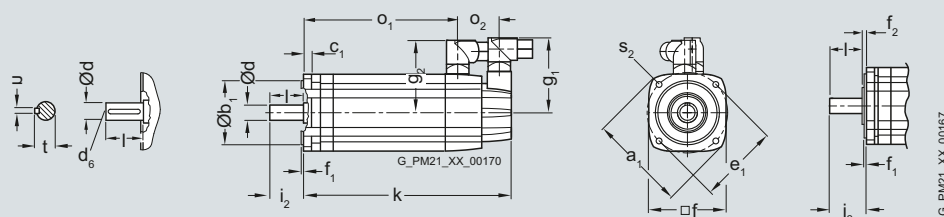
| For motor                                                                                     |            | Dimensions in mm (inches) |                     |                     |                      |                     |               |                     |                     |                     |                     |                     | Connector size      |              | Shaft extension DE  |              |                |              |
|-----------------------------------------------------------------------------------------------|------------|---------------------------|---------------------|---------------------|----------------------|---------------------|---------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------|---------------------|--------------|----------------|--------------|
| Shaft height                                                                                  | Type       | DIN IEC                   | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | o <sub>2</sub><br>– | s <sub>2</sub><br>S | g <sub>1</sub><br>– | Size                |                     | d<br>D       | d <sub>6</sub><br>– | l<br>E       | t<br>GA        | u<br>F       |
|                                                                                               |            |                           |                     |                     |                      |                     |               |                     |                     |                     |                     | 1                   | 1.5                 |              |                     |              |                |              |
|                                                                                               |            |                           |                     |                     |                      |                     |               |                     |                     |                     |                     | g <sub>2</sub><br>– | g <sub>2</sub><br>– |              |                     |              |                |              |
| 1FT7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake |            |                           |                     |                     |                      |                     |               |                     |                     |                     |                     |                     |                     |              |                     |              |                |              |
| 36                                                                                            | 1FT703.-5A |                           | 90<br>(3.54)        | 60<br>(2.36)        | 8<br>(0.31)          | 75<br>(2.95)        | 72<br>(2.83)  | 3<br>(0.12)         | 48<br>(1.89)        | 6.5<br>(0.26)       | 77<br>(3.03)        | 80<br>(3.15)        | –                   | 14<br>(0.55) | M5                  | 30<br>(1.18) | 16<br>(0.63)   | 5<br>(0.20)  |
| 48                                                                                            | 1FT704.-5A |                           | 120<br>(4.72)       | 80<br>(3.15)        | 10<br>(0.39)         | 100<br>(3.94)       | 96<br>(3.78)  | 3<br>(0.12)         | 53<br>(2.09)        | 6.5<br>(0.26)       | 93<br>(3.66)        | 90<br>(3.54)        | –                   | 19<br>(0.75) | M6                  | 40<br>(1.57) | 21.5<br>(0.85) | 6<br>(0.24)  |
| 63                                                                                            | 1FT706.-5A |                           | 155<br>(6.10)       | 110<br>(4.33)       | 10<br>(0.39)         | 130<br>(5.12)       | 126<br>(4.96) | 3.5<br>(0.14)       | 53<br>(2.09)        | 9<br>(0.35)         | 93<br>(3.66)        | 104<br>(4.09)       | –                   | 24<br>(0.94) | M8                  | 50<br>(1.97) | 27<br>(1.06)   | 8<br>(0.31)  |
| 80                                                                                            | 1FT708.-5A |                           | 195<br>(7.68)       | 130<br>(5.12)       | 11.5<br>(0.45)       | 165<br>(6.50)       | 155<br>(6.10) | 3.5<br>(0.14)       | 51<br>(2.01)        | 11<br>(0.43)        | 93<br>(3.66)        | 119<br>(4.69)       | 140<br>(5.51)       | 32<br>(1.26) | M12                 | 58<br>(2.28) | 35<br>(1.38)   | 10<br>(0.39) |
| 100                                                                                           | 1FT710.-5A |                           | 245<br>(9.65)       | 180<br>(7.09)       | 13<br>(0.51)         | 215<br>(8.46)       | 196<br>(7.72) | 4<br>(0.16)         | 56<br>(2.20)        | 14<br>(0.55)        | 93<br>(3.66)        | –                   | 160<br>(6.30)       | 38<br>(1.50) | M12                 | 80<br>(3.15) | 41<br>(1.61)   | 10<br>(0.39) |

| Shaft height | Type    | DIN IEC | Flange 0            |                     |                |                     |                |                     | Flange 1 (1FT6-compatible) |                |                     |                |                     |  |
|--------------|---------|---------|---------------------|---------------------|----------------|---------------------|----------------|---------------------|----------------------------|----------------|---------------------|----------------|---------------------|--|
|              |         |         |                     |                     | without brake  |                     | with brake     |                     |                            |                | without brake       |                | with brake          |  |
|              |         |         | f <sub>2</sub><br>— | i <sub>2</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | i <sub>2</sub><br>—        | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— |  |
| 36           | 1FT7034 |         | 5.5<br>(0.22)       | 36.5<br>(1.44)      | 189<br>(7.44)  | 127<br>(5.00)       | 216<br>(8.50)  | 154<br>(6.06)       | 30<br>(1.18)               | 195<br>(7.68)  | 133<br>(5.24)       | 222<br>(8.74)  | 160<br>(6.30)       |  |
|              | 1FT7036 |         |                     |                     | 237<br>(9.33)  | 175<br>(6.89)       | 264<br>(10.39) | 202<br>(7.95)       |                            | 243<br>(9.57)  | 181<br>(7.13)       | 270<br>(10.63) | 208<br>(8.19)       |  |
| 48           | 1FT7042 |         | 5.5<br>(0.22)       | 46<br>(1.81)        | 163<br>(6.42)  | 96<br>(3.78)        | 195<br>(7.68)  | 128<br>(5.04)       | 40<br>(1.57)               | 169<br>(6.65)  | 102<br>(4.02)       | 201<br>(7.91)  | 134<br>(5.28)       |  |
|              | 1FT7044 |         |                     |                     | 213<br>(8.39)  | 146<br>(5.75)       | 245<br>(9.65)  | 178<br>(7.01)       |                            | 219<br>(8.62)  | 152<br>(5.98)       | 251<br>(9.88)  | 184<br>(7.24)       |  |
|              | 1FT7046 |         |                     |                     | 253<br>(9.96)  | 186<br>(7.32)       | 285<br>(11.22) | 218<br>(8.58)       |                            | 259<br>(10.20) | 192<br>(7.56)       | 291<br>(11.46) | 224<br>(8.82)       |  |
| 63           | 1FT7062 |         | 6<br>(0.24)         | 56.5<br>(2.22)      | 167<br>(6.57)  | 99<br>(3.90)        | 202<br>(7.95)  | 135<br>(5.31)       | 50<br>(1.97)               | 173<br>(6.81)  | 106<br>(4.17)       | 208<br>(8.19)  | 141<br>(5.55)       |  |
|              | 1FT7064 |         |                     |                     | 198<br>(7.80)  | 131<br>(5.16)       | 233<br>(9.17)  | 166<br>(6.54)       |                            | 205<br>(8.07)  | 137<br>(5.39)       | 240<br>(9.45)  | 173<br>(6.81)       |  |
|              | 1FT7066 |         |                     |                     | 230<br>(9.06)  | 162<br>(6.38)       | 265<br>(10.43) | 198<br>(7.80)       |                            | 236<br>(9.29)  | 169<br>(6.65)       | 272<br>(10.71) | 204<br>(8.03)       |  |
|              | 1FT7068 |         |                     |                     | 277<br>(10.91) | 210<br>(8.27)       | 312<br>(12.28) | 245<br>(9.65)       |                            | 284<br>(11.18) | 216<br>(8.50)       | 319<br>(12.56) | 252<br>(9.92)       |  |
| 80           | 1FT7082 |         | 6<br>(0.24)         | 64.5<br>(2.54)      | 184<br>(7.24)  | 124<br>(4.88)       | 241<br>(9.49)  | 176<br>(6.93)       | 58<br>(2.28)               | 196<br>(7.72)  | 130<br>(5.12)       | 248<br>(9.76)  | 183<br>(7.20)       |  |
|              | 1FT7084 |         |                     |                     | 236<br>(9.29)  | 175<br>(6.89)       | 293<br>(11.54) | 228<br>(8.98)       |                            | 247<br>(9.72)  | 182<br>(7.17)       | 299<br>(11.77) | 234<br>(9.21)       |  |
|              | 1FT7086 |         |                     |                     | 287<br>(11.30) | 227<br>(8.94)       | 345<br>(13.58) | 279<br>(10.98)      |                            | 299<br>(11.77) | 234<br>(9.21)       | 351<br>(13.82) | 286<br>(11.26)      |  |
| 100          | 1FT7102 |         | 6.5<br>(0.26)       | 87<br>(3.43)        | 209<br>(8.23)  | 144<br>(5.67)       | 266<br>(10.47) | 196<br>(7.72)       | 80<br>(3.15)               | 221<br>(8.70)  | 151<br>(5.94)       | 273<br>(10.75) | 203<br>(7.99)       |  |
|              | 1FT7105 |         |                     |                     | 296<br>(11.65) | 231<br>(9.09)       | 353<br>(13.90) | 283<br>(11.14)      |                            | 307<br>(12.09) | 238<br>(9.37)       | 360<br>(14.17) | 290<br>(11.42)      |  |
|              | 1FT7108 |         |                     |                     | 365<br>(14.37) | 300<br>(11.81)      | 422<br>(16.61) | 352<br>(13.86)      |                            | 377<br>(14.84) | 307<br>(12.09)      | 429<br>(16.89) | 359<br>(14.13)      |  |

Shaft version  
with feather key

Flange 1

Flange 0





# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FT7 synchronous motors**  
Compact with DRIVE-CLiQ – Natural cooling

### Dimensional drawings

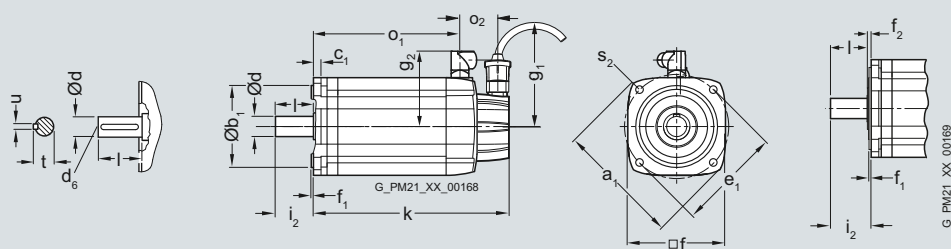
| For motor                                                                                     |            | Dimensions in mm (inches) |                  |                  |                   |                  |               |                  |                  |                  |                  |               | Connector size |              | Shaft extension DE |              |                |              |
|-----------------------------------------------------------------------------------------------|------------|---------------------------|------------------|------------------|-------------------|------------------|---------------|------------------|------------------|------------------|------------------|---------------|----------------|--------------|--------------------|--------------|----------------|--------------|
| Shaft height                                                                                  | Type       | DIN IEC                   | a <sub>1</sub> P | b <sub>1</sub> N | c <sub>1</sub> LA | e <sub>1</sub> M | f AB          | f <sub>1</sub> T | o <sub>2</sub> – | s <sub>2</sub> S | g <sub>1</sub> – | Size 1        | Size 1.5       | d D          | d <sub>6</sub> –   | l E          | t GA           | u F          |
|                                                                                               |            |                           |                  |                  |                   |                  |               |                  |                  |                  |                  |               |                |              |                    |              |                |              |
| 1FT7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake |            |                           |                  |                  |                   |                  |               |                  |                  |                  |                  |               |                |              |                    |              |                |              |
| 36                                                                                            | 1FT703.-5A |                           | 90<br>(3.54)     | 60<br>(2.36)     | 8<br>(0.31)       | 75<br>(2.95)     | 72<br>(2.83)  | 3<br>(0.12)      | 48<br>(1.89)     | 6.5<br>(0.26)    | 77<br>(3.03)     | 80<br>(3.15)  | –              | 14<br>(0.55) | M5                 | 30<br>(1.18) | 16<br>(0.63)   | 5<br>(0.20)  |
| 48                                                                                            | 1FT704.-5A |                           | 120<br>(4.72)    | 80<br>(3.15)     | 10<br>(0.39)      | 100<br>(3.94)    | 96<br>(3.78)  | 3<br>(0.12)      | 53<br>(2.09)     | 6.5<br>(0.26)    | 93<br>(3.66)     | 90<br>(3.54)  | –              | 19<br>(0.75) | M6                 | 40<br>(1.57) | 21.5<br>(0.85) | 6<br>(0.24)  |
| 63                                                                                            | 1FT706.-5A |                           | 155<br>(6.10)    | 110<br>(4.33)    | 10<br>(0.39)      | 130<br>(5.12)    | 126<br>(4.96) | 3.5<br>(0.14)    | 53<br>(2.09)     | 9<br>(0.35)      | 93<br>(3.66)     | 104<br>(4.09) | –              | 24<br>(0.94) | M8                 | 50<br>(1.97) | 27<br>(1.06)   | 8<br>(0.31)  |
| 80                                                                                            | 1FT708.-5A |                           | 195<br>(7.68)    | 130<br>(5.12)    | 11.5<br>(0.45)    | 165<br>(6.50)    | 155<br>(6.10) | 3.5<br>(0.14)    | 51<br>(2.01)     | 11<br>(0.43)     | 93<br>(3.66)     | 119<br>(4.69) | 140<br>(5.51)  | 32<br>(1.26) | M12                | 58<br>(2.28) | 35<br>(1.38)   | 10<br>(0.39) |
| 100                                                                                           | 1FT710.-5A |                           | 245<br>(9.65)    | 180<br>(7.09)    | 13<br>(0.51)      | 215<br>(8.46)    | 196<br>(7.72) | 4<br>(0.16)      | 56<br>(2.20)     | 14<br>(0.55)     | 93<br>(3.66)     | –             | 160<br>(6.30)  | 38<br>(1.50) | M12                | 80<br>(3.15) | 41<br>(1.61)   | 10<br>(0.39) |

| Shaft height | Type    | DIN IEC | Flange 0            |                     |                |                     |                |                     | Flange 1 (1FT6-compatible) |                |                     |                |                     |  |
|--------------|---------|---------|---------------------|---------------------|----------------|---------------------|----------------|---------------------|----------------------------|----------------|---------------------|----------------|---------------------|--|
|              |         |         |                     |                     | without brake  |                     | with brake     |                     |                            |                | without brake       |                | with brake          |  |
|              |         |         | f <sub>2</sub><br>— | i <sub>2</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | i <sub>2</sub><br>—        | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— |  |
| 36           | 1FT7034 |         | 5.5<br>(0.22)       | 36.5<br>(1.44)      | 189<br>(7.44)  | 127<br>(5.00)       | 216<br>(8.50)  | 154<br>(6.06)       | 30<br>(1.18)               | 196<br>(7.72)  | 133<br>(5.24)       | 223<br>(8.78)  | 160<br>(6.30)       |  |
|              | 1FT7036 |         |                     |                     | 237<br>(9.33)  | 175<br>(6.89)       | 264<br>(10.39) | 202<br>(7.95)       |                            | 244<br>(9.61)  | 181<br>(7.13)       | 271<br>(10.67) | 208<br>(8.19)       |  |
| 48           | 1FT7042 |         | 5.5<br>(0.22)       | 46<br>(1.81)        | 158<br>(6.22)  | 96<br>(3.78)        | 190<br>(7.48)  | 128<br>(5.04)       | 40<br>(1.57)               | 164<br>(6.46)  | 102<br>(4.02)       | 196<br>(7.72)  | 134<br>(5.28)       |  |
|              | 1FT7044 |         |                     |                     | 208<br>(8.19)  | 146<br>(5.75)       | 240<br>(9.45)  | 178<br>(7.01)       |                            | 214<br>(8.43)  | 152<br>(5.98)       | 246<br>(9.69)  | 184<br>(7.24)       |  |
|              | 1FT7046 |         |                     |                     | 248<br>(9.76)  | 186<br>(7.32)       | 280<br>(11.02) | 218<br>(8.58)       |                            | 254<br>(10.00) | 192<br>(7.56)       | 286<br>(11.26) | 224<br>(8.82)       |  |
| 63           | 1FT7062 |         | 6<br>(0.24)         | 56.5<br>(2.22)      | 161<br>(6.34)  | 99<br>(3.90)        | 197<br>(7.76)  | 135<br>(5.31)       | 50<br>(1.97)               | 168<br>(6.61)  | 106<br>(4.17)       | 203<br>(7.99)  | 141<br>(5.55)       |  |
|              | 1FT7064 |         |                     |                     | 193<br>(7.60)  | 131<br>(5.16)       | 228<br>(8.98)  | 166<br>(6.54)       |                            | 200<br>(7.87)  | 137<br>(5.39)       | 235<br>(9.25)  | 173<br>(6.81)       |  |
|              | 1FT7066 |         |                     |                     | 225<br>(8.86)  | 162<br>(6.38)       | 260<br>(10.24) | 198<br>(7.80)       |                            | 231<br>(9.09)  | 169<br>(6.65)       | 267<br>(10.51) | 204<br>(8.03)       |  |
|              | 1FT7068 |         |                     |                     | 272<br>(10.71) | 210<br>(8.27)       | 307<br>(12.09) | 245<br>(9.65)       |                            | 279<br>(10.98) | 216<br>(8.50)       | 314<br>(12.36) | 252<br>(9.92)       |  |
| 80           | 1FT7082 |         | 6<br>(0.24)         | 64.5<br>(2.54)      | 189<br>(7.44)  | 124<br>(4.88)       | 236<br>(9.29)  | 176<br>(6.93)       | 58<br>(2.28)               | 191<br>(7.52)  | 130<br>(5.12)       | 243<br>(9.57)  | 183<br>(7.20)       |  |
|              | 1FT7084 |         |                     |                     | 236<br>(9.29)  | 175<br>(6.89)       | 288<br>(11.34) | 228<br>(8.98)       |                            | 242<br>(9.53)  | 182<br>(7.17)       | 294<br>(11.57) | 234<br>(9.21)       |  |
|              | 1FT7086 |         |                     |                     | 287<br>(11.30) | 227<br>(8.94)       | 340<br>(13.39) | 279<br>(10.98)      |                            | 294<br>(11.57) | 234<br>(9.21)       | 346<br>(13.62) | 286<br>(11.26)      |  |
| 100          | 1FT7102 |         | 6.5<br>(0.26)       | 87<br>(3.43)        | 209<br>(8.23)  | 144<br>(5.67)       | 261<br>(10.28) | 196<br>(7.72)       | 80<br>(3.15)               | 216<br>(8.50)  | 151<br>(5.94)       | 268<br>(10.55) | 203<br>(7.99)       |  |
|              | 1FT7105 |         |                     |                     | 296<br>(11.65) | 231<br>(9.09)       | 348<br>(13.70) | 283<br>(11.14)      |                            | 303<br>(11.93) | 238<br>(9.37)       | 355<br>(13.98) | 290<br>(11.42)      |  |
|              | 1FT7108 |         |                     |                     | 365<br>(14.37) | 300<br>(11.81)      | 417<br>(16.42) | 352<br>(13.86)      |                            | 372<br>(14.65) | 307<br>(12.09)      | 424<br>(16.69) | 359<br>(14.13)      |  |

Shaft version  
with feather key

Flange 1

Flange 0



# Dimensional drawings

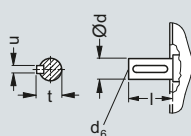
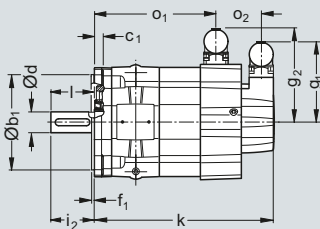
## SIMOTICS S servomotors for SINAMICS S120

### SIMOTICS S-1FT7 synchronous motors Compact/High Dynamic without DRIVE-CLiQ – Water cooling

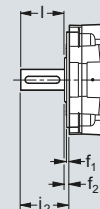
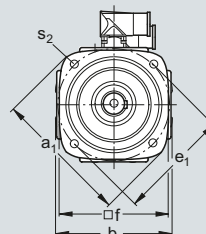
#### Dimensional drawings

| For motor                                                                          |           | Dimensions in mm (inches) |                  |               |                  |                   |                  |               |                  |                  |                  | Signal connector |                  |                  | Power connector  |                  |                  | Connector |          |        |
|------------------------------------------------------------------------------------|-----------|---------------------------|------------------|---------------|------------------|-------------------|------------------|---------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------|--------|
| Shaft height                                                                       | Type      | DIN IEC                   | a <sub>1</sub> P | b –           | b <sub>1</sub> N | c <sub>1</sub> LA | e <sub>1</sub> M | f AB          | f <sub>1</sub> T | s <sub>2</sub> S | g <sub>1</sub> – | g <sub>2</sub> – | g <sub>2</sub> – | g <sub>2</sub> – | o <sub>2</sub> – | o <sub>2</sub> – | o <sub>2</sub> – | Size 1    | Size 1.5 | Size 3 |
| 1FT7 water cooling, type of construction IM B5, with connector, without/with brake |           |                           |                  |               |                  |                   |                  |               |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |          |        |
| 63                                                                                 | 1FT06.-.W |                           | 155<br>(6.10)    | 135<br>(5.31) | 110<br>(4.33)    | 10<br>(0.39)      | 130<br>(5.12)    | 126<br>(4.96) | 3.5<br>(0.14)    | 9<br>(0.35)      | 93<br>(3.66)     | 108<br>(4.25)    | 132.5<br>(5.22)  | –                | 52<br>(2.05)     | 57<br>(2.24)     | –                |           |          |        |
| 80                                                                                 | 1FT08.-.W |                           | 194<br>(7.68)    | 165<br>(6.50) | 130<br>(5.12)    | 11.5<br>(0.45)    | 165<br>(6.50)    | 155<br>(6.10) | 3.5<br>(0.14)    | 11<br>(0.43)     | 93<br>(3.66)     | –                | 140.5<br>(5.53)  | 168.5<br>(6.63)  | –                | 50<br>(1.97)     | 67<br>(2.64)     |           |          |        |
| 100                                                                                | 1FT10.-5W |                           | 245<br>(9.65)    | 206<br>(8.11) | 180<br>(7.09)    | 13<br>(0.51)      | 215<br>(8.46)    | 196<br>(7.72) | 4<br>(0.16)      | 14<br>(0.55)     | 93<br>(3.66)     | –                | 159.5<br>(6.28)  | 187.5<br>(7.38)  | –                | 55<br>(2.17)     | 72<br>(2.83)     |           |          |        |

| Shaft height<br>Type<br>DIN IEC |         |              | Flange 1 (1FT6-compatible) |                |                  |                  |                 | Flange 0           |                  |                |                |                |                      | Shaft extension DE                            |              |              |              |  |
|---------------------------------|---------|--------------|----------------------------|----------------|------------------|------------------|-----------------|--------------------|------------------|----------------|----------------|----------------|----------------------|-----------------------------------------------|--------------|--------------|--------------|--|
|                                 |         |              | without/with brake         |                |                  |                  |                 | without/with brake |                  |                |                |                |                      | d D<br>d <sub>6</sub> –<br>l E<br>t GA<br>u F |              |              |              |  |
|                                 |         |              | Power connector            |                |                  |                  |                 | Power connector    |                  |                |                |                |                      |                                               |              |              |              |  |
|                                 |         |              | i <sub>2</sub> –           | k LB           | o <sub>1</sub> – | o <sub>1</sub> – | Size 1.5 Size 3 | Size 1             | Size 1.5         | Size 3         | Size 1         | Size 1.5       | Size 3               |                                               |              |              |              |  |
| 63                              | 1FT7062 | 50<br>(1.97) | 208<br>(8.19)              | 141<br>(5.55)  | –                | –                | 6<br>(0.24)     | 56.5<br>(2.22)     | 202<br>(7.95)    | 135<br>(5.31)  | –              | –              | <b>24<br/>(0.94)</b> | M8                                            | 50<br>(1.97) | 27<br>(1.06) | 8<br>(0.31)  |  |
|                                 | 1FT7064 |              | 240<br>(9.45)              | 173<br>(6.81)  | –                | –                |                 |                    | 233<br>(9.17)    | 166<br>(6.54)  | –              | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7065 |              | 292<br>(11.50)             | 220<br>(8.66)  | –                | –                |                 |                    | 286<br>(11.26)   | 214<br>(8.43)  | –              | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7066 |              | 272<br>(10.71)             | 204<br>(8.03)  | –                | –                |                 |                    | 265<br>(10.43)   | 198<br>(7.80)  | –              | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7067 |              | 332<br>(13.07)             | 260<br>(10.24) | –                | –                |                 |                    | 325<br>(12.80)   | 254<br>(10.00) | –              | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7068 |              | 319<br>(12.56)             | 252<br>(9.92)  | –                | –                |                 |                    | 312<br>(12.28)   | 245<br>(9.65)  | –              | –              |                      |                                               |              |              |              |  |
| 80                              | 1FT7082 | 58<br>(2.28) | 248<br>(9.76)              | –              | 183<br>(7.20)    | –                | 6<br>(0.24)     | 64.5<br>(2.54)     | 241<br>(9.49)    | –              | 176<br>(6.93)  | –              | <b>32<br/>(1.26)</b> | M12                                           | 58<br>(2.28) | 35<br>(1.38) | 10<br>(0.39) |  |
|                                 | 1FT7084 |              | 299<br>(11.77)             | –              | 234<br>(9.21)    | –                |                 |                    | 293<br>(11.54)   | –              | 228<br>(8.98)  | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7085 |              | 319<br>(12.56)             | –              | 254<br>(10.00)   | 237<br>(9.33)    |                 |                    | 312.5<br>(12.30) | –              | 247<br>(9.72)  | 231<br>(9.09)  |                      |                                               |              |              |              |  |
|                                 | 1FT7086 |              | 351<br>(13.82)             | –              | 286<br>(11.26)   | –                |                 |                    | 345<br>(13.58)   | –              | 279<br>(10.98) | –              |                      |                                               |              |              |              |  |
|                                 | 1FT7087 |              | 379<br>(14.92)             | –              | 314<br>(12.36)   | 297<br>(11.69)   |                 |                    | 372.5<br>(14.67) | –              | 307<br>(12.09) | 291<br>(11.46) |                      |                                               |              |              |              |  |
| 100                             | 1FT7102 | 80<br>(3.15) | 273<br>(10.75)             | –              | 203<br>(7.99)    | 187<br>(7.36)    | 6.5<br>(0.26)   | 87<br>(3.43)       | 266<br>(10.47)   | –              | 196<br>(7.72)  | 180<br>(7.09)  | <b>38<br/>(1.50)</b> | M12                                           | 80<br>(3.15) | 41<br>(1.61) | 10<br>(0.39) |  |
|                                 | 1FT7105 |              | 360<br>(14.17)             | –              | 290<br>(11.42)   | 273<br>(10.75)   |                 |                    | 353<br>(13.90)   | –              | 283<br>(11.14) | 266<br>(10.47) |                      |                                               |              |              |              |  |
|                                 | 1FT7108 |              | 429<br>(16.89)             | –              | 359<br>(14.13)   | 342<br>(13.46)   |                 |                    | 422<br>(16.61)   | –              | 352<br>(13.86) | 335<br>(13.19) |                      |                                               |              |              |              |  |

Flange 1  
(1FT6-compatible)Shaft version  
with feather key

Flange 0



G\_PIM21\_XX\_00177

# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FT7 synchronous motors**  
**Compact/High Dynamic with DRIVE-CLiQ – Water cooling**

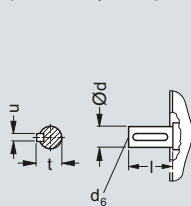
### Dimensional drawings

For motor Dimensions in mm (inches)

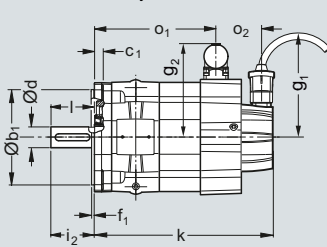
|                                                                                    |           |            |                     |               |                     |                      |                     |               |                     |                     | Signal<br>con-<br>nector | Power connector     |                     |                     |                     | Connector           |                     |  |
|------------------------------------------------------------------------------------|-----------|------------|---------------------|---------------|---------------------|----------------------|---------------------|---------------|---------------------|---------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--|
|                                                                                    |           |            |                     |               |                     |                      |                     |               |                     |                     |                          | Size 1              | Size 1.5            | Size 3              | Size 1              | Size 1.5            | Size 3              |  |
| Shaft<br>height                                                                    | Type      | DIN<br>IEC | a <sub>1</sub><br>P | b<br>–        | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | s <sub>2</sub><br>S | g <sub>1</sub><br>–      | g <sub>2</sub><br>– | g <sub>2</sub><br>– | g <sub>2</sub><br>– | o <sub>2</sub><br>– | o <sub>2</sub><br>– | o <sub>2</sub><br>– |  |
| 1FT7 water cooling, type of construction IM B5, with connector, without/with brake |           |            |                     |               |                     |                      |                     |               |                     |                     |                          |                     |                     |                     |                     |                     |                     |  |
| 63                                                                                 | 1FT06.-.W |            | 155<br>(6.10)       | 135<br>(5.31) | 110<br>(4.33)       | 10<br>(0.39)         | 130<br>(5.12)       | 126<br>(4.96) | 3.5<br>(0.14)       | 9<br>(0.35)         | 93<br>(3.66)             | 108<br>(4.25)       | 132.5<br>(5.22)     | –                   | 50<br>(1.97)        | 55<br>(2.17)        | –                   |  |
| 80                                                                                 | 1FT08.-.W |            | 194<br>(7.68)       | 165<br>(6.50) | 130<br>(5.12)       | 11.5<br>(0.45)       | 165<br>(6.50)       | 155<br>(6.10) | 3.5<br>(0.14)       | 11<br>(0.43)        | 93<br>(3.66)             | –                   | 140.5<br>(5.53)     | 168.5<br>(6.63)     | –                   | 48<br>(1.89)        | 63<br>(2.48)        |  |
| 100                                                                                | 1FT10.-5W |            | 245<br>(9.65)       | 206<br>(8.11) | 180<br>(7.09)       | 13<br>(0.51)         | 215<br>(8.46)       | 196<br>(7.72) | 4<br>(0.16)         | 14<br>(0.55)        | 93<br>(3.66)             | –                   | 159.5<br>(6.28)     | 187.5<br>(7.38)     | –                   | 53<br>(2.09)        | 69<br>(2.72)        |  |

| Shaft height<br>Type<br>DIN IEC |         |                     | Flange 1 (1FT6-compatible) |                     |                     |                     |               | Flange 0            |                     |                     |                |                     | Shaft extension DE  |         |              |              |              |
|---------------------------------|---------|---------------------|----------------------------|---------------------|---------------------|---------------------|---------------|---------------------|---------------------|---------------------|----------------|---------------------|---------------------|---------|--------------|--------------|--------------|
|                                 |         |                     | without/with brake         |                     |                     |                     |               | without/with brake  |                     |                     |                |                     |                     |         |              |              |              |
|                                 |         |                     | Power connector            |                     |                     |                     |               | Power connector     |                     |                     |                |                     |                     |         |              |              |              |
|                                 |         |                     | Size 1                     | Size 1.5            | Size 3              | Size 1              | Size 1.5      | Size 3              | Size 1              | Size 1.5            | Size 3         | Size 1              | Size 1.5            | Size 3  |              |              |              |
| i <sub>2</sub><br>–             | k<br>LB | o <sub>1</sub><br>– | o <sub>1</sub><br>–        | o <sub>1</sub><br>– | f <sub>2</sub><br>– | i <sub>2</sub><br>– | k<br>LB       | o <sub>1</sub><br>– | o <sub>1</sub><br>– | o <sub>1</sub><br>– | d<br>D         | d <sub>6</sub><br>– | l<br>E              | t<br>GA | u<br>F       |              |              |
|                                 |         |                     |                            |                     |                     |                     |               |                     |                     |                     |                |                     |                     |         |              |              |              |
| 63                              | 1FT7062 | 50<br>(1.97)        | 204<br>(8.03)              | 141<br>(5.55)       | –                   | –                   | 6<br>(0.24)   | 56.5<br>(2.22)      | 197<br>(7.76)       | 135<br>(5.31)       | –              | –                   | <b>24</b><br>(0.94) | M8      | 50<br>(1.97) | 27<br>(1.06) | 8<br>(0.31)  |
|                                 | 1FT7064 |                     | 235<br>(9.25)              | 173<br>(6.81)       | –                   | –                   |               |                     | 229<br>(9.02)       | 166<br>(6.54)       | –              | –                   |                     |         |              |              |              |
|                                 | 1FT7065 |                     | 287<br>(11.30)             | 220<br>(8.66)       | –                   | –                   |               |                     | 281<br>(11.06)      | 214<br>(8.43)       | –              | –                   |                     |         |              |              |              |
|                                 | 1FT7066 |                     | 267<br>(10.51)             | 204<br>(8.03)       | –                   | –                   |               |                     | 260<br>(10.24)      | 198<br>(7.80)       | –              | –                   |                     |         |              |              |              |
|                                 | 1FT7067 |                     | 327<br>(12.87)             | 260<br>(10.24)      | –                   | –                   |               |                     | 321<br>(12.64)      | 254<br>(10.00)      | –              | –                   |                     |         |              |              |              |
|                                 | 1FT7068 |                     | 314<br>(12.36)             | 252<br>(9.92)       | –                   | –                   |               |                     | 308<br>(12.13)      | 245<br>(9.65)       | –              | –                   |                     |         |              |              |              |
| 80                              | 1FT7082 | 58<br>(2.28)        | 243<br>(9.57)              | –                   | 183<br>(7.20)       | –                   | 6<br>(0.24)   | 64.5<br>(2.54)      | 237<br>(9.33)       | –                   | 176<br>(6.93)  | –                   | <b>32</b><br>(1.26) | M12     | 58<br>(2.28) | 35<br>(1.38) | 10<br>(0.39) |
|                                 | 1FT7084 |                     | 295<br>(11.61)             | –                   | 234<br>(9.21)       | –                   |               |                     | 288<br>(11.34)      | –                   | 228<br>(8.98)  | –                   |                     |         |              |              |              |
|                                 | 1FT7085 |                     | 314<br>(12.36)             | –                   | 254<br>(10.00)      | 237<br>(9.33)       |               |                     | 308<br>(12.13)      | –                   | 247<br>(9.72)  | 231<br>(9.09)       |                     |         |              |              |              |
|                                 | 1FT7086 |                     | 346<br>(13.62)             | –                   | 286<br>(11.26)      | –                   |               |                     | 340<br>(13.39)      | –                   | 279<br>(10.98) | –                   |                     |         |              |              |              |
|                                 | 1FT7087 |                     | 374<br>(14.72)             | –                   | 314<br>(12.36)      | 297<br>(11.69)      |               |                     | 368<br>(14.49)      | –                   | 307<br>(12.09) | 291<br>(11.46)      |                     |         |              |              |              |
| 100                             | 1FT7102 | 80<br>(3.15)        | 267<br>(10.51)             | –                   | 203<br>(7.99)       | 187<br>(7.36)       | 6.5<br>(0.26) | 87<br>(3.43)        | 262<br>(10.31)      | –                   | 196<br>(7.72)  | 180<br>(7.09)       | <b>38</b><br>(1.50) | M12     | 80<br>(3.15) | 41<br>(1.61) | 10<br>(0.39) |
|                                 | 1FT7105 |                     | 355<br>(13.98)             | –                   | 290<br>(11.42)      | 273<br>(10.75)      |               |                     | 348<br>(13.70)      | –                   | 283<br>(11.14) | 266<br>(10.47)      |                     |         |              |              |              |
|                                 | 1FT7108 |                     | 424<br>(16.69)             | –                   | 359<br>(14.13)      | 342<br>(13.46)      |               |                     | 417<br>(16.42)      | –                   | 352<br>(13.86) | 335<br>(13.19)      |                     |         |              |              |              |

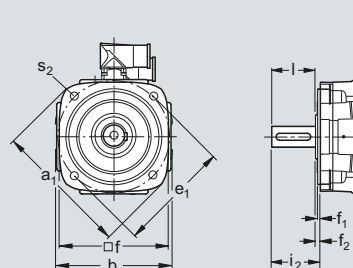
Flange 1  
(1FT6-compatible)



Shaft version  
with feather key



Flange 0



G\_PIM21\_XX\_00181

# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

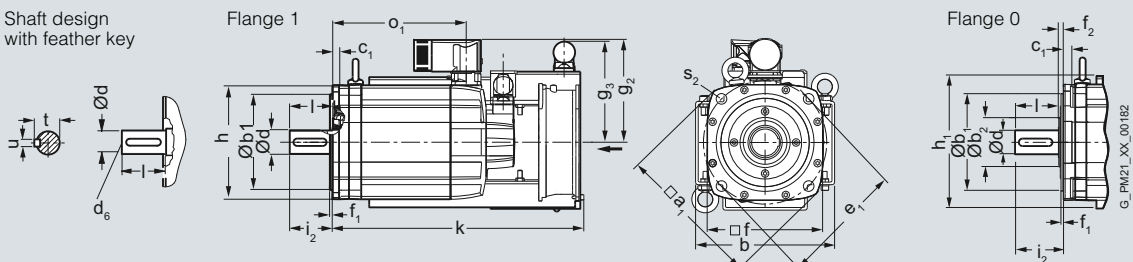
### SIMOTICS S-1FT7 synchronous motors Compact without/with DRIVE-CLiQ – Forced ventilation

#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                                                     | Type       | DIN IEC | a <sub>1</sub><br>P | b<br>–        | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | s <sub>2</sub><br>S | Connector size |               |                 | h<br>H       | h <sub>1</sub><br>– | h <sub>2</sub><br>– | Fan |
|--------------------------------------------------------------------------------------------------|------------|---------|---------------------|---------------|---------------------|----------------------|---------------------|---------------|---------------------|---------------------|----------------|---------------|-----------------|--------------|---------------------|---------------------|-----|
|                                                                                                  |            |         |                     |               |                     |                      |                     |               |                     |                     | Size 1.5       | Size 3        |                 |              |                     |                     |     |
| 1FT7 Compact, type of construction IM B5, forced ventilation, with connector, with/without brake |            |         |                     |               |                     |                      |                     |               |                     |                     |                |               |                 |              |                     |                     |     |
| 63                                                                                               | 1FT706.-.S |         | 155<br>(6.10)       | 158<br>(6.22) | 110<br>(4.33)       | 10<br>(0.39)         | 130<br>(5.12)       | 126<br>(4.96) | 3.5<br>(0.14)       | 11<br>(0.43)        | 125<br>(4.92)  | –             | 102<br>(4.02)   | 26<br>(1.02) | 143<br>(5.36)       | 135<br>(5.31)       |     |
| 80                                                                                               | 1FT708.-.S |         | 194<br>(7.68)       | 186<br>(7.32) | 130<br>(5.12)       | 11.5<br>(0.45)       | 165<br>(6.50)       | 155<br>(6.10) | 3.5<br>(0.14)       | 11<br>(0.43)        | 139<br>(5.47)  | 167<br>(6.57) | 137.5<br>(5.41) | 27<br>(1.06) | 177<br>(6.97)       | 186.5<br>(7.34)     |     |
| 100                                                                                              | 1FT710.-5S |         | 245<br>(9.65)       | 224<br>(8.82) | 180<br>(7.09)       | 13<br>(0.51)         | 215<br>(8.46)       | 196<br>(7.72) | 4<br>(0.16)         | 14<br>(0.55)        | 159<br>(6.26)  | 187<br>(7.36) | 151<br>(5.94)   | 27<br>(1.06) | 220<br>(8.66)       | 222<br>(8.74)       |     |

| Shaft height | Type       | DIN IEC | Flange 1 (1FT6-compatible) |                |                     |                |                     | Flange 0            |                     |                  |                     |                  | Shaft extension DE  |                     |     |              |              |              |
|--------------|------------|---------|----------------------------|----------------|---------------------|----------------|---------------------|---------------------|---------------------|------------------|---------------------|------------------|---------------------|---------------------|-----|--------------|--------------|--------------|
|              |            |         | without brake              |                |                     | with brake     |                     | without brake       |                     |                  | with brake          |                  | d                   | d <sub>6</sub>      | l   | t            | u            |              |
|              |            |         | i <sub>2</sub><br>—        | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | f <sub>2</sub><br>— | i <sub>2</sub><br>— | k<br>LB          | o <sub>1</sub><br>— | k<br>LB          | o <sub>1</sub><br>— | D                   | —   | E            | GA           | F            |
| 63           | 1FT7065-7S |         | 50<br>(1.97)               | 380<br>(14.96) | 220<br>(8.66)       | 380<br>(14.96) | 220<br>(8.66)       | 6<br>(0.24)         | 56.5<br>(2.22)      | 373.5<br>(14.70) | 214<br>(8.43)       | 373.5<br>(14.70) | 214<br>(8.43)       | <b>24</b><br>(0.94) | M8  | 50<br>(1.97) | 27<br>(1.06) | 8<br>(0.31)  |
|              | 1FT7067-7S |         |                            | 420<br>(16.54) | 260<br>(10.24)      | 420<br>(16.54) | 260<br>(10.24)      |                     |                     | 413.5<br>(16.28) | 254<br>(10.00)      | 413.5<br>(16.28) | 254<br>(10.00)      |                     |     |              |              |              |
| 80           | 1FT7084-5S |         | 58<br>(2.28)               | 342<br>(13.46) | 182<br>(7.17)       | 394<br>(15.51) | 234<br>(9.21)       | 6<br>(0.24)         | 64.5<br>(2.54)      | 336<br>(13.23)   | 175<br>(6.89)       | 387<br>(15.24)   | 228<br>(8.98)       | <b>32</b><br>(1.26) | M12 | 58<br>(2.28) | 35<br>(1.38) | 10<br>(0.39) |
|              | 1FT7085-7S |         |                            | 414<br>(16.30) | 254<br>(10.00)      | 414<br>(16.30) | 254<br>(10.00)      |                     |                     | 408<br>(16.06)   | 247<br>(9.72)       | 408<br>(16.06)   | 247<br>(9.72)       |                     |     |              |              |              |
|              | 1FT7086-5S |         |                            | 394<br>(15.51) | 234<br>(9.21)       | 446<br>(17.56) | 286<br>(11.26)      |                     |                     | 387<br>(15.24)   | 227<br>(8.94)       | 440<br>(17.32)   | 379<br>(14.92)      |                     |     |              |              |              |
|              | 1FT7087-7S |         |                            | 474<br>(18.66) | 314<br>(12.36)      | 474<br>(18.66) | 314<br>(12.36)      |                     |                     | 468<br>(18.43)   | 307<br>(12.09)      | 468<br>(18.43)   | 307<br>(12.09)      |                     |     |              |              |              |
| 100          | 1FT7105    |         | 80<br>(3.15)               | 404<br>(15.91) | 238<br>(9.37)       | 456<br>(17.95) | 290<br>(11.42)      | 6.5<br>(0.26)       | 87<br>(3.43)        | 397<br>(15.63)   | 231<br>(9.09)       | 449<br>(17.68)   | 283<br>(11.14)      | <b>38</b><br>(1.50) | M12 | 80<br>(3.15) | 41<br>(1.61) | 10<br>(0.39) |
|              | 1FT7108    |         |                            | 473<br>(18.62) | 307<br>(12.09)      | 525<br>(20.67) | 359<br>(14.13)      |                     |                     | 466<br>(18.35)   | 300<br>(11.81)      | 518<br>(20.39)   | 352<br>(13.86)      |                     |     |              |              |              |

1FT706  
1FT708  
1FT710Shaft design  
with feather key

G\_FW21\_XX\_00182

# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FK7 synchronous motors**  
**Compact – Natural cooling**

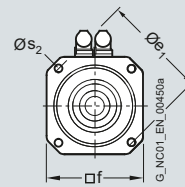
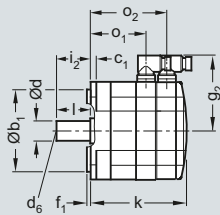
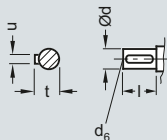
### Dimensional drawings

| For motor                                                                                     |        | Dimensions in mm (inches) |                  |                   |                  |        |                  |                  |                  |                  |        | Shaft extension DE |        |        |        |  |
|-----------------------------------------------------------------------------------------------|--------|---------------------------|------------------|-------------------|------------------|--------|------------------|------------------|------------------|------------------|--------|--------------------|--------|--------|--------|--|
| Shaft height                                                                                  | Type   | DIN IEC                   | b <sub>1</sub> N | c <sub>1</sub> LA | e <sub>1</sub> M | f AB   | f <sub>1</sub> T | g <sub>2</sub> – | i <sub>2</sub> – | s <sub>2</sub> S | d D    | d <sub>6</sub> –   | l E    | t GA   | u F    |  |
| 1FK7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake |        |                           |                  |                   |                  |        |                  |                  |                  |                  |        |                    |        |        |        |  |
| 20                                                                                            | 1FK701 |                           | 30               | 7                 | 46               | 40     | 2.5              | 66               | 18               | 4.5              | 8      | –                  | 18     | 8.8    | 2      |  |
|                                                                                               |        |                           | (1.18)           | (0.28)            | (1.81)           | (1.57) | (0.10)           | (2.60)           | (0.71)           | (0.18)           | (0.31) | (0.59)             | (0.71) | (0.35) | (0.08) |  |
| 28                                                                                            | 1FK702 |                           | 40               | 10                | 63               | 55     | 2.5              | 75               | 20               | 5.4              | 9      | M3                 | 20     | 10.2   | 3      |  |
|                                                                                               |        |                           | (1.57)           | (0.39)            | (2.48)           | (2.17) | (0.10)           | (2.95)           | (0.79)           | (0.21)           | (0.35) |                    | (0.79) | (0.40) | (0.12) |  |

| For motor    |         | Encoder system:<br>Resolver<br>Absolute encoders AM16S/R / AM15DQ |                  |                  |               |                  |                  |  | Encoder system:<br>Incremental encoders IC2048S/R / IC22DQ<br>Absolute encoders AM2048S/R / AM22DQ<br>AM512S/R / AM20DQ<br>AM32S/R / AM16DQ |                  |                  |               |                  |                  |  |
|--------------|---------|-------------------------------------------------------------------|------------------|------------------|---------------|------------------|------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|---------------|------------------|------------------|--|
|              |         | Dimensions in mm (inches)                                         |                  |                  |               |                  |                  |  |                                                                                                                                             |                  |                  |               |                  |                  |  |
|              |         | without brake                                                     |                  |                  | with brake    |                  |                  |  | without brake                                                                                                                               |                  |                  | with brake    |                  |                  |  |
| Shaft height | Type    | k LB                                                              | o <sub>1</sub> – | o <sub>2</sub> – | k LB          | o <sub>1</sub> – | o <sub>2</sub> – |  | k LB                                                                                                                                        | o <sub>1</sub> – | o <sub>2</sub> – | k LB          | o <sub>1</sub> – | o <sub>2</sub> – |  |
| 20           | 1FK7011 | 140<br>(5.51)                                                     | 89<br>(3.50)     | 118<br>(4.65)    | 140<br>(5.51) | 89<br>(3.50)     | 118<br>(4.65)    |  | 155<br>(6.10)                                                                                                                               | 89<br>(3.50)     | 118<br>(4.65)    | 155<br>(6.10) | 89<br>(3.50)     | 118<br>(4.65)    |  |
|              | 1FK7015 | 165<br>(6.50)                                                     | 114<br>(4.59)    | 143<br>(5.63)    | 165<br>(6.50) | 114<br>(4.49)    | 143<br>(5.63)    |  | 180<br>(7.09)                                                                                                                               | 114<br>(4.49)    | 143<br>(5.63)    | 180<br>(7.09) | 114<br>(4.49)    | 143<br>(5.63)    |  |
| 28           | 1FK7022 | 153<br>(6.02)                                                     | 95<br>(3.74)     | 128<br>(5.04)    | 175<br>(6.89) | 95<br>(3.74)     | 150<br>(5.91)    |  | 178<br>(7.01)                                                                                                                               | 95<br>(3.74)     | 128<br>(5.04)    | 200<br>(7.87) | 95<br>(3.74)     | 150<br>(5.91)    |  |

1FK701  
1FK702

Shaft design  
with feather key



# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FK7 synchronous motors**  
**Compact/High Dynamic/High Inertia – Natural cooling**

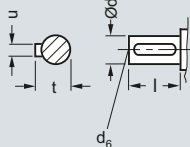
### Dimensional drawings

For motor **DQI encoder** with DRIVE-CLiQ interface (without resolver)/  
**Encoder system** without DRIVE-CLiQ interface (without resolver)  
 Dimensions in mm (inches)

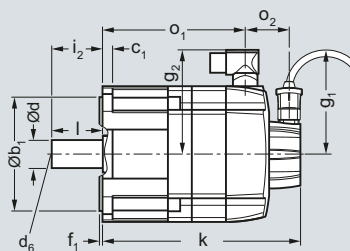
| Shaft height                                                                                                            | Type   | DIN IEC | a <sub>1</sub> P | b <sub>1</sub> N | c <sub>1</sub> LA | e <sub>1</sub> M | f AB          | f <sub>1</sub> T | i <sub>2</sub> – | s <sub>2</sub> S | Shaft extension DE |                  |              |                |              |  |
|-------------------------------------------------------------------------------------------------------------------------|--------|---------|------------------|------------------|-------------------|------------------|---------------|------------------|------------------|------------------|--------------------|------------------|--------------|----------------|--------------|--|
|                                                                                                                         |        |         |                  |                  |                   |                  |               |                  |                  |                  | d D                | d <sub>6</sub> – | l E          | t GA           | u F          |  |
| 1FK7 Compact/High Dynamic/High Inertia, type of construction IM B5, natural cooling, with connector, without/with brake |        |         |                  |                  |                   |                  |               |                  |                  |                  |                    |                  |              |                |              |  |
| 36                                                                                                                      | 1FK703 |         | 90<br>(3.54)     | 60<br>(2.36)     | 8<br>(0.31)       | 75<br>(2.95)     | 72<br>(2.83)  | 3<br>(0.12)      | 30<br>(1.18)     | 6.5<br>(0.26)    | 14<br>(0.55)       | M5               | 30<br>(1.18) | 16<br>(0.63)   | 5<br>(0.20)  |  |
| 48                                                                                                                      | 1FK704 |         | 120<br>(4.72)    | 80<br>(3.15)     | 10<br>(0.39)      | 100<br>(3.94)    | 96<br>(3.78)  | 3<br>(0.12)      | 40<br>(1.57)     | 6.5<br>(0.26)    | 19<br>(0.75)       | M6               | 40<br>(1.57) | 21.5<br>(0.85) | 6<br>(0.24)  |  |
| 63                                                                                                                      | 1FK706 |         | 155<br>(6.10)    | 110<br>(4.33)    | 10<br>(0.39)      | 130<br>(5.12)    | 126<br>(4.96) | 3.5<br>(0.14)    | 50<br>(1.97)     | 9<br>(0.35)      | 24<br>(0.94)       | M8               | 50<br>(1.97) | 27<br>(1.06)   | 8<br>(0.31)  |  |
| 80                                                                                                                      | 1FK708 |         | 194<br>(7.64)    | 130<br>(5.12)    | 11.5<br>(0.45)    | 165<br>(6.50)    | 155<br>(6.10) | 3.5<br>(0.14)    | 58<br>(2.28)     | 11<br>(0.43)     | 32<br>(1.26)       | M12              | 58<br>(2.28) | 35<br>(1.38)   | 10<br>(0.39) |  |
| 100                                                                                                                     | 1FK710 |         | 245<br>(9.65)    | 180<br>(7.09)    | 13<br>(0.51)      | 215<br>(8.46)    | 192<br>(7.56) | 4<br>(0.16)      | 80<br>(3.15)     | 14<br>(0.55)     | 38<br>(1.50)       | M12              | 80<br>(3.15) | 41<br>(1.61)   | 10<br>(0.39) |  |

1FK703  
 1FK704  
 1FK706  
 1FK708  
 1FK710

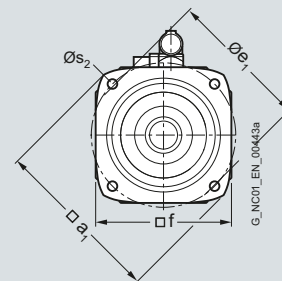
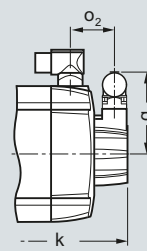
Shaft design  
 with feather key



Version  
 with DRIVE-CLiQ interface



Version  
 without DRIVE-CLiQ interface



# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FK7 synchronous motors**  
**Compact/High Dynamic/High Inertia – Natural cooling**

### Dimensional drawings

| For motor         |             | DQI encoder with DRIVE-CLiQ interface (without resolver) |                     |                     |                |                     |                |                     | Encoder system without DRIVE-CLiQ interface (without resolver) |                     |                     |                |                     |                |                     |
|-------------------|-------------|----------------------------------------------------------|---------------------|---------------------|----------------|---------------------|----------------|---------------------|----------------------------------------------------------------|---------------------|---------------------|----------------|---------------------|----------------|---------------------|
|                   |             | Dimensions in mm (inches)                                |                     |                     |                |                     |                |                     |                                                                |                     |                     |                |                     |                |                     |
| Shaft height      | Type        | without brake                                            |                     |                     |                |                     |                |                     | without brake                                                  |                     |                     |                |                     |                |                     |
|                   |             | g <sub>1</sub><br>—                                      | g <sub>2</sub><br>— | o <sub>2</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | g <sub>1</sub><br>—                                            | g <sub>2</sub><br>— | o <sub>2</sub><br>— | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— |
| 1FK7 Compact      |             |                                                          |                     |                     |                |                     |                |                     |                                                                |                     |                     |                |                     |                |                     |
| 36                | 1FK7032-2A  | 104.5<br>(4.11)                                          | 78<br>(3.07)        | 50<br>(1.97)        | 173<br>(6.81)  | 111<br>(4.37)       | 200<br>(7.87)  | 138<br>(5.43)       | 77<br>(3.03)                                                   | 78<br>(3.07)        | 47<br>(1.85)        | 173<br>(6.81)  | 111<br>(4.37)       | 200<br>(7.87)  | 138<br>(5.43)       |
|                   | 1FK7034-2A  |                                                          |                     |                     | 198<br>(7.80)  | 136<br>(5.35)       | 225<br>(8.86)  | 263<br>(6.42)       |                                                                |                     |                     | 198<br>(7.80)  | 136<br>(5.35)       | 225<br>(8.86)  | 163<br>(6.42)       |
| 48                | 1FK7040-2A  | 104.5<br>(4.11)                                          | 90<br>(4.09)        | 50<br>(1.97)        | 147<br>(6.61)  | 85<br>(4.17)        | 179<br>(7.99)  | 117<br>(5.55)       | 93<br>(3.66)                                                   | 90<br>(4.09)        | 52<br>(2.05)        | 152<br>(6.81)  | 85<br>(4.17)        | 184<br>(8.19)  | 117<br>(5.55)       |
|                   | 1FK7042-2A  |                                                          |                     |                     | 174<br>(6.85)  | 112<br>(4.41)       | 206<br>(8.11)  | 144<br>(5.67)       |                                                                |                     |                     | 179<br>(7.05)  | 112<br>(4.41)       | 211<br>(8.31)  | 144<br>(5.57)       |
| 63                | 1FK7060-2A  | 104.5<br>(4.11)                                          | 104<br>(4.09)       | 50<br>(1.97)        | 168<br>(6.61)  | 106<br>(4.17)       | 203<br>(7.99)  | 141<br>(5.55)       | 93<br>(3.66)                                                   | 104<br>(4.09)       | 52<br>(2.05)        | 173<br>(6.81)  | 106<br>(4.17)       | 208<br>(8.19)  | 141<br>(5.55)       |
|                   | 1FK7062-2A  |                                                          |                     |                     | 190<br>(7.48)  | 128<br>(5.04)       | 226<br>(8.90)  | 163<br>(6.42)       |                                                                |                     |                     | 195<br>(7.68)  | 128<br>(5.04)       | 231<br>(9.09)  | 163<br>(6.42)       |
|                   | 1FK7063-2A  |                                                          |                     |                     | 213<br>(8.39)  | 151<br>(5.94)       | 248<br>(9.76)  | 186<br>(7.32)       |                                                                |                     |                     | 218<br>(8.58)  | 151<br>(5.94)       | 253<br>(9.96)  | 186<br>(7.32)       |
| 80                | 1FK7080-2A  | 104.5<br>(4.11)                                          | 119<br>(4.69)       | 48<br>(1.89)        | 171<br>(6.73)  | 111<br>(4.37)       | 223<br>(8.78)  | 163<br>(6.42)       | 93<br>(3.66)                                                   | 119<br>(4.69)       | 50<br>(1.97)        | 176<br>(6.93)  | 111<br>(4.37)       | 228<br>(8.98)  | 163<br>(6.42)       |
|                   | 1FK7081-2A  |                                                          |                     |                     | 190<br>(7.48)  | 130<br>(5.12)       | 242<br>(9.53)  | 182<br>(7.17)       |                                                                |                     |                     | 196<br>(7.68)  | 130<br>(5.12)       | 247<br>(9.72)  | 182<br>(7.17)       |
|                   | 1FK7083-2A  |                                                          |                     |                     | 209<br>(8.23)  | 149<br>(5.87)       | 261<br>(10.28) | 201<br>(7.91)       |                                                                |                     |                     | 214<br>(8.43)  | 149<br>(5.87)       | 266<br>(10.47) | 201<br>(7.91)       |
|                   | 1FK7084-2A  |                                                          |                     |                     | 229<br>(9.02)  | 168<br>(6.61)       | 281<br>(11.06) | 221<br>(8.70)       |                                                                |                     |                     | 234<br>(9.21)  | 168<br>(6.61)       | 286<br>(11.26) | 221<br>(8.70)       |
| 100               | 1FK7100-2A  | 104.5<br>(4.11)                                          | 137<br>(5.39)       | 53<br>(2.09)        | 183<br>(7.20)  | 118<br>(4.65)       | 220<br>(8.66)  | 170<br>(6.69)       | 93<br>(3.66)                                                   | 137<br>(5.39)       | 55<br>(2.17)        | 188<br>(7.40)  | 118<br>(4.65)       | 225<br>(8.86)  | 170<br>(6.69)       |
|                   | 1FK7101-2A  |                                                          | 158<br>(6.22)       |                     | 209<br>(8.23)  | 144<br>(5.67)       | 261<br>(10.28) | 196<br>(7.72)       |                                                                | 158<br>(6.22)       |                     | 214<br>(8.43)  | 144<br>(5.67)       | 266<br>(10.47) | 196<br>(7.72)       |
|                   | 1FK7103-2A  |                                                          |                     |                     | 235<br>(9.25)  | 170<br>(6.69)       | 287<br>(11.30) | 222<br>(8.74)       |                                                                |                     |                     | 240<br>(9.45)  | 170<br>(6.69)       | 292<br>(11.50) | 222<br>(8.74)       |
|                   | 1FK7105-2A  |                                                          |                     |                     | 287<br>(11.30) | 222<br>(8.74)       | 339<br>(13.35) | 274<br>(10.79)      |                                                                |                     |                     | 292<br>(11.50) | 222<br>(8.74)       | 344<br>(13.54) | 274<br>(10.79)      |
| 1FK7 High Dynamic |             |                                                          |                     |                     |                |                     |                |                     |                                                                |                     |                     |                |                     |                |                     |
| 36                | 1FK7033-4C  | 104.5<br>(4.11)                                          | 78<br>(3.07)        | 50<br>(1.97)        | 183<br>(7.20)  | 121<br>(4.76)       | 210<br>(8.27)  | 148<br>(5.83)       | 77<br>(3.03)                                                   | 78<br>(3.07)        | 47<br>(1.85)        | 183<br>(7.20)  | 121<br>(4.76)       | 210<br>(8.27)  | 148<br>(5.83)       |
| 48                | 1FK7043-4C  | 104.5<br>(4.11)                                          | 90<br>(3.54)        | 56<br>(2.20)        | 200<br>(7.87)  | 132<br>(5.20)       | 232<br>(9.13)  | 164<br>(6.46)       | 93<br>(3.66)                                                   | 90<br>(3.54)        | 58<br>(2.28)        | 205<br>(8.07)  | 132<br>(5.20)       | 237<br>(9.33)  | 164<br>(6.46)       |
|                   | 1FK7044-4C  |                                                          |                     |                     | 225<br>(8.86)  | 157<br>(6.18)       | 257<br>(10.12) | 189<br>(7.44)       |                                                                |                     |                     | 230<br>(9.06)  | 157<br>(6.18)       | 262<br>(10.31) | 189<br>(7.44)       |
| 63                | 1FK7061-4C  | 104.5<br>(4.11)                                          | 104<br>(4.09)       | 50<br>(1.97)        | 203<br>(7.99)  | 141<br>(5.55)       | 238<br>(9.37)  | 176<br>(6.93)       | 93<br>(3.66)                                                   | 104<br>(4.09)       | 52<br>(2.05)        | 208<br>(8.19)  | 141<br>(5.55)       | 243<br>(9.57)  | 176<br>(6.93)       |
|                   | 1FK7064-4C  |                                                          |                     |                     | 267<br>(10.51) | 205<br>(8.07)       | 302<br>(11.89) | 240<br>(9.45)       |                                                                |                     |                     | 272<br>(10.71) | 205<br>(8.07)       | 307<br>(12.09) | 240<br>(9.45)       |
| 80                | 1FK708.-4CC | 104.5<br>(4.11)                                          | 119<br>(4.69)       | 48<br>(1.89)        | 257<br>(10.12) | 197<br>(7.76)       | 309<br>(12.17) | 249<br>(9.80)       | 93<br>(3.66)                                                   | 119<br>(4.69)       | 50<br>(1.97)        | 262<br>(10.31) | 197<br>(7.76)       | 314<br>(12.36) | 249<br>(9.80)       |
|                   | 1FK708.-4CF |                                                          | 139<br>(5.47)       |                     |                |                     |                |                     |                                                                |                     | 139<br>(5.47)       |                |                     |                |                     |
| 1FK7 High Inertia |             |                                                          |                     |                     |                |                     |                |                     |                                                                |                     |                     |                |                     |                |                     |
| 48                | 1FK7042-3B  | 104.5<br>(4.11)                                          | 90<br>(3.54)        | 50<br>(1.97)        | 187<br>(7.36)  | 125<br>(4.92)       | 219<br>(8.62)  | 157<br>(6.18)       | 93<br>(3.66)                                                   | 90<br>(3.54)        | 52<br>(2.05)        | 192<br>(7.56)  | 125<br>(4.92)       | 224<br>(8.82)  | 157<br>(6.18)       |
| 63                | 1FK7060-3B  | 104.5<br>(4.11)                                          | 104<br>(4.09)       | 50<br>(1.97)        | 182<br>(7.17)  | 120<br>(4.72)       | 217<br>(8.54)  | 155<br>(6.10)       | 93<br>(3.66)                                                   | 104<br>(4.09)       | 52<br>(2.05)        | 187<br>(7.36)  | 120<br>(4.72)       | 222<br>(8.74)  | 155<br>(6.10)       |
|                   | 1FK7062-3B  |                                                          |                     |                     | 216<br>(8.50)  | 153<br>(6.02)       | 251<br>(9.88)  | 189<br>(7.44)       |                                                                |                     |                     | 221<br>(8.70)  | 153<br>(6.02)       | 256<br>(10.08) | 189<br>(7.44)       |
| 80                | 1FK7081-3B  | 104.5<br>(4.11)                                          | 119<br>(4.69)       | 48<br>(1.89)        | 211<br>(8.31)  | 151<br>(5.94)       | 264<br>(10.39) | 203<br>(7.99)       | 93<br>(3.66)                                                   | 119<br>(4.69)       | 50<br>(1.97)        | 216<br>(8.50)  | 151<br>(5.94)       | 269<br>(10.59) | 203<br>(7.99)       |
|                   | 1FK7084-3B  |                                                          |                     |                     | 270<br>(10.63) | 209<br>(8.23)       | 322<br>(12.68) | 262<br>(10.31)      |                                                                |                     |                     | 275<br>(10.83) | 209<br>(8.23)       | 327<br>(12.87) | 262<br>(10.31)      |



# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FK7 synchronous motors**  
**Compact/High Dynamic/High Inertia – Natural cooling**

### Dimensional drawings

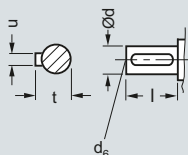
For motor **Resolver** with/without DRIVE-CLiQ interface

Dimensions in mm (inches)

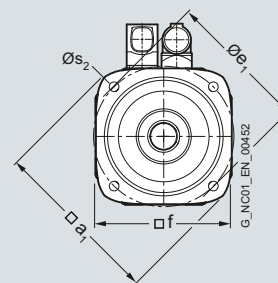
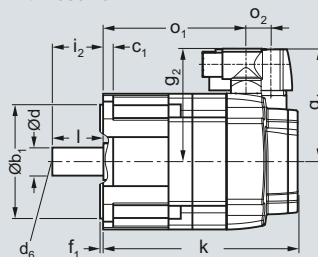
| Shaft height              | Type   | DIN IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | i <sub>2</sub><br>– | s <sub>2</sub><br>S | Shaft extension DE         |                     |              |                |              |  |
|---------------------------|--------|---------|---------------------|---------------------|----------------------|---------------------|---------------|---------------------|---------------------|---------------------|----------------------------|---------------------|--------------|----------------|--------------|--|
|                           |        |         |                     |                     |                      |                     |               |                     |                     |                     | d<br>D                     | d <sub>6</sub><br>– | l<br>E       | t<br>GA        | u<br>F       |  |
| 1FK7 Compact/High Dynamic |        |         |                     |                     |                      |                     |               |                     |                     |                     |                            |                     |              |                |              |  |
| 36                        | 1FK703 |         | 90<br>(3.54)        | 60<br>(2.36)        | 8<br>(0.31)          | 75<br>(2.95)        | 72<br>(2.83)  | 3<br>(0.12)         | 30<br>(1.18)        | 6.5<br>(0.26)       | <b>14</b><br><b>(0.55)</b> | M5                  | 30<br>(1.18) | 16<br>(0.63)   | 5<br>(0.20)  |  |
| 48                        | 1FK704 |         | 120<br>(4.72)       | 80<br>(3.15)        | 10<br>(0.39)         | 100<br>(3.94)       | 96<br>(3.78)  | 3<br>(0.12)         | 40<br>(1.57)        | 6.5<br>(0.26)       | <b>19</b><br><b>(0.75)</b> | M6                  | 40<br>(1.57) | 21.5<br>(0.85) | 6<br>(0.24)  |  |
| 63                        | 1FK706 |         | 155<br>(6.10)       | 110<br>(4.33)       | 10<br>(0.39)         | 130<br>(5.12)       | 126<br>(4.96) | 3.5<br>(0.14)       | 50<br>(1.97)        | 9<br>(0.35)         | <b>24</b><br><b>(0.94)</b> | M8                  | 50<br>(1.97) | 27<br>(1.06)   | 8<br>(0.31)  |  |
| 80                        | 1FK708 |         | 194<br>(7.64)       | 130<br>(5.12)       | 11.5<br>(0.45)       | 165<br>(6.50)       | 155<br>(6.10) | 3.5<br>(0.14)       | 58<br>(2.28)        | 11<br>(0.43)        | <b>32</b><br><b>(1.26)</b> | M12                 | 58<br>(2.28) | 35<br>(1.38)   | 10<br>(0.39) |  |
| 100                       | 1FK710 |         | 245<br>(9.65)       | 180<br>(7.09)       | 13<br>(0.51)         | 215<br>(8.46)       | 192<br>(7.56) | 4<br>(0.16)         | 80<br>(3.15)        | 14<br>(0.55)        | <b>38</b><br><b>(1.50)</b> | M12                 | 80<br>(3.15) | 41<br>(1.61)   | 10<br>(0.39) |  |

1FK703  
1FK704  
1FK706  
1FK708  
1FK710

Shaft design  
with feather key



Version  
with resolver



# Dimensional drawings

## SIMOTICS S servomotors for SINAMICS S120

**SIMOTICS S-1FK7 synchronous motors**  
**Compact/High Dynamic/High Inertia – Natural cooling**

### Dimensional drawings

| For motor         |             | Resolver with/without DRIVE-CLiQ interface |                     |                     |                |                     |                |                     |  |
|-------------------|-------------|--------------------------------------------|---------------------|---------------------|----------------|---------------------|----------------|---------------------|--|
|                   |             | Dimensions in mm (inches)                  |                     |                     |                |                     |                |                     |  |
| Shaft height      | Type        | g <sub>1</sub><br>—                        | g <sub>2</sub><br>— | o <sub>2</sub><br>— | without brake  |                     | with brake     |                     |  |
|                   |             |                                            |                     |                     | k<br>LB        | o <sub>1</sub><br>— | k<br>LB        | o <sub>1</sub><br>— |  |
| 1FK7 Compact      |             |                                            |                     |                     |                |                     |                |                     |  |
| 36                | 1FK7032-2A  | 80<br>(3.15)                               | 80<br>(3.15)        | 15<br>(0.59)        | 153<br>(6.02)  | 117<br>(4.61)       | 180<br>(7.09)  | 144<br>(5.67)       |  |
|                   | 1FK7034-2A  |                                            |                     |                     | 178<br>(7.01)  | 142<br>(5.59)       | 205<br>(8.07)  | 169<br>(6.65)       |  |
| 48                | 1FK7040-2A  | 90<br>(3.54)                               | 90<br>(3.54)        | 23<br>(0.91)        | 132<br>(5.20)  | 85<br>(3.35)        | 164<br>(6.46)  | 117<br>(4.61)       |  |
|                   | 1FK7042-2A  |                                            |                     |                     | 160<br>(6.30)  | 112<br>(4.41)       | 192<br>(7.56)  | 144<br>(5.67)       |  |
| 63                | 1FK7060-2A  | 103<br>(4.06)                              | 104<br>(4.09)       | 23<br>(0.91)        | 153<br>(6.02)  | 106<br>(4.17)       | 189<br>(7.44)  | 141<br>(5.55)       |  |
|                   | 1FK7062-2A  |                                            |                     |                     | 176<br>(6.93)  | 128<br>(5.04)       | 211<br>(8.31)  | 163<br>(6.42)       |  |
|                   | 1FK7063-2A  |                                            |                     |                     | 198<br>(7.80)  | 151<br>(5.94)       | 234<br>(9.21)  | 186<br>(7.32)       |  |
| 80                | 1FK7080-2A  | 118<br>(4.65)                              | 119<br>(4.69)       | 21<br>(0.83)        | 157<br>(6.18)  | 111<br>(4.37)       | 209<br>(8.23)  | 163<br>(6.42)       |  |
|                   | 1FK7081-2A  |                                            |                     |                     | 176<br>(6.93)  | 130<br>(5.12)       | 228<br>(8.98)  | 182<br>(7.17)       |  |
|                   | 1FK7083-2A  |                                            |                     |                     | 195<br>(7.68)  | 149<br>(5.87)       | 247<br>(9.72)  | 201<br>(7.91)       |  |
|                   | 1FK7084-2A  |                                            |                     |                     | 214<br>(8.43)  | 168<br>(6.61)       | 266<br>(10.47) | 221<br>(8.70)       |  |
| 100               | 1FK7100-2A  | 136<br>(5.35)                              | 137<br>(5.39)       | 26<br>(1.02)        | 169<br>(6.65)  | 118<br>(4.65)       | 206<br>(8.11)  | 155<br>(6.10)       |  |
|                   | 1FK7101-2A  |                                            | 158<br>(6.22)       |                     | 195<br>(7.68)  | 144<br>(5.67)       | 247<br>(9.72)  | 196<br>(7.72)       |  |
|                   | 1FK7103-2A  |                                            |                     |                     | 221<br>(8.70)  | 170<br>(6.69)       | 273<br>(10.75) | 222<br>(8.74)       |  |
|                   | 1FK7105-2A  |                                            |                     |                     | 273<br>(10.75) | 222<br>(8.74)       | 325<br>(12.80) | 274<br>(10.79)      |  |
| 1FK7 High Dynamic |             |                                            |                     |                     |                |                     |                |                     |  |
| 36                | 1FK7033-4C  | 81<br>(3.19)                               | 80<br>(3.15)        | 15<br>(0.59)        | 163<br>(6.42)  | 127<br>(5.00)       | 190<br>(7.48)  | 154<br>(6.06)       |  |
| 48                | 1FK7043-4C  | 90<br>(3.54)                               | 90<br>(3.54)        | 23<br>(0.9)         | 186<br>(7.32)  | 138<br>(5.43)       | 218<br>(8.58)  | 170<br>(6.69)       |  |
|                   | 1FK7044-4C  |                                            |                     |                     | 211<br>(8.31)  | 163<br>(6.42)       | 243<br>(9.57)  | 195<br>(7.68)       |  |
| 63                | 1FK7061-4C  | 103<br>(4.06)                              | 104<br>(4.09)       | 23<br>(0.9)         | 188<br>(7.40)  | 141<br>(5.55)       | 224<br>(8.82)  | 176<br>(6.93)       |  |
|                   | 1FK7064-4C  |                                            |                     |                     | 252<br>(9.92)  | 205<br>(8.07)       | 288<br>(11.34) | 240<br>(9.45)       |  |
| 80                | 1FK708.-4CC | 118<br>(4.65)                              | 119<br>(4.69)       | 21<br>(0.83)        | 243<br>(9.57)  | 197<br>(7.76)       | 295<br>(11.61) | 250<br>(9.84)       |  |
|                   | 1FK708.-4CF |                                            | 139<br>(5.47)       |                     |                |                     |                |                     |  |

# Dimensional drawings

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series SP+ for SIMOTICS S-1FT7/1FK7 synchronous motors

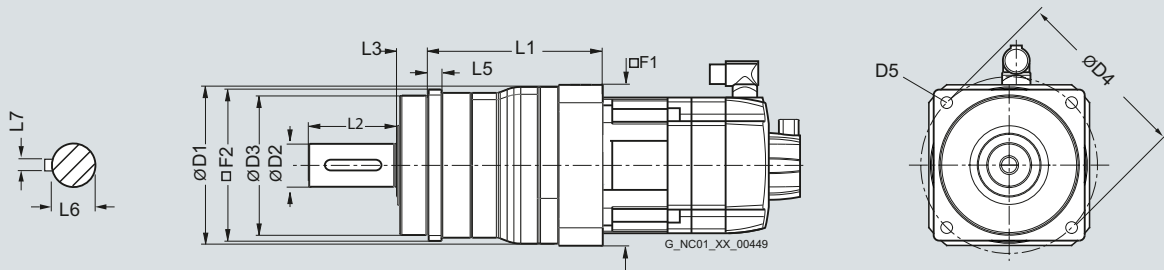
#### Dimensional drawings

For SP+ series planetary gearboxes on SIMOTICS S-1FT7/-1FK7 motors

Dimensions in mm (inches)

Planetary gearbox

| Type                                                               | D2           | D3            | D4             | D5             | F2            | L2            | L3           | L5           | L6             | L7           |
|--------------------------------------------------------------------|--------------|---------------|----------------|----------------|---------------|---------------|--------------|--------------|----------------|--------------|
| <b>1FT7/1FK7 with SP+ series planetary gearbox 1-stage/2-stage</b> |              |               |                |                |               |               |              |              |                |              |
| SP060S-MF1/-MF2                                                    | 16<br>(0.63) | 60<br>(2.36)  | 68<br>(2.68)   | 5.5<br>(0.22)  | 62<br>(2.48)  | 28<br>(1.10)  | 20<br>(0.79) | 6<br>(0.24)  | 18<br>(0.71)   | 5<br>(0.20)  |
| SP075S-MF1/-MF2                                                    | 22<br>(0.87) | 70<br>(2.76)  | 85<br>(3.35)   | 6.6<br>(0.26)  | 76<br>(2.99)  | 36<br>(1.42)  | 20<br>(0.79) | 7<br>(0.28)  | 24.5<br>(0.96) | 6<br>(0.24)  |
| SP100S-MF1/-MF2                                                    | 32<br>(1.26) | 90<br>(3.54)  | 120<br>(4.72)  | 9<br>(0.35)    | 101<br>(3.98) | 58<br>(2.28)  | 30<br>(1.18) | 10<br>(0.39) | 35<br>(1.38)   | 10<br>(0.39) |
| SP140S-MF1/-MF2                                                    | 40<br>(1.57) | 130<br>(5.12) | 165<br>(6.50)  | 11<br>(0.43)   | 141<br>(5.55) | 82<br>(3.23)  | 30<br>(1.18) | 12<br>(0.47) | 43<br>(1.69)   | 12<br>(0.47) |
| SP180S-MF1/-MF2                                                    | 55<br>(2.17) | 160<br>(6.30) | 215<br>(8.46)  | 13.5<br>(0.53) | 182<br>(7.17) | 82<br>(3.23)  | 30<br>(1.18) | 15<br>(0.59) | 59<br>(2.32)   | 16<br>(0.63) |
| SP210S-MF1/-MF2                                                    | 75<br>(2.95) | 180<br>(7.09) | 250<br>(9.84)  | 17<br>(0.67)   | 215<br>(8.46) | 105<br>(4.13) | 38<br>(1.50) | 17<br>(0.67) | 79.5<br>(3.13) | 20<br>(0.79) |
| SP240S-MF1/-MF285                                                  | 85<br>(3.35) | 200<br>(7.87) | 290<br>(11.42) | 17<br>(0.67)   | 245<br>(9.65) | 130<br>(5.12) | 40<br>(1.57) | 20<br>(0.79) | 90<br>(3.54)   | 22<br>(0.87) |



# Dimensional drawings

## Gearboxes for SIMOTICS S servomotors

Planetary gearboxes series SP+  
for SIMOTICS S-1FT7/1FK7 synchronous motors

### Dimensional drawings

For SP+ series planetary gearboxes on SIMOTICS S-1FT7/-1FK7 motors

| Planetary gearbox<br>Type                                   |               | Motor<br>Type |               | Dimensions in mm (inches)               |               |               |                                         |
|-------------------------------------------------------------|---------------|---------------|---------------|-----------------------------------------|---------------|---------------|-----------------------------------------|
|                                                             |               |               |               | SP+ series planetary gearbox<br>1-stage |               |               | SP+ series planetary gearbox<br>2-stage |
|                                                             |               |               |               | -MF1                                    |               |               | -MF2                                    |
| 1FT7/1FK7 with SP+ series planetary gearbox 1-stage/2-stage |               |               |               |                                         |               |               |                                         |
| SP060S-                                                     | 1FT702/1FK702 | 68<br>(2.68)  | 70<br>(2.76)  | 89.3<br>(3.52)                          | 70<br>(2.76)  | 60<br>(2.36)  | 108<br>(4.25)                           |
|                                                             | 1FT703/1FK703 | 68<br>(2.68)  | 70<br>(2.76)  | 94<br>(3.70)                            | 68<br>(2.68)  | 70<br>(2.76)  | 116<br>(4.57)                           |
|                                                             | 1FT704/1FK704 | 91<br>(3.58)  | 90<br>(3.54)  | 106<br>(4.17)                           | –             | –             | –                                       |
| SP075S-                                                     | 1FT702/1FK702 | 91<br>(3.58)  | 90<br>(3.54)  | 107.8<br>(4.24)                         | 95<br>(3.74)  | 70<br>(2.76)  | 119<br>(4.69)                           |
|                                                             | 1FT703/1FK703 | 91<br>(3.58)  | 90<br>(3.54)  | 107.8<br>(4.24)                         | 95<br>(3.74)  | 70<br>(2.76)  | 123.4<br>(4.86)                         |
|                                                             | 1FT704/1FK704 | 91<br>(3.58)  | 90<br>(3.54)  | 111.5<br>(4.39)                         | 91<br>(3.58)  | 90<br>(3.54)  | 135.6<br>(5.34)                         |
| SP100S-                                                     | 1FT702/1FK702 | –             | –             | –                                       | 118<br>(4.65) | 90<br>(3.54)  | 142.3<br>(5.60)                         |
|                                                             | 1FT703/1FK703 | –             | –             | –                                       | 118<br>(4.65) | 90<br>(3.54)  | 142.3<br>(5.60)                         |
|                                                             | 1FT704/1FK704 | 115<br>(4.53) | 120<br>(4.72) | 122<br>(4.80)                           | 118<br>(4.65) | 90<br>(3.54)  | 146<br>(5.75)                           |
|                                                             | 1FT704/1FK706 | 115<br>(4.53) | 120<br>(4.72) | 129<br>(5.08)                           | 115<br>(4.53) | 120<br>(4.72) | 164<br>(6.46)                           |
| SP140S-                                                     | 1FT704/1FK704 | –             | –             | –                                       | 152<br>(5.98) | 120<br>(4.72) | 186.3<br>(7.33)                         |
|                                                             | 1FT706/1FK706 | 146<br>(5.75) | 150<br>(5.91) | 162.3<br>(6.39)                         | 152<br>(5.98) | 120<br>(4.72) | 193.3<br>(7.61)                         |
|                                                             | 1FT708/1FK708 | 146<br>(5.75) | 150<br>(5.91) | 171.3<br>(6.74)                         | 146<br>(5.75) | 150<br>(5.91) | 220<br>(8.66)                           |
|                                                             | 1FT710/1FK710 | 146<br>(5.75) | 190<br>(7.48) | 171.3<br>(6.74)                         | –             | –             | –                                       |
| SP180S-                                                     | 1FT706/1FK706 | –             | –             | –                                       | 212<br>(8.35) | 150<br>(5.91) | 234<br>(9.21)                           |
|                                                             | 1FT708/1FK708 | 207<br>(8.15) | 210<br>(8.27) | 198<br>(7.80)                           | 212<br>(8.35) | 150<br>(5.91) | 242.9<br>(9.56)                         |
|                                                             | 1FT710/1FK710 | 207<br>(8.15) | 210<br>(8.27) | 203.5<br>(8.01)                         | 212<br>(8.35) | 190<br>(7.48) | 242.9<br>(9.56)                         |
| SP210S-                                                     | 1FT708/1FK708 | –             | –             | –                                       | 215<br>(8.46) | 210<br>(8.27) | 272<br>(10.71)                          |
|                                                             | 1FT710/1FK710 | 215<br>(8.46) | 190<br>(7.48) | 242<br>(9.53)                           | 215<br>(8.46) | 210<br>(8.27) | 272<br>(10.71)                          |
| SP240S-                                                     | 1FT708/1FK708 | –             | –             | –                                       | 245<br>(9.65) | 210<br>(8.27) | 297.5<br>(11.71)                        |
|                                                             | 1FT710/1FK710 | 245<br>(9.65) | 240<br>(9.45) | 273<br>(10.75)                          | 245<br>(9.65) | 210<br>(8.27) | 297.5<br>(11.71)                        |

# Dimensional drawings

## Gearboxes for SIMOTICS S servomotors

### Planetary gearboxes series LP+ for SIMOTICS S-1FK7 synchronous motors

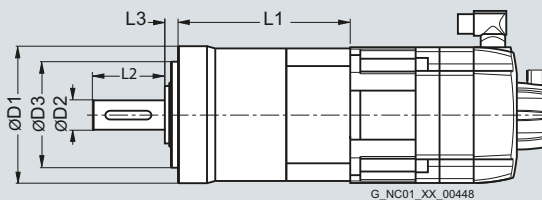
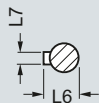
#### Dimensional drawings

For LP+ series planetary gearboxes on SIMOTICS S-1FK7 motors

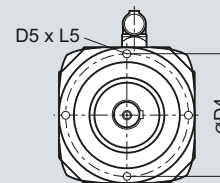
Dimensions in mm (inches)

| Planetary gearbox Type                        | Motor Type | L1              | L2           | L3            | L5           | L6             | L7           | D1            | D2           | D3            | D4            | D5  |
|-----------------------------------------------|------------|-----------------|--------------|---------------|--------------|----------------|--------------|---------------|--------------|---------------|---------------|-----|
| <b>1FK7 with LP+ series planetary gearbox</b> |            |                 |              |               |              |                |              |               |              |               |               |     |
| LP050-MO1                                     | 1FK702     | 63<br>(2.48)    | 18<br>(0.71) | 6.5<br>(0.26) | 8<br>(0.31)  | 13.5<br>(0.53) | 4<br>(0.16)  | 50<br>(1.97)  | 12<br>(0.47) | 35<br>(1.38)  | 44<br>(1.73)  | M4  |
| LP070-MO1                                     | 1FK702     | 83<br>(3.27)    | 28<br>(1.10) | 8<br>(0.31)   | 10<br>(0.39) | 18<br>(0.71)   | 5<br>(0.20)  | 70<br>(2.76)  | 16<br>(0.63) | 52<br>(2.05)  | 62<br>(2.44)  | M5  |
|                                               | 1FK703     | 90<br>(3.54)    |              |               |              |                |              |               |              |               |               |     |
| LP090-MO1                                     | 1FK704     | 112<br>(4.41)   | 36<br>(1.42) | 10<br>(0.39)  | 12<br>(0.47) | 24.5<br>(0.96) | 6<br>(0.24)  | 90<br>(3.54)  | 22<br>(0.87) | 68<br>(2.68)  | 80<br>(3.15)  | M6  |
|                                               | 1FK706     | 122<br>(4.80)   |              |               |              |                |              |               |              |               |               |     |
|                                               | 1FK708     | 132<br>(5.20)   |              |               |              |                |              |               |              |               |               |     |
| LP120-MO1                                     | 1FK706     | 140<br>(5.51)   | 58<br>(2.28) | 12<br>(0.47)  | 16<br>(0.63) | 35<br>(1.38)   | 10<br>(0.39) | 120<br>(4.72) | 32<br>(1.26) | 90<br>(3.54)  | 108<br>(4.25) | M8  |
|                                               | 1FK708     | 150<br>(5.91)   |              |               |              |                |              |               |              |               |               |     |
| LP155-MO1                                     | 1FK708     | 168.5<br>(6.63) | 82<br>(3.23) | 15<br>(0.59)  | 20<br>(0.79) | 43<br>(1.69)   | 12<br>(0.47) | 155<br>(6.10) | 40<br>(1.57) | 120<br>(4.72) | 140<br>(5.51) | M10 |
|                                               | 1FK710     | 188.5<br>(7.42) |              |               |              |                |              |               |              |               |               |     |

1FK703  
1FK704  
1FK706  
1FK708  
1FK710



G\_NC01\_XX\_00448



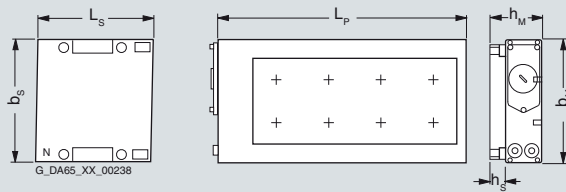
# Dimensional drawings

## SIMOTICS L linear motors for SINAMICS S120

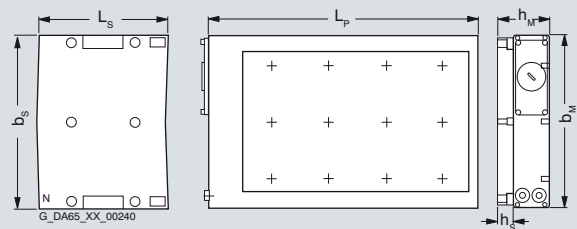
**SIMOTICS L-1FN3 synchronous linear motors**  
Version for peak load – Water cooling

### Dimensional drawings

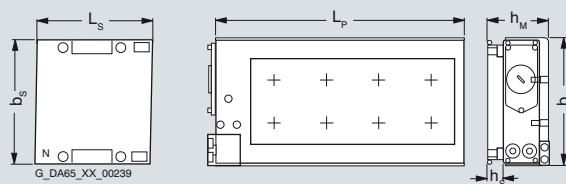
| Primary section                            | Dimensions in mm (inches) |                |                        |                |                           | Primary section length | Secondary section | Dimensions in mm (inches)        |                |                |                |  | Secondary section length |
|--------------------------------------------|---------------------------|----------------|------------------------|----------------|---------------------------|------------------------|-------------------|----------------------------------|----------------|----------------|----------------|--|--------------------------|
|                                            | Without precision cooling |                | With precision cooling |                | Without precision cooling |                        |                   | With precision cooling and cover |                |                |                |  |                          |
| Type                                       | b <sub>M</sub>            | h <sub>M</sub> | b <sub>M</sub>         | h <sub>M</sub> | L <sub>P</sub>            | Type                   | b <sub>S</sub>    | h <sub>S</sub>                   | b <sub>S</sub> | h <sub>S</sub> | L <sub>S</sub> |  |                          |
| 1FN3 version for peak load – water cooling |                           |                |                        |                |                           |                        |                   |                                  |                |                |                |  |                          |
| 1FN3050-2W                                 | 67 (2.64)                 | 48.5 (1.91)    | 76 (2.99)              | 63.4 (2.50)    | 255 (10.04)               | 1FN3050-4SA00-0AA0     | 58 (2.28)         | 11.8 (0.46)                      | 75 (2.95)      | 14.8 (0.58)    | 120 (4.72)     |  |                          |
| 1FN3100-1W                                 | 96 (3.78)                 | 48.5 (1.91)    | –                      | –              | 150 (5.91)                | 1FN3100-4SA00-0AA0     | 88 (3.46)         | 11.8 (0.46)                      | 105 (4.13)     | 14.8 (0.58)    | 120 (4.72)     |  |                          |
| 1FN3100-2W                                 |                           |                | 105 (4.13)             | 63.4 (2.50)    | 255 (10.04)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3100-3W                                 |                           |                |                        |                | 360 (14.17)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3100-4W                                 |                           |                |                        |                | 465 (18.31)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3100-5W                                 |                           |                |                        |                | 570 (22.44)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3150-1W                                 | 126 (4.96)                | 50.5 (1.99)    | –                      | –              | 150 (5.91)                | 1FN3150-4SA00-0AA0     | 118 (4.65)        | 13.8 (0.54)                      | 135 (5.31)     | 16.8 (0.66)    | 120 (4.72)     |  |                          |
| 1FN3150-2W                                 |                           |                | 135 (5.31)             | 65.4 (2.57)    | 255 (10.04)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3150-3W                                 |                           |                |                        |                | 360 (14.17)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3150-4W                                 |                           |                |                        |                | 465 (18.31)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3150-5W                                 |                           |                |                        |                | 570 (22.44)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3300-1W                                 | 141 (5.55)                | 64.1 (2.52)    | –                      | –              | 221 (8.70)                | 1FN3300-4SA00-0AA0     | 134 (5.28)        | 16.5 (0.65)                      | 151 (5.94)     | 19.5 (0.77)    | 184 (7.24)     |  |                          |
| 1FN3300-2W                                 |                           |                | 150 (5.91)             | 79 (3.11)      | 382 (15.04)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3300-3W                                 |                           |                |                        |                | 543 (21.38)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3300-4W                                 |                           |                |                        |                | 704 (27.72)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3450-2W                                 | 188 (7.40)                | 66.1 (2.60)    | 197 (7.76)             | 81 (3.19)      | 382 (15.04)               | 1FN3450-4SA00-0AA0     | 180 (7.09)        | 18.5 (0.73)                      | 197 (7.76)     | 21.5 (0.85)    | 184 (7.24)     |  |                          |
| 1FN3450-3W                                 |                           |                |                        |                | 543 (21.38)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3450-4W                                 |                           |                |                        |                | 704 (27.72)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3600-2W                                 | 248 (9.76)                | 64.1 (2.52)    | 257 (10.12)            | 86 (3.39)      | 382 (15.04)               | 1FN3600-4SA00-0AA0     | 240 (9.45)        | 16.5 (0.65)                      | 247 (9.72)     | 26.5 (1.04)    | 184 (7.24)     |  |                          |
| 1FN3600-3W                                 |                           |                |                        |                | 543 (21.38)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3600-4W                                 |                           |                |                        |                | 704 (27.72)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3900-2W                                 | 342 (13.46)               | 66.1 (2.60)    | 351 (13.82)            | 88 (3.46)      | 382 (15.04)               | 1FN3900-4SA00-0AA0     | 334 (13.15)       | 18.5 (0.73)                      | 341 (13.43)    | 28.5 (1.12)    | 184 (7.24)     |  |                          |
| 1FN3900-3W                                 |                           |                |                        |                | 543 (21.38)               |                        |                   |                                  |                |                |                |  |                          |
| 1FN3900-4W                                 |                           |                |                        |                | 704 (27.72)               |                        |                   |                                  |                |                |                |  |                          |



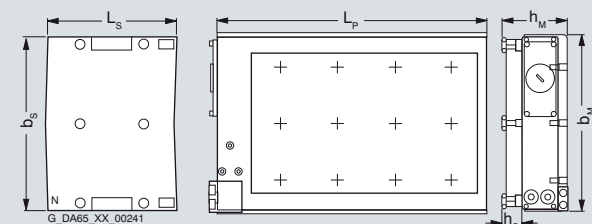
1FN3050 to 1FN3450 without precision cooling



1FN3600 to 1FN3900 without precision cooling  
Note: 4-row drill pattern with 1FN3900 for fixing the primary section



1FN3050 to 1FN3450 with precision cooling



1FN3600 to 1FN3900 with precision cooling  
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

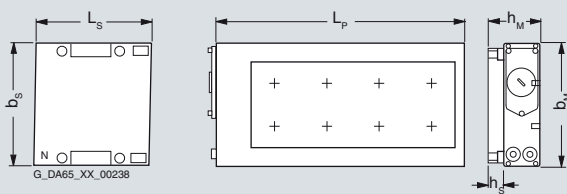
# Dimensional drawings

## SIMOTICS L linear motors for SINAMICS S120

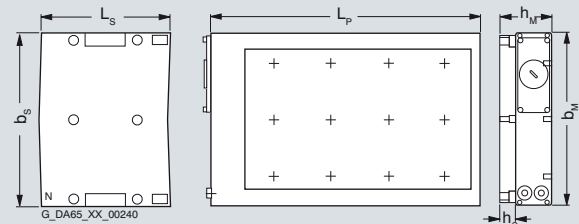
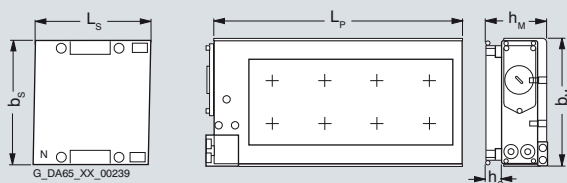
### SIMOTICS L-1FN3 synchronous linear motors Version for continuous load – Water cooling

#### Dimensional drawings

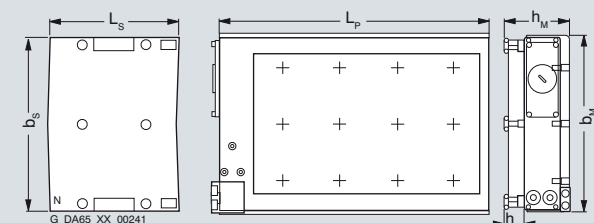
| Primary section Dimensions in mm (inches)        |                           |                |                        |                |                        | Secondary section  | Dimensions in mm (inches) |                |                        |                |                          |
|--------------------------------------------------|---------------------------|----------------|------------------------|----------------|------------------------|--------------------|---------------------------|----------------|------------------------|----------------|--------------------------|
|                                                  | Without precision cooling |                | With precision cooling |                | Primary section length |                    | Without precision cooling |                | With precision cooling |                | Secondary section length |
| Type                                             | b <sub>M</sub>            | h <sub>M</sub> | b <sub>M</sub>         | h <sub>M</sub> |                        | Type               | b <sub>S</sub>            | h <sub>S</sub> | b <sub>M</sub>         | h <sub>M</sub> |                          |
| 1FN3 version for continuous load – water cooling |                           |                |                        |                |                        |                    |                           |                |                        |                |                          |
| 1FN3050-1ND                                      | 67 (2.64)                 | 59.4 (2.34)    | 76 (2.99)              | 74.3 (2.93)    | 162 (6.38)             | 1FN3050-4SA00-0AA0 | 58 (2.28)                 | 11.8 (0.46)    | 75 (2.95)              | 14.8 (0.58)    | 120 (4.72)               |
| 1FN3050-2NB                                      |                           |                |                        |                | 267 (10.51)            |                    |                           |                |                        |                |                          |
| 1FN3100-1NC                                      | 96 (3.78)                 | 59.4 (2.34)    | 105 (4.13)             | 74.3 (2.93)    | 162 (6.38)             |                    |                           |                |                        |                |                          |
| 1FN3100-2NC                                      |                           |                |                        |                | 267 (10.51)            |                    |                           |                |                        |                |                          |
| 1FN3100-3NC                                      |                           |                |                        |                | 372 (14.65)            |                    |                           |                |                        |                |                          |
| 1FN3100-4NC                                      |                           |                |                        |                | 477 (18.78)            | 1FN3150-4SA00-0AA0 | 118 (4.65)                | 13.8 (0.54)    | 135 (5.31)             | 16.8 (0.66)    | 120 (4.72)               |
| 1FN3150-1NC                                      | 126 (4.96)                | 61.4 (2.42)    | 135 (5.31)             | 76.3 (3.00)    | 162 (6.38)             |                    |                           |                |                        |                |                          |
| 1FN3150-2NB                                      |                           |                |                        |                | 267 (10.51)            |                    |                           |                |                        |                |                          |
| 1FN3150-3NC                                      |                           |                |                        |                | 372 (14.65)            |                    |                           |                |                        |                |                          |
| 1FN3150-4NB                                      |                           |                |                        |                | 477 (18.78)            |                    |                           |                |                        |                |                          |
| 1FN3300-1NC                                      | 141 (5.55)                | 78 (3.07)      | 150 (5.91)             | 92.9 (3.66)    | 238 (9.37)             | 1FN3300-4SA00-0AA0 | 134 (5.28)                | 16.5 (0.65)    | 151 (5.94)             | 19.5 (0.77)    | 184 (7.24)               |
| 1FN3300-2NC                                      |                           |                |                        |                | 399 (15.71)            |                    |                           |                |                        |                |                          |
| 1FN3300-3NC                                      |                           |                |                        |                | 560 (22.05)            |                    |                           |                |                        |                |                          |
| 1FN3300-4NB                                      |                           |                |                        |                | 721 (28.39)            |                    |                           |                |                        |                |                          |
| 1FN3450-2NC                                      | 188 (7.40)                | 80 (3.15)      | 197 (7.76)             | 94.9 (3.74)    | 399 (15.71)            | 1FN3450-4SA00-0AA0 | 180 (7.09)                | 18.5 (0.73)    | 197 (7.76)             | 21.5 (0.85)    | 184 (7.24)               |
| 1FN3450-3NC                                      |                           |                |                        |                | 560 (22.05)            |                    |                           |                |                        |                |                          |
| 1FN3450-4NB                                      |                           |                |                        |                | 721 (28.39)            |                    |                           |                |                        |                |                          |
| 1FN3600-2NB                                      | 248 (9.76)                | 78 (3.07)      | 257 (10.12)            | 99.9 (3.93)    | 399 (15.71)            | 1FN3600-4SA00-0AA0 | 240 (9.45)                | 16.5 (0.65)    | 247 (9.72)             | 26.5 (1.04)    | 184 (7.24)               |
| 1FN3600-3NB                                      |                           |                |                        |                | 560 (22.05)            |                    |                           |                |                        |                |                          |
| 1FN3600-4NB                                      |                           |                |                        |                | 721 (28.39)            |                    |                           |                |                        |                |                          |
| 1FN3900-2NB                                      | 342 (13.46)               | 80 (3.15)      | 351 (13.82)            | 101.9 (4.01)   | 399 (15.71)            | 1FN3900-4SA00-0AA0 | 334 (13.15)               | 18.5 (0.73)    | 341 (13.43)            | 28.5 (1.12)    | 184 (7.24)               |
| 1FN3900-3NB                                      |                           |                |                        |                | 560 (22.05)            |                    |                           |                |                        |                |                          |
| 1FN3900-4NB                                      |                           |                |                        |                | 721 (28.39)            |                    |                           |                |                        |                |                          |



1FN3050 to 1FN3450 without precision cooling

1FN3600 to 1FN3900 without precision cooling  
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

1FN3050 to 1FN3450 with precision cooling

1FN3600 to 1FN3900 with precision cooling  
Note: 4-row drill pattern with 1FN3900 for fixing the primary section



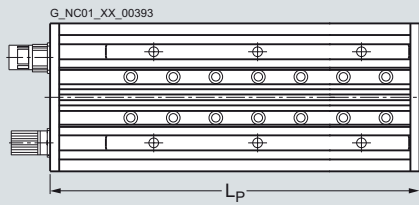
# Dimensional drawings

## SIMOTICS L linear motors for SINAMICS S120

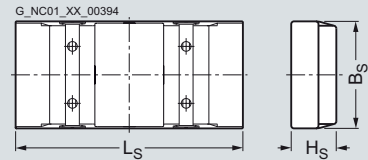
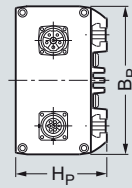
### SIMOTICS L-1FN6 synchronous linear motors Natural cooling

#### Dimensional drawings

| Primary section             |                |                |                                       | Secondary section         |                |                |                                         |
|-----------------------------|----------------|----------------|---------------------------------------|---------------------------|----------------|----------------|-----------------------------------------|
| Dimensions in mm (inches)   |                |                |                                       | Dimensions in mm (inches) |                |                |                                         |
| Type                        | B <sub>P</sub> | H <sub>P</sub> | Primary section length L <sub>P</sub> | Type                      | B <sub>S</sub> | H <sub>S</sub> | Secondary section length L <sub>S</sub> |
| <b>1FN6 natural cooling</b> |                |                |                                       |                           |                |                |                                         |
| 1FN6003-1LC                 | 80 (3.15)      | 49.4 (1.94)    | 203 (7.99)                            | 1FN6003-1SC00-0AA0        | 75 (2.95)      | 20 (0.79)      | 200 (7.87)                              |
| 1FN6003-1LE                 |                |                | 328 (12.91)                           | 1FN6003-1SF00-0AA0        |                |                | 500 (19.69)                             |
| 1FN6003-1LG                 |                |                | 453 (17.83)                           |                           |                |                |                                         |
| 1FN6003-1LJ                 |                |                | 578 (22.76)                           |                           |                |                |                                         |
| 1FN6003-1LL                 |                |                | 703 (27.68)                           |                           |                |                |                                         |
| 1FN6003-1LN                 |                |                | 828 (32.60)                           |                           |                |                |                                         |
| 1FN6007-1LC                 | 115 (4.53)     | 55.4 (2.18)    | 203 (7.99)                            | 1FN6007-1SC00-0AA0        | 110 (4.33)     | 26 (1.02)      | 200 (7.87)                              |
| 1FN6007-1LE                 |                |                | 328 (12.91)                           | 1FN6007-1SF00-0AA0        |                |                | 500 (19.69)                             |
| 1FN6007-1LG                 |                |                | 453 (17.83)                           |                           |                |                |                                         |
| 1FN6007-1LJ                 |                |                | 578 (22.76)                           |                           |                |                |                                         |
| 1FN6007-1LL                 |                |                | 703 (27.68)                           |                           |                |                |                                         |
| 1FN6007-1LN                 |                |                | 828 (32.60)                           |                           |                |                |                                         |
| 1FN6008-1LC                 | 130 (5.12)     | 80.4 (3.17)    | 392 (15.43)                           | 1FN6008-1SC00-0AA0        | 90 (3.54)      | 40 (1.57)      | 200 (7.87)                              |
| 1FN6008-1LE                 |                |                | 642 (25.28)                           |                           |                |                |                                         |
| 1FN6008-1LG                 |                |                | 892 (35.12)                           |                           |                |                |                                         |
| 1FN6016-1LC                 | 209 (8.23)     | 80.4 (3.17)    | 392 (15.43)                           | 1FN6016-1SC00-0AA0        | 170 (6.69)     | 40 (1.57)      | 200 (7.87)                              |
| 1FN6016-1LE                 |                |                | 642 (25.28)                           |                           |                |                |                                         |
| 1FN6016-1LG                 |                |                | 892 (35.12)                           |                           |                |                |                                         |
| 1FN6024-1LC                 | 289 (11.38)    | 80.4 (3.17)    | 392 (15.43)                           | 1FN6024-1SC00-0AA0        | 250 (9.84)     | 40 (1.57)      | 200 (7.87)                              |
| 1FN6024-1LE                 |                |                | 642 (25.28)                           |                           |                |                |                                         |
| 1FN6024-1LG                 |                |                | 892 (35.12)                           |                           |                |                |                                         |



SIMOTICS L-1FN6 primary section



SIMOTICS L-1FN6 secondary section

# Dimensional drawings

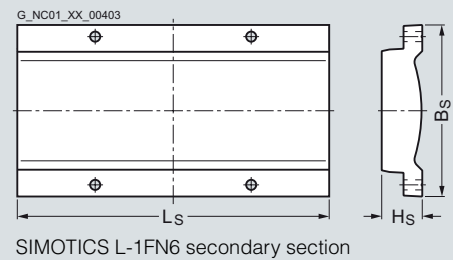
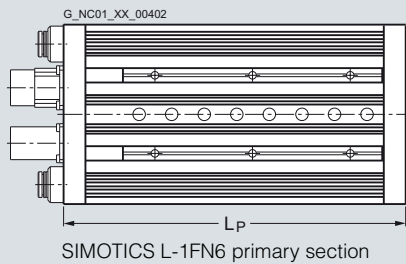
## SIMOTICS L linear motors for SINAMICS S120

### SIMOTICS L-1FN6 synchronous linear motors

#### Water cooling

#### Dimensional drawings

| Primary section           |                |                |                                       | Secondary section                        |                |                |                                         |
|---------------------------|----------------|----------------|---------------------------------------|------------------------------------------|----------------|----------------|-----------------------------------------|
| Dimensions in mm (inches) |                |                |                                       | Dimensions in mm (inches)                |                |                |                                         |
| Type                      | B <sub>P</sub> | H <sub>P</sub> | Primary section length L <sub>P</sub> | Type                                     | B <sub>S</sub> | H <sub>S</sub> | Secondary section length L <sub>S</sub> |
| <b>1FN6 water cooling</b> |                |                |                                       |                                          |                |                |                                         |
| 1FN6003-1WC               | 80 (3.15)      | 49.4 (1.94)    | 219 (8.62)                            | 1FN6003-1SC00-0AA0<br>1FN6003-1SF00-0AA0 | 75 (2.95)      | 20 (0.79)      | 200 (7.87)                              |
| 1FN6003-1WE               |                |                | 344 (13.54)                           |                                          |                |                | 500 (19.69)                             |
| 1FN6003-1WG               |                |                | 469 (18.46)                           |                                          |                |                |                                         |
| 1FN6003-1WJ               |                |                | 594 (23.39)                           |                                          |                |                |                                         |
| 1FN6003-1WL               |                |                | 719 (28.31)                           |                                          |                |                |                                         |
| 1FN6003-1WN               |                |                | 844 (33.23)                           |                                          |                |                |                                         |
| 1FN6007-1WC               | 115 (4.53)     | 55.4 (2.18)    | 219 (8.62)                            | 1FN6007-1SC00-0AA0<br>1FN6007-1SF00-0AA0 | 110 (4.33)     | 26 (1.02)      | 200 (7.87)                              |
| 1FN6007-1WE               |                |                | 344 (13.54)                           |                                          |                |                | 500 (19.69)                             |
| 1FN6007-1WG               |                |                | 469 (18.46)                           |                                          |                |                |                                         |
| 1FN6007-1WJ               |                |                | 594 (23.39)                           |                                          |                |                |                                         |
| 1FN6007-1WL               |                |                | 719 (28.31)                           |                                          |                |                |                                         |
| 1FN6007-1WN               |                |                | 844 (33.23)                           |                                          |                |                |                                         |



# Dimensional drawings

## SIMOTICS T torque motors for SINAMICS S120

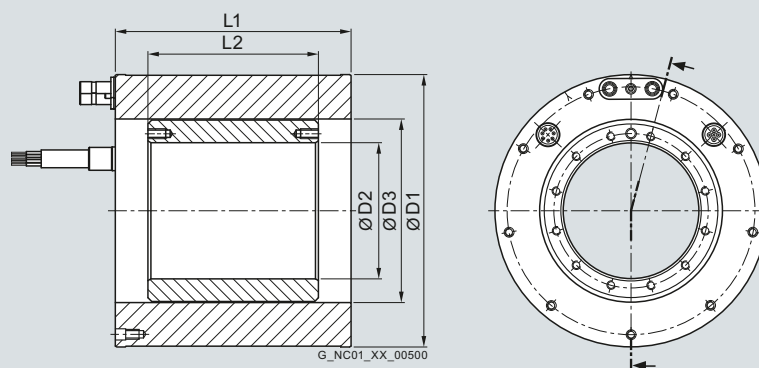
**SIMOTICS T-1FW6 synchronous built-in torque motors**  
**Water cooling**

### Dimensional drawings

For motor Dimensions in mm (inches)

| Type                                              | D1         | D2        | D3         | L1         | L2         |
|---------------------------------------------------|------------|-----------|------------|------------|------------|
| <b>1FW6, individual components, water cooling</b> |            |           |            |            |            |
| 1FW6050-0.B03                                     | 159 (6.26) | 64 (2.52) | 96 (3.78)  | 89 (3.50)  | 35 (1.38)  |
| 1FW6050-0.B05                                     |            |           |            | 109 (4.29) | 65 (2.56)  |
| 1FW6050-0.B07                                     |            |           |            | 129 (5.08) | 85 (3.35)  |
| 1FW6050-0.B10                                     |            |           |            | 159 (6.26) | 115 (4.53) |
| 1FW6050-0.B15                                     |            |           |            | 209 (8.23) | 165 (6.50) |
| 1FW6060-0.B03                                     | 184 (7.24) | 92 (3.62) | 124 (4.88) | 89 (3.50)  | 35 (1.38)  |
| 1FW6060-0.B05                                     |            |           |            | 109 (4.29) | 65 (2.56)  |
| 1FW6060-0.B07                                     |            |           |            | 129 (5.08) | 85 (3.35)  |
| 1FW6060-0.B10                                     |            |           |            | 159 (6.26) | 115 (4.53) |
| 1FW6060-0.B15                                     |            |           |            | 209 (8.23) | 165 (6.50) |

1FW6050  
1FW6060



# Dimensional drawings

## SIMOTICS T torque motors for SINAMICS S120

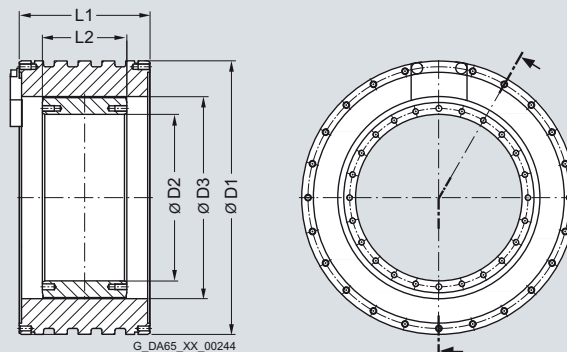
### SIMOTICS T-1FW6 synchronous built-in torque motors

#### Water cooling

#### Dimensional drawings

| For motor                                         | Dimensions in mm (inches) |             |             |            |            |
|---------------------------------------------------|---------------------------|-------------|-------------|------------|------------|
| Type                                              | D1                        | D2          | D3          | L1         | L2         |
| <b>1FW6, individual components, water cooling</b> |                           |             |             |            |            |
| 1FW6090-0.B05                                     | 230 (9.06)                | 140 (5.51)  | 170 (6.69)  | 90 (3.54)  | 51 (2.01)  |
| 1FW6090-0.B07                                     |                           |             |             | 110 (4.33) | 71 (2.80)  |
| 1FW6090-0.B10                                     |                           |             |             | 140 (5.51) | 101 (3.98) |
| 1FW6090-0.B15                                     |                           |             |             | 190 (7.48) | 151 (5.94) |
| 1FW6130-0.B05                                     | 310 (12.20)               | 220 (8.66)  | 254 (10.00) | 90 (3.54)  | 51 (2.01)  |
| 1FW6130-0.B07                                     |                           |             |             | 110 (4.33) | 71 (2.80)  |
| 1FW6130-0.B10                                     |                           |             |             | 140 (5.51) | 101 (3.98) |
| 1FW6130-0.B15                                     |                           |             |             | 190 (7.48) | 151 (5.94) |
| 1FW6150-0.B05                                     | 385 (15.16)               | 265 (10.43) | 300 (11.81) | 110 (4.33) | 51 (2.01)  |
| 1FW6150-0.B07                                     |                           |             |             | 130 (5.12) | 71 (2.80)  |
| 1FW6150-0.B10                                     |                           |             |             | 160 (6.30) | 101 (3.98) |
| 1FW6150-0.B15                                     |                           |             |             | 210 (8.27) | 151 (5.94) |

1FW6090  
1FW6130  
1FW6150



# Dimensional drawings

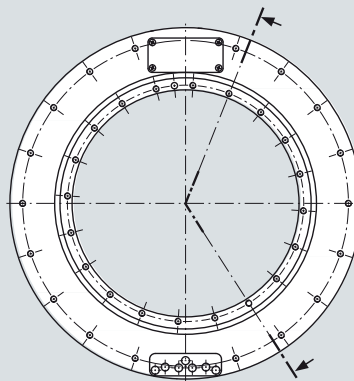
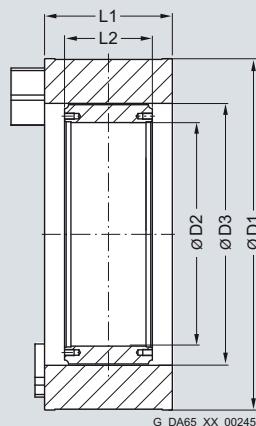
## SIMOTICS T torque motors for SINAMICS S120

**SIMOTICS T-1FW6 synchronous built-in torque motors**  
**Water cooling**

### Dimensional drawings

| For motor                                         | Dimensions in mm (inches) |             |             |             |            |
|---------------------------------------------------|---------------------------|-------------|-------------|-------------|------------|
| Type                                              | D1                        | D2          | D3          | L1          | L2         |
| <b>1FW6, individual components, water cooling</b> |                           |             |             |             |            |
| 1FW6160-0.B05                                     | 440 (17.32)               | 280 (11.02) | 328 (12.91) | 110 (4.33)  | 60 (2.36)  |
| 1FW6160-0.B07                                     |                           |             |             | 130 (5.12)  | 80 (3.15)  |
| 1FW6160-0.B10-.J.2/-5G.2/-8FB2                    |                           |             |             | 160 (6.30)  | 110 (4.33) |
| 1FW6160-0.B10-2PB2                                |                           |             |             | 170 (6.69)  | 110 (4.33) |
| 1FW6160-0.B15-2J.2/-5G.2/-8FB2                    |                           |             |             | 210 (8.27)  | 160 (6.30) |
| 1FW6160-0.B15-2PB2/-0WB2                          |                           |             |             | 220 (8.66)  | 160 (6.30) |
| 1FW6160-0.B20-5G.2/-8FB2                          |                           |             |             | 260 (10.23) | 210 (8.27) |
| 1FW6160-0.B20-2PB2/-0WB2                          |                           |             |             | 270 (10.63) | 210 (8.27) |
| 1FW6190-0.B05                                     | 502 (19.76)               | 342 (13.46) | 389 (15.31) | 110 (4.33)  | 60 (2.36)  |
| 1FW6190-0.B07                                     |                           |             |             | 130 (5.12)  | 80 (3.15)  |
| 1FW6190-0.B10-.J.2/-5G.2/-8FB2                    |                           |             |             | 160 (6.30)  | 110 (4.33) |
| 1FW6190-0.B10-2PB2                                |                           |             |             | 170 (6.69)  | 110 (4.33) |
| 1FW6190-0.B15-2J.2/-5G.2/-8FB2                    |                           |             |             | 210 (8.27)  | 160 (6.30) |
| 1FW6190-0.B15-2PB2/-0WB2                          |                           |             |             | 220 (8.66)  | 160 (6.30) |
| 1FW6190-0.B20-5G.2/-8FB2                          |                           |             |             | 260 (10.24) | 210 (8.27) |
| 1FW6190-0.B20-2PB2/-0WB2                          |                           |             |             | 270 (10.63) | 210 (8.27) |
| 1FW6230-0.B05                                     | 576 (22.68)               | 416 (16.38) | 463 (18.23) | 110 (4.33)  | 60 (2.36)  |
| 1FW6230-0.B07                                     |                           |             |             | 130 (5.12)  | 80 (3.15)  |
| 1FW6230-0.B10                                     |                           |             |             | 160 (6.30)  | 110 (4.33) |
| 1FW6230-0.B15-4C.2/-5G.2/-8FB2/-2PB2              |                           |             |             | 210 (8.27)  | 160 (6.30) |
| 1FW6230-0.B15-0WB2                                |                           |             |             | 220 (8.66)  | 160 (6.30) |
| 1FW6230-0.B20-5G.2/-8FB2/-2PB2                    |                           |             |             | 260 (10.24) | 210 (8.27) |
| 1FW6230-0.B20-0WB2                                |                           |             |             | 270 (10.63) | 210 (8.27) |
| 1FW6290-0.B07-5G.2/-0LB2                          | 730 (28.74)               | 520 (20.47) | 580 (22.83) | 140 (5.51)  | 90 (3.54)  |
| 1FW6290-0.B07-2PB2                                |                           |             |             | 160 (6.30)  | 90 (3.54)  |
| 1FW6290-0.B11-7A.2/-0LB2                          |                           |             |             | 180 (7.09)  | 130 (5.12) |
| 1FW6290-0.B11-2PB2                                |                           |             |             | 200 (7.87)  | 130 (5.12) |
| 1FW6290-0.B15-7A.2/-0LB2                          |                           |             |             | 220 (8.66)  | 170 (6.69) |
| 1FW6290-0.B15-2PB2                                |                           |             |             | 240 (9.45)  | 170 (6.69) |
| 1FW6290-0.B20-0LB2                                |                           |             |             | 260 (10.24) | 210 (8.27) |
| 1FW6290-0.B20-2PB2                                |                           |             |             | 280 (11.02) | 210 (8.27) |

1FW6160  
 1FW6190  
 1FW6230  
 1FW6290



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 80 – Forced ventilation

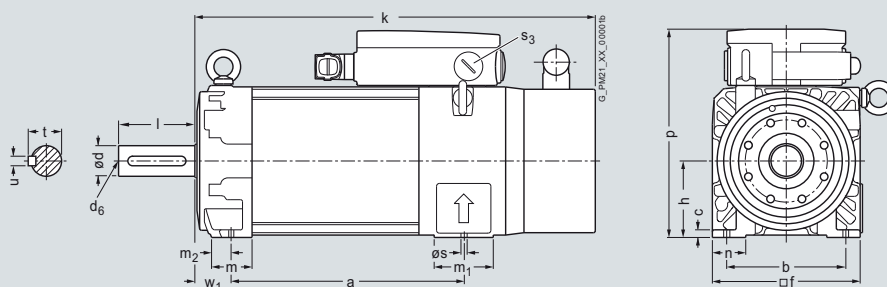
#### Dimensional drawings

For motor Dimensions in mm (inches)

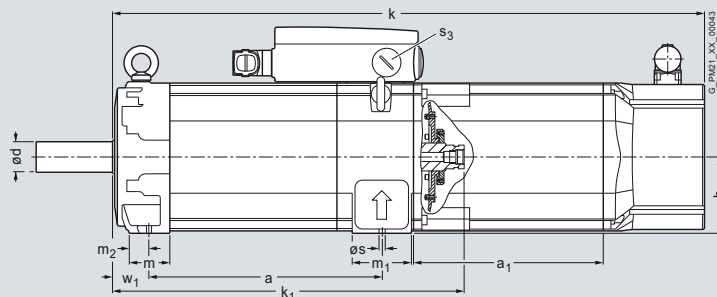
| Shaft height                                                | Type    | DIN IEC | a B           | b A           | c HA        | f AB          | h H          | k LB           | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         | p HD         | p <sub>1</sub> – | s K          | s <sub>3</sub> – | w <sub>1</sub> C |
|-------------------------------------------------------------|---------|---------|---------------|---------------|-------------|---------------|--------------|----------------|--------------|------------------|------------------|--------------|--------------|------------------|--------------|------------------|------------------|
| <b>1PH8, type of construction IM B3, forced ventilation</b> |         |         |               |               |             |               |              |                |              |                  |                  |              |              |                  |              |                  |                  |
| 80                                                          | 1PH8083 |         | 194<br>(7.64) | 125<br>(4.92) | 8<br>(0.31) | 155<br>(6.10) | 80<br>(3.15) | 375<br>(14.76) | 42<br>(1.65) | 62<br>(2.44)     | 20<br>(0.79)     | 35<br>(1.38) | 216<br>(8.5) | 253.5<br>(9.98)  | 10<br>(0.39) | M25x1.5          | 38<br>(1.50)     |
|                                                             | 1PH8087 |         | 244<br>(9.61) |               |             |               |              | 425<br>(16.73) |              |                  |                  |              |              |                  |              |                  |                  |

| Shaft height | Type    | DIN IEC | Shaft extension DE |              |                  |              | Design with hollow shaft |                |                  |
|--------------|---------|---------|--------------------|--------------|------------------|--------------|--------------------------|----------------|------------------|
|              |         |         | d D                | l L          | d <sub>6</sub> – | t GA         | u F                      | k LB           | k <sub>1</sub> – |
| 80           | 1PH8083 |         | 32<br>(1.26)       | 80<br>(3.15) | M12              | 35<br>(1.39) | 10<br>(0.39)             | 575<br>(22.64) | 319.3<br>(12.57) |
|              | 1PH8087 |         |                    |              |                  |              |                          | 625<br>(24.61) | 369.3<br>(14.54) |

1PH808



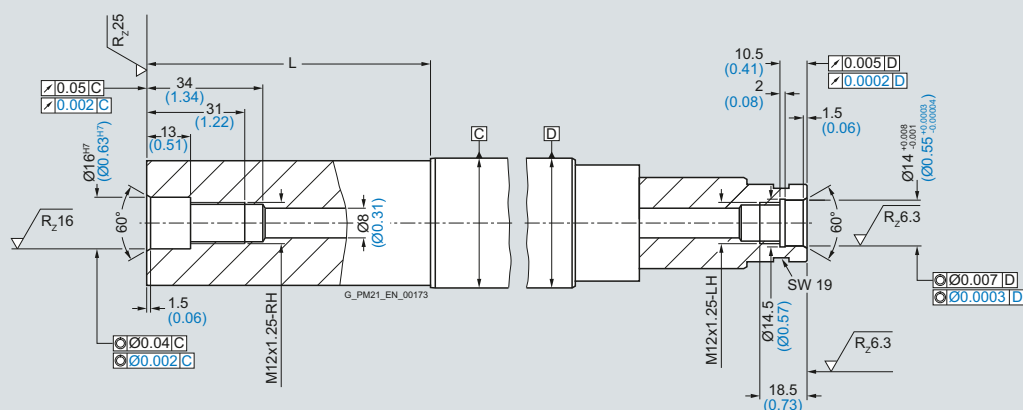
Design with hollow shaft



Hollow shaft

DE shaft extension

NDE shaft extension



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 80 – Forced ventilation

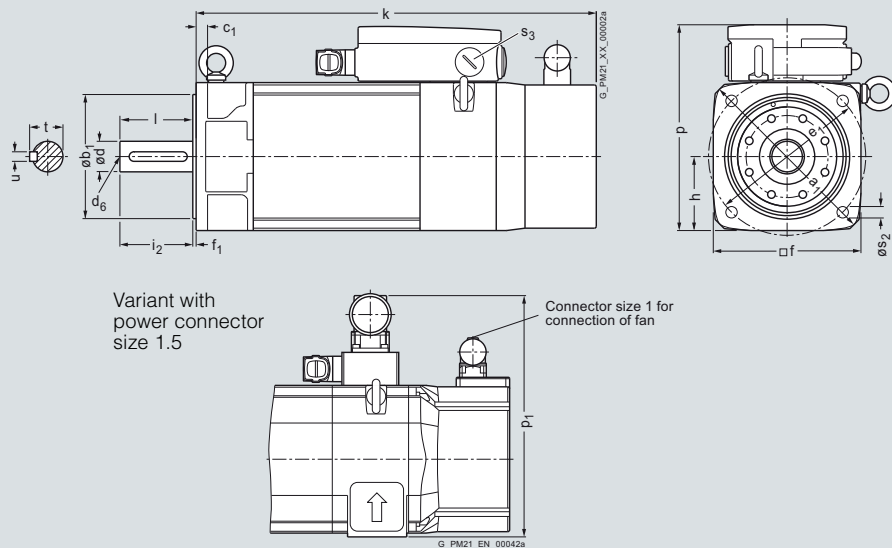
## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                         | Type    | DIN IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | h<br>H         | k<br>LB        | p<br>HD         | p <sub>1</sub><br>– | s <sub>2</sub><br>– | s <sub>3</sub><br>– |
|------------------------------------------------------|---------|---------|---------------------|---------------------|----------------------|---------------------|---------------|---------------------|----------------|----------------|-----------------|---------------------|---------------------|---------------------|
| 1PH8, type of construction IM B5, forced ventilation |         |         |                     |                     |                      |                     |               |                     |                |                |                 |                     |                     |                     |
| 80                                                   | 1PH8083 |         | 200<br>(7.87)       | 130<br>(5.12)       | 12<br>(0.47)         | 165<br>(6.50)       | 155<br>(6.10) | 3.5<br>(0.14)       | 77.5<br>(3.05) | 375<br>(14.76) | 213.5<br>(8.41) | 251<br>(9.88)       | 12<br>(0.47)        | M25×1.5             |
|                                                      | 1PH8087 |         |                     |                     |                      |                     |               |                     |                | 425<br>(16.73) |                 |                     |                     |                     |

| Shaft height | Type    | DIN IEC | Shaft extension DE |              |                     |                     |              | Design with hollow shaft |                |                     |  |
|--------------|---------|---------|--------------------|--------------|---------------------|---------------------|--------------|--------------------------|----------------|---------------------|--|
|              |         |         | d<br>D             | l<br>L       | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA      | u<br>F                   | k<br>LB        | k <sub>1</sub><br>– |  |
| 80           | 1PH8083 |         | 32<br>(1.26)       | 80<br>(3.15) | M12                 | 80<br>(3.15)        | 35<br>(1.38) | 10<br>(0.39)             | 575<br>(22.64) | 319.3<br>(12.57)    |  |
|              | 1PH8087 |         |                    |              |                     |                     |              |                          | 625<br>(24.61) | 369.3<br>(14.54)    |  |

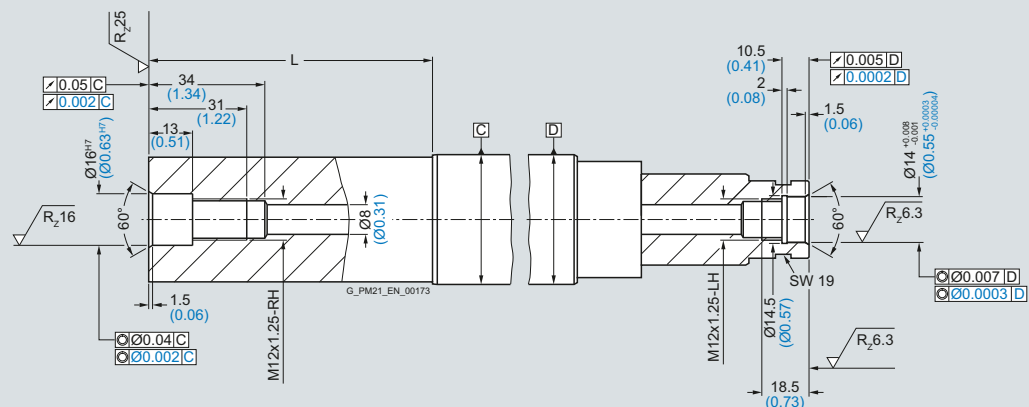
1PH808



Hollow shaft

DE shaft extension

NDE shaft extension





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 100/SH 132 – Forced ventilation

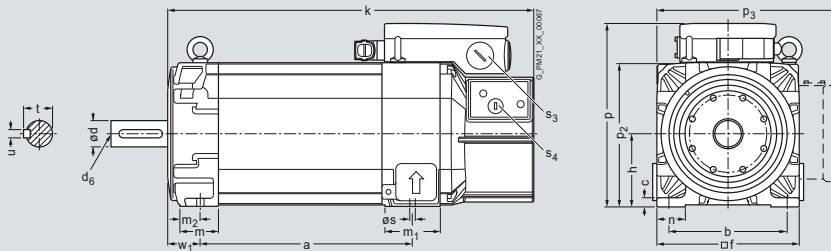
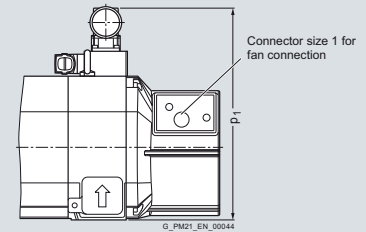
#### Dimensional drawings

| For motor                                                   |         | Dimensions in mm (inches) |                  |               |              |                |               |                  |              |                  |                  |              |                  |                  |                  |                  |
|-------------------------------------------------------------|---------|---------------------------|------------------|---------------|--------------|----------------|---------------|------------------|--------------|------------------|------------------|--------------|------------------|------------------|------------------|------------------|
| Shaft height                                                | Type    | DIN IEC                   | a B              | b A           | c HA         | f AB           | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         | p HD             | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – |
| <b>1PH8, type of construction IM B3, forced ventilation</b> |         |                           |                  |               |              |                |               |                  |              |                  |                  |              |                  |                  |                  |                  |
| 100                                                         | 1PH8101 |                           | 167<br>(6.57)    | 160<br>(6.30) | 11<br>(0.43) | 196<br>(7.72)  | 100<br>(3.94) | 369.5<br>(14.55) | 49<br>(1.93) | 74<br>(2.91)     | 24<br>(0.94)     | 40<br>(1.57) | 252<br>(9.92)    | 294<br>(11.6)    | 198<br>(7.80)    | 276.5<br>(10.89) |
|                                                             | 1PH8103 |                           | 202.5<br>(7.97)  |               |              |                |               | 405<br>(15.94)   |              |                  |                  |              |                  |                  |                  |                  |
|                                                             | 1PH8105 |                           | 262<br>(10.31)   |               |              |                |               | 464.5<br>(18.29) |              |                  |                  |              |                  |                  |                  |                  |
|                                                             | 1PH8107 |                           | 297.5<br>(11.71) |               |              |                |               | 500<br>(19.69)   |              |                  |                  |              |                  |                  |                  |                  |
| 132                                                         | 1PH8131 |                           | 220.5<br>(8.68)  | 216<br>(8.50) | 15<br>(0.59) | 260<br>(10.24) | 132<br>(5.2)  | 439<br>(17.28)   | 57<br>(2.24) | 93<br>(3.66)     | 27<br>(1.06)     | 52<br>(2.05) | 317.5<br>(12.50) | 347<br>(13.66)   | 262<br>(10.31)   | 357.5<br>(14.07) |
|                                                             | 1PH8133 |                           | 265.5<br>(10.45) |               |              |                |               | 484<br>(19.06)   |              |                  |                  |              |                  |                  |                  |                  |
|                                                             | 1PH8135 |                           | 310.5<br>(12.22) |               |              |                |               | 529<br>(20.83)   |              |                  |                  |              |                  |                  |                  |                  |
|                                                             | 1PH8137 |                           | 350.5<br>(13.80) |               |              |                |               | 569<br>(22.40)   |              |                  |                  |              |                  |                  |                  |                  |

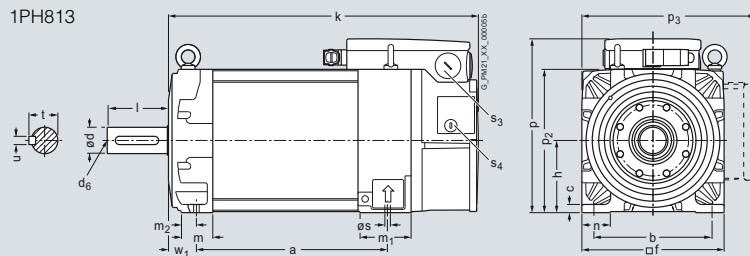
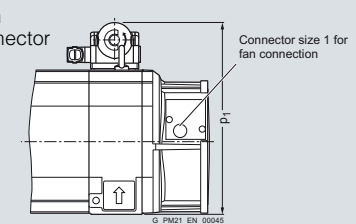
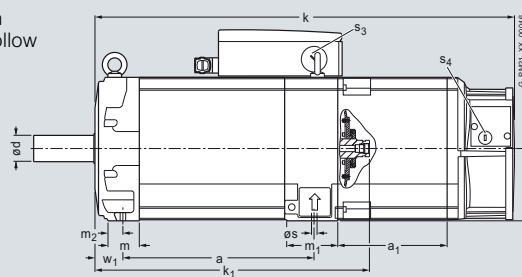
| Shaft height | Type    | DIN IEC | s<br>K       | s <sub>3</sub><br>– | s <sub>4</sub><br>– | Shaft extension DE  |                     |               |                     |                |              | Design with hollow shaft |                     |                  |                     |                     |  |
|--------------|---------|---------|--------------|---------------------|---------------------|---------------------|---------------------|---------------|---------------------|----------------|--------------|--------------------------|---------------------|------------------|---------------------|---------------------|--|
|              |         |         |              |                     |                     | w <sub>1</sub><br>C | d<br>D              | l<br>L        | d <sub>6</sub><br>– | t<br>GA        | u<br>F       | k<br>LB                  | k <sub>1</sub><br>– | p<br>HD          | p <sub>3</sub><br>– | s <sub>3</sub><br>– |  |
| 100          | 1PH8101 |         | 12<br>(0.47) | M32×1.5             | M20×1.5             | 43<br>(1.69)        | <b>38</b><br>(1.50) | 80<br>(3.15)  | M12                 | 41<br>(1.61)   | 10<br>(0.39) | 569.5<br>(22.42)         | 312.3<br>(12.30)    | 266.5<br>(10.49) | 276.5<br>(10.89)    | M32×1.5             |  |
|              | 1PH8103 |         |              |                     |                     |                     |                     |               |                     |                |              | 605<br>(23.82)           | 347.8<br>(13.69)    |                  |                     |                     |  |
|              | 1PH8105 |         |              |                     |                     |                     |                     |               |                     |                |              | 664.5<br>(26.16)         | 407.3<br>(16.04)    |                  |                     |                     |  |
|              | 1PH8107 |         |              |                     |                     |                     |                     |               |                     |                |              | 700<br>(27.56)           | 442.8<br>(17.43)    |                  |                     |                     |  |
| 132          | 1PH8131 |         | 12<br>(0.47) | M40×1.5             | M20×1.5             | 53<br>(2.09)        | <b>48</b><br>(1.89) | 110<br>(4.33) | M16                 | 51.5<br>(2.03) | 14<br>(0.55) | 639<br>(25.16)           | 372.8<br>(14.68)    | 347.5<br>(13.68) | 357.5<br>(14.07)    | M50×1.5             |  |
|              | 1PH8133 |         |              |                     |                     |                     |                     |               |                     |                |              | 684<br>(26.93)           | 417.8<br>(16.45)    |                  |                     |                     |  |
|              | 1PH8135 |         |              |                     |                     |                     |                     |               |                     |                |              | 729<br>(28.70)           | 462.8<br>(18.22)    |                  |                     |                     |  |
|              | 1PH8137 |         |              |                     |                     |                     |                     |               |                     |                |              | 769<br>(30.28)           | 502.8<br>(19.80)    |                  |                     |                     |  |

**SIMOTICS M asynchronous and synchronous motors for SINAMICS S120****SIMOTICS M-1PH8 asynchronous motors  
SH 100/SH 132 – Forced ventilation****Dimensional drawings**

1PH810

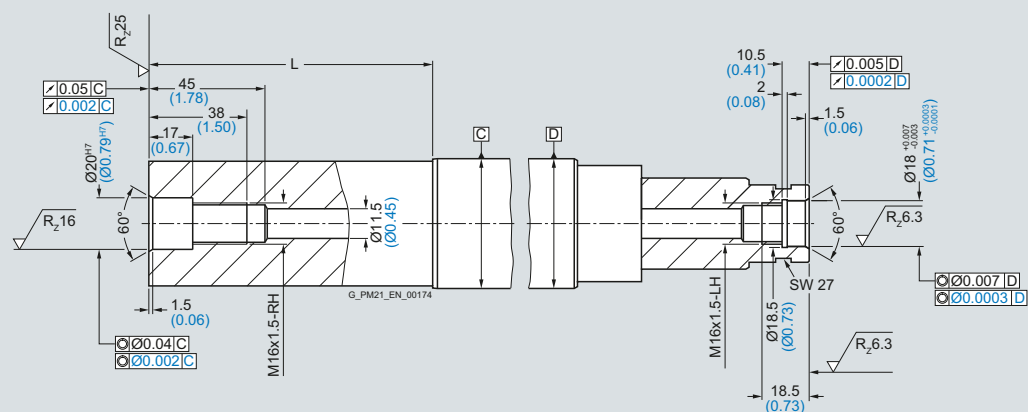
Variant with  
power connector  
size 1.5

1PH813

Variant with  
power connector  
size 3Design  
with hollow  
shaftHollow shaft  
1PH810  
1PH813

DE shaft extension

NDE shaft extension



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

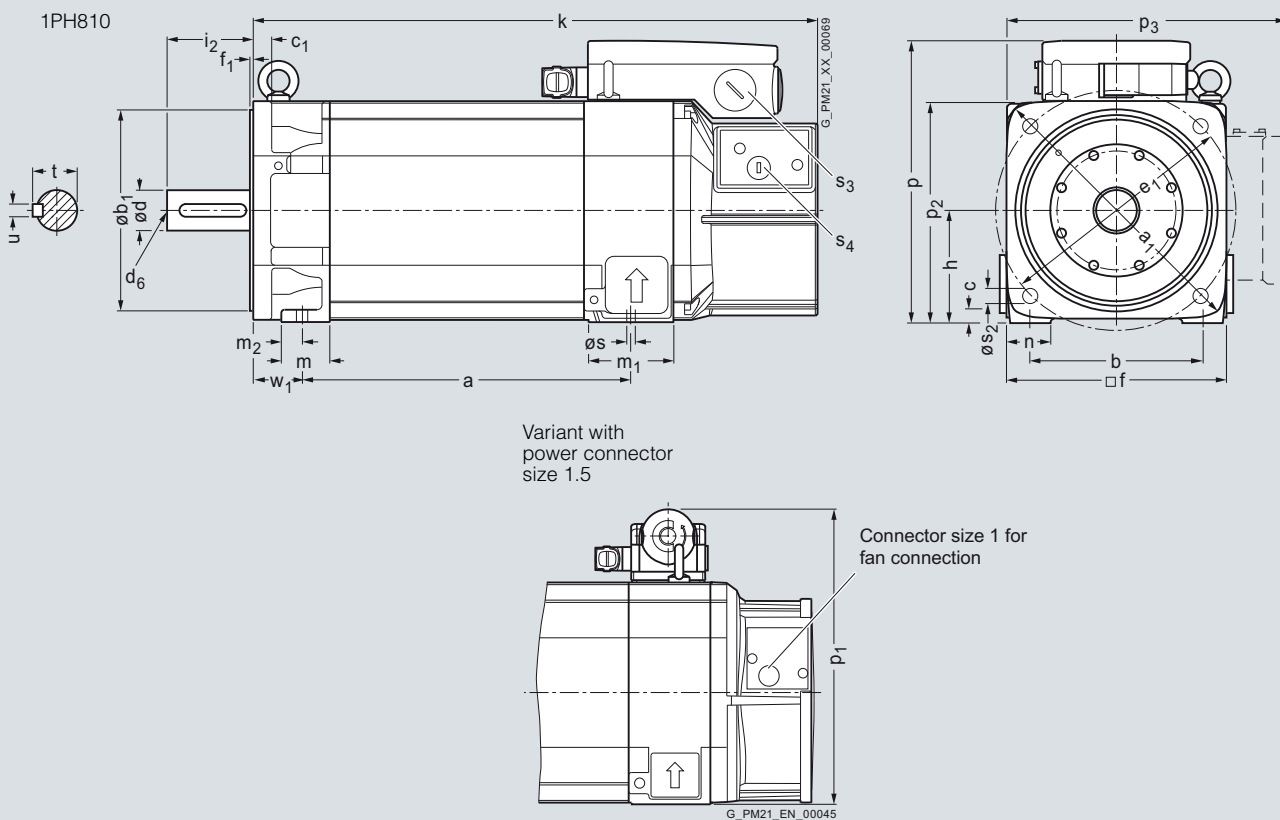
### SIMOTICS M-1PH8 asynchronous motors SH 100 – Forced ventilation

#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                 | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A           | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB          | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         | p HD          | p <sub>1</sub> – |
|--------------------------------------------------------------|---------|---------|------------------|------------------|---------------|------------------|--------------|-------------------|------------------|---------------|------------------|---------------|------------------|--------------|------------------|------------------|--------------|---------------|------------------|
| <b>1PH8, type of construction IM B35, forced ventilation</b> |         |         |                  |                  |               |                  |              |                   |                  |               |                  |               |                  |              |                  |                  |              |               |                  |
| 100                                                          | 1PH8101 |         | 167<br>(6.57)    | 250<br>(9.84)    | 160<br>(6.30) | 180<br>(7.09)    | 11<br>(0.43) | 16<br>(0.63)      | 215<br>(8.46)    | 196<br>(7.72) | 4<br>(0.16)      | 100<br>(3.94) | 369.5<br>(14.55) | 44<br>(1.73) | 74<br>(2.91)     | 19<br>(0.75)     | 40<br>(1.57) | 252<br>(9.92) | 294<br>(11.57)   |
|                                                              | 1PH8103 |         | 202.5<br>(7.97)  |                  |               |                  |              |                   |                  |               |                  |               | 405<br>(15.94)   |              |                  |                  |              |               |                  |
|                                                              | 1PH8105 |         | 262<br>(10.31)   |                  |               |                  |              |                   |                  |               |                  |               | 464.5<br>(18.29) |              |                  |                  |              |               |                  |
|                                                              | 1PH8107 |         | 297.5<br>(11.71) |                  |               |                  |              |                   |                  |               |                  |               | 500<br>(19.69)   |              |                  |                  |              |               |                  |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |              |                  |                  |                  |                  |              |              |                  |                  |              |              | Design with hollow shaft |                  |                  |                  |                  |
|--------------|---------|---------|--------------------|------------------|--------------|------------------|------------------|------------------|------------------|--------------|--------------|------------------|------------------|--------------|--------------|--------------------------|------------------|------------------|------------------|------------------|
|              |         |         | p <sub>2</sub> –   | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | d D          | l L          | d <sub>6</sub> – | i <sub>2</sub> E | t GA         | u F          | k LB                     | k <sub>1</sub> – | p HD             | p <sub>3</sub> – | s <sub>3</sub> – |
| 100          | 1PH8101 |         | 198<br>(7.80)      | 276.5<br>(10.89) | 12<br>(0.47) | 14<br>(0.55)     | M32×1.5          | M20×1.5          | 43<br>(1.69)     | 38<br>(1.50) | 80<br>(3.15) | M12              | 80<br>(3.15)     | 41<br>(1.61) | 10<br>(0.39) | 569.5<br>(22.42)         | 312.3<br>(12.30) | 266.5<br>(10.49) | 276.5<br>(10.89) | M32×1.5          |
|              | 1PH8103 |         |                    |                  |              |                  |                  |                  |                  |              |              |                  |                  |              |              | 605<br>(23.82)           | 347.8<br>(13.69) |                  |                  |                  |
|              | 1PH8105 |         |                    |                  |              |                  |                  |                  |                  |              |              |                  |                  |              |              | 664.5<br>(26.16)         | 407.3<br>(16.04) |                  |                  |                  |
|              | 1PH8107 |         |                    |                  |              |                  |                  |                  |                  |              |              |                  |                  |              |              | 700<br>(27.56)           | 442.8<br>(17.43) |                  |                  |                  |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

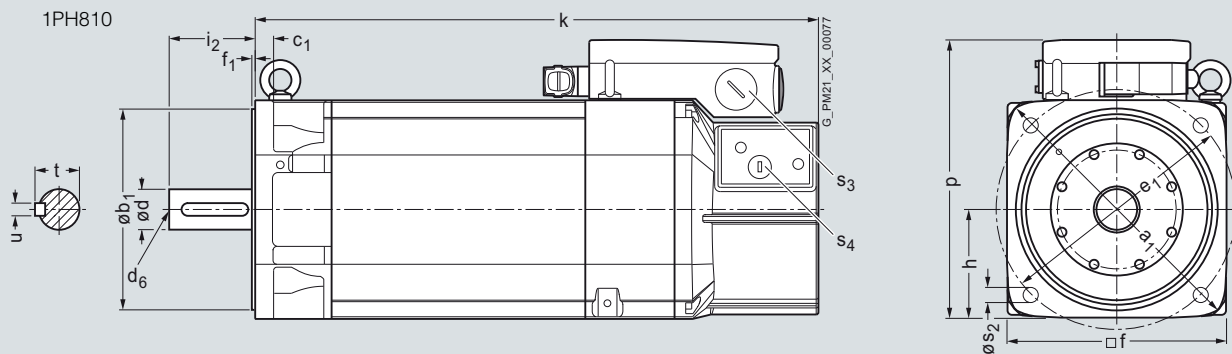
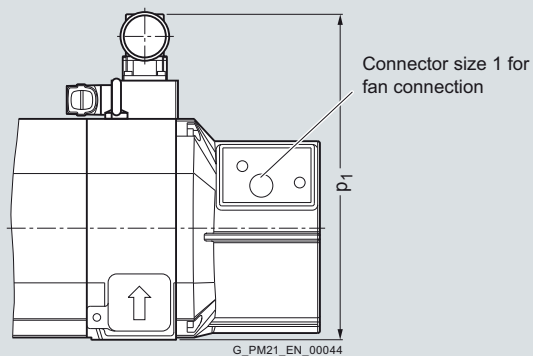
SIMOTICS M-1PH8 asynchronous motors  
SH 100 – Forced ventilation

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                | Type    | DIN IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB       | f <sub>1</sub><br>T | h<br>H       | k<br>LB          | p<br>HD       | p <sub>1</sub><br>– |
|-------------------------------------------------------------|---------|---------|---------------------|---------------------|----------------------|---------------------|---------------|---------------------|--------------|------------------|---------------|---------------------|
| <b>1PH8, type of construction IM B5, forced ventilation</b> |         |         |                     |                     |                      |                     |               |                     |              |                  |               |                     |
| 100                                                         | 1PH8101 |         | 250<br>(9.84)       | 180<br>(7.09)       | 16<br>(0.63)         | 215<br>(8.46)       | 196<br>(7.72) | 4<br>(0.16)         | 98<br>(3.86) | 369.5<br>(14.55) | 250<br>(9.84) | 292<br>(11.50)      |
|                                                             | 1PH8103 |         |                     |                     |                      |                     |               |                     |              | 405<br>(15.94)   |               |                     |
|                                                             | 1PH8105 |         |                     |                     |                      |                     |               |                     |              | 464.5<br>(18.29) |               |                     |
|                                                             | 1PH8107 |         |                     |                     |                      |                     |               |                     |              | 500<br>(19.69)   |               |                     |

| Shaft height | Type    | DIN IEC | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | Shaft extension DE   |              |                     |                     |              |              | Design with hollow shaft |                     |                  |                     |
|--------------|---------|---------|---------------------|---------------------|---------------------|----------------------|--------------|---------------------|---------------------|--------------|--------------|--------------------------|---------------------|------------------|---------------------|
|              |         |         |                     |                     |                     | <b>d</b><br><b>D</b> | l<br>L       | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA      | u<br>F       | k<br>LB                  | k <sub>1</sub><br>– | p<br>HD          | s <sub>3</sub><br>– |
| 100          | 1PH8101 |         | 14<br>(0.55)        | M32×1.5             | M20×1.5             | <b>38</b><br>(1.50)  | 80<br>(3.15) | M12                 | 80<br>(3.15)        | 41<br>(1.61) | 10<br>(0.39) | 569.5<br>(22.42)         | 312.3<br>(12.30)    | 264.5<br>(10.41) | M32×1.5             |
|              | 1PH8103 |         |                     |                     |                     |                      |              |                     |                     |              |              | 605<br>(23.82)           | 347.8<br>(13.69)    |                  |                     |
|              | 1PH8105 |         |                     |                     |                     |                      |              |                     |                     |              |              | 664.5<br>(16.16)         | 407.3<br>(16.04)    |                  |                     |
|              | 1PH8107 |         |                     |                     |                     |                      |              |                     |                     |              |              | 700<br>(17.56)           | 442.8<br>(17.43)    |                  |                     |

Variant with  
power connector  
size 1.5Connector size 1 for  
fan connection

# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 132 – Forced ventilation

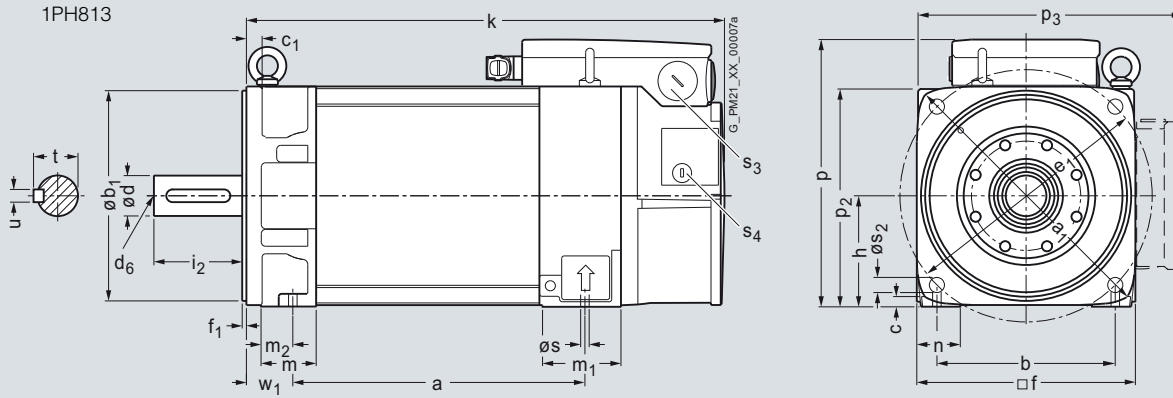
#### Dimensional drawings

For motor Dimensions in mm (inches)

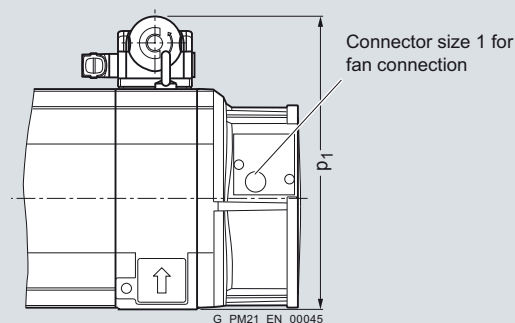
| Shaft height                                                 | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A           | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB           | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         | p HD             | p <sub>1</sub> – |
|--------------------------------------------------------------|---------|---------|------------------|------------------|---------------|------------------|--------------|-------------------|------------------|----------------|------------------|---------------|----------------|--------------|------------------|------------------|--------------|------------------|------------------|
| <b>1PH8, type of construction IM B35, forced ventilation</b> |         |         |                  |                  |               |                  |              |                   |                  |                |                  |               |                |              |                  |                  |              |                  |                  |
| 132                                                          | 1PH8131 |         | 220.5<br>(8.68)  | 340<br>(13.39)   | 216<br>(8.50) | 250<br>(9.84)    | 15<br>(0.59) | 18<br>(0.71)      | 300<br>(11.81)   | 260<br>(10.24) | 5<br>(0.20)      | 132<br>(5.20) | 439<br>(17.28) | 65<br>(2.56) | 93<br>(3.66)     | 35<br>(1.38)     | 52<br>(2.05) | 317.5<br>(12.50) | 347<br>(13.66)   |
|                                                              | 1PH8133 |         | 265.5<br>(10.45) |                  |               |                  |              |                   |                  |                |                  |               | 484<br>(19.06) |              |                  |                  |              |                  |                  |
|                                                              | 1PH8135 |         | 310.5<br>(12.22) |                  |               |                  |              |                   |                  |                |                  |               | 529<br>(20.83) |              |                  |                  |              |                  |                  |
|                                                              | 1PH8137 |         | 350.4<br>(13.80) |                  |               |                  |              |                   |                  |                |                  |               | 569<br>(22.40) |              |                  |                  |              |                  |                  |

| Shaft height | Type    | DIN IEC | Shaft extension DE  |                     |              |                     |                     |                     |                     |              |               |                     |                     |                | Design with hollow shaft |                |                     |                  |                     |                     |
|--------------|---------|---------|---------------------|---------------------|--------------|---------------------|---------------------|---------------------|---------------------|--------------|---------------|---------------------|---------------------|----------------|--------------------------|----------------|---------------------|------------------|---------------------|---------------------|
|              |         |         | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s<br>K       | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | w <sub>1</sub><br>C | d<br>D       | l<br>L        | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA        | u<br>F                   | k<br>LB        | k <sub>1</sub><br>– | p<br>HD          | p <sub>3</sub><br>– | s <sub>3</sub><br>– |
| 132          | 1PH8131 |         | 262<br>(10.31)      | 357.5<br>(14.07)    | 12<br>(0.47) | 18<br>(0.71)        | M40×1.5             | M20×1.5             | 53<br>(2.09)        | 48<br>(1.89) | 110<br>(4.33) | M16                 | 110<br>(4.33)       | 51.5<br>(2.03) | 14<br>(0.55)             | 639<br>(25.16) | 372.8<br>(14.68)    | 347.5<br>(13.68) | 357.5<br>(14.07)    | M50×1.5             |
|              | 1PH8133 |         |                     |                     |              |                     |                     |                     |                     |              |               |                     |                     |                |                          | 684<br>(26.93) | 417.8<br>(16.45)    |                  |                     |                     |
|              | 1PH8135 |         |                     |                     |              |                     |                     |                     |                     |              |               |                     |                     |                |                          | 729<br>(28.70) | 462.8<br>(18.22)    |                  |                     |                     |
|              | 1PH8137 |         |                     |                     |              |                     |                     |                     |                     |              |               |                     |                     |                |                          | 769<br>(30.28) | 502.8<br>(19.80)    |                  |                     |                     |

1PH813



Variant with  
power connector  
size 3



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

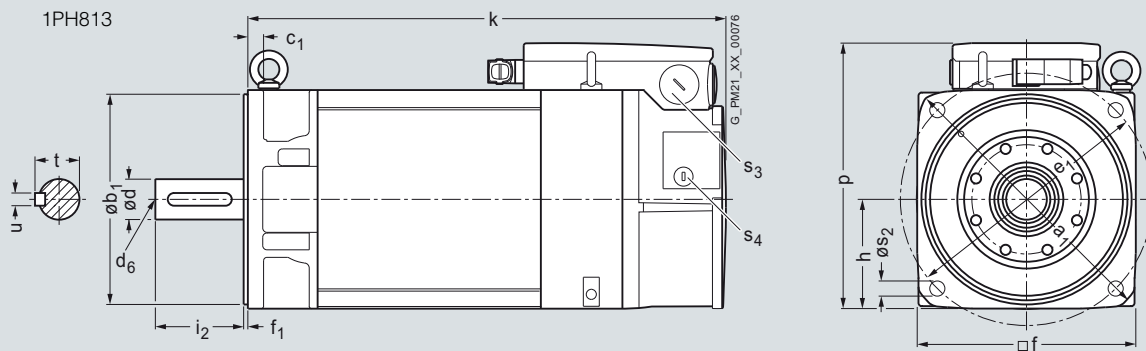
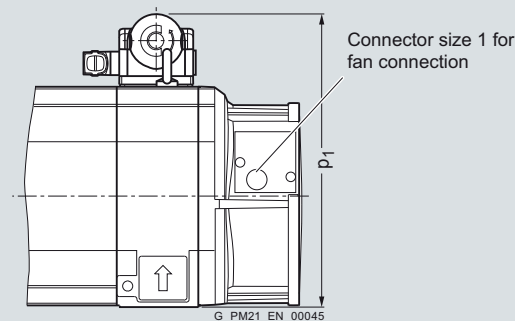
SIMOTICS M-1PH8 asynchronous motors  
SH 132 – Forced ventilation

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                | Type    | DIN IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H        | k<br>LB        | p<br>HD          | p <sub>1</sub><br>– |
|-------------------------------------------------------------|---------|---------|---------------------|---------------------|----------------------|---------------------|----------------|---------------------|---------------|----------------|------------------|---------------------|
| <b>1PH8, type of construction IM B5, forced ventilation</b> |         |         |                     |                     |                      |                     |                |                     |               |                |                  |                     |
| 132                                                         | 1PH8131 |         | 340<br>(13.39)      | 250<br>(9.84)       | 18<br>(0.71)         | 300<br>(11.81)      | 260<br>(10.24) | 5<br>(0.20)         | 130<br>(5.12) | 439<br>(17.28) | 315.5<br>(12.42) | 345<br>(13.58)      |
|                                                             | 1PH8133 |         |                     |                     |                      |                     |                |                     |               | 484<br>(19.06) |                  |                     |
|                                                             | 1PH8135 |         |                     |                     |                      |                     |                |                     |               | 529<br>(20.83) |                  |                     |
|                                                             | 1PH8137 |         |                     |                     |                      |                     |                |                     |               | 569<br>(22.40) |                  |                     |

| Shaft height | Type    | DIN IEC | Shaft extension DE  |                     |                     |              |               |                     |                     |                | Design with hollow shaft |                |                     |                  |                     |
|--------------|---------|---------|---------------------|---------------------|---------------------|--------------|---------------|---------------------|---------------------|----------------|--------------------------|----------------|---------------------|------------------|---------------------|
|              |         |         | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | d<br>D       | l<br>L        | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA        | u<br>F                   | k<br>LB        | k <sub>1</sub><br>– | p<br>HD          | s <sub>3</sub><br>– |
| 132          | 1PH8131 |         | 18<br>(0.71)        | M40×1.5             | M20×1.5             | 48<br>(1.89) | 110<br>(4.33) | M16                 | 110<br>(4.33)       | 51.5<br>(2.03) | 14<br>(0.55)             | 639<br>(25.16) | 372.8<br>(14.68)    | 345.5<br>(13.60) | M50×1.5             |
|              | 1PH8133 |         |                     |                     |                     |              |               |                     |                     |                |                          | 684<br>(26.93) | 417.8<br>(16.45)    |                  |                     |
|              | 1PH8135 |         |                     |                     |                     |              |               |                     |                     |                |                          | 729<br>(28.70) | 462.8<br>(18.22)    |                  |                     |
|              | 1PH8137 |         |                     |                     |                     |              |               |                     |                     |                |                          | 769<br>(30.28) | 502.8<br>(19.80)    |                  |                     |

Variant with  
power connector  
size 3

# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 160 – Forced ventilation

#### Dimensional drawings

For motor Dimensions in mm (inches)

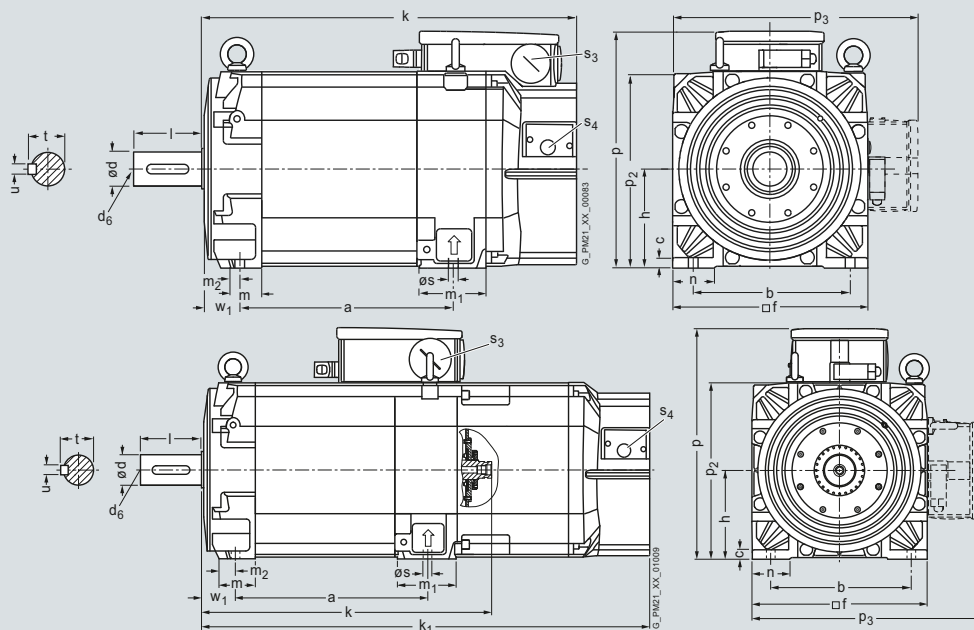
| Shaft height | Type | DIN IEC | a B | a <sub>1</sub> P | b A | b <sub>1</sub> N | c HA | c <sub>1</sub> LA | e <sub>1</sub> M | f AB | f <sub>1</sub> T | h H | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|

#### 1PH8, type of construction IM B3, forced ventilation

|     |         |                  |   |                |   |              |              |   |                |   |               |                  |              |                |              |              |
|-----|---------|------------------|---|----------------|---|--------------|--------------|---|----------------|---|---------------|------------------|--------------|----------------|--------------|--------------|
| 160 | 1PH8163 | 346.5<br>(13.64) | – | 254<br>(10.00) | – | 17<br>(0.67) | 23<br>(0.91) | – | 314<br>(12.36) | – | 160<br>(6.30) | 610.5<br>(24.04) | 64<br>(2.52) | 99.5<br>(3.92) | 28<br>(1.10) | 70<br>(2.76) |
|     | 1PH8165 | 406.5<br>(16.00) |   |                |   |              |              |   |                |   |               | 670.5<br>(26.40) |              |                |              |              |

| Shaft height | Type    | DIN IEC | p HD             | Shaft extension DE |                  |                  |              |                  |                  |                  |                   |              |                  | Design with hollow shaft |              |              |                  |                  |                  |                  |
|--------------|---------|---------|------------------|--------------------|------------------|------------------|--------------|------------------|------------------|------------------|-------------------|--------------|------------------|--------------------------|--------------|--------------|------------------|------------------|------------------|------------------|
|              |         |         |                  | p <sub>1</sub> –   | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> Cv | d D          | d <sub>6</sub> – | l L                      | t GA         | u F          | k LB             | k <sub>1</sub> – | p HD             | s <sub>3</sub> – |
| 160          | 1PH8163 |         | 382.5<br>(15.06) | –                  | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55) | –                | M50×1.5          | M20×1.5          | 61<br>(2.40)      | 55<br>(2.17) | M20              | 110<br>(4.33)            | 59<br>(2.32) | 16<br>(0.63) | 810.5<br>(31.91) | 520.8<br>(20.50) | 415.5<br>(16.36) | M63 × 1.5        |
|              | 1PH8165 |         |                  |                    |                  |                  |              |                  |                  |                  |                   |              |                  |                          |              |              | 870.5<br>(34.27) | 580.8<br>(22.87) |                  |                  |

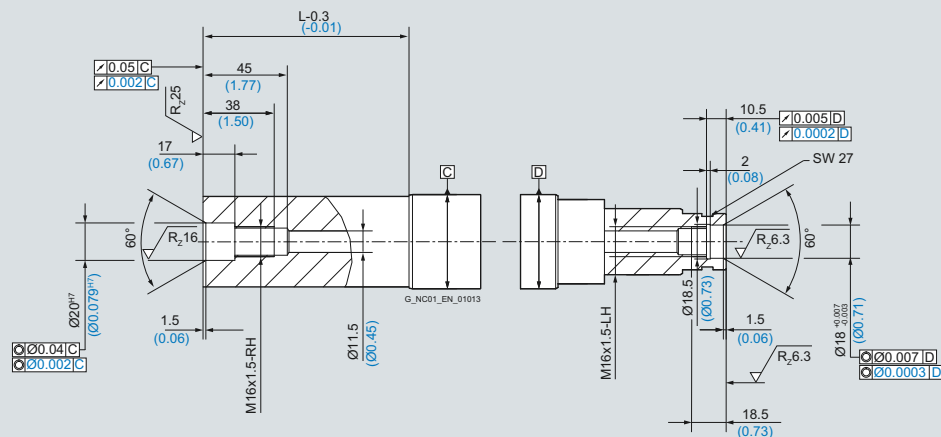
1PH816



Hollow shaft

DE shaft extension

NDE shaft extension



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 160 – Forced ventilation

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height | Type | DIN IEC | a B | a <sub>1</sub> P | b A | b <sub>1</sub> N | c HA | c <sub>1</sub> LA | e <sub>1</sub> M | f AB | f <sub>1</sub> T | h H | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|

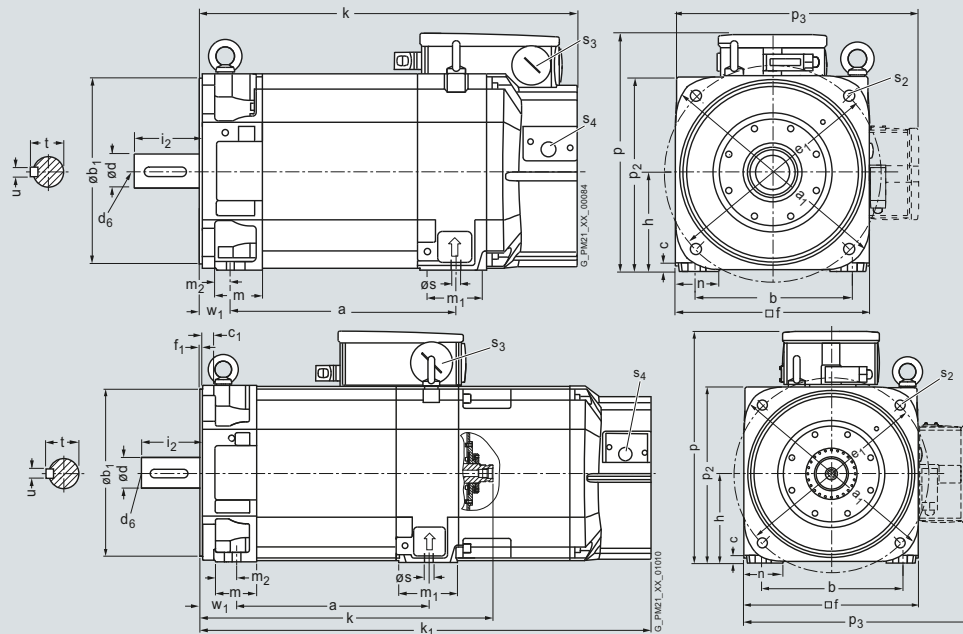
## 1PH8, type of construction IM B5/IM B35, forced ventilation

|     |         |  |                  |                |                |                |              |   |                |                |             |               |                  |              |                |              |              |
|-----|---------|--|------------------|----------------|----------------|----------------|--------------|---|----------------|----------------|-------------|---------------|------------------|--------------|----------------|--------------|--------------|
| 160 | 1PH8163 |  | 346.5<br>(13.64) | 393<br>(15.47) | 254<br>(10.00) | 300<br>(11.81) | 17<br>(0.67) | – | 350<br>(13.78) | 314<br>(12.36) | 5<br>(0.20) | 160<br>(6.30) | 610.5<br>(24.04) | 55<br>(2.17) | 99.5<br>(3.92) | 19<br>(0.75) | 70<br>(2.76) |
|     | 1PH8165 |  | 406.5<br>(16.00) |                |                |                |              |   |                |                |             |               | 670.5<br>(26.40) |              |                |              |              |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |                  |                  |                |                  |                  |                  |                  |                |                  |                  | Design with hollow shaft |                |                 |                  |                  |                  |           |
|--------------|---------|---------|--------------------|------------------|------------------|------------------|----------------|------------------|------------------|------------------|------------------|----------------|------------------|------------------|--------------------------|----------------|-----------------|------------------|------------------|------------------|-----------|
|              |         |         | p <sub>HD</sub>    | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s <sub>K</sub> | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | d <sub>D</sub> | d <sub>6</sub> – | i <sub>2</sub> E | t <sub>GA</sub>          | u <sub>F</sub> | k <sub>LB</sub> | k <sub>1</sub> – | p <sub>HD</sub>  | s <sub>3</sub> – |           |
| 160          | 1PH8163 |         | 382.5<br>(15.06)   | –                | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55)   | 18<br>(0.71)     |                  | M50×1.5          | M20×1.5          | 61<br>(2.40)   | 55<br>(2.17)     | M20              | 110<br>(4.33)            | 59<br>(2.32)   | 16<br>(0.63)    | 810.5<br>(31.91) | 520.8<br>(20.50) | 415.5<br>(16.36) | M63 × 1.5 |
|              | 1PH8165 |         |                    |                  |                  |                  |                |                  |                  |                  |                  |                |                  |                  |                          |                |                 | 870.5<br>(34.27) | 580.8<br>(22.87) |                  |           |

1PH816

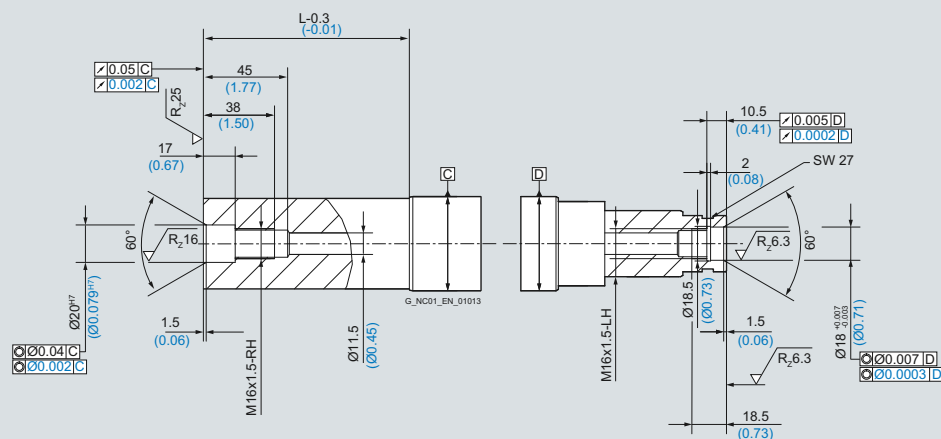
Design with hollow shaft



Hollow shaft

DE shaft extension

NDE shaft extension





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 – Forced ventilation

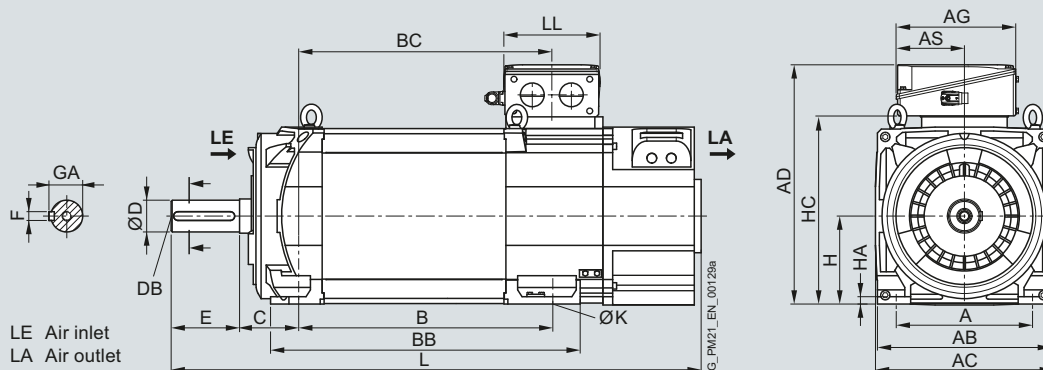
#### Dimensional drawings

| For motor                                                                             | Shaft Type | IEC A          | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               |
|---------------------------------------------------------------------------------------|------------|----------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE |            |                |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| 180                                                                                   | 1PH8184    | 279<br>(10.98) | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  |
|                                                                                       | 1PH8186    |                |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |

| Terminal box               | Shaft Type | IEC AD         | AG            | AS            | BC             | LL            |
|----------------------------|------------|----------------|---------------|---------------|----------------|---------------|
| Terminal box type 1XB7 322 |            |                |               |               |                |               |
| 180                        | 1PH8184    | 490<br>(19.29) | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186    |                |               |               | 519<br>(20.43) |               |

|                            |         |                |                |               |                |               |
|----------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| Terminal box type 1XB7 422 |         |                |                |               |                |               |
| 180                        | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                            | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                            |         |                |                |               |                |                |
|----------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| Terminal box type 1XB7 700 |         |                |                |               |                |                |
| 180                        | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                            | 1PH8186 |                |                |               | 519<br>(20.43) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 – Forced ventilation

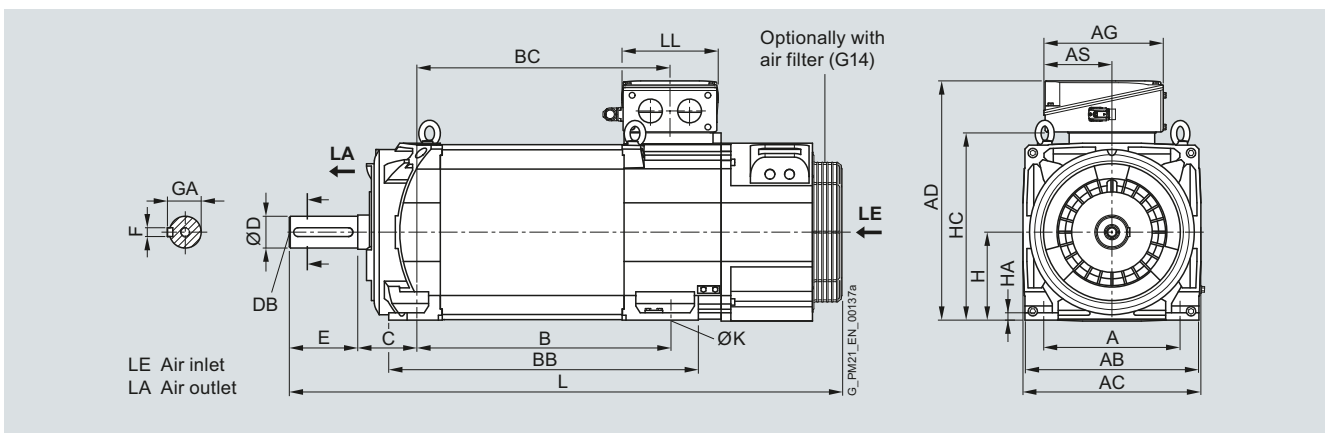
## Dimensional drawings

| For motor                                                                             |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
|---------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft                                                                                 | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               |
| height                                                                                |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| 180                                                                                   | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 1047<br>(41.22) |
|                                                                                       | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1137<br>(44.76) |

| Terminal box               |         | Dimensions in mm (inches) |               |               |                |               |
|----------------------------|---------|---------------------------|---------------|---------------|----------------|---------------|
| Shaft Type                 | height  | IEC AD                    | AG            | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |               |               |                |               |
| 180                        | 1PH8184 | 490<br>(19.29)            | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186 |                           |               |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 – Forced ventilation

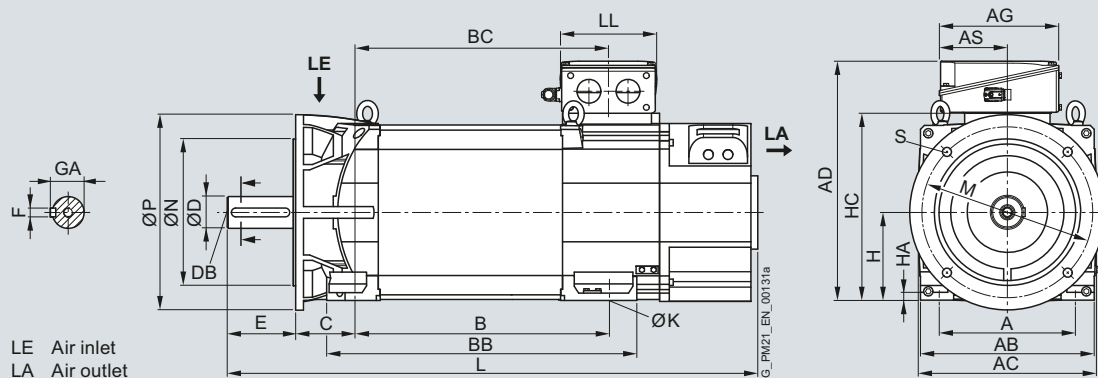
#### Dimensional drawings

| For motor                                                                                                        |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
|------------------------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                                            | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| height                                                                                                           |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A400 (option K90) |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 180                                                                                                              | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  | 350<br>(13.78) | 300<br>(11.81) | 400<br>(15.75) | 18.5<br>(0.73) |
|                                                                                                                  | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |                |                |                |                |

| Terminal box               |         | Dimensions in mm (inches) |               |               |                |               |
|----------------------------|---------|---------------------------|---------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG            | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |               |               |                |               |
| 180                        | 1PH8184 | 490<br>(19.29)            | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186 |                           |               |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 – Forced ventilation

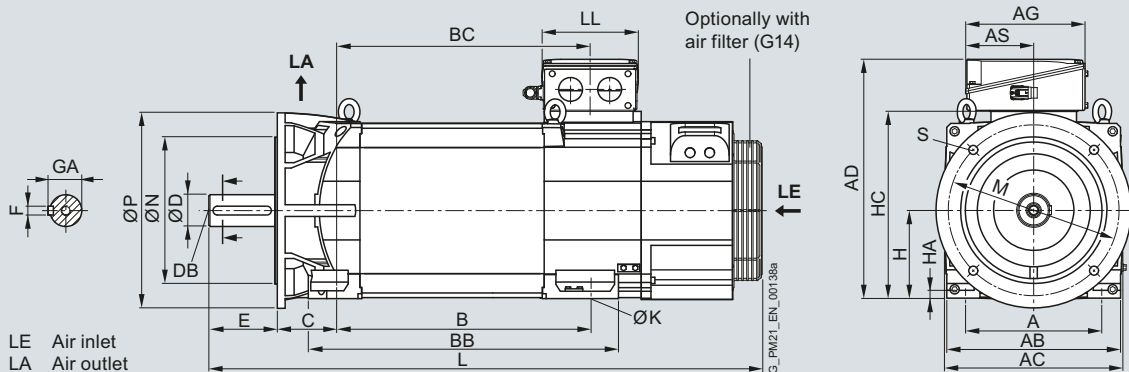
## Dimensional drawings

| For motor                                                                                                  | Dimensions in mm (inches) |                |                |                |                |                |               |              |               |               |              |              |               |               |               |                 |                 |                |                |               |
|------------------------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|---------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|---------------|-----------------|-----------------|----------------|----------------|---------------|
| Shaft Type                                                                                                 | IEC A                     | AB             | AC             | B              | BB             | C              | D             | DB           | E             | F             | GA           | H            | HA            | HC            | K             | L               | M               | N              | P              | S             |
| height                                                                                                     |                           |                |                |                |                |                |               |              |               |               |              |              |               |               |               |                 |                 |                |                |               |
| <b>1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A400</b> |                           |                |                |                |                |                |               |              |               |               |              |              |               |               |               |                 |                 |                |                |               |
| 180                                                                                                        | 1PH8184                   | 279<br>(10.98) | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20<br>(5.51) | 140<br>(0.71) | 18<br>(2.72) | 69<br>(7.09) | 180<br>(0.59) | 15<br>(15.08) | 383<br>(0.57) | 14.5<br>(41.22) | 1047<br>(13.78) | 350<br>(11.81) | 300<br>(15.75) | 400<br>(0.73) |
|                                                                                                            | 1PH8186                   |                |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |               |               |              |              |               |               |               |                 | 1137<br>(44.76) |                |                |               |

| Terminal box               |         | Dimensions in mm (inches) |               |               |                |               |
|----------------------------|---------|---------------------------|---------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG            | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |               |               |                |               |
| 180                        | 1PH8184 | 490<br>(19.29)            | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186 |                           |               |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 – Forced ventilation

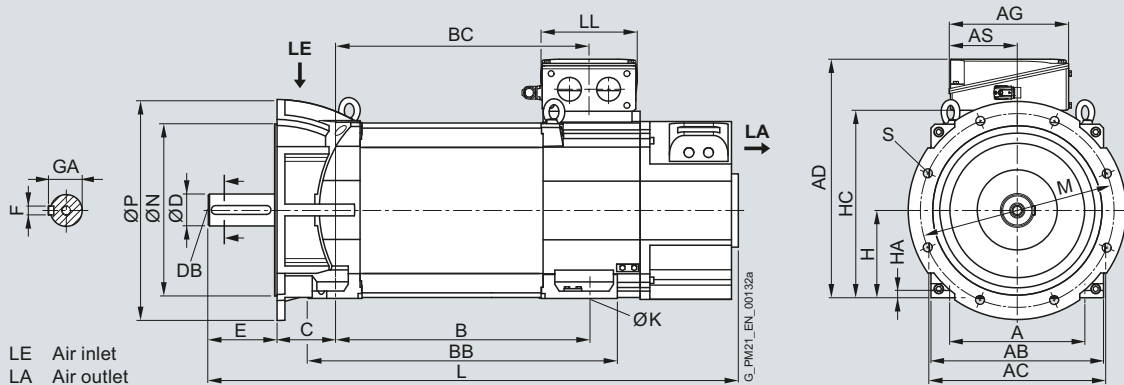
#### Dimensional drawings

| For motor                                                                                           |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
|-----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                               | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| height                                                                                              |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A450 |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 180                                                                                                 | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  | 400<br>(15.75) | 350<br>(13.78) | 450<br>(17.72) | 18.5<br>(0.73) |
|                                                                                                     | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |                |                |                |                |

| Terminal box               |         | Dimensions in mm (inches) |               |               |                |               |
|----------------------------|---------|---------------------------|---------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG            | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |               |               |                |               |
| 180                        | 1PH8184 | 490<br>(19.29)            | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186 |                           |               |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 – Forced ventilation

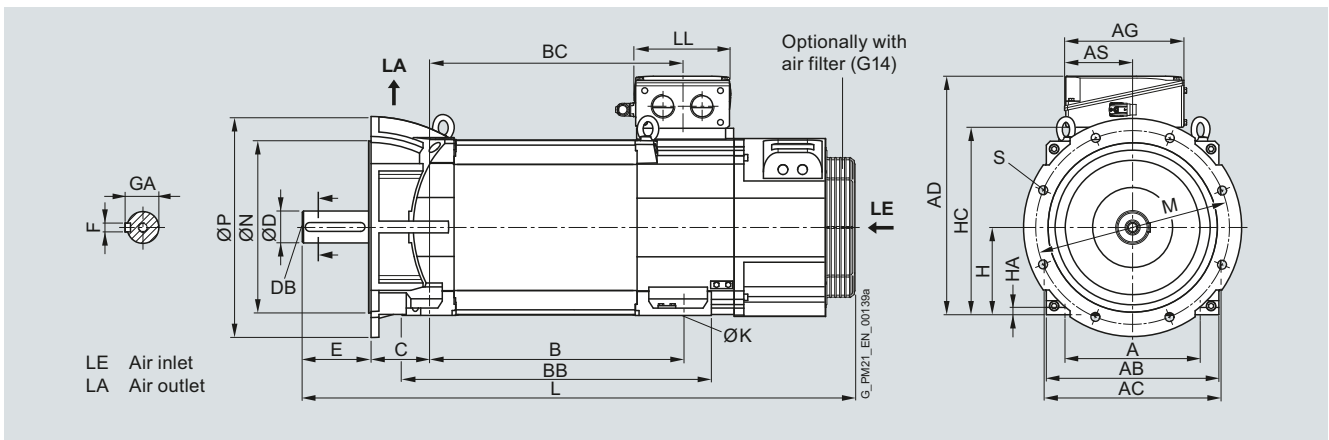
## Dimensional drawings

| For motor                                                                                           |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
|-----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                               | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| height                                                                                              |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A450 |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 180                                                                                                 | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 1047<br>(41.22) | 400<br>(15.75) | 350<br>(13.78) | 450<br>(17.72) | 18.5<br>(0.73) |
|                                                                                                     | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1137<br>(44.76) |                |                |                |                |

| Terminal box               |         | Dimensions in mm (inches) |               |               |                |               |
|----------------------------|---------|---------------------------|---------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG            | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |               |               |                |               |
| 180                        | 1PH8184 | 490<br>(19.29)            | 245<br>(9.65) | 140<br>(5.51) | 429<br>(16.89) | 196<br>(7.72) |
|                            | 1PH8186 |                           |               |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 533<br>(20.98) | 281<br>(11.06) | 176<br>(6.93) | 429<br>(16.89) | 233<br>(9.17) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 586<br>(23.07) | 297<br>(11.69) | 156<br>(6.14) | 429<br>(16.89) | 310<br>(12.20) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 225 – Forced ventilation

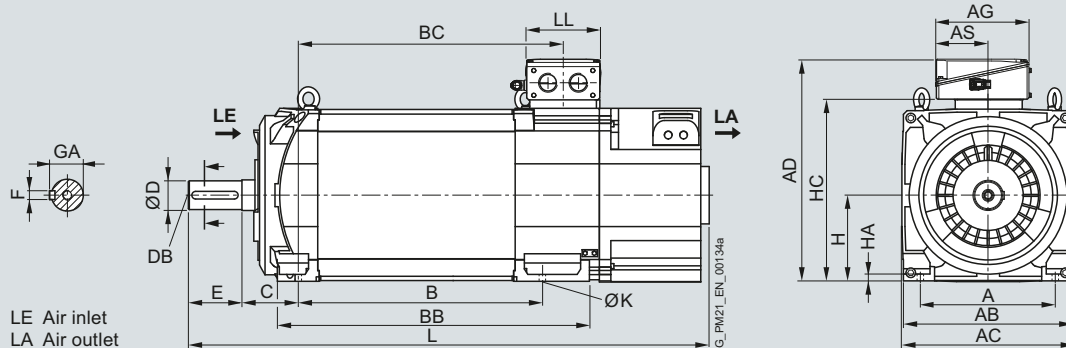
#### Dimensional drawings

| For motor                                                                             |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
|---------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft height                                                                          | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE |         |                           |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
| 225                                                                                   | 1PH8224 | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87) | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1171<br>(46.10) |
|                                                                                       | 1PH8226 |                           |                |                | 545<br>(21.46) | 725<br>(28.54) |               |              |     |               |              |                |               |              |                |                | 1271<br>(40.04) |
|                                                                                       | 1PH8228 |                           |                |                | 635<br>(25.00) | 815<br>(32.09) |               |              |     |               |              |                |               |              |                |                | 1361<br>(53.58) |

| Terminal box                      | Dimensions in mm (inches) |                |               |               |                |               |
|-----------------------------------|---------------------------|----------------|---------------|---------------|----------------|---------------|
| Shaft Type                        | IEC AD                    | AG             | AS            | BC            | LL             |               |
| height                            |                           |                |               |               |                |               |
| <b>Terminal box type 1XB7 322</b> |                           |                |               |               |                |               |
| 225                               | 1PH8224                   | 582<br>(22.91) | 245<br>(9.65) | 140<br>(5.51) | 481<br>(18.94) | 196<br>(7.72) |
|                                   | 1PH8226                   |                |               |               | 581<br>(22.87) |               |
|                                   | 1PH8228                   |                |               |               | 671<br>(26.42) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 225                               | 1PH8224 | 625<br>(24.61) | 281<br>(11.06) | 176<br>(6.93) | 481<br>(18.94) | 233<br>(9.17) |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |               |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 225                               | 1PH8224 | 678<br>(26.69) | 297<br>(11.69) | 156<br>(6.14) | 481<br>(18.94) | 310<br>(12.20) |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |                |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 225 – Forced ventilation

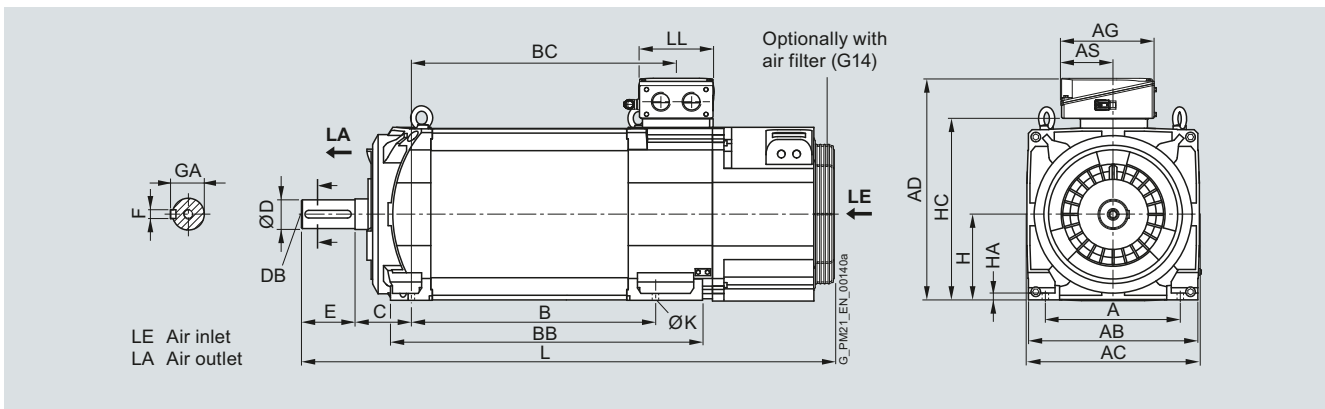
## Dimensional drawings

| For motor                                                                                    | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
|----------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft Type                                                                                   | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               |
| <b>1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE</b> |                           |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
| 225 1PH8224                                                                                  | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87) | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1206<br>(47.48) |
| 1PH8226                                                                                      |                           |                |                | 545<br>(21.46) | 725<br>(28.54) |               |              |     |               |              |                |               |              |                |                | 1306<br>(51.42) |
| 1PH8228                                                                                      |                           |                |                | 635<br>(25.00) | 815<br>(32.09) |               |              |     |               |              |                |               |              |                |                | 1396<br>(54.96) |

| Terminal box                      | Dimensions in mm (inches) |               |               |                |               |  |
|-----------------------------------|---------------------------|---------------|---------------|----------------|---------------|--|
| Shaft Type                        | IEC AD                    | AG            | AS            | BC             | LL            |  |
| <b>Terminal box type 1XB7 322</b> |                           |               |               |                |               |  |
| 225 1PH8224                       | 582<br>(22.91)            | 245<br>(9.65) | 140<br>(5.51) | 481<br>(18.94) | 196<br>(7.72) |  |
| 1PH8226                           |                           |               |               | 581<br>(22.87) |               |  |
| 1PH8228                           |                           |               |               | 671<br>(26.42) |               |  |

| Terminal box type 1XB7 422 |                |                |               |                |               |  |
|----------------------------|----------------|----------------|---------------|----------------|---------------|--|
| 225 1PH8224                | 625<br>(24.61) | 281<br>(11.06) | 176<br>(6.93) | 481<br>(18.94) | 233<br>(9.17) |  |
| 1PH8226                    |                |                |               | 581<br>(22.87) |               |  |
| 1PH8228                    |                |                |               | 671<br>(26.42) |               |  |

| Terminal box type 1XB7 700 |                |                |               |                |                |  |
|----------------------------|----------------|----------------|---------------|----------------|----------------|--|
| 225 1PH8224                | 678<br>(26.69) | 297<br>(11.69) | 156<br>(6.14) | 481<br>(18.94) | 310<br>(12.20) |  |
| 1PH8226                    |                |                |               | 581<br>(22.87) |                |  |
| 1PH8228                    |                |                |               | 671<br>(26.42) |                |  |





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 225 – Forced ventilation

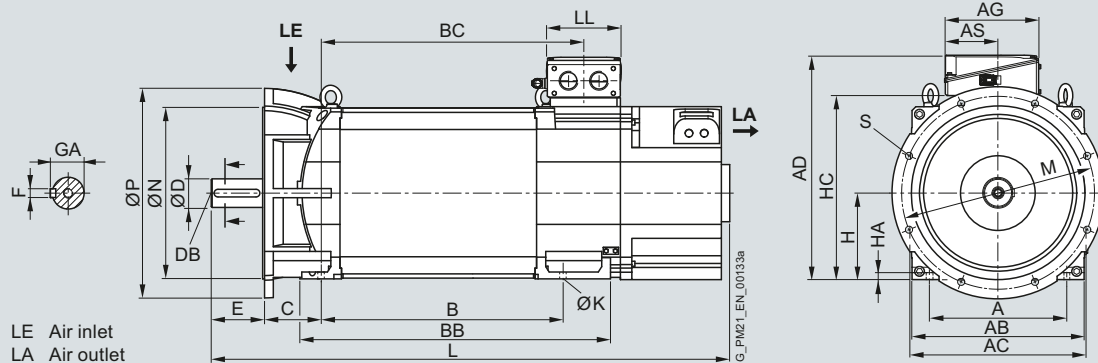
#### Dimensional drawings

| For motor                                                                                           | Dimensions in mm (inches) |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                |                 |
|-----------------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft Type                                                                                          | IEC A                     | AB             | AC             | B              | BB             | C              | D              | DB           | E   | F             | GA           | H              | HA            | HC           | K              | L              | M               |
| height                                                                                              |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                |                 |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A550 |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                |                 |
| 225                                                                                                 | 1PH8224                   | 356<br>(14.02) | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87)  | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1171<br>(46.10) |
|                                                                                                     | 1PH8226                   |                |                |                |                | 545<br>(21.46) | 725<br>(28.54) |              |     |               |              |                |               |              |                |                | 500<br>(19.69)  |
|                                                                                                     | 1PH8228                   |                |                |                |                | 635<br>(25.00) | 815<br>(32.09) |              |     |               |              |                |               |              |                |                | 450<br>(17.72)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                | 550<br>(21.65)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                | 18.5<br>(0.73)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                | 1271<br>(50.04) |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                | 1361<br>(53.58) |

| Terminal box               | Dimensions in mm (inches) |                |               |               |                |               |
|----------------------------|---------------------------|----------------|---------------|---------------|----------------|---------------|
| Shaft Type                 | IEC AD                    | AG             | AS            | BC            | LL             |               |
| height                     |                           |                |               |               |                |               |
| Terminal box type 1XB7 322 |                           |                |               |               |                |               |
| 225                        | 1PH8224                   | 582<br>(22.91) | 245<br>(9.65) | 140<br>(5.51) | 481<br>(18.94) | 196<br>(7.72) |
|                            | 1PH8226                   |                |               |               | 581<br>(22.87) |               |
|                            | 1PH8228                   |                |               |               | 671<br>(26.42) |               |

|                            |         |                |                |               |                |               |
|----------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| Terminal box type 1XB7 422 |         |                |                |               |                |               |
| 225                        | 1PH8224 | 625<br>(24.61) | 281<br>(11.06) | 176<br>(6.93) | 481<br>(18.94) | 233<br>(9.17) |
|                            | 1PH8226 |                |                |               | 581<br>(22.87) |               |
|                            | 1PH8228 |                |                |               | 671<br>(26.42) |               |

|                            |         |                |                |               |                |                |
|----------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| Terminal box type 1XB7 700 |         |                |                |               |                |                |
| 225                        | 1PH8224 | 678<br>(26.69) | 297<br>(11.69) | 156<br>(6.14) | 481<br>(18.94) | 310<br>(12.20) |
|                            | 1PH8226 |                |                |               | 581<br>(22.87) |                |
|                            | 1PH8228 |                |                |               | 671<br>(26.42) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 225 – Forced ventilation

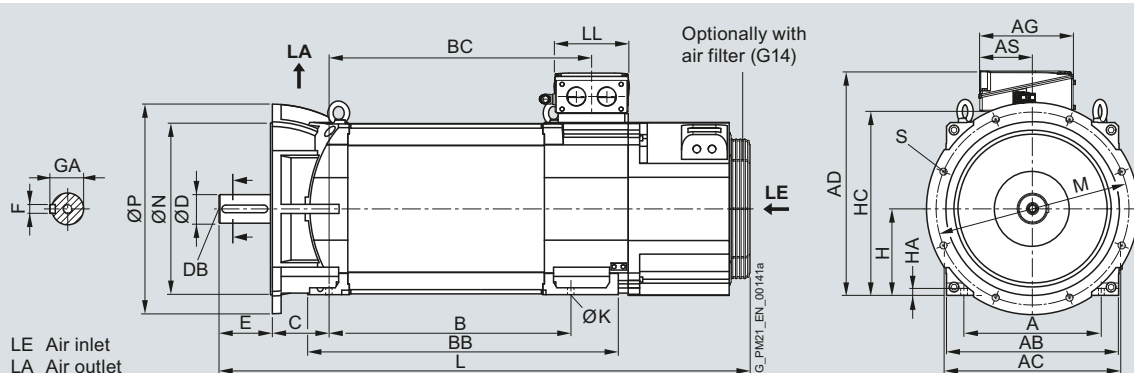
## Dimensional drawings

| For motor                                                                                           |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |                |                |                |                |
|-----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                               | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A550 |         |                           |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |                |                |                |                |
| 225                                                                                                 | 1PH8224 | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87) | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1206<br>(47.48) | 500<br>(19.69) | 450<br>(17.72) | 550<br>(21.65) | 18.5<br>(0.73) |
|                                                                                                     | 1PH8226 |                           |                |                | 545<br>(21.46) | 725<br>(28.54) |               |              |     |               |              |                |               |              |                |                | 1306<br>(51.42) |                |                |                |                |
|                                                                                                     | 1PH8228 |                           |                |                | 635<br>(25.00) | 815<br>(32.09) |               |              |     |               |              |                |               |              |                |                | 1396<br>(54.96) |                |                |                |                |

| Terminal box                      | Dimensions in mm (inches) |                |               |               |                |               |
|-----------------------------------|---------------------------|----------------|---------------|---------------|----------------|---------------|
| Shaft Type                        | IEC AD                    | AG             | AS            | BC            | LL             |               |
| <b>Terminal box type 1XB7 322</b> |                           |                |               |               |                |               |
| 225                               | 1PH8224                   | 582<br>(22.91) | 245<br>(9.65) | 140<br>(5.51) | 481<br>(18.94) | 196<br>(7.72) |
|                                   | 1PH8226                   |                |               |               | 581<br>(22.87) |               |
|                                   | 1PH8228                   |                |               |               | 671<br>(26.42) |               |

| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| 225                               | 1PH8224 | 625<br>(24.61) | 281<br>(11.06) | 176<br>(6.93) | 481<br>(18.94) | 233<br>(9.17) |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |               |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |               |

| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| 225                               | 1PH8224 | 678<br>(26.69) | 297<br>(11.69) | 156<br>(6.14) | 481<br>(18.94) | 310<br>(12.20) |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |                |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

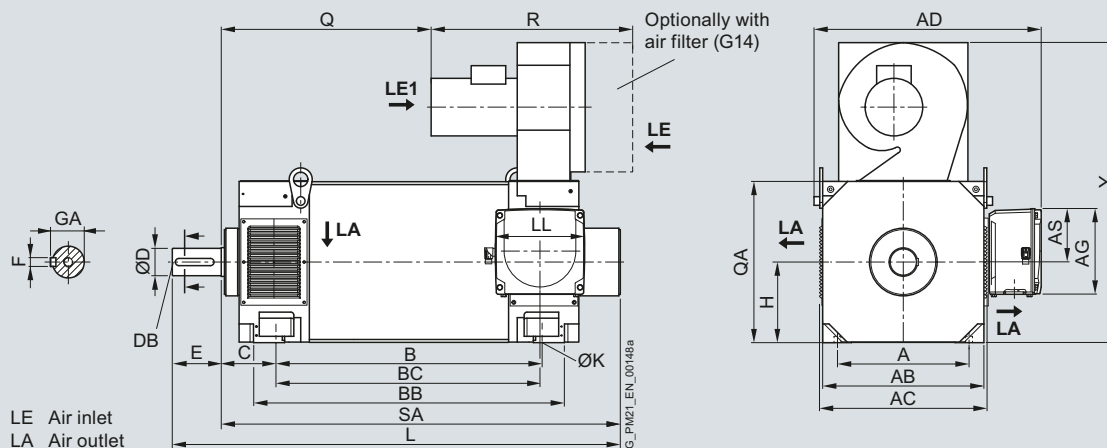
### SIMOTICS M-1PH8 asynchronous motors SH 280 – Forced ventilation

#### Dimensional drawings

| For motor                                                                             |         | Dimensions in mm (inches) |                |                |                |                 |               |              |     |               |              |               |                |              |                 |                |                |                |                 |                 |   |
|---------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|-----------------|---------------|--------------|-----|---------------|--------------|---------------|----------------|--------------|-----------------|----------------|----------------|----------------|-----------------|-----------------|---|
| Shaft                                                                                 | Type    | IEC                       | A              | AB             | AC             | B               | BB            | C            | D   | DB            | E            | F             | GA             | H            | K               | L              | Q              | QA             | R               | SA              | Y |
| height                                                                                |         |                           |                |                |                |                 |               |              |     |               |              |               |                |              |                 |                |                |                |                 |                 |   |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE |         |                           |                |                |                |                 |               |              |     |               |              |               |                |              |                 |                |                |                |                 |                 |   |
| 280                                                                                   | 1PH8284 | 457<br>(17.99)            | 560<br>(22.05) | 582<br>(22.91) | 684<br>(26.93) | 840<br>(33.07)  | 190<br>(7.48) | 95<br>(3.74) | M24 | 170<br>(6.69) | 25<br>(0.98) | 100<br>(3.94) | 280<br>(11.02) | 24<br>(0.94) | 1316<br>(51.81) | 489<br>(19.25) | 560<br>(22.05) | 700<br>(27.56) | 1146<br>(45.12) | 1042<br>(41.02) |   |
|                                                                                       | 1PH8286 |                           |                |                | 794<br>(31.26) | 950<br>(37.40)  |               |              |     |               |              |               |                |              | 1426<br>(56.14) | 599<br>(23.58) |                |                | 1256<br>(49.45) |                 |   |
|                                                                                       | 1PH8288 |                           |                |                | 924<br>(36.38) | 1080<br>(42.52) |               |              |     |               |              |               |                |              | 1556<br>(61.26) | 729<br>(28.70) |                |                | 1386<br>(54.57) |                 |   |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |                |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|----------------|
| Shaft height               | Type    | IEC AD                    | AG             | AS            | BC             | LL             |
| Terminal box type 1XB7 700 |         |                           |                |               |                |                |
| 280                        | 1PH8284 | 789<br>(31.06)            | 297<br>(11.69) | 186<br>(7.32) | 677<br>(26.65) | 310<br>(12.20) |
|                            | 1PH8286 |                           |                |               | 787<br>(30.98) |                |
|                            | 1PH8288 |                           |                |               | 917<br>(36.10) |                |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 712</b> |         |                |                |               |                |                |
| 280                               | 1PH8284 | 836<br>(32.91) | 371<br>(14.61) | 201<br>(7.91) | 691<br>(27.20) | 370<br>(14.57) |
|                                   | 1PH8286 |                |                |               | 801<br>(31.54) |                |
|                                   | 1PH8288 |                |                |               | 931<br>(36.65) |                |



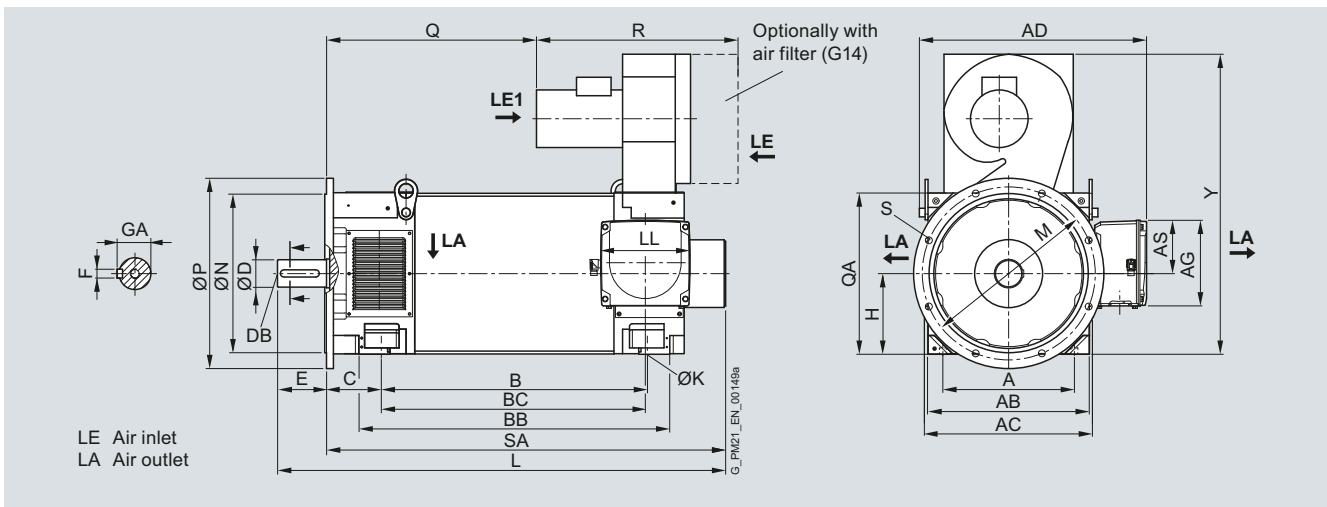
## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 280 – Forced ventilation

## Dimensional drawings

| For motor                                                                                           |         | Dimensions in mm (inches) |                 |                |                |                 |                |                |                |               |                 |                 |                |
|-----------------------------------------------------------------------------------------------------|---------|---------------------------|-----------------|----------------|----------------|-----------------|----------------|----------------|----------------|---------------|-----------------|-----------------|----------------|
| Shaft height                                                                                        | Type    | IEC A                     | AB              | AC             | B              | BB              | C              | D              | DB             | E             | F               | GA              | H              |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A660 |         |                           |                 |                |                |                 |                |                |                |               |                 |                 |                |
| 280                                                                                                 | 1PH8284 | 457<br>(17.99)            | 560<br>(22.05)  | 582<br>(22.91) | 684<br>(26.93) | 840<br>(33.07)  | 190<br>(7.48)  | 95<br>(3.74)   | M24            | 170<br>(6.69) | 25<br>(0.98)    | 100<br>(3.94)   | 280<br>(11.02) |
|                                                                                                     | 1PH8286 |                           |                 |                | 794<br>(31.26) | 950<br>(37.40)  |                |                |                |               |                 |                 |                |
|                                                                                                     | 1PH8288 |                           |                 |                | 924<br>(36.38) | 1080<br>(42.52) |                |                |                |               |                 |                 |                |
|                                                                                                     |         | K                         | L               | M              | N              | P               | Q              | QA             | R              | S             | SA              | Y               |                |
|                                                                                                     | 1PH8284 | 24<br>(0.94)              | 1316<br>(51.81) | 600<br>(23.62) | 550<br>(21.65) | 660<br>(25.98)  | 489<br>(19.25) | 560<br>(22.05) | 700<br>(27.56) | 24<br>(0.94)  | 1146<br>(45.12) | 1042<br>(41.02) |                |
|                                                                                                     | 1PH8286 |                           | 1426<br>(56.14) |                |                |                 | 599<br>(23.58) |                |                |               | 1256<br>(49.45) |                 |                |
|                                                                                                     | 1PH8288 |                           | 1556<br>(61.26) |                |                |                 | 729<br>(28.70) |                |                |               | 1386<br>(54.57) |                 |                |

| Terminal box                      |         | Dimensions in mm (inches) |                |               |                |                |  |
|-----------------------------------|---------|---------------------------|----------------|---------------|----------------|----------------|--|
| Shaft height                      | Type    | IEC AD                    | AG             | AS            | BC             | LL             |  |
| <b>Terminal box type 1XB7 700</b> |         |                           |                |               |                |                |  |
| 280                               | 1PH8284 | 789<br>(31.06)            | 297<br>(11.69) | 186<br>(7.32) | 677<br>(26.65) | 310<br>(12.20) |  |
|                                   | 1PH8286 |                           |                |               | 787<br>(30.98) |                |  |
|                                   | 1PH8288 |                           |                |               | 917<br>(36.10) |                |  |
| <b>Terminal box type 1XB7 712</b> |         |                           |                |               |                |                |  |
| 280                               | 1PH8284 | 836<br>(32.91)            | 371<br>(14.61) | 201<br>(7.91) | 691<br>(27.20) | 370<br>(14.57) |  |
|                                   | 1PH8286 |                           |                |               | 801<br>(31.54) |                |  |
|                                   | 1PH8288 |                           |                |               | 931<br>(36.65) |                |  |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 80 to SH 132 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                    | Type    | DIN IEC | a B              | b A           | c HA         | f AB           | h H           | k LB             | Standard/<br>Advanced/<br>Performance | High Performance/<br>hollow shaft encoder |                           | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         |
|-------------------------------------------------|---------|---------|------------------|---------------|--------------|----------------|---------------|------------------|---------------------------------------|-------------------------------------------|---------------------------|--------------|------------------|------------------|--------------|
|                                                 |         |         |                  |               |              |                |               |                  |                                       | without hollow shaft<br>k LB              | with hollow shaft<br>k LB |              |                  |                  |              |
| 1PH8, type of construction IM B3, water cooling |         |         |                  |               |              |                |               |                  |                                       |                                           |                           |              |                  |                  |              |
| 80                                              | 1PH8083 |         | 194<br>(7.64)    | 125<br>(4.92) | 8<br>(0.31)  | 155<br>(6.10)  | 80<br>(3.15)  | 301.5<br>(11.87) |                                       | 306.3<br>(12.06)                          | 319.3<br>(12.57)          | 37<br>(1.46) | 63.5<br>(2.50)   | 15<br>(0.59)     | 35<br>(1.38) |
|                                                 | 1PH8087 |         | 244<br>(9.61)    |               |              |                |               | 351.5<br>(13.84) |                                       | 356.3<br>(14.03)                          | 369.3<br>(14.54)          |              |                  |                  |              |
| 100                                             | 1PH8101 |         | 167<br>(6.57)    | 160<br>(6.30) | 11<br>(0.43) | 196<br>(7.72)  | 100<br>(3.94) | 289.5<br>(11.40) |                                       | 294.5<br>(11.59)                          | 312.3<br>(12.30)          | 44<br>(1.73) | 68<br>(2.68)     | 19<br>(0.75)     | 43<br>(1.69) |
|                                                 | 1PH8103 |         | 202.5<br>(7.97)  |               |              |                |               | 325<br>(12.80)   |                                       | 330<br>(12.99)                            | 347.8<br>(13.69)          |              |                  |                  |              |
|                                                 | 1PH8105 |         | 262<br>(10.31)   |               |              |                |               | 384.5<br>(15.14) |                                       | 389.5<br>(15.33)                          | 407.3<br>(16.04)          |              |                  |                  |              |
|                                                 | 1PH8107 |         | 297.5<br>(11.71) |               |              |                |               | 420<br>(16.54)   |                                       | 425<br>(16.73)                            | 442.8<br>(17.43)          |              |                  |                  |              |
| 132                                             | 1PH8131 |         | 220.5<br>(8.68)  | 216<br>(8.50) | 15<br>(0.59) | 260<br>(10.24) | 132<br>(5.20) | 347.5<br>(13.68) |                                       | 355<br>(13.98)                            | 372.8<br>(14.68)          | 43<br>(1.69) | 81<br>(3.19)     | 13<br>(0.51)     | 43<br>(1.69) |
|                                                 | 1PH8133 |         | 265.5<br>(10.45) |               |              |                |               | 392.5<br>(15.45) |                                       | 400<br>(15.75)                            | 417.8<br>(16.45)          |              |                  |                  |              |
|                                                 | 1PH8135 |         | 310.5<br>(12.22) |               |              |                |               | 437.5<br>(17.22) |                                       | 445<br>(17.52)                            | 462.8<br>(18.22)          |              |                  |                  |              |
|                                                 | 1PH8137 |         | 350.5<br>(13.80) |               |              |                |               | 477.5<br>(18.80) |                                       | 485<br>(19.09)                            | 502.8<br>(19.80)          |              |                  |                  |              |
|                                                 | 1PH8138 |         | 350.5<br>(13.80) |               |              |                |               | 477.5<br>(18.80) |                                       | 485<br>(19.09)                            | 502.8<br>(19.80)          |              |                  |                  |              |

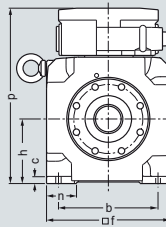
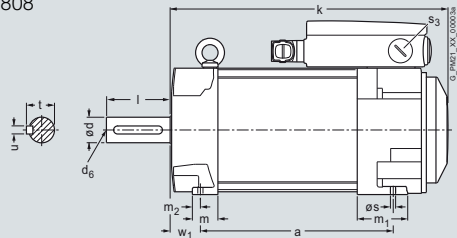
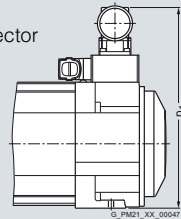
| Shaft height | Type    | DIN IEC |                  |                     |                     |                     |              |                     | Shaft extension DE  |                     |                     |                |              |               |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|--------------|---------------------|---------------------|---------------------|---------------------|----------------|--------------|---------------|
|              |         |         | p<br>HD          | p <sub>1</sub><br>– | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s<br>K       | s <sub>3</sub><br>– | w <sub>1</sub><br>C | d<br>D              | d <sub>6</sub><br>– | t<br>GA        | u<br>F       | l<br>L        |
| 80           | 1PH8083 |         | 216<br>(8.50)    | 253.5<br>(9.98)     | –                   | –                   | 10<br>(0.39) | M25×1.5             | 38<br>(1.50)        | <b>32</b><br>(1.26) | M12                 | 35<br>(1.38)   | 10<br>(0.39) | 80<br>(3.15)  |
|              | 1PH8087 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
| 100          | 1PH8101 |         | 266.5<br>(10.49) | 294<br>(11.57)      | 198<br>(7.80)       | 276.5<br>(10.89)    | 12<br>(0.47) | M32×1.5             | 43<br>(1.69)        | <b>38</b><br>(1.50) | M12                 | 41<br>(1.61)   | 10<br>(0.39) | 80<br>(3.15)  |
|              | 1PH8103 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
|              | 1PH8105 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
|              | 1PH8107 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
| 132          | 1PH8131 |         | 347.5<br>(13.68) | 347<br>(13.66)      | 262<br>(10.31)      | 357.5<br>(14.07)    | 12<br>(0.47) | M50×1.5             | 53<br>(2.09)        | <b>48</b><br>(1.89) | M16                 | 51.5<br>(2.03) | 14<br>(0.55) | 110<br>(4.33) |
|              | 1PH8133 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
|              | 1PH8135 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
|              | 1PH8137 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |
|              | 1PH8138 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                |              |               |

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 80 to SH 132 – Water cooling

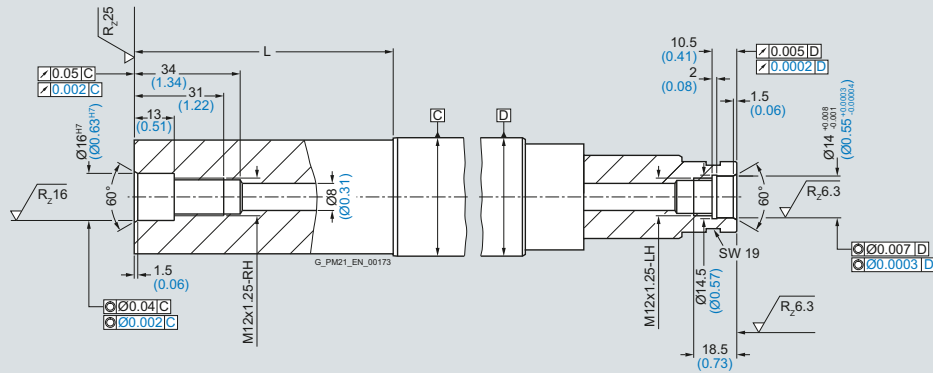
## Dimensional drawings

1PH808

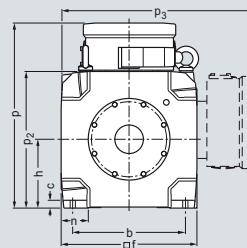
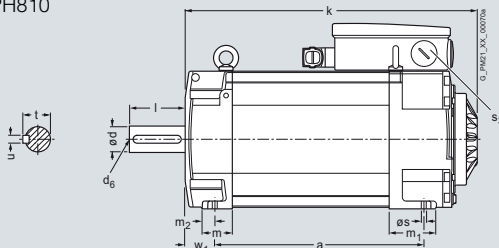
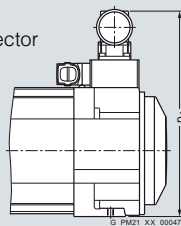
Variant with  
power connector  
size 1.5Hollow shaft  
1PH808

DE shaft extension

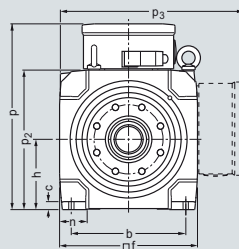
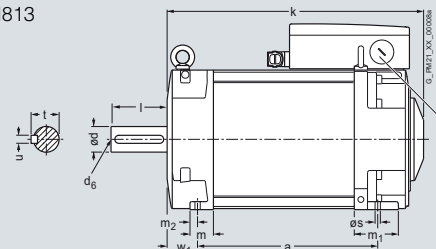
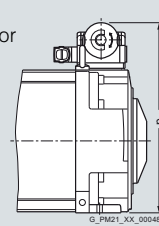
NDE shaft extension



1PH810

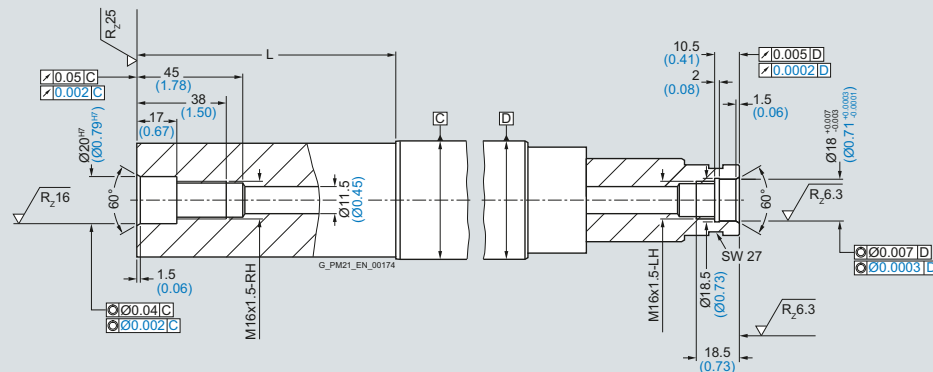
Variant with  
power connector  
size 1.5

1PH813

Variant with  
power connector  
size 3Hollow shaft  
1PH810  
1PH813

DE shaft extension

NDE shaft extension



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

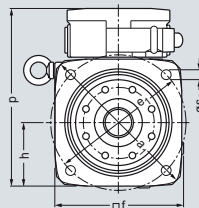
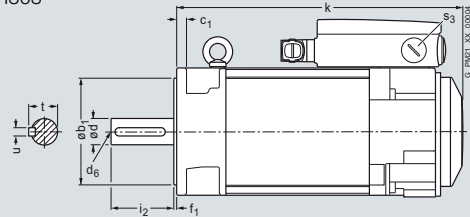
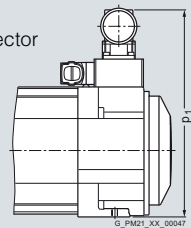
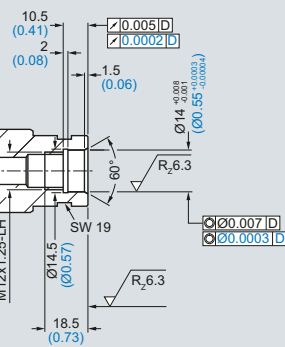
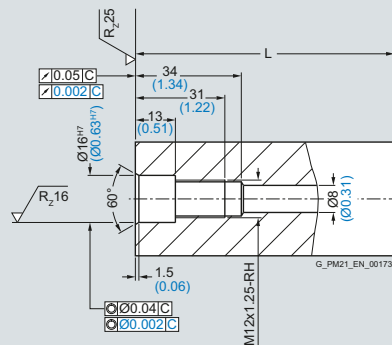
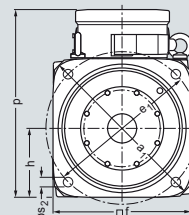
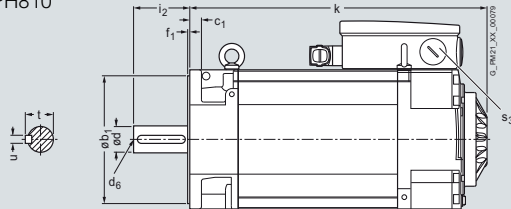
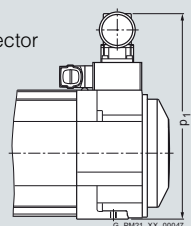
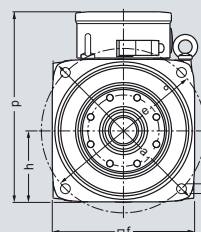
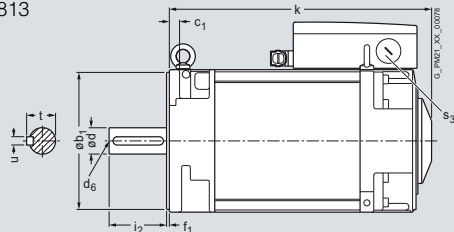
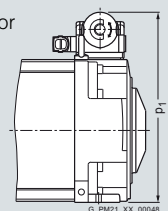
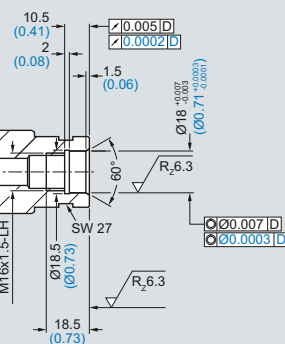
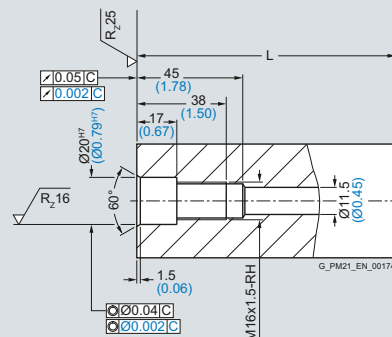
### SIMOTICS M-1PH8 asynchronous motors SH 80 to SH 132 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

|                                                 |         |            |                     |                     |                      |                     |                |                     |                |               |                  | Standard/<br>Advanced/<br>Performance | High Performance/<br>hollow shaft encoder |                         |
|-------------------------------------------------|---------|------------|---------------------|---------------------|----------------------|---------------------|----------------|---------------------|----------------|---------------|------------------|---------------------------------------|-------------------------------------------|-------------------------|
|                                                 |         |            |                     |                     |                      |                     |                |                     |                |               |                  |                                       | without<br>hollow<br>shaft                | with<br>hollow<br>shaft |
| Shaft<br>height                                 | Type    | DIN<br>IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H         | l<br>L        | k<br>LB          | k<br>LB                               | k<br>LB                                   |                         |
| 1PH8, type of construction IM B5, water cooling |         |            |                     |                     |                      |                     |                |                     |                |               |                  |                                       |                                           |                         |
| 80                                              | 1PH8083 |            | 199<br>(7.83)       | 130<br>(5.12)       | 12<br>(0.47)         | 165<br>(6.50)       | 155<br>(6.10)  | 3.5<br>(0.14)       | 77.5<br>(3.05) | 80<br>(3.15)  | 301.5<br>(11.87) | 306.3<br>(12.06)                      | 319.3<br>(12.57)                          |                         |
|                                                 | 1PH8087 |            |                     |                     |                      |                     |                |                     |                |               | 351.5<br>(13.84) | 356.3<br>(14.03)                      | 369.3<br>(14.51)                          |                         |
| 100                                             | 1PH8101 |            | 250<br>(9.84)       | 180<br>(7.09)       | 16<br>(0.63)         | 215<br>(8.46)       | 196<br>(7.72)  | 4<br>(0.16)         | 98<br>(3.86)   | 80<br>(3.15)  | 289.5<br>(11.40) | 294.5<br>(11.59)                      | 312.3<br>(12.30)                          |                         |
|                                                 | 1PH8103 |            |                     |                     |                      |                     |                |                     |                |               | 325<br>(12.80)   | 330<br>(12.99)                        | 347.8<br>(13.69)                          |                         |
|                                                 | 1PH8105 |            |                     |                     |                      |                     |                |                     |                |               | 384.5<br>(15.14) | 389.5<br>(15.33)                      | 407.3<br>(16.04)                          |                         |
|                                                 | 1PH8107 |            |                     |                     |                      |                     |                |                     |                |               | 420<br>(16.54)   | 425<br>(16.73)                        | 442.8<br>(17.43)                          |                         |
| 132                                             | 1PH8131 |            | 340<br>(13.39)      | 250<br>(9.84)       | 18<br>(0.71)         | 300<br>(11.81)      | 260<br>(10.24) | 5<br>(0.20)         | 130<br>(5.12)  | 110<br>(4.33) | 347.5<br>(13.68) | 355<br>(13.98)                        | 372.8<br>(14.68)                          |                         |
|                                                 | 1PH8133 |            |                     |                     |                      |                     |                |                     |                |               | 392.5<br>(15.45) | 400<br>(15.75)                        | 417.8<br>(16.45)                          |                         |
|                                                 | 1PH8135 |            |                     |                     |                      |                     |                |                     |                |               | 437.5<br>(17.22) | 445<br>(17.52)                        | 462.8<br>(18.22)                          |                         |
|                                                 | 1PH8137 |            |                     |                     |                      |                     |                |                     |                |               | 477.5<br>(18.80) | 485<br>(19.09)                        | 502.8<br>(19.80)                          |                         |
|                                                 | 1PH8138 |            |                     |                     |                      |                     |                |                     |                |               | 477.5<br>(18.80) | 485<br>(19.09)                        | 502.8<br>(19.80)                          |                         |

| Shaft height | Type    | DIN IEC | p<br>HD          | p <sub>1</sub><br>– | s <sub>2</sub><br>– | s <sub>3</sub><br>– | Shaft extension DE  |                     |                     |                |              | t<br>GA | u<br>F |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|--------------|---------|--------|
|              |         |         |                  |                     |                     |                     | d<br>D              | d <sub>6</sub><br>– | i <sub>2</sub><br>E |                |              |         |        |
| 80           | 1PH8083 |         | 213.5<br>(8.41)  | 251<br>(9.88)       | 12<br>(0.47)        | M25×1.5             | <b>32</b><br>(1.25) | M12                 | 80<br>(3.15)        | 35<br>(1.38)   | 10<br>(0.39) |         |        |
|              | 1PH8087 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
| 100          | 1PH8101 |         | 264.5<br>(10.41) | 292<br>(11.50)      | 14<br>(0.55)        | M32×1.5             | <b>38</b><br>(1.50) | M12                 | 80<br>(3.15)        | 41<br>(1.61)   | 10<br>(0.39) |         |        |
|              | 1PH8103 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
|              | 1PH8105 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
|              | 1PH8107 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
| 132          | 1PH8131 |         | 345.5<br>(13.6)  | 345<br>(13.58)      | 18<br>(0.71)        | M50×1.5             | <b>48</b><br>(1.89) | M16                 | 110<br>(4.33)       | 51.5<br>(2.03) | 14<br>(0.55) |         |        |
|              | 1PH8133 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
|              | 1PH8135 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
|              | 1PH8137 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |
|              | 1PH8138 |         |                  |                     |                     |                     |                     |                     |                     |                |              |         |        |

**SIMOTICS M asynchronous and synchronous motors for SINAMICS S120****SIMOTICS M-1PH8 asynchronous motors  
SH 80 to SH 132 – Water cooling****Dimensional drawings****1PH808**Variant with  
power connector  
size 1.5**Hollow shaft  
1PH808****DE shaft extension****NDE shaft extension****1PH810**Variant with  
power connector  
size 1.5**1PH813**Variant with  
power connector  
size 3**Hollow shaft  
1PH810  
1PH813****DE shaft extension****NDE shaft extension**



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 100/SH 132 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

|                                                  |         |            |                  |                     |               |                     |              |                      |                     |                |                     |               |               | Standard/<br>Advanced/<br>Performance | High Performance |                            |                         |         |
|--------------------------------------------------|---------|------------|------------------|---------------------|---------------|---------------------|--------------|----------------------|---------------------|----------------|---------------------|---------------|---------------|---------------------------------------|------------------|----------------------------|-------------------------|---------|
| Shaft<br>height                                  | Type    | DIN<br>IEC | a<br>B           | a <sub>1</sub><br>P | b<br>A        | b <sub>1</sub><br>N | c<br>HA      | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H        | l<br>L        | k<br>LB                               | k<br>LB          | without<br>hollow<br>shaft | with<br>hollow<br>shaft | m<br>BA |
| 1PH8, type of construction IM B35, water cooling |         |            |                  |                     |               |                     |              |                      |                     |                |                     |               |               |                                       |                  |                            |                         |         |
| 100                                              | 1PH8101 |            | 167<br>(6.57)    | 250<br>(9.84)       | 160<br>(6.30) | 180<br>(7.09)       | 11<br>(0.43) | 16<br>(0.63)         | 215<br>(8.46)       | 196<br>(7.72)  | 4<br>(0.16)         | 100<br>(3.94) | 80<br>(3.15)  | 289.5<br>(11.40)                      | 294.5<br>(11.59) | 312.3<br>(12.30)           | 37<br>(1.46)            |         |
|                                                  | 1PH8103 |            | 202.5<br>(7.97)  |                     |               |                     |              |                      |                     |                |                     |               |               | 325<br>(12.80)                        | 330<br>(12.99)   | 347.8<br>(13.69)           |                         |         |
|                                                  | 1PH8105 |            | 262<br>(10.31)   |                     |               |                     |              |                      |                     |                |                     |               |               | 384.5<br>(15.14)                      | 389.5<br>(15.33) | 407.3<br>(16.04)           |                         |         |
|                                                  | 1PH8107 |            | 297.5<br>(11.71) |                     |               |                     |              |                      |                     |                |                     |               |               | 420<br>(16.54)                        | 425<br>(16.73)   | 442.8<br>(17.43)           |                         |         |
| 132                                              | 1PH8131 |            | 220.5<br>(8.68)  | 340<br>(13.39)      | 216<br>(8.50) | 250<br>(9.84)       | 15<br>(0.59) | 18<br>(0.71)         | 300<br>(11.81)      | 260<br>(10.24) | 5<br>(0.20)         | 132<br>(5.20) | 110<br>(4.33) | 347.5<br>(13.68)                      | 355<br>(13.98)   | 372.8<br>(14.68)           | 42<br>(1.65)            |         |
|                                                  | 1PH8133 |            | 265.5<br>(10.45) |                     |               |                     |              |                      |                     |                |                     |               |               | 392.5<br>(15.45)                      | 400<br>(15.75)   | 417.8<br>(16.45)           |                         |         |
|                                                  | 1PH8135 |            | 310.5<br>(12.22) |                     |               |                     |              |                      |                     |                |                     |               |               | 437.5<br>(17.22)                      | 445<br>(17.52)   | 462.8<br>(18.22)           |                         |         |
|                                                  | 1PH8137 |            | 350.5<br>(13.80) |                     |               |                     |              |                      |                     |                |                     |               |               | 477.5<br>(18.80)                      | 485<br>(19.09)   | 502.8<br>(19.80)           |                         |         |
|                                                  | 1PH8138 |            | 350.5<br>(13.80) |                     |               |                     |              |                      |                     |                |                     |               |               | 477.5<br>(18.80)                      | 485<br>(19.09)   | 502.8<br>(19.80)           |                         |         |

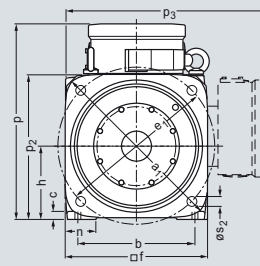
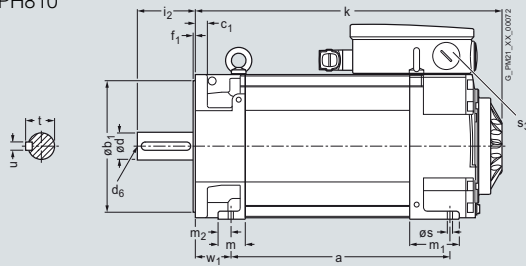
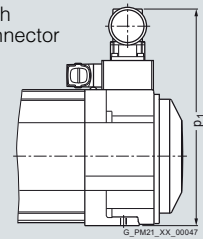
| Shaft height | Type    | DIN IEC | Shaft extension DE  |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|--------------|---------|---------|---------------------|---------------------|--------------|------------------|---------------------|---------------------|---------------------|--------------|---------------------|---------------------|---------------------|--------------|---------------------|---------------------|----------------|--------------|
|              |         |         | m <sub>1</sub><br>– | m <sub>2</sub><br>– | n<br>AA      | p<br>HD          | p <sub>1</sub><br>– | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s<br>K       | s <sub>2</sub><br>– | s <sub>3</sub><br>– | w <sub>1</sub><br>C | d<br>D       | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA        | u<br>F       |
| 100          | 1PH8101 |         | 68<br>(2.68)        | 12<br>(0.47)        | 43<br>(1.69) | 266.5<br>(10.49) | 294<br>(11.57)      | 198<br>(7.80)       | 276.5<br>(10.89)    | 12<br>(0.47) | 14<br>(0.55)        | M32×1.5             | 43<br>(1.69)        | 38<br>(1.50) | M12                 | 80<br>(3.15)        | 41<br>(1.61)   | 10<br>(0.39) |
|              | 1PH8103 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|              | 1PH8105 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|              | 1PH8107 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
| 132          | 1PH8131 |         | 81<br>(3.19)        | 12<br>(0.47)        | 43<br>(1.69) | 347.5<br>(13.68) | 347<br>(13.66)      | 262<br>(10.31)      | 357.5<br>(14.07)    | 12<br>(0.47) | 18<br>(0.71)        | M50×1.5             | 53<br>(2.09)        | 48<br>(1.89) | M16                 | 110<br>(4.33)       | 51.5<br>(2.03) | 14<br>(0.55) |
|              | 1PH8133 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|              | 1PH8135 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|              | 1PH8137 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |
|              | 1PH8138 |         |                     |                     |              |                  |                     |                     |                     |              |                     |                     |                     |              |                     |                     |                |              |

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

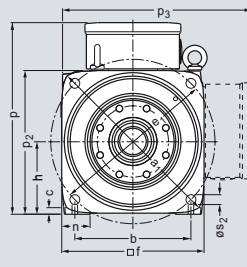
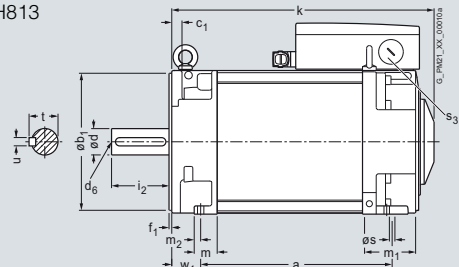
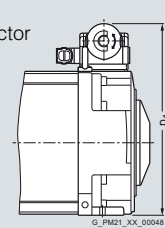
SIMOTICS M-1PH8 asynchronous motors  
SH 100/SH 132 – Water cooling

## Dimensional drawings

1PH810

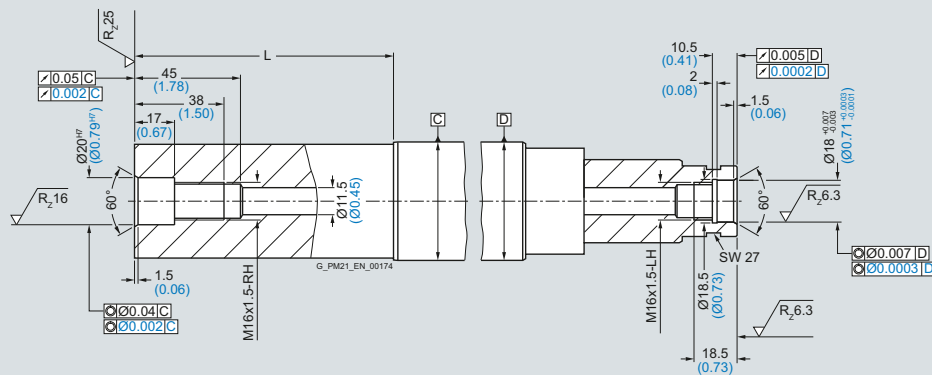
Variant with  
power connector  
size 1.5

1PH813

Variant with  
power connector  
size 3Hollow shaft  
1PH810  
1PH813

DE shaft extension

NDE shaft extension



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 160 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

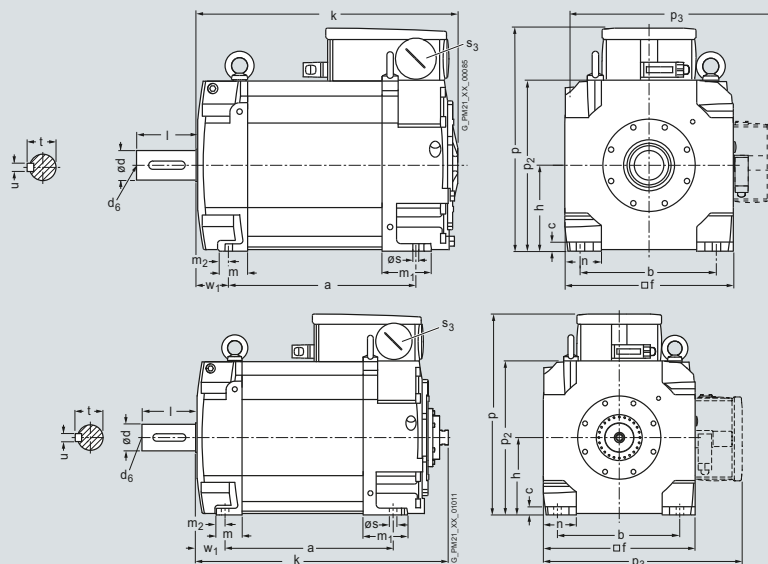
| Shaft height | Type | DIN IEC | a B | a <sub>1</sub> P | b A | b <sub>1</sub> N | c HA | c <sub>1</sub> LA | e <sub>1</sub> M | f AB | f <sub>1</sub> T | h H | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|

#### 1PH8, type of construction IM B3, water cooling

|     |         |  |                  |   |                |   |              |              |   |                |   |               |                  |              |              |              |              |
|-----|---------|--|------------------|---|----------------|---|--------------|--------------|---|----------------|---|---------------|------------------|--------------|--------------|--------------|--------------|
| 160 | 1PH8163 |  | 346.5<br>(13.64) | – | 254<br>(10.00) | – | 17<br>(0.67) | 23<br>(0.91) | – | 314<br>(12.36) | – | 160<br>(6.30) | 488.5<br>(19.23) | 53<br>(2.09) | 91<br>(3.58) | 17<br>(0.67) | 70<br>(2.76) |
|     | 1PH8165 |  | 406.5<br>(16.00) |   |                |   |              |              |   |                |   |               | 548.5<br>(21.59) |              |              |              |              |
|     | 1PH8166 |  |                  |   |                |   |              |              |   |                |   |               |                  |              |              |              |              |

| Shaft height | Type    | DIN IEC | p HD             | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | Shaft extension DE  |                  |               |              |              | Design with hollow shaft |
|--------------|---------|---------|------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|------------------|---------------------|------------------|---------------|--------------|--------------|--------------------------|
|              |         |         |                  |                  |                  |                  |              |                  |                  |                  |                  | d D                 | d <sub>6</sub> – | l L           | t GA         | u F          | k LB                     |
| 160          | 1PH8163 |         | 415.5<br>(16.36) | –                | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55) | –                | M63 × 1.5        | –                | 61<br>(2.40)     | <b>55</b><br>(2.17) | M20              | 110<br>(4.33) | 59<br>(2.32) | 16<br>(0.63) | 520.8<br>(20.50)         |
|              | 1PH8165 |         |                  |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |               |              |              | 580.8<br>(22.87)         |
|              | 1PH8166 |         |                  |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |               |              |              | 580.8<br>(22.87)         |

1PH816

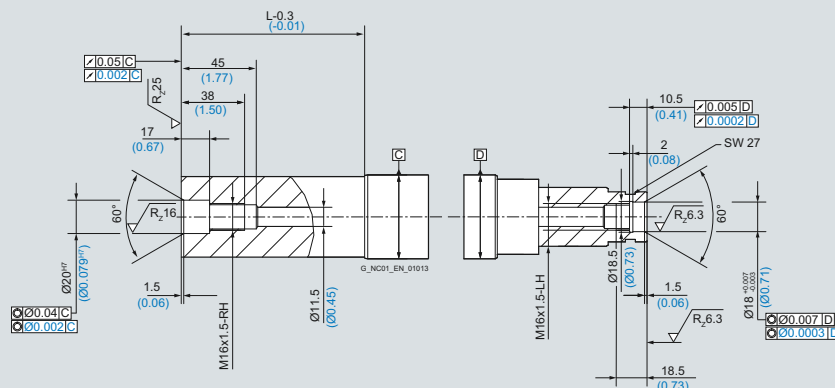


Design with hollow shaft

Hollow shaft

DE shaft extension

NDE shaft extension



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 160 – Water cooling

## Dimensional drawings

For motor Dimensions in mm (inches)

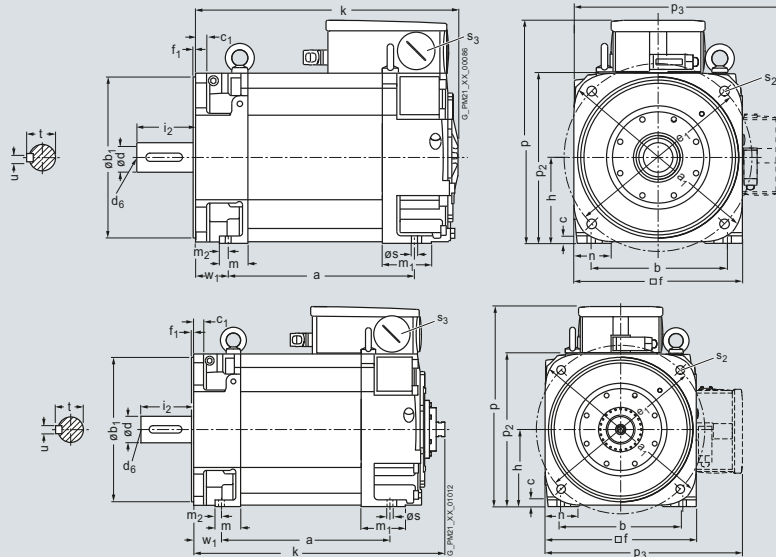
| Shaft height | Type | DIN IEC | a B | a <sub>1</sub> P | b A | b <sub>1</sub> N | c HA | c <sub>1</sub> LA | e <sub>1</sub> M | f AB | f <sub>1</sub> T | h Hv | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|------|------|------|------------------|------------------|------|
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|------|------|------|------------------|------------------|------|

## 1PH8, type of construction IM B5/IM B35, water cooling

|     |         |  |                  |                |                |                |              |   |                |                |             |               |                  |              |              |              |              |
|-----|---------|--|------------------|----------------|----------------|----------------|--------------|---|----------------|----------------|-------------|---------------|------------------|--------------|--------------|--------------|--------------|
| 160 | 1PH8163 |  | 346.5<br>(13.64) | 393<br>(15.47) | 254<br>(10.00) | 300<br>(11.81) | 17<br>(0.67) | – | 350<br>(13.78) | 314<br>(12.36) | 5<br>(0.20) | 160<br>(6.30) | 488.5<br>(19.23) | 53<br>(2.09) | 91<br>(3.58) | 17<br>(0.67) | 70<br>(2.76) |
|     | 1PH8165 |  | 406.5<br>(16.00) |                |                |                |              |   |                |                |             |               | 548.5<br>(21.59) |              |              |              |              |
|     | 1PH8166 |  |                  |                |                |                |              |   |                |                |             |               |                  |              |              |              |              |

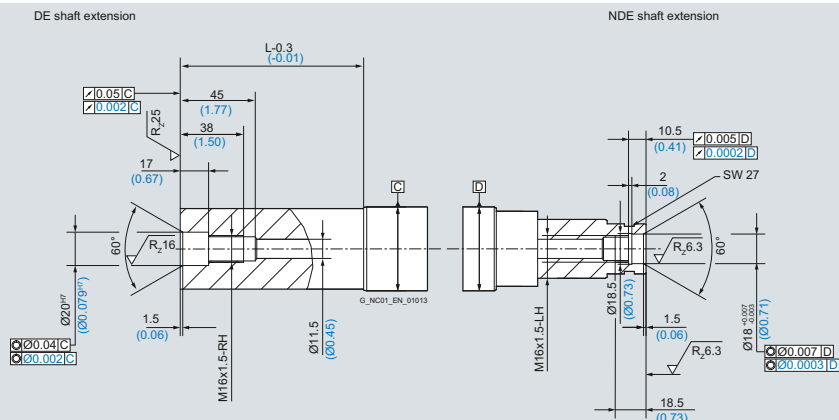
| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  | Design with hollow shaft |              |                  |
|--------------|---------|---------|--------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|------------------|---------------------|------------------|------------------|--------------------------|--------------|------------------|
|              |         |         | p HD               | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | d D                 | d <sub>6</sub> – | i <sub>2</sub> E | t GA                     | u F          | k LB             |
| 160          | 1PH8163 |         | 415.5<br>(16.36)   | –                | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55) | 18<br>(0.71)     | M63 × 1.5        | –                | 61<br>(2.40)     | <b>55</b><br>(2.17) | M20              | 110<br>(4.33)    | 59<br>(2.32)             | 16<br>(0.63) | 520.8<br>(20.50) |
|              | 1PH8165 |         |                    |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  |                          |              | 580.8<br>(22.87) |
|              | 1PH8166 |         |                    |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  |                          |              | 580.8<br>(22.87) |

1PH816



Design with hollow shaft

Hollow shaft



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 180 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height | Type | DIN IEC | a B | b A | c HA | f AB | g AC | h H | k LB | m BA | n AA | p <sub>2</sub> – | s K | w <sub>1</sub> C |
|--------------|------|---------|-----|-----|------|------|------|-----|------|------|------|------------------|-----|------------------|
|--------------|------|---------|-----|-----|------|------|------|-----|------|------|------|------------------|-----|------------------|

#### 1PH8, types of construction IM B3/IM V5, water cooling

|     |         |  |                |                |              |                |                |               |                |               |              |                |                |               |
|-----|---------|--|----------------|----------------|--------------|----------------|----------------|---------------|----------------|---------------|--------------|----------------|----------------|---------------|
| 180 | 1PH8184 |  | 430<br>(16.93) | 279<br>(10.98) | 15<br>(0.59) | 356<br>(14.02) | 384<br>(15.12) | 180<br>(7.09) | 670<br>(26.38) | 138<br>(5.43) | 73<br>(2.87) | 372<br>(14.65) | 14.5<br>(0.57) | 121<br>(4.76) |
|     | 1PH8186 |  | 520<br>(20.47) |                |              |                |                |               | 760<br>(29.92) |               |              |                |                |               |

Shaft extension DE

Terminal box type

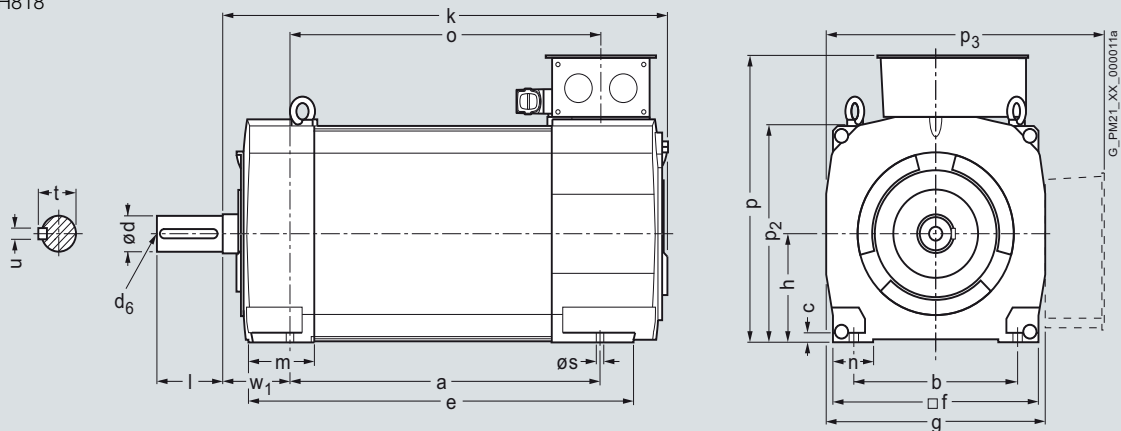
1XB7322

1XB7422

1XB7700

| Shaft height | Type    | DIN IEC | d D         | d <sub>6</sub> – | l E           | t GA         | u F          | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL           | x <sub>1</sub> AG |
|--------------|---------|---------|-------------|------------------|---------------|--------------|--------------|----------------|------------------|---------------|-------------------|----------------|------------------|---------------|-------------------|----------------|------------------|----------------|-------------------|
| 180          | 1PH8184 |         | <b>65m6</b> | M20              | 140<br>(5.51) | 69<br>(2.72) | 18<br>(0.71) | 484<br>(19.06) | 485<br>(19.09)   | 197<br>(7.76) | 258<br>(10.16)    | 539<br>(21.22) | 540<br>(21.26)   | 230<br>(9.06) | 303<br>(11.93)    | 588<br>(23.15) | 574<br>(22.60)   | 310<br>(12.20) | 295<br>(11.61)    |
|              | 1PH8186 |         |             |                  |               |              |              |                |                  |               |                   |                |                  |               |                   |                |                  |                |                   |

1PH818



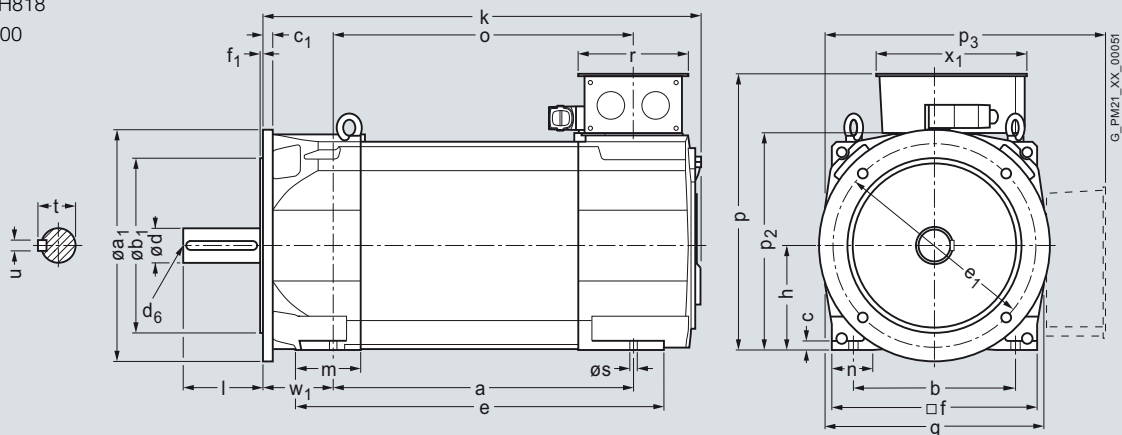
## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 180 – Water cooling

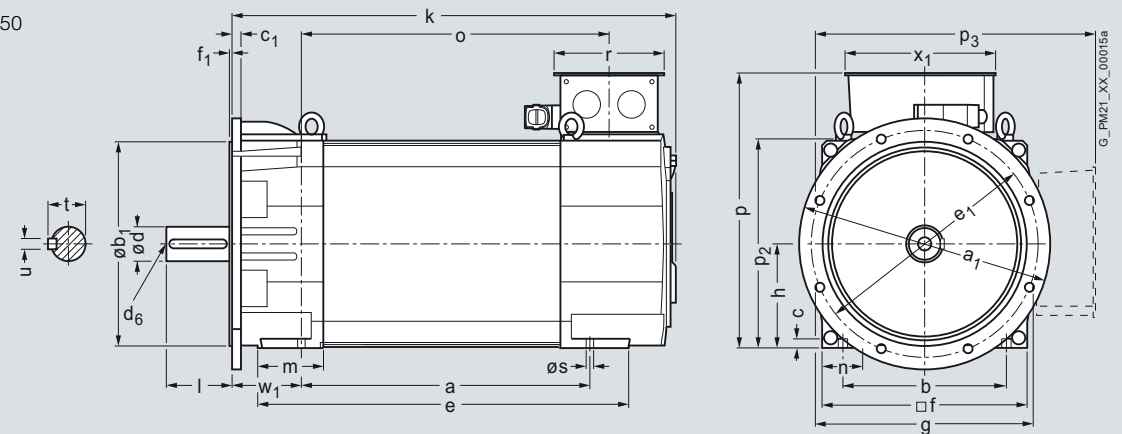
## Dimensional drawings

| For motor                                                      |         | Dimensions in mm (inches) |                |                  |                |                  |                |                   |                  |              |                |                |                |             |                |               |                  |      |     |                |      |
|----------------------------------------------------------------|---------|---------------------------|----------------|------------------|----------------|------------------|----------------|-------------------|------------------|--------------|----------------|----------------|----------------|-------------|----------------|---------------|------------------|------|-----|----------------|------|
| Shaft height                                                   | Type    | DIN IEC                   | a B            | D400             |                | D450             |                | D400              |                  | D450         |                | D400           |                | D450        |                | f AB          | f <sub>1</sub> T | g AC | h H | k LB           | m BA |
|                                                                |         |                           |                | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA           | c <sub>1</sub> LA | e <sub>1</sub> M |              |                |                |                |             |                |               |                  |      |     |                |      |
| 1PH8, types of construction IM B5/IM B35/IM V15, water cooling |         |                           |                |                  |                |                  |                |                   |                  |              |                |                |                |             |                |               |                  |      |     |                |      |
| 180                                                            | 1PH8184 |                           | 430<br>(16.93) | 400<br>(15.75)   | 450<br>(17.72) | 279<br>(10.98)   | 300<br>(11.81) | 350<br>(13.78)    | 15<br>(0.59)     | 16<br>(0.63) | 350<br>(13.78) | 400<br>(15.75) | 356<br>(14.02) | 5<br>(0.20) | 384<br>(15.12) | 180<br>(7.09) | 670<br>(26.38)   |      |     | 123<br>(4.84)  |      |
|                                                                | 1PH8186 |                           | 520<br>(20.47) |                  |                |                  |                |                   |                  |              |                |                |                |             |                |               |                  |      |     | 760<br>(29.92) |      |

| Shaft extension DE |         |         |              |                  |                |                  |      |                  |               |              | Terminal box type |                                                     |  |
|--------------------|---------|---------|--------------|------------------|----------------|------------------|------|------------------|---------------|--------------|-------------------|-----------------------------------------------------|--|
| Shaft height       | Type    | DIN IEC | n AA         | p <sub>2</sub> – | s K            | w <sub>1</sub> C | d D  | d <sub>6</sub> – | l E           | t GA         | u F               | Dimensions as for types of construction IM B3/IM V5 |  |
|                    |         |         |              |                  |                |                  |      |                  |               |              |                   |                                                     |  |
| 180                | 1PH8184 |         | 73<br>(2.87) | 372<br>(14.65)   | 14.5<br>(0.57) | 121<br>(4.76)    | 65m6 | M20              | 140<br>(5.51) | 69<br>(2.72) | 18<br>(0.71)      |                                                     |  |
|                    | 1PH8186 |         |              |                  |                |                  |      |                  |               |              |                   |                                                     |  |

1PH818  
D400

D450



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 225 – Water cooling

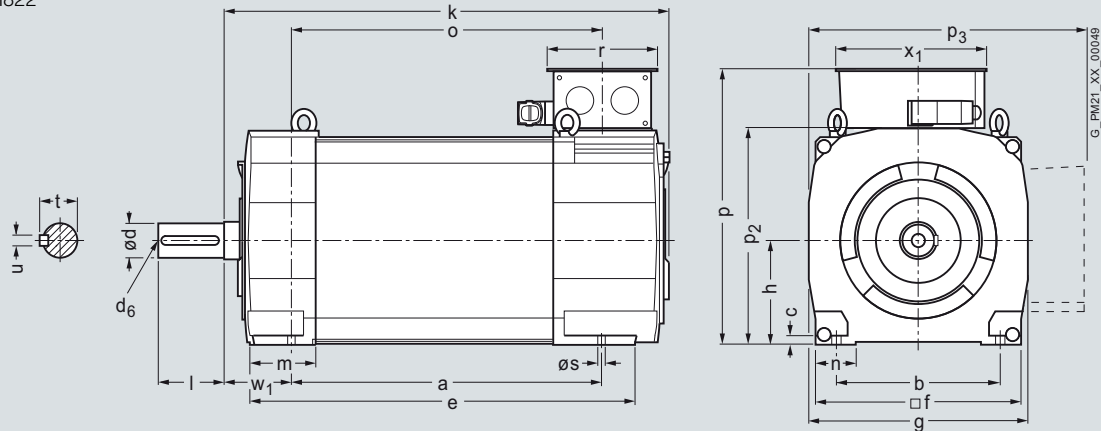
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                  | Type    | DIN IEC | a B            | b A            | c HA         | f AB           | g AC           | h H           | k LB           | m BA          | n AA         | p <sub>2</sub> – | s K            | w <sub>1</sub> C |
|---------------------------------------------------------------|---------|---------|----------------|----------------|--------------|----------------|----------------|---------------|----------------|---------------|--------------|------------------|----------------|------------------|
| <b>1PH8, types of construction IM B3/IM V5, water cooling</b> |         |         |                |                |              |                |                |               |                |               |              |                  |                |                  |
| 225                                                           | 1PH8224 |         | 445<br>(17.52) | 356<br>(14.02) | 18<br>(0.71) | 446<br>(17.56) | 474<br>(18.66) | 225<br>(8.86) | 775<br>(30.51) | 154<br>(6.06) | 88<br>(3.46) | 462<br>(18.19)   | 18.5<br>(0.73) | 149<br>(5.87)    |
|                                                               | 1PH8226 |         | 545<br>(21.46) |                |              |                |                |               | 875<br>(34.45) |               |              |                  |                |                  |
|                                                               | 1PH8228 |         | 635<br>(25.0)  |                |              |                |                |               | 965<br>(37.99) |               |              |                  |                |                  |

|              |         | Shaft extension DE |             |                  |               |                |              | Terminal box type |                  |               |                   |                |                  |               |                   |                |                  |                |                   |
|--------------|---------|--------------------|-------------|------------------|---------------|----------------|--------------|-------------------|------------------|---------------|-------------------|----------------|------------------|---------------|-------------------|----------------|------------------|----------------|-------------------|
|              |         |                    |             |                  |               |                |              | 1XB7322           |                  |               |                   | 1XB7422        |                  |               |                   | 1XB7700        |                  |                |                   |
| Shaft height | Type    | DIN IEC            | d D         | d <sub>6</sub> – | l E           | t GA           | u F          | p HD              | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL           | x <sub>1</sub> AG |
| 225          | 1PH8224 |                    | <b>75m6</b> | M20              | 140<br>(5.51) | 79.5<br>(3.13) | 20<br>(0.79) | 579<br>(22.80)    | 577<br>(22.72)   | 197<br>(7.76) | 258<br>(10.16)    | 634<br>(24.96) | 632<br>(24.88)   | 230<br>(9.06) | 303<br>(11.93)    | 683<br>(26.89) | 666<br>(26.22)   | 310<br>(12.20) | 295<br>(11.61)    |
|              | 1PH8226 |                    |             |                  |               |                |              |                   |                  |               |                   |                |                  |               |                   |                |                  |                |                   |
|              | 1PH8228 |                    |             |                  |               |                |              |                   |                  |               |                   |                |                  |               |                   |                |                  |                |                   |

1PH822



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 225 – Water cooling

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                               | Type    | DIN IEC | a B            | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | g AC           | h H           | k LB           | m BA          | n AA         | p <sub>2</sub> – | w <sub>1</sub> C |
|----------------------------------------------------------------------------|---------|---------|----------------|------------------|----------------|------------------|--------------|-------------------|------------------|----------------|------------------|----------------|---------------|----------------|---------------|--------------|------------------|------------------|
| <b>1PH8, types of construction IM B5/IM B35/IM V15 D550, water cooling</b> |         |         |                |                  |                |                  |              |                   |                  |                |                  |                |               |                |               |              |                  |                  |
| 225                                                                        | 1PH8224 |         | 445<br>(17.52) | 550<br>(21.65)   | 356<br>(14.02) | 450<br>(17.72)   | 18<br>(0.71) | 20<br>(0.79)      | 500<br>(19.69)   | 446<br>(17.56) | 5<br>(0.20)      | 474<br>(18.66) | 225<br>(8.86) | 770<br>(30.31) | 144<br>(5.67) | 88<br>(3.46) | 462<br>(18.19)   | 149<br>(5.87)    |
|                                                                            | 1PH8226 |         | 545<br>(21.46) |                  |                |                  |              |                   |                  |                |                  |                |               | 872<br>(34.33) |               |              |                  |                  |
|                                                                            | 1PH8228 |         | 635<br>(25.00) |                  |                |                  |              |                   |                  |                |                  |                |               | 962<br>(37.87) |               |              |                  |                  |

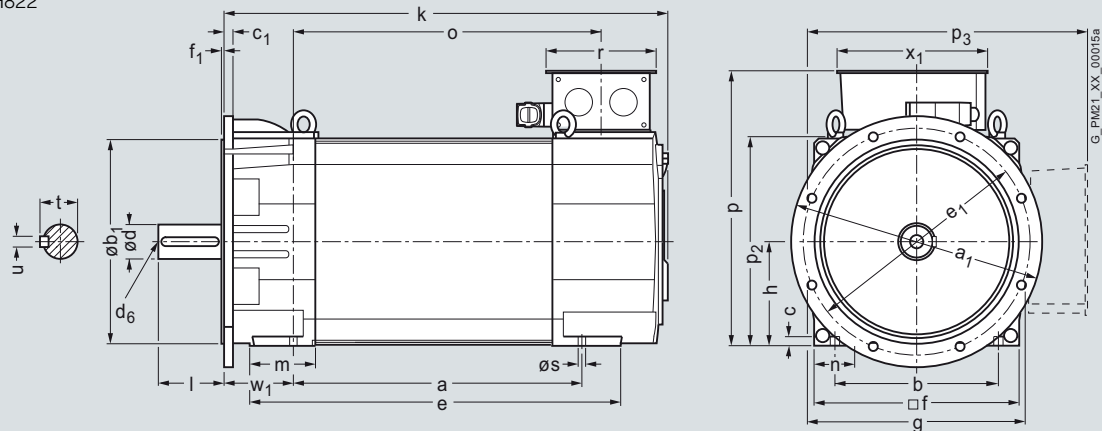
Shaft extension DE

Terminal box type

Dimensions as for types of construction IM B3/IM V5

| Shaft height | Type    | DIN IEC | d D         | d <sub>6</sub> – | l E           | t GA           | u F          |
|--------------|---------|---------|-------------|------------------|---------------|----------------|--------------|
| 225          | 1PH8224 |         | <b>75m6</b> | M20              | 140<br>(5.51) | 79.5<br>(3.13) | 20<br>(0.79) |
|              | 1PH8226 |         |             |                  |               |                |              |
|              | 1PH8228 |         |             |                  |               |                |              |

1PH822





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 asynchronous motors SH 280 – Water cooling

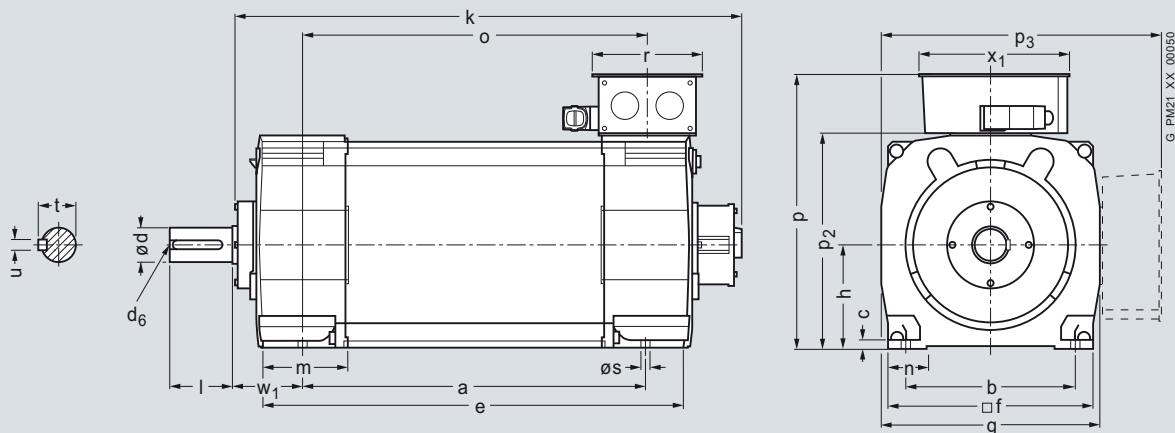
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                           | Type    | DIN IEC |                |                |              |                |                |                |                 |               |               |                  |              |                  |             | Shaft extension DE |               |               |              |  |
|--------------------------------------------------------|---------|---------|----------------|----------------|--------------|----------------|----------------|----------------|-----------------|---------------|---------------|------------------|--------------|------------------|-------------|--------------------|---------------|---------------|--------------|--|
|                                                        |         |         | a B            | b A            | c LA/HA      | f AB           | g AC           | h H            | k LB            | m BA          | n AA          | p <sub>2</sub> – | s K          | w <sub>1</sub> C | <b>d D</b>  | d <sub>6</sub> –   | l E           | t GA          | u F          |  |
| 1PH8, types of construction IM B3/IM V5, water cooling |         |         |                |                |              |                |                |                |                 |               |               |                  |              |                  |             |                    |               |               |              |  |
| 280                                                    | 1PH8284 |         | 684<br>(26.93) | 457<br>(17.99) | 21<br>(0.83) | 556<br>(21.89) | 588<br>(23.15) | 280<br>(11.02) | 1134<br>(44.65) | 220<br>(8.66) | 105<br>(4.13) | 574<br>(22.60)   | 24<br>(0.94) | 190<br>(7.48)    | <b>95m6</b> | M24                | 170<br>(6.69) | 100<br>(3.94) | 25<br>(0.98) |  |
|                                                        | 1PH8286 |         | 794<br>(31.26) |                |              |                |                |                | 1244<br>(48.98) |               |               |                  |              |                  |             |                    |               |               |              |  |
|                                                        | 1PH8288 |         | 924<br>(36.38) |                |              |                |                |                | 1374<br>(54.09) |               |               |                  |              |                  |             |                    |               |               |              |  |

| Shaft height | Type    | DIN IEC | Terminal box type |                  |               |                   |               |                  |               |                   |                |                  |               |                   |                |                  |                |                   |
|--------------|---------|---------|-------------------|------------------|---------------|-------------------|---------------|------------------|---------------|-------------------|----------------|------------------|---------------|-------------------|----------------|------------------|----------------|-------------------|
|              |         |         | 1XB7322           |                  |               |                   | 1XB7422       |                  |               |                   | 1XB7700        |                  |               |                   | 1XB7712        |                  |                |                   |
|              |         |         | p HD              | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD          | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL           | x <sub>1</sub> AG |
| 280          | 1PH8284 |         | 709<br>(27.91)    | 716<br>(28.19)   | 197<br>(7.76) | 258<br>(10.16)    | 724<br>(28.5) | 731<br>(28.78)   | 230<br>(9.06) | 303<br>(11.93)    | 770<br>(30.31) | 777<br>(30.59)   | 310<br>(12.2) | 318<br>(12.52)    | 820<br>(32.28) | 827<br>(32.56)   | 377<br>(14.84) | 370<br>(14.57)    |
|              | 1PH8286 |         |                   |                  |               |                   |               |                  |               |                   |                |                  |               |                   |                |                  |                |                   |
|              | 1PH8288 |         |                   |                  |               |                   |               |                  |               |                   |                |                  |               |                   |                |                  |                |                   |

1PH828



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors  
SH 280 – Water cooling

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                               | Type    | DIN IEC | a B            | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | g AC           | h H            | i <sub>2</sub> EB | k LB            | m BA          | n AA          | p <sub>2</sub> – | s K          |
|----------------------------------------------------------------------------|---------|---------|----------------|------------------|----------------|------------------|--------------|-------------------|------------------|----------------|------------------|----------------|----------------|-------------------|-----------------|---------------|---------------|------------------|--------------|
| <b>1PH8, types of construction IM B5/IM B35/IM V15 D660, water cooling</b> |         |         |                |                  |                |                  |              |                   |                  |                |                  |                |                |                   |                 |               |               |                  |              |
| 280                                                                        | 1PH8284 |         | 684<br>(26.93) | 660<br>(25.98)   | 457<br>(17.99) | 550<br>(21.65)   | 21<br>(0.83) | 24<br>(0.94)      | 600<br>(23.62)   | 556<br>(21.89) | 6<br>(0.24)      | 588<br>(23.15) | 280<br>(11.02) | 140<br>(5.51)     | 1134<br>(44.65) | 220<br>(8.66) | 105<br>(4.13) | 574<br>(22.60)   | 24<br>(0.94) |
|                                                                            | 1PH8286 |         | 794<br>(31.26) |                  |                |                  |              |                   |                  |                |                  |                |                |                   | 1244<br>(48.98) |               |               |                  |              |
|                                                                            | 1PH8288 |         | 924<br>(36.38) |                  |                |                  |              |                   |                  |                |                  |                |                |                   | 1374<br>(54.09) |               |               |                  |              |

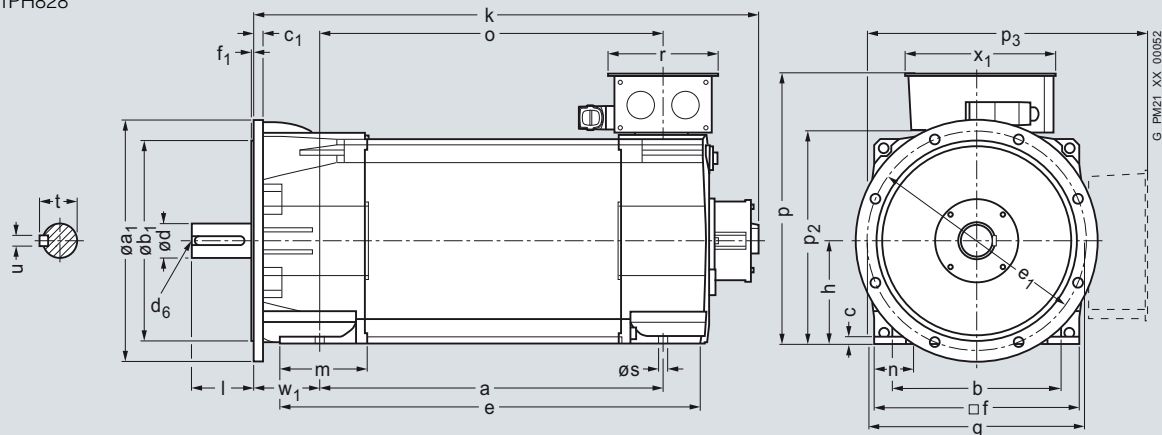
Shaft extension DE

Terminal box type

Dimensions as for types of construction  
IM B3/IM V5

| Shaft height | Type    | DIN IEC | m BA          | n AA          | s K          | w <sub>1</sub> C | d D         | d <sub>6</sub> – | l E           | t GA          | u F          |
|--------------|---------|---------|---------------|---------------|--------------|------------------|-------------|------------------|---------------|---------------|--------------|
| 280          | 1PH8284 |         | 220<br>(8.66) | 105<br>(4.13) | 24<br>(0.94) | 190<br>(7.48)    | <b>95m6</b> | M24              | 170<br>(6.69) | 100<br>(3.94) | 25<br>(0.98) |
|              | 1PH8286 |         |               |               |              |                  |             |                  |               |               |              |
|              | 1PH8288 |         |               |               |              |                  |             |                  |               |               |              |

1PH828



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 132 – Forced ventilation

#### Dimensional drawings

For motor Dimensions in mm (inches)

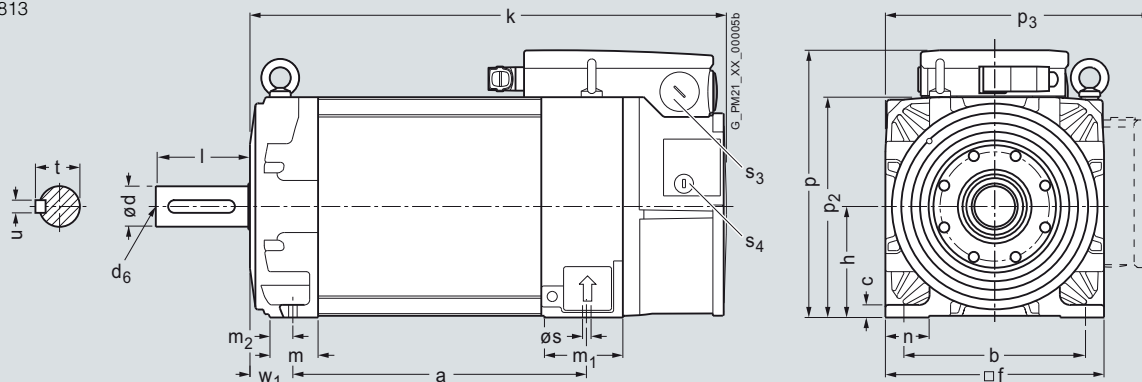
| Shaft height | Type | DIN IEC | a B | b A | c HA | c <sub>1</sub> LA | f AB | h H | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|-----|------|-------------------|------|-----|------|------|------------------|------------------|------|
|--------------|------|---------|-----|-----|------|-------------------|------|-----|------|------|------------------|------------------|------|

#### 1PH8, type of construction IM B3, forced ventilation

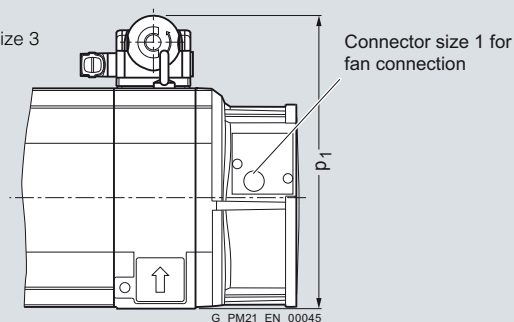
|     |         |  |                  |               |              |              |                |               |                |              |              |              |              |
|-----|---------|--|------------------|---------------|--------------|--------------|----------------|---------------|----------------|--------------|--------------|--------------|--------------|
| 132 | 1PH8131 |  | 220.5<br>(8.68)  | 216<br>(8.50) | 15<br>(0.59) | 18<br>(0.71) | 260<br>(10.24) | 132<br>(5.20) | 439<br>(17.28) | 57<br>(2.24) | 93<br>(3.66) | 27<br>(1.06) | 52<br>(2.05) |
|     | 1PH8133 |  | 265.5<br>(10.45) |               |              |              |                |               | 484<br>(19.06) |              |              |              |              |
|     | 1PH8135 |  | 310.5<br>(12.22) |               |              |              |                |               | 529<br>(20.83) |              |              |              |              |
|     | 1PH8137 |  | 350.5<br>(13.80) |               |              |              |                |               | 569<br>(22.40) |              |              |              |              |

| Shaft height | Type    | DIN IEC |                  |                     |                     |                     |                |                     |                     |                     |                            |                     | Shaft extension DE |                |              |  |  |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|----------------|---------------------|---------------------|---------------------|----------------------------|---------------------|--------------------|----------------|--------------|--|--|
|              |         |         | p <sub>HD</sub>  | p <sub>1</sub><br>— | p <sub>2</sub><br>— | p <sub>3</sub><br>— | s <sub>K</sub> | s <sub>3</sub><br>— | s <sub>4</sub><br>— | w <sub>1</sub><br>C | <b>d</b><br><b>D</b>       | d <sub>6</sub><br>— | l<br>L             | t<br>GA        | u<br>F       |  |  |
| 132          | 1PH8131 |         | 317.5<br>(12.50) | 347<br>(13.66)      | 262<br>(10.31)      | 357.5<br>(14.07)    | 12<br>(0.47)   | M40×1.5             | M20×1.5             | 53<br>(2.09)        | <b>48</b><br><b>(1.89)</b> | M16                 | 110<br>(4.33)      | 51.5<br>(2.03) | 14<br>(0.55) |  |  |
|              | 1PH8133 |         |                  |                     |                     |                     |                |                     |                     |                     |                            |                     |                    |                |              |  |  |
|              | 1PH8135 |         |                  |                     |                     |                     |                |                     |                     |                     |                            |                     |                    |                |              |  |  |
|              | 1PH8137 |         |                  |                     |                     |                     |                |                     |                     |                     |                            |                     |                    |                |              |  |  |

1PH813



Variant with  
power connector size 3



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 132 – Forced ventilation

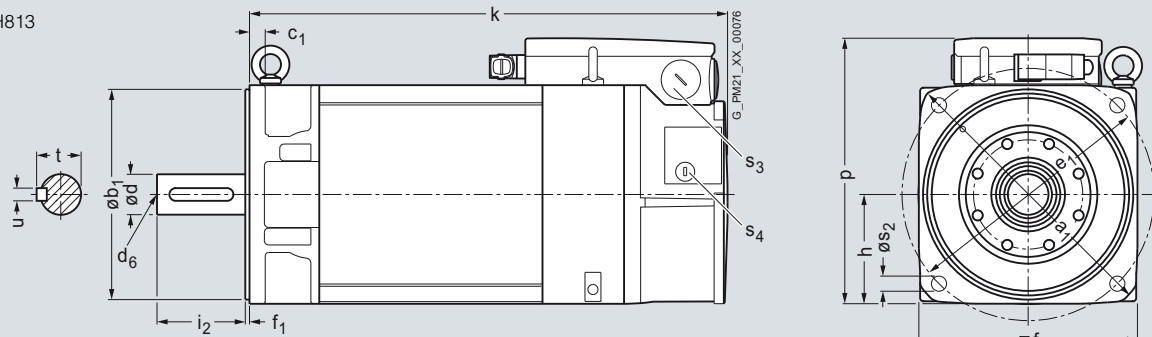
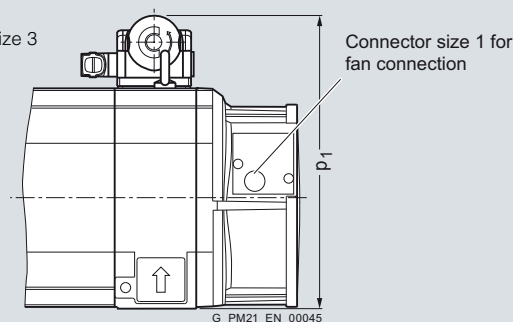
## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                | Type    | DIN IEC | a <sub>1</sub><br>P | b <sub>1</sub><br>N | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H        | k<br>LB        |
|-------------------------------------------------------------|---------|---------|---------------------|---------------------|----------------------|---------------------|----------------|---------------------|---------------|----------------|
| <b>1PH8, type of construction IM B5, forced ventilation</b> |         |         |                     |                     |                      |                     |                |                     |               |                |
| 132                                                         | 1PH8131 |         | 340<br>(13.39)      | 250<br>(9.84)       | 18<br>(0.71)         | 300<br>(11.81)      | 260<br>(10.24) | 5<br>(0.20)         | 130<br>(5.12) | 439<br>(17.28) |
|                                                             | 1PH8133 |         |                     |                     |                      |                     |                |                     |               | 484<br>(19.06) |
|                                                             | 1PH8135 |         |                     |                     |                      |                     |                |                     |               | 529<br>(20.83) |
|                                                             | 1PH8137 |         |                     |                     |                      |                     |                |                     |               | 569<br>(22.40) |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                     |                     |                     |                     |              |                     |                                  |                |              |
|--------------|---------|---------|--------------------|---------------------|---------------------|---------------------|---------------------|--------------|---------------------|----------------------------------|----------------|--------------|
|              |         |         | p<br>HD            | p <sub>1</sub><br>— | s <sub>2</sub><br>— | s <sub>3</sub><br>— | s <sub>4</sub><br>— | d<br>D       | d <sub>6</sub><br>— | i <sub>2</sub><br>E <sub>2</sub> | t<br>GA        | u<br>F       |
| 132          | 1PH8131 |         | 315.5<br>(12.42)   | 345<br>(13.58)      | 18<br>(0.71)        | M40×1.5             | M20×1.5             | 48<br>(1.89) | M16                 | 110<br>(4.33)                    | 51.5<br>(2.03) | 14<br>(0.55) |
|              | 1PH8133 |         |                    |                     |                     |                     |                     |              |                     |                                  |                |              |
|              | 1PH8135 |         |                    |                     |                     |                     |                     |              |                     |                                  |                |              |
|              | 1PH8137 |         |                    |                     |                     |                     |                     |              |                     |                                  |                |              |

1PH813

Variant with  
power connector size 3

# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 132 – Forced ventilation

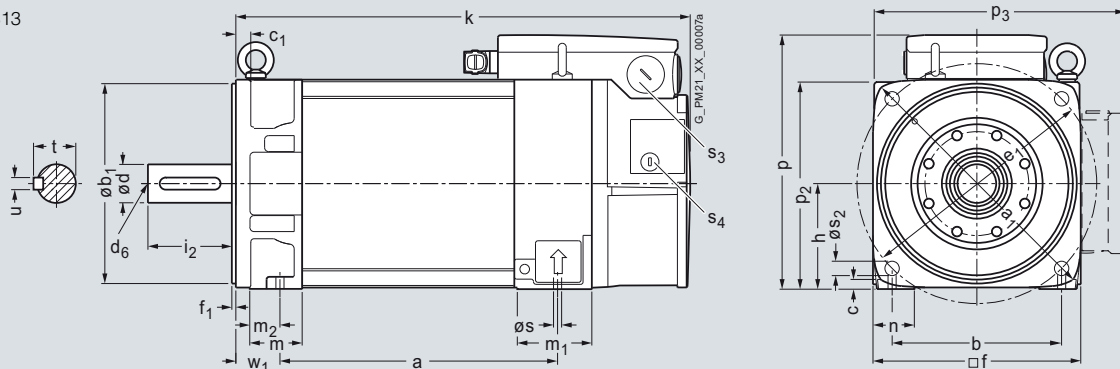
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                 | Type    | DIN IEC | a<br>B           | a <sub>1</sub><br>P | b<br>A        | b <sub>1</sub><br>N | c<br>HA      | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H        | k<br>LB        | m<br>BA      | m <sub>1</sub><br>– | m <sub>2</sub><br>– | n<br>AA      |
|--------------------------------------------------------------|---------|---------|------------------|---------------------|---------------|---------------------|--------------|---------------------|----------------|---------------------|---------------|----------------|--------------|---------------------|---------------------|--------------|
| <b>1PH8, type of construction IM B35, forced ventilation</b> |         |         |                  |                     |               |                     |              |                     |                |                     |               |                |              |                     |                     |              |
| 132                                                          | 1PH8131 |         | 220.5<br>(8.68)  | 340<br>(13.39)      | 216<br>(8.50) | 250<br>(9.84)       | 15<br>(0.59) | 300<br>(11.81)      | 260<br>(10.24) | 5<br>(0.20)         | 132<br>(5.20) | 439<br>(17.28) | 65<br>(2.56) | 93<br>(3.66)        | 35<br>(1.38)        | 52<br>(2.05) |
|                                                              | 1PH8133 |         | 265.5<br>(10.45) |                     |               |                     |              |                     |                |                     |               | 484<br>(19.06) |              |                     |                     |              |
|                                                              | 1PH8135 |         | 310.5<br>(12.22) |                     |               |                     |              |                     |                |                     |               | 529<br>(20.83) |              |                     |                     |              |
|                                                              | 1PH8137 |         | 350.5<br>(13.80) |                     |               |                     |              |                     |                |                     |               | 569<br>(22.40) |              |                     |                     |              |

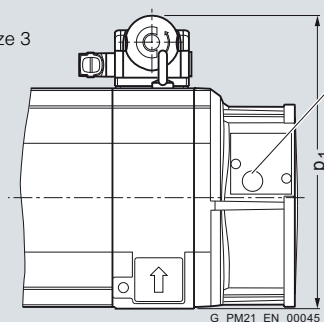
| Shaft height | Type    | DIN IEC |                  |                     |                     |                     |              |                     |                     |                     |                     |                     | Shaft extension DE  |                     |                |              |  |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|--------------|--|
|              |         |         | p<br>HD          | p <sub>1</sub><br>– | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s<br>K       | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | w <sub>1</sub><br>C | d<br>D              | d <sub>6</sub><br>– | i <sub>2</sub><br>E | t<br>GA        | u<br>F       |  |
| 132          | 1PH8131 |         | 317.5<br>(12.42) | 347<br>(13.66)      | 262<br>(10.31)      | 357.5<br>(14.07)    | 12<br>(0.47) | 18<br>(0.71)        | M40×1.5             | M20×1.5             | 53<br>(2.09)        | <b>48</b><br>(1.89) | M16                 | 110<br>(4.33)       | 51.5<br>(2.03) | 14<br>(0.55) |  |
|              | 1PH8133 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                     |                     |                     |                |              |  |
|              | 1PH8135 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                     |                     |                     |                |              |  |
|              | 1PH8137 |         |                  |                     |                     |                     |              |                     |                     |                     |                     |                     |                     |                     |                |              |  |

1PH813



Variant with  
power connector size 3

Connector size 1 for  
fan connection



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 160 – Forced ventilation

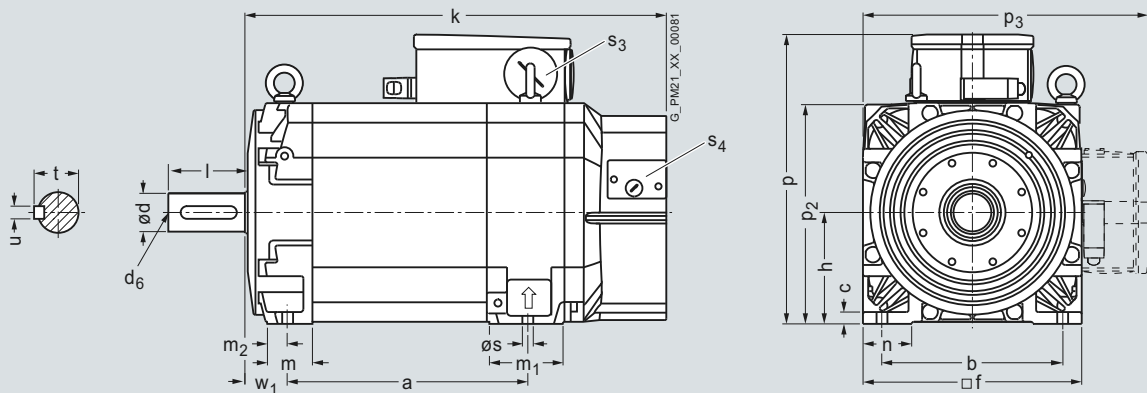
## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                | Type    | DIN IEC | a<br>B           | a <sub>1</sub><br>P | b<br>A         | b <sub>1</sub><br>N | c<br>HA      | c <sub>1</sub><br>LA | e <sub>1</sub><br>M | f<br>AB        | f <sub>1</sub><br>T | h<br>H        | k<br>LB          | m<br>BA      | m <sub>1</sub><br>– | m <sub>2</sub><br>– | n<br>AA      |
|-------------------------------------------------------------|---------|---------|------------------|---------------------|----------------|---------------------|--------------|----------------------|---------------------|----------------|---------------------|---------------|------------------|--------------|---------------------|---------------------|--------------|
| <b>1PH8, type of construction IM B3, forced ventilation</b> |         |         |                  |                     |                |                     |              |                      |                     |                |                     |               |                  |              |                     |                     |              |
| 160                                                         | 1PH8165 |         | 406.5<br>(16.00) | –                   | 254<br>(10.00) | –                   | 17<br>(0.67) | 23<br>(0.91)         | –                   | 314<br>(12.36) | –                   | 160<br>(6.30) | 670.5<br>(26.40) | 64<br>(2.52) | 99.5<br>(3.92)      | 28<br>(1.10)        | 70<br>(2.76) |
|                                                             | 1PH8167 |         | 446.5<br>(17.58) |                     |                |                     |              |                      |                     |                |                     |               | 710.5<br>(27.97) |              |                     |                     |              |

| Shaft height | Type    | DIN IEC | p <sub>HD</sub>  | p <sub>1</sub><br>– | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s <sub>K</sub> | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | w <sub>1</sub><br>C | Shaft extension DE   |                            |        |               |              |              |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------------|--------|---------------|--------------|--------------|
|              |         |         |                  |                     |                     |                     |                |                     |                     |                     |                     | <b>d</b><br><b>D</b> | d <sub>6</sub><br>–        | l<br>L | t<br>GA       | u<br>F       |              |
| 160          | 1PH8165 |         | 415.5<br>(16.36) | –                   | 317<br>(12.48)      | 412.5<br>(16.24)    | 14<br>(0.55)   | –                   |                     | M63 × 1.5           | M20×1.5             | 61<br>(2.40)         | <b>55</b><br><b>(2.17)</b> | M20    | 110<br>(4.33) | 59<br>(2.32) | 16<br>(0.63) |
|              | 1PH8167 |         |                  |                     |                     |                     |                |                     |                     |                     |                     |                      |                            |        |               |              |              |

1PH816



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 160 – Forced ventilation

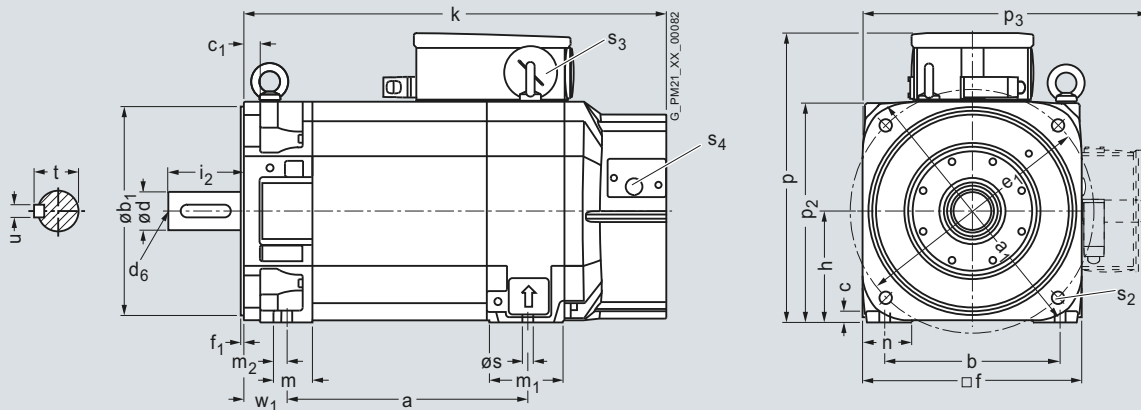
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                       | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         |
|--------------------------------------------------------------------|---------|---------|------------------|------------------|----------------|------------------|--------------|-------------------|------------------|----------------|------------------|---------------|------------------|--------------|------------------|------------------|--------------|
| <b>1PH8, type of construction IM B5/IM B35, forced ventilation</b> |         |         |                  |                  |                |                  |              |                   |                  |                |                  |               |                  |              |                  |                  |              |
| 160                                                                | 1PH8165 |         | 406.5<br>(16.00) | 393<br>(15.47)   | 254<br>(10.00) | 300<br>(11.81)   | 17<br>(0.67) | –                 | 350<br>(13.78)   | 314<br>(12.36) | 5<br>(0.20)      | 160<br>(6.30) | 670.5<br>(26.40) | 55<br>(2.17) | 99.5<br>(3.92)   | 19<br>(0.75)     | 70<br>(2.76) |
|                                                                    | 1PH8167 |         | 446.5<br>(17.58) |                  |                |                  |              |                   |                  |                |                  |               | 710.5<br>(27.97) |              |                  |                  |              |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |                  |                  |              |                  |                  |                  |                  |              |                  |                  |              |              |
|--------------|---------|---------|--------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|------------------|--------------|------------------|------------------|--------------|--------------|
|              |         |         | p HD               | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | d D          | d <sub>6</sub> – | i <sub>2</sub> E | t GA         | u F          |
| 160          | 1PH8165 |         | 415.5<br>(16.36)   | –                | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55) | 18<br>(0.71)     | M63 × 1.5        | M20×1.5          | 61<br>(2.40)     | 55<br>(2.17) | M20              | 110<br>(4.33)    | 59<br>(2.32) | 16<br>(0.63) |
|              | 1PH8167 |         |                    |                  |                  |                  |              |                  |                  |                  |                  |              |                  |                  |              |              |

1PH816



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180 – Forced ventilation

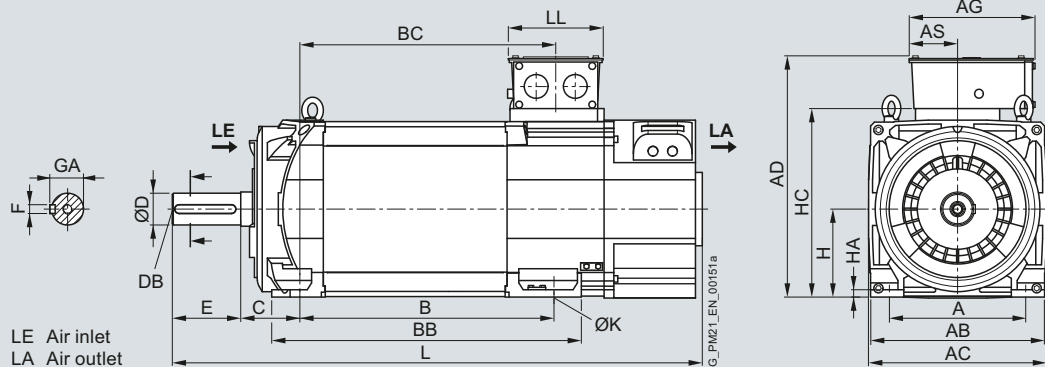
## Dimensional drawings

| For motor                                                                                    | Shaft Type | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
|----------------------------------------------------------------------------------------------|------------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|
| IEC A                                                                                        | AB         | AC                        | B              | BB             | C              | D              | DB            | E            | F   | GA            | H            | HA           | HC            | K            | L              |                |                 |
| <b>1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE</b> |            |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| 180                                                                                          | 1PH8184    | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  |
|                                                                                              | 1PH8186    |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |

| Terminal box                      | Shaft Type | Dimensions in mm (inches) |                |               |                |               |
|-----------------------------------|------------|---------------------------|----------------|---------------|----------------|---------------|
| IEC AD                            | AG         | AS                        | BC             | LL            |                |               |
| <b>Terminal box type 1XB7 322</b> |            |                           |                |               |                |               |
| 180                               | 1PH8184    | 484<br>(19.06)            | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |
|                                   | 1PH8186    |                           |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180 – Forced ventilation

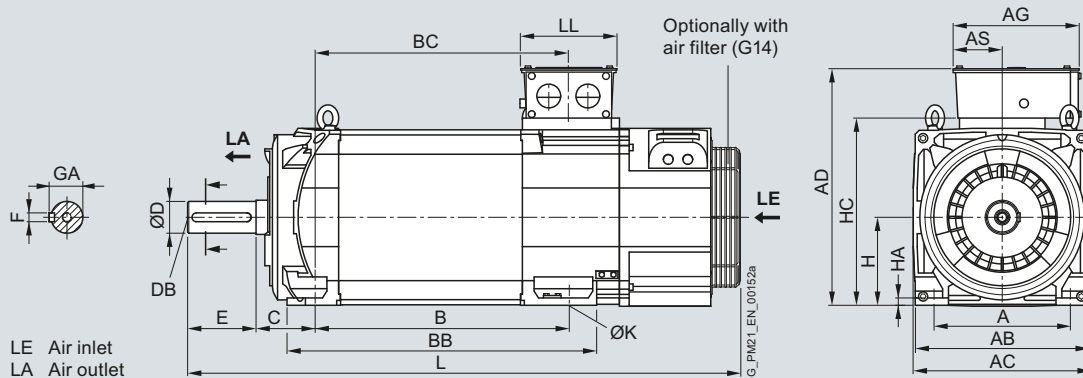
#### Dimensional drawings

| For motor                                                                                    | Dimensions in mm (inches) |                |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
|----------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft Type                                                                                   | IEC A                     | AB             | AC             | B              | BB             | C              | D             | DB           | E   | F             | GA           | H            | HA            | HC           | K              | L              |                 |
| height                                                                                       |                           |                |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| <b>1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE</b> |                           |                |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |
| 180                                                                                          | 1PH8184                   | 279<br>(10.98) | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 1047<br>(41.22) |
|                                                                                              | 1PH8186                   |                |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1137<br>(44.76) |

| Terminal box                      | Dimensions in mm (inches) |                |                |               |                |               |  |
|-----------------------------------|---------------------------|----------------|----------------|---------------|----------------|---------------|--|
| Shaft Type                        | IEC AD                    | AG             | AS             | BC            | LL             |               |  |
| height                            |                           |                |                |               |                |               |  |
| <b>Terminal box type 1XB7 322</b> |                           |                |                |               |                |               |  |
| 180                               | 1PH8184                   | 484<br>(19.06) | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |  |
|                                   | 1PH8186                   |                |                |               | 519<br>(20.43) |               |  |

|                                   |         |                |                |               |                |               |  |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|--|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |  |
| 180                               | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |  |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |  |

|                                   |         |                |                |               |                |                |  |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|--|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |  |
| 180                               | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |  |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |  |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180 – Forced ventilation

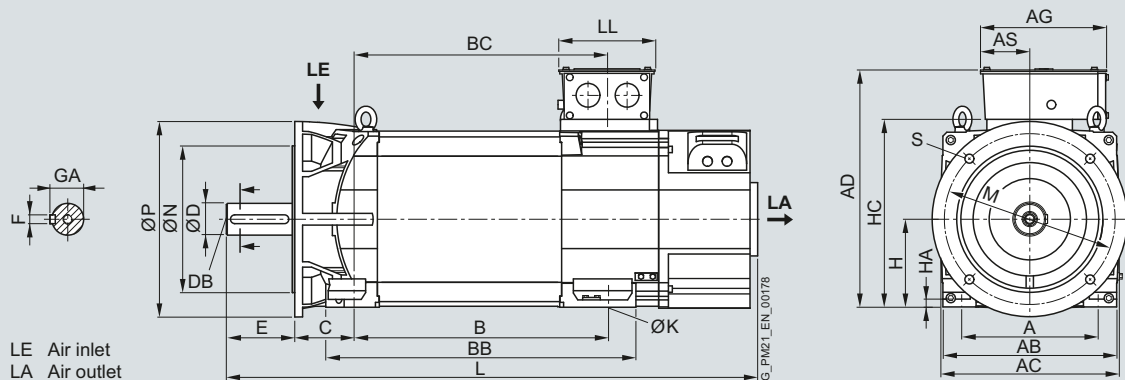
## Dimensional drawings

| For motor                                                                                                        |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
|------------------------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                                            | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A400 (option K90) |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 180                                                                                                              | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  | 350<br>(13.78) | 300<br>(11.81) | 400<br>(15.75) | 18.5<br>(0.73) |
|                                                                                                                  | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |                |                |                |                |

| Terminal box               | Dimensions in mm (inches) |                |                |               |                |               |
|----------------------------|---------------------------|----------------|----------------|---------------|----------------|---------------|
| Shaft Type                 | IEC AD                    | AG             | AS             | BC            | LL             |               |
| Terminal box type 1XB7 322 |                           |                |                |               |                |               |
| 180                        | 1PH8184                   | 484<br>(19.06) | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |
|                            | 1PH8186                   |                |                |               | 519<br>(20.43) |               |

| Terminal box type 1XB7 422 |         |                |                |               |                |               |
|----------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| 180                        | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |
|                            | 1PH8186 |                |                |               | 519<br>(20.43) |               |

| Terminal box type 1XB7 700 |         |                |                |               |                |                |
|----------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| 180                        | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |
|                            | 1PH8186 |                |                |               | 519<br>(20.43) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180 – Forced ventilation

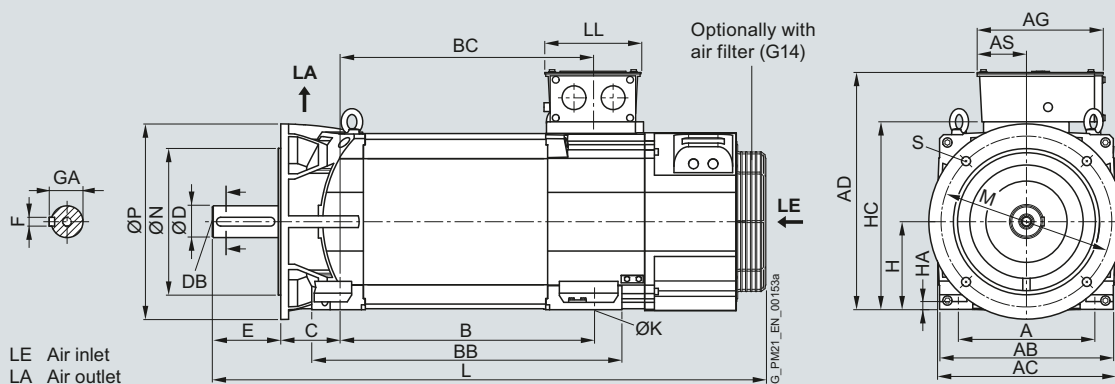
#### Dimensional drawings

| For motor |                                                                                                                  | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                 |                |                |                |   |
|-----------|------------------------------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|-----------------|----------------|----------------|----------------|---|
| Shaft     | Type                                                                                                             | IEC                       | A              | AB             | AC             | B              | BB            | C            | D   | DB            | E            | F            | GA            | H            | HA             | HC             | K               | L               | M              | N              | P              | S |
| height    | 1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A400 (option K90) |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                 |                |                |                |   |
| 180       | 1PH8184                                                                                                          | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 1047<br>(41.22) | 350<br>(13.78)  | 300<br>(11.81) | 400<br>(15.75) | 18.5<br>(0.73) |   |
|           | 1PH8186                                                                                                          |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                |                 | 1137<br>(44.76) |                |                |                |   |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |               |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|---------------|
| Shaft Type                 |         | IEC AD                    | AG             | AS            | BC             | LL            |
| height                     |         |                           |                |               |                |               |
| Terminal box type 1XB7 322 |         |                           |                |               |                |               |
| 180                        | 1PH8184 | 484<br>(19.06)            | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |
|                            | 1PH8186 |                           |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180 – Forced ventilation

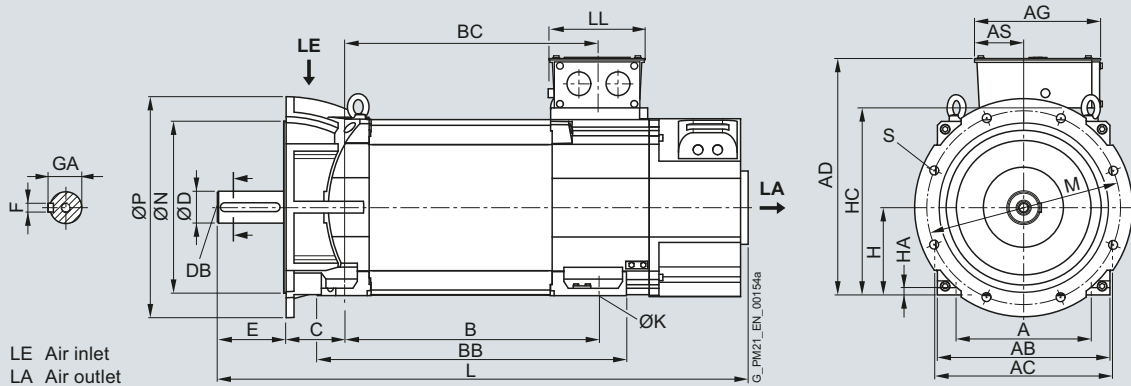
## Dimensional drawings

| For motor                                                                                          |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
|----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft Type                                                                                         | height  | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE, flange A450 |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                |                |                |                |
| 180                                                                                                | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 995<br>(39.17)  | 400<br>(15.75) | 350<br>(13.78) | 450<br>(17.72) | 18.5<br>(0.73) |
|                                                                                                    | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                | 1085<br>(42.72) |                |                |                |                |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |               |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|---------------|
| Shaft Type                 | IEC AD  | AG                        | AS             | BC            | LL             |               |
| height                     |         |                           |                |               |                |               |
| Terminal box type 1XB7 322 |         |                           |                |               |                |               |
| 180                        | 1PH8184 | 484<br>(19.06)            | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |
|                            | 1PH8186 |                           |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180 – Forced ventilation

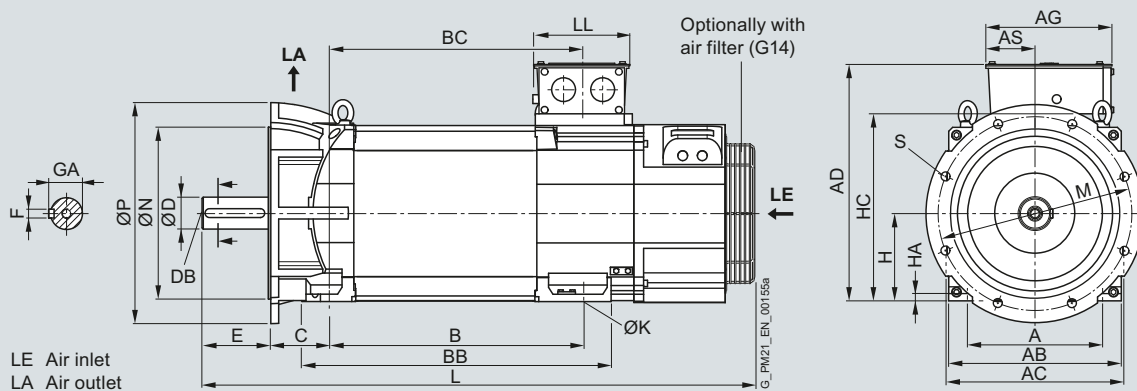
#### Dimensional drawings

| For motor                                                                                          |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                 |                |                |                |  |
|----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|--------------|---------------|--------------|----------------|----------------|-----------------|-----------------|----------------|----------------|----------------|--|
| Shaft                                                                                              | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA           | H             | HA           | HC             | K              | L               | M               | N              | P              | S              |  |
| height                                                                                             |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                 |                |                |                |  |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE, flange A450 |         |                           |                |                |                |                |               |              |     |               |              |              |               |              |                |                |                 |                 |                |                |                |  |
| 180                                                                                                | 1PH8184 | 279<br>(10.98)            | 356<br>(14.02) | 364<br>(14.33) | 430<br>(16.93) | 545<br>(21.46) | 121<br>(4.76) | 65<br>(2.56) | M20 | 140<br>(5.51) | 18<br>(0.71) | 69<br>(2.72) | 180<br>(7.09) | 15<br>(0.59) | 383<br>(15.08) | 14.5<br>(0.57) | 1047<br>(41.22) | 400<br>(15.75)  | 350<br>(13.78) | 450<br>(17.72) | 18.5<br>(0.73) |  |
|                                                                                                    | 1PH8186 |                           |                |                | 520<br>(20.47) | 635<br>(25.00) |               |              |     |               |              |              |               |              |                |                |                 | 1137<br>(44.76) |                |                |                |  |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |               |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|---------------|
| Shaft Type                 |         | IEC AD                    | AG             | AS            | BC             | LL            |
| height                     |         |                           |                |               |                |               |
| Terminal box type 1XB7 322 |         |                           |                |               |                |               |
| 180                        | 1PH8184 | 484<br>(19.06)            | 258<br>(10.16) | 100<br>(3.94) | 429<br>(16.89) | 197<br>(7.76) |
|                            | 1PH8186 |                           |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |               |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |
| 180                               | 1PH8184 | 499<br>(19.65) | 303<br>(11.93) | 120<br>(4.72) | 429<br>(16.89) | 230<br>(9.06) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |               |

|                                   |         |                |                |               |                |                |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |
| 180                               | 1PH8184 | 525<br>(20.67) | 310<br>(12.20) | 185<br>(7.28) | 429<br>(16.89) | 295<br>(11.61) |
|                                   | 1PH8186 |                |                |               | 519<br>(20.43) |                |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 225 – Forced ventilation

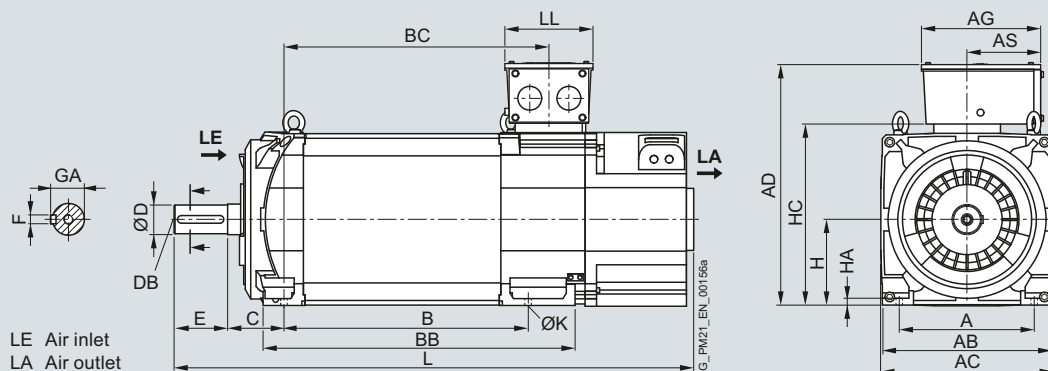
## Dimensional drawings

| For motor                                                                             |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
|---------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft height                                                                          | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE |         |                           |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
| 225                                                                                   | 1PH8224 | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87) | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1171<br>(46.10) |
|                                                                                       | 1PH8226 |                           |                |                | 545<br>(21.46) | 725<br>(28.54) |               |              |     |               |              |                |               |              |                |                | 1271<br>(50.04) |
|                                                                                       | 1PH8228 |                           |                |                | 635<br>(25.00) | 815<br>(32.09) |               |              |     |               |              |                |               |              |                |                | 1361<br>(53.58) |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |               |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG             | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |                |               |                |               |
| 225                        | 1PH8224 | 613<br>(24.13)            | 258<br>(10.16) | 100<br>(3.94) | 481<br>(18.94) | 197<br>(7.76) |
|                            | 1PH8226 |                           |                |               | 581<br>(22.87) |               |
|                            | 1PH8228 |                           |                |               | 671<br>(26.42) |               |

|                                   |         |                |                |               |                |               |  |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|---------------|--|
| <b>Terminal box type 1XB7 422</b> |         |                |                |               |                |               |  |
| 225                               | 1PH8224 | 628<br>(24.72) | 303<br>(11.93) | 120<br>(4.72) | 481<br>(18.94) | 230<br>(9.06) |  |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |               |  |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |               |  |

|                                   |         |                |                |               |                |                |  |
|-----------------------------------|---------|----------------|----------------|---------------|----------------|----------------|--|
| <b>Terminal box type 1XB7 700</b> |         |                |                |               |                |                |  |
| 225                               | 1PH8224 | 654<br>(25.75) | 295<br>(11.61) | 185<br>(7.28) | 481<br>(18.94) | 310<br>(12.20) |  |
|                                   | 1PH8226 |                |                |               | 581<br>(22.87) |                |  |
|                                   | 1PH8228 |                |                |               | 671<br>(26.42) |                |  |



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 225 – Forced ventilation

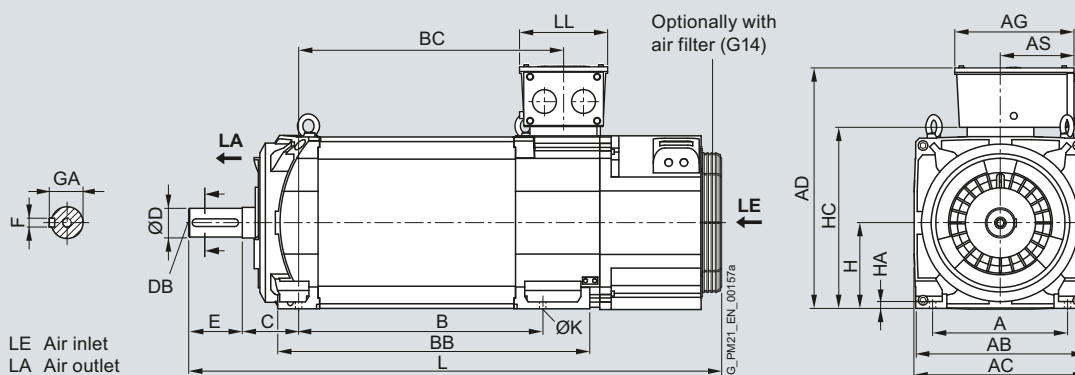
#### Dimensional drawings

| For motor                                                                             |         | Dimensions in mm (inches) |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
|---------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|---------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|
| Shaft height                                                                          | Type    | IEC A                     | AB             | AC             | B              | BB             | C             | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               |
| 1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE |         |                           |                |                |                |                |               |              |     |               |              |                |               |              |                |                |                 |
| 225                                                                                   | 1PH8224 | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87) | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1206<br>(47.48) |
|                                                                                       | 1PH8226 |                           |                |                | 545<br>(21.46) | 725<br>(28.54) |               |              |     |               |              |                |               |              |                |                | 1306<br>(51.42) |
|                                                                                       | 1PH8228 |                           |                |                | 635<br>(25.00) | 815<br>(32.09) |               |              |     |               |              |                |               |              |                |                | 1396<br>(54.96) |

| Terminal box               |         | Dimensions in mm (inches) |                |               |                |               |
|----------------------------|---------|---------------------------|----------------|---------------|----------------|---------------|
| Shaft height               | Type    | IEC AD                    | AG             | AS            | BC             | LL            |
| Terminal box type 1XB7 322 |         |                           |                |               |                |               |
| 225                        | 1PH8224 | 613<br>(24.13)            | 258<br>(10.16) | 100<br>(3.94) | 481<br>(18.94) | 197<br>(7.76) |
|                            | 1PH8226 |                           |                |               | 581<br>(22.87) |               |
|                            | 1PH8228 |                           |                |               | 671<br>(26.42) |               |

|                                   |                |                |               |                |               |  |  |
|-----------------------------------|----------------|----------------|---------------|----------------|---------------|--|--|
| <b>Terminal box type 1XB7 422</b> |                |                |               |                |               |  |  |
| 225 1PH8224                       | 628<br>(24.72) | 303<br>(11.93) | 120<br>(4.72) | 481<br>(18.94) | 230<br>(9.06) |  |  |
| 1PH8226                           |                |                |               | 581<br>(22.87) |               |  |  |
| 1PH8228                           |                |                |               | 671<br>(26.42) |               |  |  |

|                                   |                |                |               |                |                |  |  |
|-----------------------------------|----------------|----------------|---------------|----------------|----------------|--|--|
| <b>Terminal box type 1XB7 700</b> |                |                |               |                |                |  |  |
| 225 1PH8224                       | 654<br>(25.75) | 295<br>(11.61) | 185<br>(7.28) | 481<br>(18.94) | 310<br>(12.20) |  |  |
| 1PH8226                           |                |                |               | 581<br>(22.87) |                |  |  |
| 1PH8228                           |                |                |               | 671<br>(26.42) |                |  |  |



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 225 – Forced ventilation

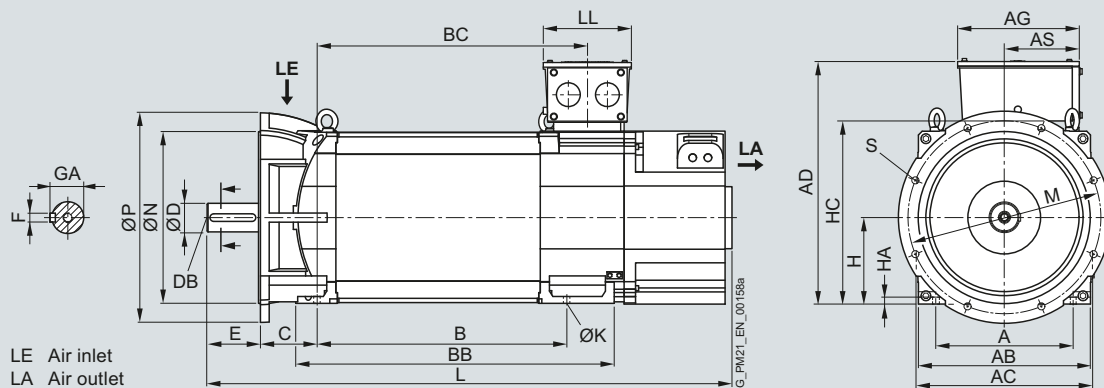
## Dimensional drawings

| For motor                                                                                           |         | Dimensions in mm (inches) |                |                |                |                |                |              |     |               |              |                |               |              |                |                |                 |                |                |                |                |
|-----------------------------------------------------------------------------------------------------|---------|---------------------------|----------------|----------------|----------------|----------------|----------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|
| Shaft                                                                                               | Type    | IEC A                     | AB             | AC             | B              | BB             | C              | D            | DB  | E             | F            | GA             | H             | HA           | HC             | K              | L               | M              | N              | P              | S              |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A550 |         |                           |                |                |                |                |                |              |     |               |              |                |               |              |                |                |                 |                |                |                |                |
| 225                                                                                                 | 1PH8224 | 356<br>(14.02)            | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87)  | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73) | 1171<br>(46.10) | 500<br>(19.69) | 450<br>(17.72) | 550<br>(21.65) | 18.5<br>(0.73) |
|                                                                                                     | 1PH8226 |                           |                |                |                | 545<br>(21.46) | 725<br>(28.54) |              |     |               |              |                |               |              |                |                | 1271<br>(50.04) |                |                |                |                |
|                                                                                                     | 1PH8228 |                           |                |                |                | 635<br>(25.00) | 815<br>(32.09) |              |     |               |              |                |               |              |                |                | 1361<br>(53.58) |                |                |                |                |

| Terminal box                      | Dimensions in mm (inches) |                |               |                |               |  |
|-----------------------------------|---------------------------|----------------|---------------|----------------|---------------|--|
| Shaft Type                        | IEC AD                    | AG             | AS            | BC             | LL            |  |
| <b>Terminal box type 1XB7 322</b> |                           |                |               |                |               |  |
| 225 1PH8224                       | 613<br>(24.13)            | 258<br>(10.16) | 100<br>(3.94) | 481<br>(18.94) | 197<br>(7.76) |  |
| 1PH8226                           |                           |                |               | 581<br>(22.87) |               |  |
| 1PH8228                           |                           |                |               | 671<br>(26.42) |               |  |

| <b>Terminal box type 1XB7 422</b> |                |                |               |                |               |  |
|-----------------------------------|----------------|----------------|---------------|----------------|---------------|--|
| 225 1PH8224                       | 628<br>(24.72) | 303<br>(11.93) | 120<br>(4.72) | 481<br>(18.94) | 230<br>(9.06) |  |
| 1PH8226                           |                |                |               | 581<br>(22.87) |               |  |
| 1PH8228                           |                |                |               | 671<br>(26.42) |               |  |

| <b>Terminal box type 1XB7 700</b> |                |                |               |                |                |  |
|-----------------------------------|----------------|----------------|---------------|----------------|----------------|--|
| 225 1PH8224                       | 654<br>(25.75) | 295<br>(11.61) | 185<br>(7.28) | 481<br>(18.94) | 310<br>(12.20) |  |
| 1PH8226                           |                |                |               | 581<br>(22.87) |                |  |
| 1PH8228                           |                |                |               | 671<br>(26.42) |                |  |





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 225 – Forced ventilation

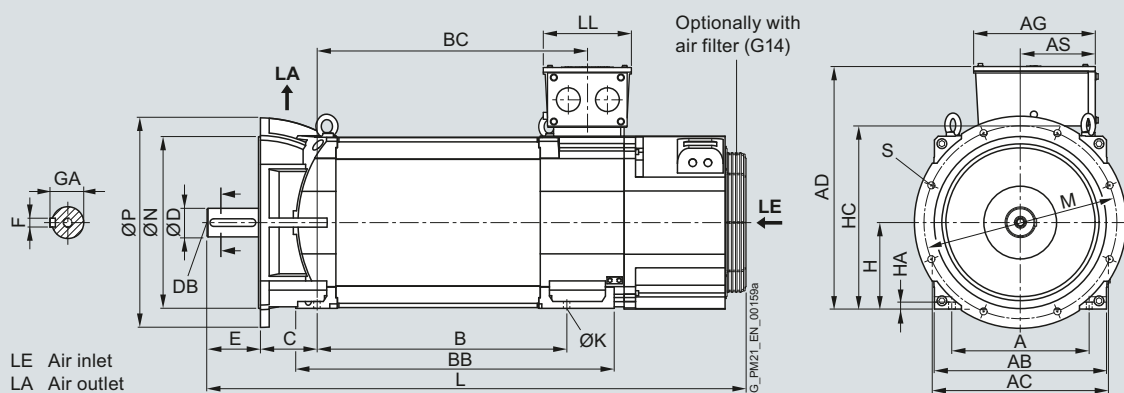
#### Dimensional drawings

| For motor                                                                                           | Dimensions in mm (inches) |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                 |
|-----------------------------------------------------------------------------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|-----|---------------|--------------|----------------|---------------|--------------|----------------|-----------------|
| Shaft Type                                                                                          | IEC A                     | AB             | AC             | B              | BB             | C              | D              | DB           | E   | F             | GA           | H              | HA            | HC           | K              | L               |
| height                                                                                              |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                 |
| 1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A550 |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                |                 |
| 225                                                                                                 | 1PH8224                   | 356<br>(14.02) | 446<br>(17.56) | 454<br>(17.87) | 445<br>(17.52) | 625<br>(24.61) | 149<br>(5.87)  | 75<br>(2.95) | M20 | 140<br>(5.51) | 20<br>(0.79) | 79.5<br>(3.13) | 225<br>(8.86) | 18<br>(0.71) | 475<br>(18.70) | 18.5<br>(0.73)  |
|                                                                                                     | 1PH8226                   |                |                |                |                | 545<br>(21.46) | 725<br>(28.54) |              |     |               |              |                |               |              |                | 1206<br>(47.48) |
|                                                                                                     | 1PH8228                   |                |                |                |                | 635<br>(25.00) | 815<br>(32.09) |              |     |               |              |                |               |              |                | 500<br>(19.69)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                | 450<br>(17.72)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                | 550<br>(21.65)  |
|                                                                                                     |                           |                |                |                |                |                |                |              |     |               |              |                |               |              |                | 18.5<br>(0.73)  |

| Terminal box               | Dimensions in mm (inches) |                |                |               |                |               |
|----------------------------|---------------------------|----------------|----------------|---------------|----------------|---------------|
| Shaft Type                 | IEC AD                    | AG             | AS             | BC            | LL             |               |
| height                     |                           |                |                |               |                |               |
| Terminal box type 1XB7 322 |                           |                |                |               |                |               |
| 225                        | 1PH8224                   | 613<br>(24.13) | 258<br>(10.16) | 100<br>(3.94) | 481<br>(18.94) | 197<br>(7.76) |
|                            | 1PH8226                   |                |                |               | 581<br>(22.87) |               |
|                            | 1PH8228                   |                |                |               | 671<br>(26.42) |               |

|                            |         |                |                |               |                |               |
|----------------------------|---------|----------------|----------------|---------------|----------------|---------------|
| Terminal box type 1XB7 422 |         |                |                |               |                |               |
| 225                        | 1PH8224 | 628<br>(24.72) | 303<br>(11.93) | 120<br>(4.72) | 481<br>(18.94) | 230<br>(9.06) |
|                            | 1PH8226 |                |                |               | 581<br>(22.87) |               |
|                            | 1PH8228 |                |                |               | 671<br>(26.42) |               |

|                            |         |                |                |               |                |                |
|----------------------------|---------|----------------|----------------|---------------|----------------|----------------|
| Terminal box type 1XB7 700 |         |                |                |               |                |                |
| 225                        | 1PH8224 | 654<br>(25.75) | 295<br>(11.61) | 185<br>(7.28) | 481<br>(18.94) | 310<br>(12.20) |
|                            | 1PH8226 |                |                |               | 581<br>(22.87) |                |
|                            | 1PH8228 |                |                |               | 671<br>(26.42) |                |



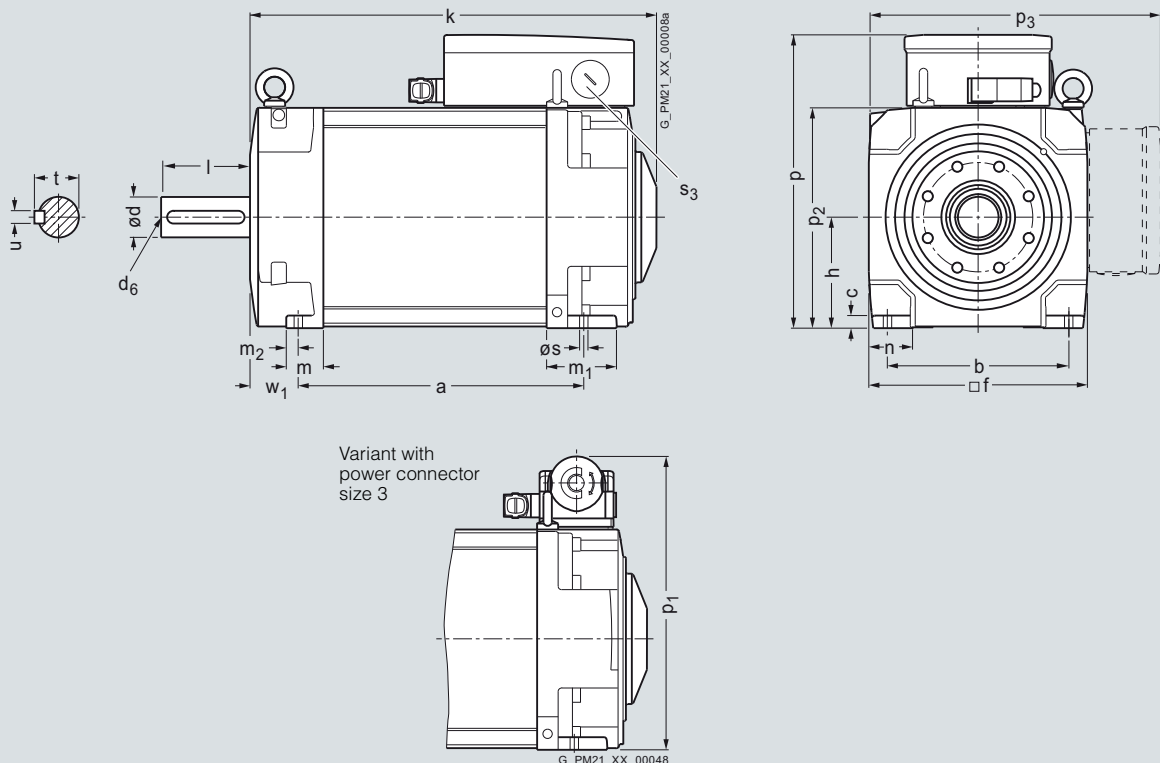
**SIMOTICS M asynchronous and synchronous motors for SINAMICS S120****SIMOTICS M-1PH8 synchronous motors  
SH 132 – Water cooling****Dimensional drawings**

For motor      Dimensions in mm (inches)

| Shaft height                                           | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A           | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         |
|--------------------------------------------------------|---------|---------|------------------|------------------|---------------|------------------|--------------|-------------------|------------------|----------------|------------------|---------------|------------------|--------------|------------------|------------------|--------------|
| <b>1PH8, type of construction IM B3, water cooling</b> |         |         |                  |                  |               |                  |              |                   |                  |                |                  |               |                  |              |                  |                  |              |
| 132                                                    | 1PH8131 |         | 220.5<br>(8.68)  | –                | 216<br>(8.50) | –                | 15<br>(0.59) | –                 | –                | 260<br>(10.24) | –                | 132<br>(5.20) | 347.5<br>(13.68) | 42<br>(1.65) | 81<br>(3.19)     | 12<br>(0.47)     | 43<br>(1.69) |
|                                                        | 1PH8133 |         | 265.5<br>(10.45) |                  |               |                  |              |                   |                  |                |                  |               | 392.5<br>(15.45) |              |                  |                  |              |
|                                                        | 1PH8135 |         | 310.5<br>(12.22) |                  |               |                  |              |                   |                  |                |                  |               | 437.5<br>(17.22) |              |                  |                  |              |
|                                                        | 1PH8137 |         | 350.5<br>(13.80) |                  |               |                  |              |                   |                  |                |                  |               | 477.5<br>(18.80) |              |                  |                  |              |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |                  |                  |              |                  |                  |                  |                            |                  |               |                |              |
|--------------|---------|---------|--------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|----------------------------|------------------|---------------|----------------|--------------|
|              |         |         | p HD               | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | w <sub>1</sub> C | d D                        | d <sub>6</sub> – | l E           | t GA           | u F          |
| 132          | 1PH8131 |         | 347.5<br>(13.68)   | 347<br>(13.66)   | 262<br>(10.31)   | 357.5<br>(14.07) | 12<br>(0.47) | –                | M50×1.5          | 53<br>(2.09)     | <b>48</b><br><b>(1.89)</b> | M16              | 110<br>(4.33) | 51.5<br>(2.03) | 14<br>(0.55) |
|              | 1PH8133 |         |                    |                  |                  |                  |              |                  |                  |                  |                            |                  |               |                |              |
|              | 1PH8135 |         |                    |                  |                  |                  |              |                  |                  |                  |                            |                  |               |                |              |
|              | 1PH8137 |         |                    |                  |                  |                  |              |                  |                  |                  |                            |                  |               |                |              |

1PH813



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 132 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

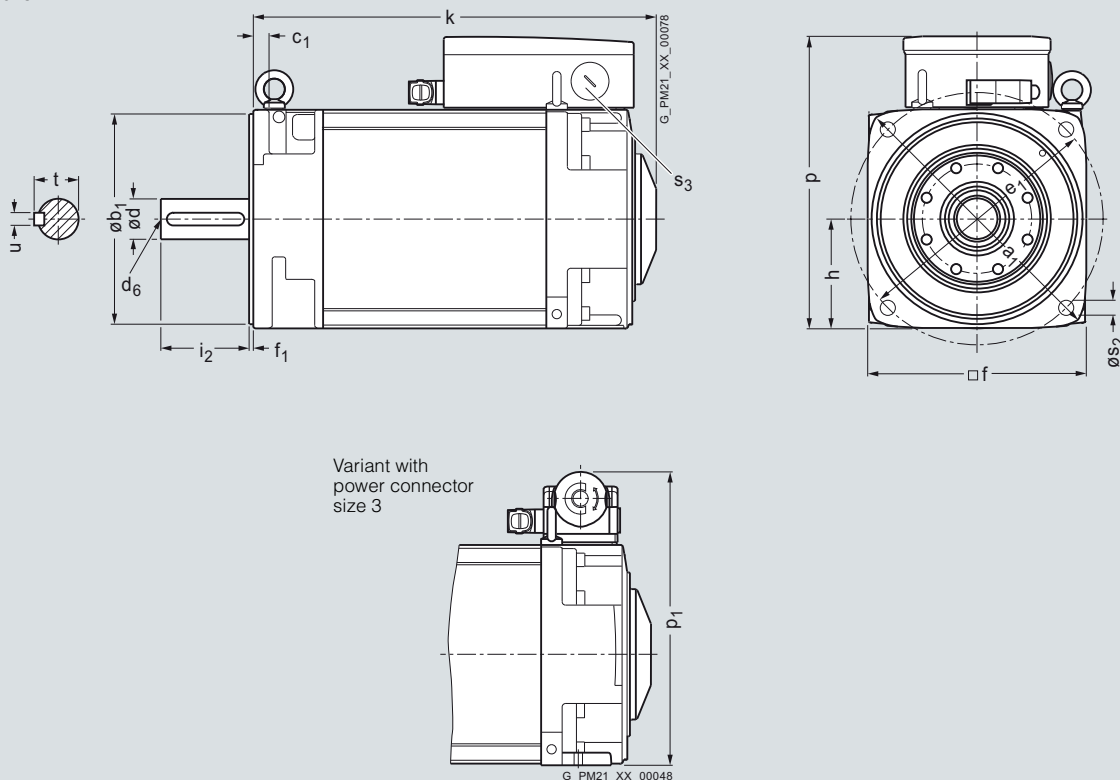
| Shaft height | Type | DIN IEC | a B | a <sub>1</sub> P | b A | b <sub>1</sub> N | c HA | c <sub>1</sub> LA | e <sub>1</sub> M | f AB | f <sub>1</sub> T | h H | k LB | m BA | m <sub>1</sub> – | m <sub>2</sub> – | n AA |
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|
|--------------|------|---------|-----|------------------|-----|------------------|------|-------------------|------------------|------|------------------|-----|------|------|------------------|------------------|------|

#### 1PH8, type of construction IM B5, water cooling

|     |         |   |                |   |               |   |              |                |                |             |               |                  |   |   |   |   |   |
|-----|---------|---|----------------|---|---------------|---|--------------|----------------|----------------|-------------|---------------|------------------|---|---|---|---|---|
| 132 | 1PH8131 | – | 340<br>(13.39) | – | 250<br>(9.84) | – | 18<br>(0.71) | 300<br>(11.81) | 260<br>(10.24) | 5<br>(0.20) | 132<br>(5.20) | 347.5<br>(13.68) | – | – | – | – | – |
|     | 1PH8133 |   |                |   |               |   |              |                |                |             |               | 392.5<br>(15.45) |   |   |   |   |   |
|     | 1PH8135 |   |                |   |               |   |              |                |                |             |               | 437.5<br>(17.22) |   |   |   |   |   |
|     | 1PH8137 |   |                |   |               |   |              |                |                |             |               | 477.5<br>(18.80) |   |   |   |   |   |

| Shaft height | Type    | DIN IEC | p HD             | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K | s <sub>2</sub> – | s <sub>3</sub> – | w <sub>1</sub> C | Shaft extension DE         |                  |                  |                |              |
|--------------|---------|---------|------------------|------------------|------------------|------------------|-----|------------------|------------------|------------------|----------------------------|------------------|------------------|----------------|--------------|
|              |         |         |                  |                  |                  |                  |     |                  |                  |                  | <b>d</b><br><b>D</b>       | d <sub>6</sub> – | i <sub>2</sub> E | t GA           | u F          |
| 132          | 1PH8131 |         | 345.5<br>(13.60) | 345<br>(13.58)   | –                | –                | –   | 18<br>(0.71)     | M50×1.5          | –                | <b>48</b><br><b>(1.89)</b> | M16              | 110<br>(4.33)    | 51.5<br>(2.03) | 14<br>(0.55) |
|              | 1PH8133 |         |                  |                  |                  |                  |     |                  |                  |                  |                            |                  |                  |                |              |
|              | 1PH8135 |         |                  |                  |                  |                  |     |                  |                  |                  |                            |                  |                  |                |              |
|              | 1PH8137 |         |                  |                  |                  |                  |     |                  |                  |                  |                            |                  |                  |                |              |

1PH813



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 132 – Water cooling

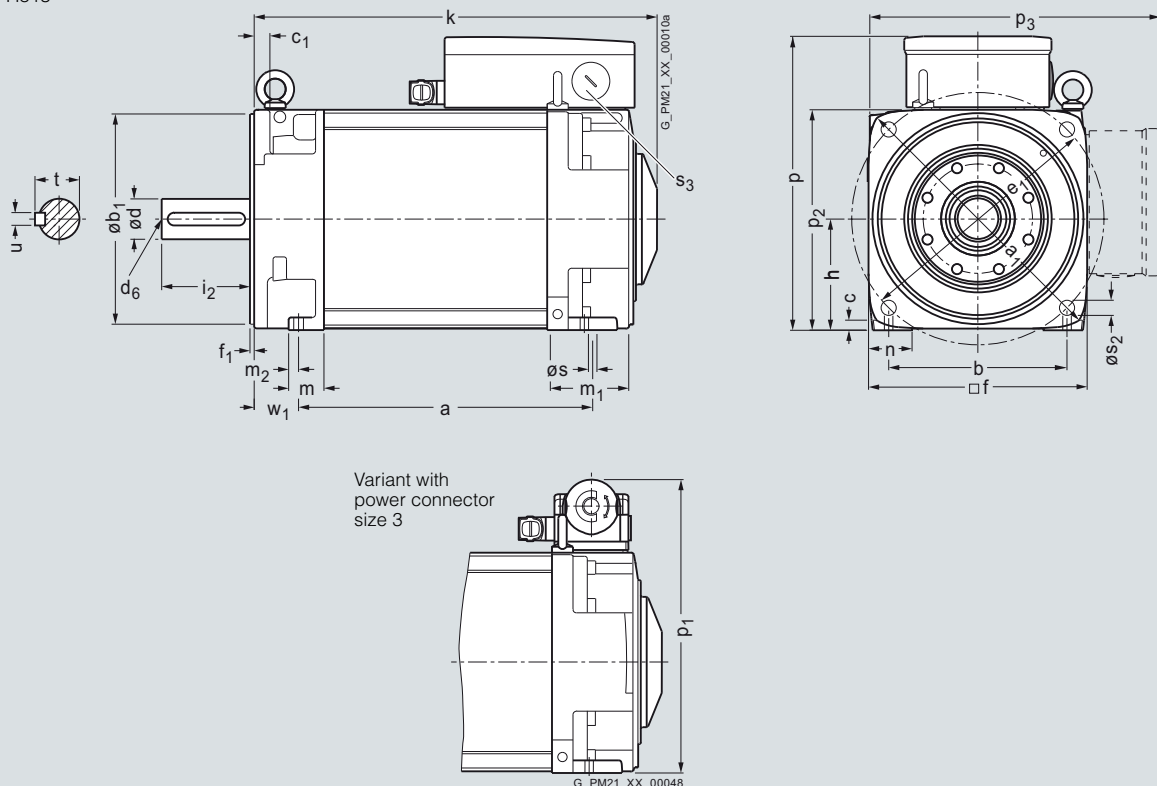
## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                            | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A           | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         |
|---------------------------------------------------------|---------|---------|------------------|------------------|---------------|------------------|--------------|-------------------|------------------|----------------|------------------|---------------|------------------|--------------|------------------|------------------|--------------|
| <b>1PH8, type of construction IM B35, water cooling</b> |         |         |                  |                  |               |                  |              |                   |                  |                |                  |               |                  |              |                  |                  |              |
| 132                                                     | 1PH8131 |         | 220.5<br>(8.68)  | 340<br>(13.39)   | 216<br>(8.50) | 250<br>(9.84)    | 15<br>(0.59) | 18<br>(0.71)      | 300<br>(11.81)   | 260<br>(10.24) | 5<br>(0.20)      | 132<br>(5.20) | 347.5<br>(13.68) | 42<br>(1.65) | 81<br>(3.19)     | 12<br>(0.47)     | 43<br>(1.69) |
|                                                         | 1PH8133 |         | 265.5<br>(10.45) |                  |               |                  |              |                   |                  |                |                  |               | 392.5<br>(15.45) |              |                  |                  |              |
|                                                         | 1PH8135 |         | 310.5<br>(12.22) |                  |               |                  |              |                   |                  |                |                  |               | 437.5<br>(17.22) |              |                  |                  |              |
|                                                         | 1PH8137 |         | 350.5<br>(13.80) |                  |               |                  |              |                   |                  |                |                  |               | 477.5<br>(18.80) |              |                  |                  |              |

| Shaft height | Type    | DIN IEC | p HD             | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | w <sub>1</sub> C | Shaft extension DE         |                  |                  |                |              |
|--------------|---------|---------|------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|----------------------------|------------------|------------------|----------------|--------------|
|              |         |         |                  |                  |                  |                  |              |                  |                  |                  | <b>d</b><br><b>D</b>       | d <sub>6</sub> – | i <sub>2</sub> E | t GA           | u F          |
| 132          | 1PH8131 |         | 347.5<br>(13.68) | 347<br>(13.66)   | 262<br>(10.31)   | 357.5<br>(14.07) | 12<br>(0.47) | 18<br>(0.71)     | M50×1.5          | 53<br>(2.09)     | <b>48</b><br><b>(1.89)</b> | M16              | 110<br>(4.33)    | 51.5<br>(2.03) | 14<br>(0.55) |
|              | 1PH8133 |         |                  |                  |                  |                  |              |                  |                  |                  |                            |                  |                  |                |              |
|              | 1PH8135 |         |                  |                  |                  |                  |              |                  |                  |                  |                            |                  |                  |                |              |
|              | 1PH8137 |         |                  |                  |                  |                  |              |                  |                  |                  |                            |                  |                  |                |              |

1PH813



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 160 – Water cooling

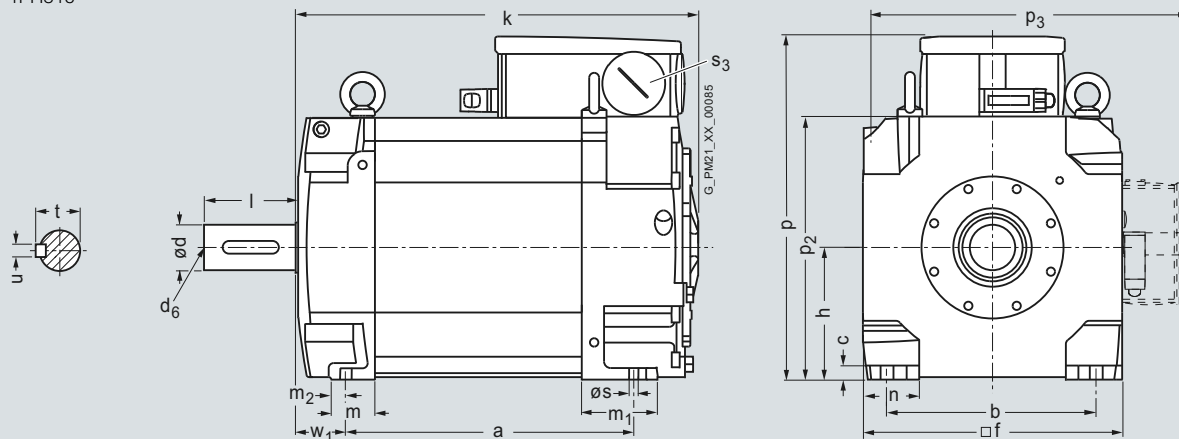
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                           | Type    | DIN IEC | a B              | a <sub>P</sub> | b A            | b <sub>N</sub> | c HA         | c <sub>LA</sub> | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> | m <sub>2</sub> | n AA         |
|--------------------------------------------------------|---------|---------|------------------|----------------|----------------|----------------|--------------|-----------------|------------------|----------------|------------------|---------------|------------------|--------------|----------------|----------------|--------------|
| <b>1PH8, type of construction IM B3, water cooling</b> |         |         |                  |                |                |                |              |                 |                  |                |                  |               |                  |              |                |                |              |
| 160                                                    | 1PH8164 |         | 346.5<br>(13.64) | –              | 254<br>(10.00) | –              | 17<br>(0.67) | 23<br>(0.91)    | –                | 314<br>(12.36) | –                | 160<br>(6.30) | 488.5<br>(19.23) | 53<br>(2.09) | 91<br>(3.58)   | 17<br>(0.67)   | 70<br>(2.76) |
|                                                        | 1PH8166 |         | 406.5<br>(16.00) |                |                |                |              |                 |                  |                |                  |               | 548.5<br>(21.59) |              |                |                |              |
|                                                        | 1PH8168 |         | 446.5<br>(17.58) |                |                |                |              |                 |                  |                |                  |               | 588.5<br>(23.17) |              |                |                |              |

|              |         |         |                  |                     |                     |                     |                |                     |                     |                     |                     | Shaft extension DE  |                     |               |              |              |  |
|--------------|---------|---------|------------------|---------------------|---------------------|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------|--------------|--------------|--|
| Shaft height | Type    | DIN IEC | p <sub>HD</sub>  | p <sub>1</sub><br>– | p <sub>2</sub><br>– | p <sub>3</sub><br>– | s <sub>K</sub> | s <sub>2</sub><br>– | s <sub>3</sub><br>– | s <sub>4</sub><br>– | w <sub>1</sub><br>C | d<br>D              | d <sub>6</sub><br>– | l<br>L        | t<br>GA      | u<br>F       |  |
| 160          | 1PH8164 |         | 415.5<br>(16.36) | –                   | 317<br>(12.48)      | 412.5<br>(16.24)    | 14<br>(0.55)   | –                   | M63 × 1.5           | –                   | 61<br>(2.40)        | <b>55</b><br>(2.17) | M20                 | 110<br>(4.33) | 59<br>(2.32) | 16<br>(0.63) |  |
|              | 1PH8166 |         |                  |                     |                     |                     |                |                     |                     |                     |                     |                     |                     |               |              |              |  |
|              | 1PH8168 |         |                  |                     |                     |                     |                |                     |                     |                     |                     |                     |                     |               |              |              |  |

1PH816



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 160 – Water cooling

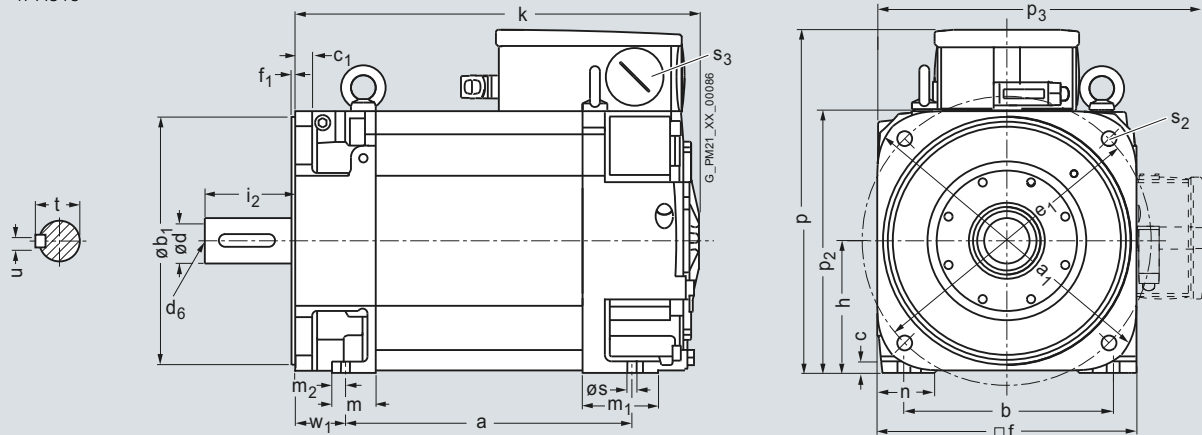
## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                  | Type    | DIN IEC | a B              | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | h H           | k LB             | m BA         | m <sub>1</sub> – | m <sub>2</sub> – | n AA         |
|---------------------------------------------------------------|---------|---------|------------------|------------------|----------------|------------------|--------------|-------------------|------------------|----------------|------------------|---------------|------------------|--------------|------------------|------------------|--------------|
| <b>1PH8, type of construction IM B5/IM B35, water cooling</b> |         |         |                  |                  |                |                  |              |                   |                  |                |                  |               |                  |              |                  |                  |              |
| 160                                                           | 1PH8164 |         | 346.5<br>(13.64) | 393<br>(15.47)   | 254<br>(10.00) | 300<br>(11.81)   | 17<br>(0.67) | –                 | 350<br>(13.78)   | 314<br>(12.36) | 5<br>(0.20)      | 160<br>(6.30) | 488.5<br>(19.23) | 53<br>(2.09) | 91<br>(3.58)     | 17<br>(0.67)     | 70<br>(2.76) |
|                                                               | 1PH8166 |         | 406.5<br>(16.00) |                  |                |                  |              |                   |                  |                |                  |               | 548.5<br>(21.59) |              |                  |                  |              |
|                                                               | 1PH8168 |         | 446.5<br>(17.58) |                  |                |                  |              |                   |                  |                |                  |               | 588.5<br>(23.17) |              |                  |                  |              |

| Shaft height | Type    | DIN IEC | Shaft extension DE |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  |              |              |
|--------------|---------|---------|--------------------|------------------|------------------|------------------|--------------|------------------|------------------|------------------|------------------|---------------------|------------------|------------------|--------------|--------------|
|              |         |         | p HD               | p <sub>1</sub> – | p <sub>2</sub> – | p <sub>3</sub> – | s K          | s <sub>2</sub> – | s <sub>3</sub> – | s <sub>4</sub> – | w <sub>1</sub> C | d D                 | d <sub>6</sub> – | i <sub>2</sub> E | t GA         | u F          |
| 160          | 1PH8164 |         | 415.5<br>(16.36)   | –                | 317<br>(12.48)   | 412.5<br>(16.24) | 14<br>(0.55) | 18<br>(0.71)     | M63 × 1.5        | –                | 61<br>(2.40)     | <b>55</b><br>(2.17) | M20              | 110<br>(4.33)    | 59<br>(2.32) | 16<br>(0.63) |
|              | 1PH8166 |         |                    |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  |              |              |
|              | 1PH8168 |         |                    |                  |                  |                  |              |                  |                  |                  |                  |                     |                  |                  |              |              |

1PH816



# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 180 – Water cooling

#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height | Type | DIN IEC | a B | b A | c HA | f AB | g AC | h H | k LB | m BA | n AA | p <sub>2</sub> – | s K | w <sub>1</sub> C |
|--------------|------|---------|-----|-----|------|------|------|-----|------|------|------|------------------|-----|------------------|
|--------------|------|---------|-----|-----|------|------|------|-----|------|------|------|------------------|-----|------------------|

#### 1PH8, types of construction IM B3/IM V5, water cooling

|     |         |  |                |                |              |                |                |               |                |               |              |                |                |               |
|-----|---------|--|----------------|----------------|--------------|----------------|----------------|---------------|----------------|---------------|--------------|----------------|----------------|---------------|
| 180 | 1PH8184 |  | 430<br>(16.93) | 279<br>(10.98) | 15<br>(0.59) | 356<br>(14.02) | 384<br>(15.12) | 180<br>(7.09) | 670<br>(26.38) | 138<br>(5.43) | 73<br>(2.87) | 372<br>(14.65) | 14.5<br>(0.57) | 121<br>(4.76) |
|     | 1PH8186 |  | 520<br>(20.47) |                |              |                |                |               | 760<br>(29.92) |               |              |                |                |               |

Shaft extension DE

Terminal box type

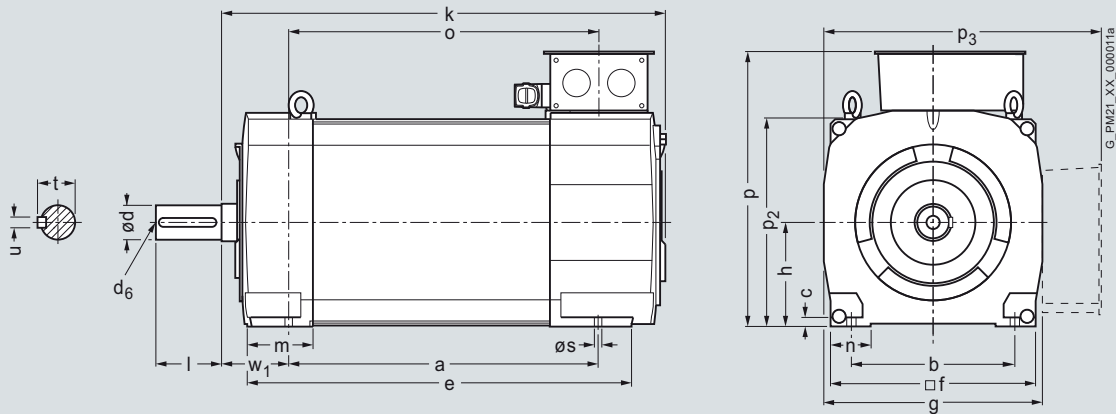
1XB7322

1XB7422

1XB7700

| Shaft height | Type    | DIN IEC | d D         | d <sub>6</sub> – | l E           | t GA         | u F          | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL          | x <sub>1</sub> AG | p HD           | p <sub>3</sub> – | r LL           | x <sub>1</sub> AG |
|--------------|---------|---------|-------------|------------------|---------------|--------------|--------------|----------------|------------------|---------------|-------------------|----------------|------------------|---------------|-------------------|----------------|------------------|----------------|-------------------|
| 180          | 1PH8184 |         | <b>65m6</b> | M20              | 140<br>(5.51) | 69<br>(2.72) | 18<br>(0.71) | 484<br>(19.06) | 485<br>(19.09)   | 197<br>(7.76) | 258<br>(10.16)    | 539<br>(21.22) | 540<br>(21.26)   | 230<br>(9.06) | 303<br>(11.93)    | 588<br>(23.15) | 574<br>(22.60)   | 310<br>(12.20) | 295<br>(11.61)    |
|              | 1PH8186 |         |             |                  |               |              |              |                |                  |               |                   |                |                  |               |                   |                |                  |                |                   |

1PH818



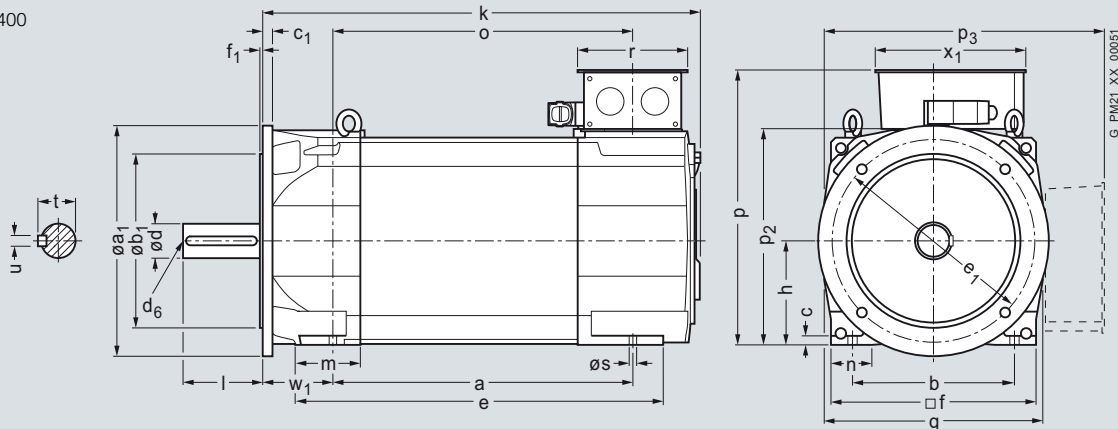
## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 180 – Water cooling

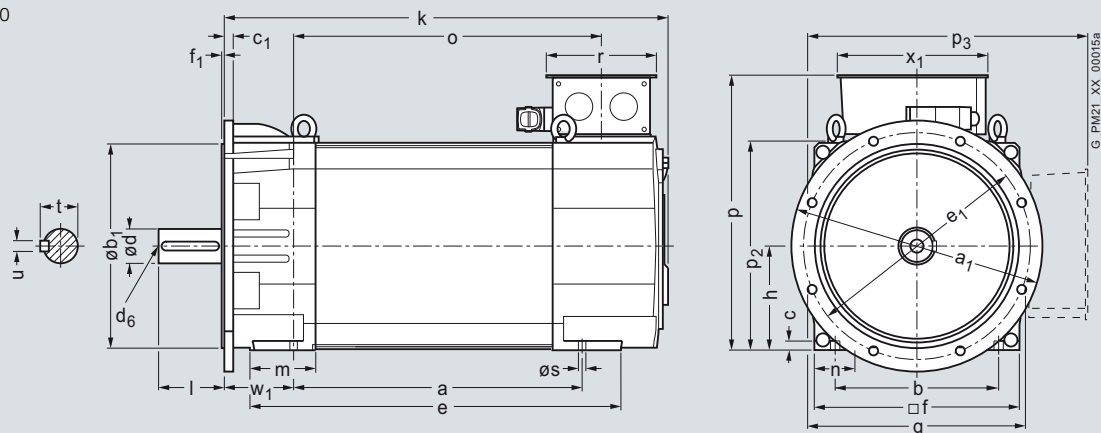
## Dimensional drawings

| For motor                                                      |         | Dimensions in mm (inches) |         |                  |         |                  |         |                   |                  |           |         |         |                  |        |         |        |         |        |
|----------------------------------------------------------------|---------|---------------------------|---------|------------------|---------|------------------|---------|-------------------|------------------|-----------|---------|---------|------------------|--------|---------|--------|---------|--------|
| Shaft height                                                   | Type    | DIN IEC                   | a B     | D400 D450        |         | D400 D450        |         | D400 D450         |                  | D400 D450 |         | f AB    | f <sub>1</sub> T | g AC   | h H     | k LB   | m BA    |        |
|                                                                |         |                           |         | a <sub>1</sub> P | b A     | b <sub>1</sub> N | c HA    | c <sub>1</sub> LA | e <sub>1</sub> M |           |         |         |                  |        |         |        |         |        |
| 1PH8, types of construction IM B5/IM B35/IM V15, water cooling |         |                           |         |                  |         |                  |         |                   |                  |           |         |         |                  |        |         |        |         |        |
| 180                                                            | 1PH8184 |                           | 430     | 400              | 450     | 279              | 300     | 350               | 15               | 16        | 350     | 400     | 356              | 5      | 384     | 180    | 670     | 123    |
|                                                                |         |                           | (16.93) | (15.75)          | (17.72) | (10.98)          | (11.81) | (13.78)           | (0.59)           | (0.63)    | (13.78) | (15.75) | (14.02)          | (0.20) | (15.12) | (7.09) | (26.38) | (4.84) |
|                                                                | 1PH8186 |                           | 520     |                  |         |                  |         |                   |                  |           |         |         |                  |        |         |        | 760     |        |
|                                                                |         |                           | (20.47) |                  |         |                  |         |                   |                  |           |         |         |                  |        |         |        | (29.92) |        |

| Shaft extension DE |         |         |        |                  |        |                  |      |                  |        |        | Terminal box type |                                                     |
|--------------------|---------|---------|--------|------------------|--------|------------------|------|------------------|--------|--------|-------------------|-----------------------------------------------------|
| Shaft height       | Type    | DIN IEC | n AA   | p <sub>2</sub> – | s K    | w <sub>1</sub> C | d D  | d <sub>6</sub> – | l E    | t GA   | u F               | Dimensions as for types of construction IM B3/IM V5 |
|                    |         |         |        |                  |        |                  |      |                  |        |        |                   |                                                     |
| 180                | 1PH8184 |         | 73     | 372              | 14.5   | 121              | 65m6 | M20              | 140    | 69     | 18                |                                                     |
|                    |         |         | (2.87) | (14.65)          | (0.57) | (4.76)           |      |                  | (5.51) | (2.72) | (0.71)            |                                                     |
|                    | 1PH8186 |         |        |                  |        |                  |      |                  |        |        |                   |                                                     |

1PH818  
D400

D450





# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1PH8 synchronous motors SH 225 – Water cooling

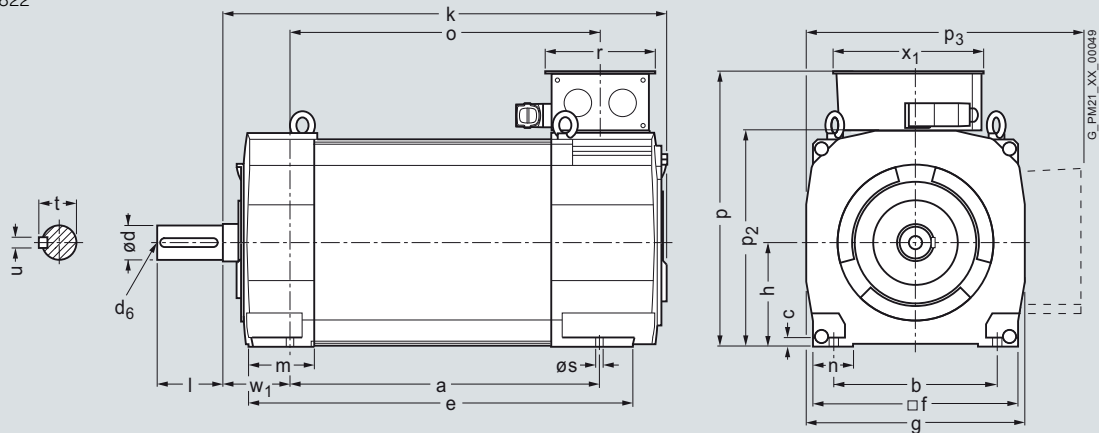
#### Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                  | Type    | DIN IEC | a B            | b A            | c HA         | f AB           | g AC           | h H           | k LB           | m BA          | n AA         | p <sub>2</sub> – | s K            | w <sub>1</sub> C |
|---------------------------------------------------------------|---------|---------|----------------|----------------|--------------|----------------|----------------|---------------|----------------|---------------|--------------|------------------|----------------|------------------|
| <b>1PH8, types of construction IM B3/IM V5, water cooling</b> |         |         |                |                |              |                |                |               |                |               |              |                  |                |                  |
| 225                                                           | 1PH8224 |         | 445<br>(17.52) | 356<br>(14.02) | 18<br>(0.71) | 446<br>(17.56) | 474<br>(18.66) | 225<br>(8.86) | 775<br>(30.51) | 154<br>(6.06) | 88<br>(3.46) | 462<br>(18.19)   | 18.5<br>(0.73) | 149<br>(5.87)    |
|                                                               | 1PH8226 |         | 545<br>(21.46) |                |              |                |                |               | 875<br>(34.45) |               |              |                  |                |                  |
|                                                               | 1PH8228 |         | 635<br>(25.0)  |                |              |                |                |               | 965<br>(37.99) |               |              |                  |                |                  |

|              |         | Shaft extension DE |      |                  |     |      |     | Terminal box type |                  |         |                   |      |                  |         |                   |      |                  |      |                   |
|--------------|---------|--------------------|------|------------------|-----|------|-----|-------------------|------------------|---------|-------------------|------|------------------|---------|-------------------|------|------------------|------|-------------------|
|              |         |                    |      |                  |     |      |     | 1XB7322           |                  | 1XB7422 |                   |      |                  | 1XB7700 |                   |      |                  |      |                   |
| Shaft height | Type    | DIN IEC            | d D  | d <sub>6</sub> – | l E | t GA | u F | p HD              | p <sub>3</sub> – | r LL    | x <sub>1</sub> AG | p HD | p <sub>3</sub> – | r LL    | x <sub>1</sub> AG | p HD | p <sub>3</sub> – | r LL | x <sub>1</sub> AG |
| 225          | 1PH8224 |                    | 75m6 | M20              | 140 | 79.5 | 20  | 579               | 577              | 197     | 258               | 634  | 632              | 230     | 303               | 683  | 666              | 310  | 295               |
|              | 1PH8226 |                    |      |                  |     |      |     |                   |                  |         |                   |      |                  |         |                   |      |                  |      |                   |
|              | 1PH8228 |                    |      |                  |     |      |     |                   |                  |         |                   |      |                  |         |                   |      |                  |      |                   |

1PH822



## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors  
SH 225 – Water cooling

## Dimensional drawings

For motor Dimensions in mm (inches)

| Shaft height                                                        | Type    | DIN IEC | a B            | a <sub>1</sub> P | b A            | b <sub>1</sub> N | c HA         | c <sub>1</sub> LA | e <sub>1</sub> M | f AB           | f <sub>1</sub> T | g AC           | h H           | k LB           | m BA          | n AA         | p <sub>2</sub> – | w <sub>1</sub> C |
|---------------------------------------------------------------------|---------|---------|----------------|------------------|----------------|------------------|--------------|-------------------|------------------|----------------|------------------|----------------|---------------|----------------|---------------|--------------|------------------|------------------|
| 1PH8, types of construction IM B5/IM B35/IM V15 D550, water cooling |         |         |                |                  |                |                  |              |                   |                  |                |                  |                |               |                |               |              |                  |                  |
| 225                                                                 | 1PH8224 |         | 445<br>(17.52) | 550<br>(21.65)   | 356<br>(14.02) | 450<br>(17.72)   | 18<br>(0.71) | 20<br>(0.79)      | 500<br>(19.69)   | 446<br>(17.56) | 5<br>(0.20)      | 474<br>(18.66) | 225<br>(8.86) | 770<br>(30.31) | 144<br>(5.67) | 88<br>(3.46) | 462<br>(18.19)   | 149<br>(5.87)    |
|                                                                     | 1PH8226 |         | 545<br>(21.46) |                  |                |                  |              |                   |                  |                |                  |                |               | 872<br>(34.33) |               |              |                  |                  |
|                                                                     | 1PH8228 |         | 635<br>(25.00) |                  |                |                  |              |                   |                  |                |                  |                |               | 962<br>(37.87) |               |              |                  |                  |

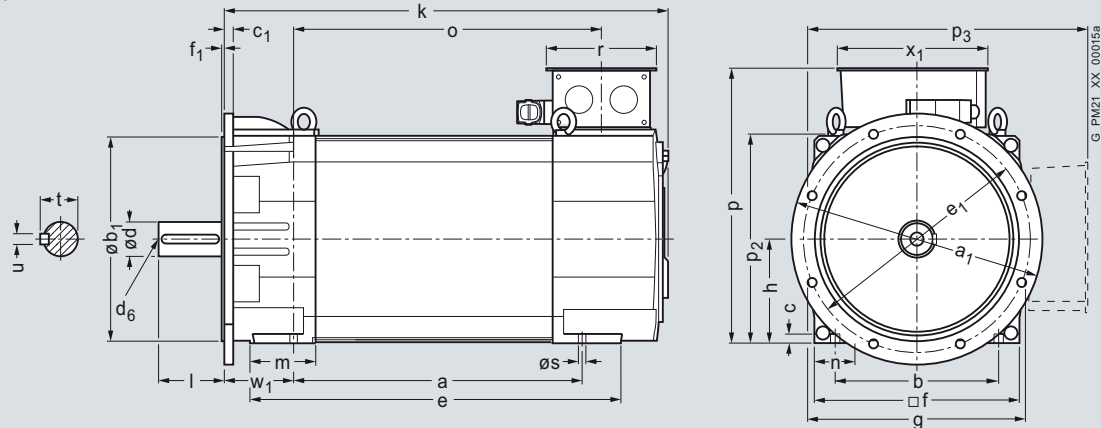
Shaft extension DE

Terminal box type

Dimensions as for types of construction IM B3/IM V5

| Shaft height | Type    | DIN IEC | d D  | d <sub>6</sub> – | l E           | t GA           | u F          |
|--------------|---------|---------|------|------------------|---------------|----------------|--------------|
| 225          | 1PH8224 |         | 75m6 | M20              | 140<br>(5.51) | 79.5<br>(3.13) | 20<br>(0.79) |
|              | 1PH8226 |         |      |                  |               |                |              |
|              | 1PH8228 |         |      |                  |               |                |              |

1PH822

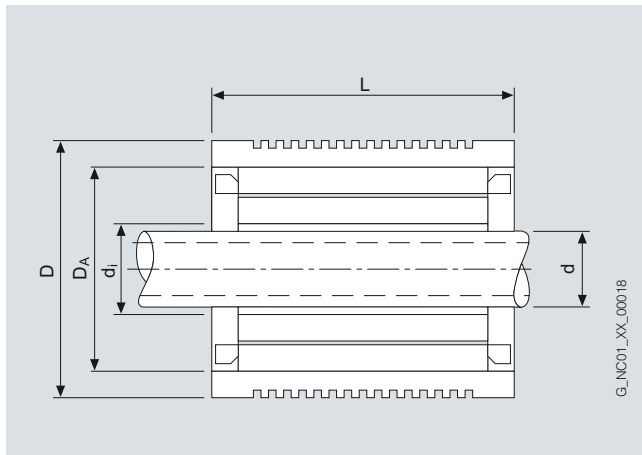


# Dimensional drawings

## SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

### SIMOTICS M-1FE1 synchronous built-in motors Water cooling

#### Dimensional drawings



| For motor<br>Type             | Dimensions in mm (inches) |                                   |                                                    |                                                   |
|-------------------------------|---------------------------|-----------------------------------|----------------------------------------------------|---------------------------------------------------|
|                               | Total length<br>L         | Total outer<br>dia-<br>meter<br>D | Stator<br>outer<br>dia-<br>meter<br>D <sub>A</sub> | Rotor<br>inner<br>dia-<br>meter<br>d <sub>i</sub> |
| <b>1FE1 High Speed series</b> |                           |                                   |                                                    |                                                   |
| 1FE1051-4....-1BA.            | 130 (5.12)                | 120 (4.72)                        | 106 (4.17)                                         | 46 (1.81)                                         |
| 1FE1052-4....-1BA.            | 180 (7.09)                |                                   |                                                    |                                                   |
| 1FE1053-4....-1BA.            | 230 (9.06)                |                                   |                                                    |                                                   |
| 1FE1072-4W....-1BA.           | 185 (7.28)                | 155 (6.10)                        | 135 (5.31)                                         | 58 (2.28)                                         |
| 1FE1073-4W....-1BA.           | 235 (9.25)                |                                   |                                                    |                                                   |
| 1FE1074-4W....-1BA.           | 285 (11.22)               |                                   |                                                    |                                                   |
| 1FE1082-4W....-1BA.           | 190 (7.48)                | 180 (7.09)                        | 160 (6.30)                                         | 68 (2.68)                                         |
| 1FE1083-4W....-1BA.           | 240 (9.45)                |                                   |                                                    |                                                   |
| 1FE1084-4W....-1BA.           | 290 (11.42)               |                                   |                                                    |                                                   |
| 1FE1085-4W....-1BA.           | 340 (13.39)               |                                   |                                                    |                                                   |
| 1FE1092-4W....-1BR.           | 200 (7.87)                | 205 (8.07)                        | 180 (7.09)                                         | 80 (3.15)                                         |
| 1FE1093-4W....-1BA.           | 250 (9.84)                |                                   |                                                    | 72 (2.83)                                         |
| 1FE1093-4W....-1BR.           | 250 (9.84)                |                                   |                                                    | 80 (3.15)                                         |
| 1FE1094-4W....-1BA.           | 300 (11.81)               |                                   |                                                    | 72 (2.83)                                         |
| 1FE1094-4W....-1BR.           | 300 (11.81)               |                                   |                                                    | 80 (3.15)                                         |
| 1FE1095-4W....-1BA.           | 350 (13.78)               |                                   |                                                    | 72 (2.83)                                         |
| 1FE1095-4W....-1BR.           | 350 (13.78)               |                                   |                                                    | 80 (3.15)                                         |
| 1FE1096-4W....-1BA.           | 400 (15.75)               |                                   |                                                    | 72 (2.83)                                         |
| 1FE1096-4W....-1BR.           | 400 (15.75)               |                                   |                                                    | 80 (3.15)                                         |
| 1FE1103-4W....-1BA.           | 265 (10.43)               | 230 (9.06)                        | 200 (7.87)                                         | 96 (3.78)                                         |
| 1FE1104-4W....-1BA.           | 315 (12.40)               |                                   |                                                    |                                                   |
| 1FE1105-4W....-1BA.           | 365 (14.37)               |                                   |                                                    |                                                   |
| 1FE1106-4W....-1BA.           | 415 (16.34)               |                                   |                                                    |                                                   |
| 1FE1124-4W....-1BA.           | 315 (12.40)               | 270 (10.63)                       | 240 (9.45)                                         | 110 (4.33)                                        |
| 1FE1125-4W....-1BA.           | 365 (14.37)               |                                   |                                                    |                                                   |
| 1FE1126-4W....-1BA.           | 415 (16.34)               |                                   |                                                    |                                                   |

| For motor<br>Type              | Dimensions in mm (inches) |                              |                                            |                                           | Rotor inner diameter with sleeve |              |              |              |
|--------------------------------|---------------------------|------------------------------|--------------------------------------------|-------------------------------------------|----------------------------------|--------------|--------------|--------------|
|                                | Total length<br>L         | Total outer<br>diameter<br>D | Stator outer<br>diameter<br>D <sub>A</sub> | Rotor inner<br>diameter<br>d <sub>i</sub> | d*                               | d**          | d**          | d**          |
|                                |                           |                              |                                            | ...A.                                     | ...B.                            | ...C.        | ...D.        | ...E.        |
| <b>1FE1 High Torque series</b> |                           |                              |                                            |                                           |                                  |              |              |              |
| 1FE1041-6W....-1BA.            | 107 (4.21)                | 95 (3.74)                    | 85 (3.35)                                  | 44 (1.73)                                 | —                                | —            | —            | —            |
| 1FE1042-6W....-1BA.            | 157 (6.18)                | 95 (3.74)                    | 85 (3.35)                                  | 44 (1.73)                                 | —                                | —            | —            | —            |
| 1FE1051-6W....-1B..            | 170 (6.69)                | 115 (4.53)                   | 103.5 (4.07)                               | 42 (1.65)                                 | —                                | 33 (1.30)    | —            | —            |
| 1FE1052-6W....-1B..            | 220 (8.66)                | 115 (4.53)                   | 103.5 (4.07)                               | 42 (1.65)                                 | —                                | 33 (1.30)    | —            | —            |
| 1FE1054-6W....-1BA.            | 320 (12.60)               | 115 (4.53)                   | 103.5 (4.07)                               | 42 (1.65)                                 | —                                | —            | —            | —            |
| 1FE1061-6W....-1B..            | 130 (5.12)                | 130 (5.12)                   | 118 (4.65)                                 | 58 (2.28)                                 | 48 (1.89)                        | —            | —            | —            |
| 1FE1064-6W....-1BA.            | 280 (11.02)               | 130 (5.12)                   | 118 (4.65)                                 | 58 (2.28)                                 | —                                | —            | —            | —            |
| 1FE1082-6W....-1B..            | 195 (7.68)                | 190 (7.48)                   | 170 (6.69)                                 | 93 (3.66)                                 | 67 (2.64)                        | 74 (2.91)    | 80 (23.15)   | —            |
| 1FE1083-6W....-1B..            | 245 (9.65)                | 190 (7.48)                   | 170 (6.69)                                 | 93 (3.66)                                 | 67 (2.64)                        | 74 (2.91)    | —            | —            |
| 1FE1084-6W....-1B..            | 295 (11.61)               | 190 (7.48)                   | 170 (6.69)                                 | 93 (3.66)                                 | —                                | 74 (2.91)    | —            | —            |
| 1FE1091-6W....-1B..            | 150 (5.91)                | 205 (8.07)                   | 180 (7.09)                                 | 92 (3.62)                                 | 67 (2.64)                        | 80 (3.15)    | —            | —            |
| 1FE1092-6W....-1B..            | 200 (7.87)                | 205 (8.07)                   | 180 (7.09)                                 | 92 (3.62)                                 | 67 (2.64)                        | 80 (3.15)    | —            | —            |
| 1FE1093-6W....-1B..            | 250 (9.84)                | 205 (8.07)                   | 180 (7.09)                                 | 92 (3.62)                                 | 67 (2.64)                        | 80 (3.15)    | —            | —            |
| 1FE1113-6W....-1B..            | 260 (10.24)               | 250 (9.84)                   | 220 (8.66)                                 | 120 (4.72)                                | —                                | —            | 80 (23.15)   | 105.2 (4.14) |
| 1FE1114-6W....-1B..            | 310 (12.20)               | 250 (9.84)                   | 220 (8.66)                                 | 120 (4.72)                                | 82 (3.23)                        | 102 (4.02)   | —            | —            |
| 1FE1115-6W....-1BC.            | 360 (14.17)               | 250 (9.84)                   | 220 (8.66)                                 | 120 (4.72)                                | —                                | 102 (4.02)   | —            | —            |
| 1FE1116-6W....-1B..            | 410 (16.14)               | 250 (9.84)                   | 220 (8.66)                                 | 120 (4.72)                                | 82 (3.23)                        | 102 (4.02)   | —            | —            |
| 1FE1144-8W....-1B..            | 340 (13.39)               | 310 (12.20)                  | 280 (11.02)                                | 166.7 (6.56)                              | —                                | 150.3 (5.92) | —            | —            |
| 1FE1145-8W....-1B..            | 390 (15.35)               | 310 (12.20)                  | 280 (11.02)                                | —                                         | —                                | 150.3 (5.92) | 140.3 (5.52) | 125 (4.92)   |
| 1FE1147-8W....-1B..            | 490 (19.29)               | 310 (12.20)                  | 280 (11.02)                                | —                                         | —                                | 150.3 (5.92) | 140.3 (5.52) | —            |

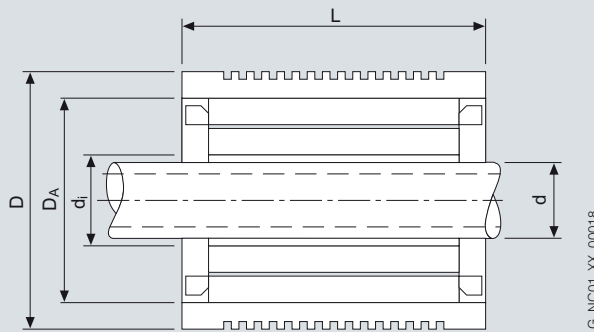
**SIMOTICS M asynchronous and synchronous motors for SINAMICS S120****SIMOTICS M-1PH2 asynchronous built-in motors  
Water cooling****Dimensional drawings**

For motor Dimensions in mm (inches)

| Type | Standard spindle diameter<br>d | Rotor inner diameter<br>d <sub>i</sub> | Stator outer diameter<br>D <sub>A</sub> | Total outer diameter<br>D | Total length<br>L |
|------|--------------------------------|----------------------------------------|-----------------------------------------|---------------------------|-------------------|
|------|--------------------------------|----------------------------------------|-----------------------------------------|---------------------------|-------------------|

**1PH2 water cooling**

|         |              |               |               |               |                |
|---------|--------------|---------------|---------------|---------------|----------------|
| 1PH2093 | 67<br>(2.64) | 85<br>(3.35)  | 180<br>(7.09) | 205<br>(8.07) | 250<br>(9.84)  |
| 1PH2095 |              |               |               |               | 300<br>(11.81) |
| 1PH2113 | 82<br>(3.23) | 100<br>(3.94) | 220<br>(8.66) | 250<br>(9.84) | 290<br>(11.42) |
| 1PH2115 |              |               |               |               | 310<br>(12.20) |
| 1PH2117 |              |               |               |               | 330<br>(12.99) |
| 1PH2118 |              |               |               |               | 390<br>(15.35) |



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# Dimensional drawings

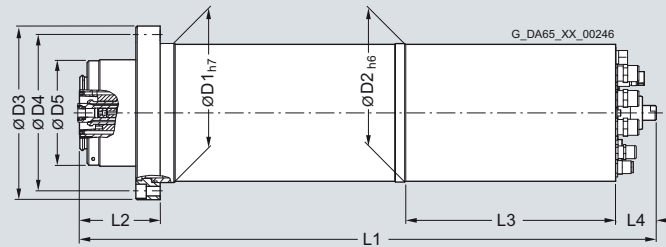
## Asynchronous and synchronous motors for SINAMICS S120

### 2SP1 motor spindles Water cooling

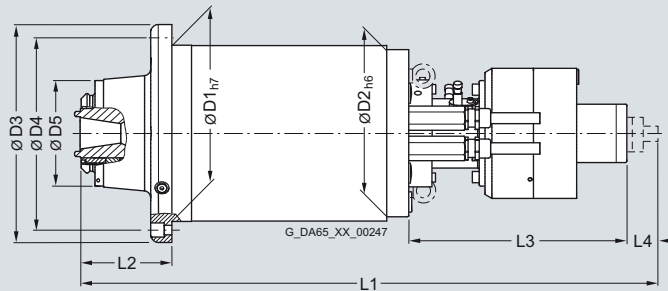
#### Dimensional drawings

| For motor                 | Dimensions in mm (inches) |               |                |                |               |                              |                 |                              |                            |
|---------------------------|---------------------------|---------------|----------------|----------------|---------------|------------------------------|-----------------|------------------------------|----------------------------|
| Type                      | D1                        | D2            | D3             | D4             | D5            | L1 <sup>1)</sup>             | L2              | L3                           | L4                         |
| <b>2SP1 water cooling</b> |                           |               |                |                |               |                              |                 |                              |                            |
| 2SP1202                   | 200<br>(7.88)             | 199<br>(7.84) | 250<br>(9.85)  | 225<br>(8.87)  | 150<br>(5.91) | 735 <sup>4)</sup><br>(28.94) | 115.5<br>(4.55) | 309 <sup>4)</sup><br>(12.17) | 58 <sup>4)</sup><br>(2.28) |
| 2SP1204                   |                           |               |                |                |               | 835 <sup>4)</sup><br>(32.87) |                 |                              |                            |
| 2SP1253 <sup>2)</sup>     | 250<br>(9.85)             | 237<br>(9.34) | 310<br>(12.21) | 275<br>(10.84) | 150<br>(5.91) | 813<br>(32.03)               | 124.4<br>(4.90) | 310<br>(12.21)               | 43<br>(1.69)               |
| 2SP1255 <sup>2)</sup>     |                           |               |                |                |               | 913<br>(35.97)               |                 |                              |                            |
| 2SP1253 <sup>3)</sup>     |                           |               |                |                |               | 819<br>(32.27)               | 130.0<br>(5.12) |                              |                            |
| 2SP1255 <sup>3)</sup>     |                           |               |                |                |               | 919<br>(36.21)               |                 |                              |                            |

2SP120



2SP125



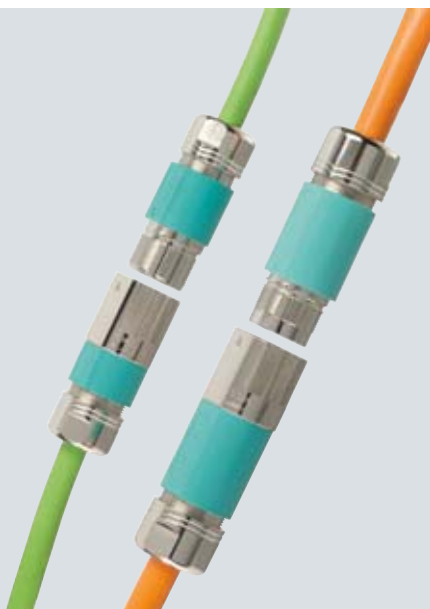
<sup>1)</sup> The spindle is approx. 43 mm (1.69 in) shorter without turning bushing.

<sup>2)</sup> HSK A63 tool interface.

<sup>3)</sup> SK40, CAT40, BT40 tool interfaces.

<sup>4)</sup> Spindle length L1 is approx. 118 mm (4.65 in) shorter, L3 approx. 147 mm (5.79 in) shorter and L4 approx. 30 mm (1.18 in) longer with a hydraulic tool clamping device.

# MOTION-CONNECT connection systems



|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
|             |                                                                                             |
| <b>7/2</b>  | <b>Overview</b>                                                                             |
| <b>7/4</b>  | <b>Introduction</b>                                                                         |
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| <b>7/7</b>  | <b>Power cables for SINAMICS S120</b>                                                       |
| 7/9         | Power cables for SIMOTICS S-1FT7/-1FK7/ SIMOTICS M-1PH8 motors with SPEED-CONNECT connector |
| 7/12        | Power cables for SIMOTICS S-1FT7/-1FK7/ SIMOTICS M-1PH8 motors with full-thread connector   |
| 7/15        | Extensions for power cables with SPEED-CONNECT or full-thread connector                     |
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| 7/19        | Power cables for SIMOTICS L-1FN3 motors                                                     |
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| <b>7/22</b> | <b>Signal cables for SINAMICS S120</b>                                                      |
| 7/25        | DRIVE-CLiQ signal cables without 24 V DC cores                                              |
| 7/26        | MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores                                  |
| 7/27        | Signal cables for motors with SPEED-CONNECT/full-thread connector                           |
| 7/27        | Signal cables for motors with full-thread connector                                         |
| <b>7/29</b> | <b>Order number code</b>                                                                    |
| 7/29        | Power cables                                                                                |
| 7/30        | Signal cables                                                                               |
| 7/31        | Length code                                                                                 |
| <b>7/32</b> | <b>Connection overviews</b>                                                                 |
| <b>7/43</b> | <b>Accessories for power and signal cables</b>                                              |
| 7/43        | Power connector                                                                             |
| 7/43        | Power and signal connectors for SIMOTICS T-1FW6 built-in torque motors                      |
| 7/44        | Mounting flange                                                                             |
| 7/44        | HF (high-frequency) clamp                                                                   |
| 7/45        | DRIVE-CLiQ cabinet bushing (RJ45)                                                           |
| 7/45        | DRIVE-CLiQ cabinet bushing (M12)                                                            |
| 7/46        | DRIVE-CLiQ coupler                                                                          |

# MOTION-CONNECT connection systems

## Overview

| Cable                      | For motor | MOTION-CONNECT 500 | MOTION-CONNECT 800PLUS | Page |
|----------------------------|-----------|--------------------|------------------------|------|
| Dynamic requirements       | SIMOTICS  | Average            | High                   |      |
| Environmental requirements |           | Average            | High                   |      |
| UL/CSA                     |           | ✓                  | ✓                      |      |
| Halogen-free               |           | –                  | ✓                      |      |
| RoHS                       |           | ✓                  | ✓                      |      |

### Power cables with SPEED-CONNECT connector

|                                                                                   |                      |   |   |      |
|-----------------------------------------------------------------------------------|----------------------|---|---|------|
|  | S-1FT7               | ✓ | ✓ | 7/9  |
|                                                                                   | S-1FK7               | ✓ | ✓ | 7/10 |
|                                                                                   | M-1PH808<br>M-1PH810 | ✓ | ✓ | 7/9  |
|                                                                                   | L-1FN6               | – | ✓ | 7/20 |

### Power cables with full-thread connector

|                                                                                   |                                  |   |   |               |
|-----------------------------------------------------------------------------------|----------------------------------|---|---|---------------|
|  | S-1FT7                           | ✓ | ✓ | 7/12 ... 7/14 |
|                                                                                   | S-1FK7                           | ✓ | ✓ | 7/14          |
|                                                                                   | M-1PH808<br>M-1PH810<br>M-1PH813 | ✓ | ✓ | 7/12, 7/14    |
|                                                                                   | L-1FN3                           | – | – | 7/19          |
|                                                                                   | T-1FW6                           | – | ✓ | 7/21          |

### Extensions for power cables with SPEED-CONNECT or full-thread connector

|                                                                                    |                                  |   |   |      |
|------------------------------------------------------------------------------------|----------------------------------|---|---|------|
|  | S-1FT7                           | ✓ | ✓ | 7/15 |
|                                                                                    | S-1FK7                           | ✓ | ✓ | 7/15 |
|                                                                                    | M-1PH808<br>M-1PH810<br>M-1PH813 | ✓ | ✓ | 7/15 |
|                                                                                    | L-1FN3                           | – | ✓ | 7/19 |
|                                                                                    | L-1FN6                           | – | ✓ | 7/20 |
|                                                                                    | T-1FW6                           | – | ✓ | 7/21 |

### Power cables for motors with terminal box

|                                                                                     |                                              |                                |                                 |            |
|-------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|---------------------------------|------------|
|  | M-1PH808<br>M-1PH810<br>M-1PH813<br>M-1PH816 | ✓ 35 mm <sup>2</sup> or larger | ✓ 16 mm <sup>2</sup> or smaller | 7/16, 7/17 |
|-------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|---------------------------------|------------|

✓ = Possible  
– = Not possible

| Cable                      | For motor | MOTION-CONNECT 500 | MOTION-CONNECT 800PLUS | Page |
|----------------------------|-----------|--------------------|------------------------|------|
| Dynamic requirements       | SIMOTICS  | Average            | High                   |      |
| Environmental requirements |           | Average            | High                   |      |
| UL/CSA                     |           | ✓                  | ✓                      |      |
| Halogen-free               |           | –                  | ✓                      |      |
| RoHS                       |           | ✓                  | ✓                      |      |

**MOTION-CONNECT DRIVE-CLiQ signal cables**

|                                                                                   |        |   |   |      |
|-----------------------------------------------------------------------------------|--------|---|---|------|
|  | S-1FT7 | ✓ | ✓ | 7/26 |
|                                                                                   | S-1FK7 | ✓ | ✓ | 7/26 |
|                                                                                   | M-1PH8 | ✓ | ✓ | 7/26 |
|                                                                                   | L-1FN3 | ✓ | ✓ | 7/26 |
|                                                                                   | L-1FN6 | ✓ | ✓ | 7/26 |
|                                                                                   | T-1FW6 | ✓ | ✓ | 7/26 |

**Signal cables for connecting third-party direct measuring systems**

|                                                                                   |                                                                |   |   |      |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------|---|---|------|
|  | third-party direct measuring systems with DRIVE-CLiQ interface | ✓ | ✓ | 7/26 |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------|---|---|------|

**Extensions for connecting third-party direct measuring systems**

|  |                           |   |   |      |
|--|---------------------------|---|---|------|
|  | with DRIVE-CLiQ interface | ✓ | ✓ | 7/26 |
|--|---------------------------|---|---|------|

**Signal cables with SPEED-CONNECT connector**

|                                                                                     |          |   |   |      |
|-------------------------------------------------------------------------------------|----------|---|---|------|
|  | S-1FK7   | ✓ | ✓ | 7/27 |
|                                                                                     | M-1PH808 | ✓ | ✓ | 7/27 |
|                                                                                     | M-1PH810 |   |   |      |
|                                                                                     | M-1PH813 |   |   |      |

**Extensions for signal cables with SPEED-CONNECT connector**

|                                                                                     |          |   |   |      |
|-------------------------------------------------------------------------------------|----------|---|---|------|
|  | S-1FK7   | ✓ | ✓ | 7/27 |
|                                                                                     | M-1PH808 | ✓ | ✓ | 7/27 |
|                                                                                     | M-1PH810 |   |   |      |
|                                                                                     | M-1PH813 |   |   |      |

**Signal cables with full-thread connector**

|                                                                                     |        |   |   |            |
|-------------------------------------------------------------------------------------|--------|---|---|------------|
|  | S-1FT7 | ✓ | ✓ | 7/27       |
|                                                                                     | S-1FK7 | ✓ | ✓ | 7/27, 7/28 |
|                                                                                     | M-1PH8 | ✓ | ✓ | 7/27, 7/28 |
|                                                                                     | L-1FN3 | – | ✓ | 7/27, 7/28 |
|                                                                                     | L-1FN6 | – | ✓ | 7/27, 7/28 |
|                                                                                     | T-1FW6 | – | ✓ | 7/27, 7/28 |

**Extensions for signal cables with full-thread connector**

|                                                                                     |        |   |                 |            |
|-------------------------------------------------------------------------------------|--------|---|-----------------|------------|
|  | S-1FT7 | ✓ | ✓               | 7/27       |
|                                                                                     | S-1FK7 | ✓ | ✓               | 7/27, 7/28 |
|                                                                                     | M-1PH8 | ✓ | ✓               | 7/27, 7/28 |
|                                                                                     | L-1FN3 | – | ✓ <sup>1)</sup> | 7/27       |
|                                                                                     | L-1FN6 | – | ✓               | 7/27       |
|                                                                                     | T-1FW6 | – | ✓               | 7/27       |

✓ = Possible  
– = Not possible

<sup>1)</sup> MOTION-CONNECT 700



# MOTION-CONNECT connection systems

## Introduction

### General information

#### Overview

MOTION-CONNECT cables are suitable for use with many different types of machine tools and production machinery.

The following variants of MOTION-CONNECT cable are available as fully-assembled power and signal cables or sold by the meter:

- **MOTION-CONNECT 500**
  - Cost-effective solution for predominantly fixed installation
  - Suitable for low mechanical loading
  - Tested for travel distances of up to 5 m (16.41 ft)
- **MOTION-CONNECT 800PLUS**
  - Meets requirements for use in cable carriers
  - Suitable for high mechanical loading
  - Oil resistance
  - Tested for travel distances of up to 50 m (164 ft)

#### Benefits

Pre-assembled MOTION-CONNECT cables provide high quality and perfect, system-tested functionality.

#### SPEED-CONNECT

Fast, stable and reliable connections can be made with the new, pre-assembled cables with SPEED-CONNECT connectors. With a short rotation as far as the stop, the cap nut of the connector secures the connection.

The cables with SPEED-CONNECT connectors supplement the established range of MOTION-CONNECT cables with fully-threaded connectors.

#### Application

MOTION-CONNECT cables are intended for use in machines. They are not suitable for building technology applications or outdoor installation.

MOTION-CONNECT cables are tested in a cable carrier with horizontal travel distance and are also designed for cable carrier installation. They are not self-supporting.

The pre-assembled cables can be ordered in length units of 10 cm (3.94 in) and can be extended, if necessary.

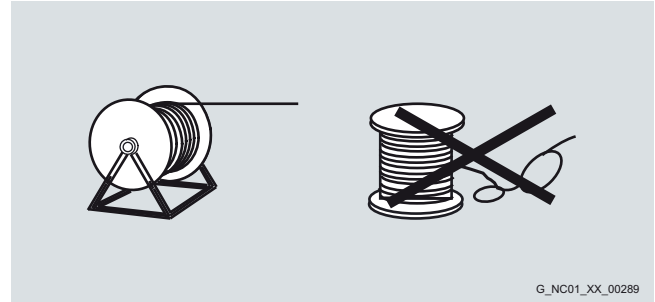
When cable lengths (basic cables and extensions) are determined for the systems and applications described in this catalog, the technically permissible maximum cable lengths (e.g. 25 m (82 ft)) specified in the catalog must be observed. Malfunctions can occur if longer cables are used.

Siemens AG assumes no liability for correct transmission of signals or power in this case.

Compatibility between SPEED-CONNECT and full-thread connectors:

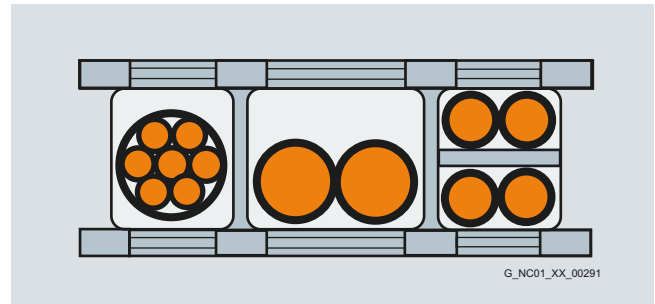
| Connector on motor with external thread | Connector with cap nut on cable | Compatibility |
|-----------------------------------------|---------------------------------|---------------|
| SPEED-CONNECT                           | SPEED-CONNECT                   | ✓             |
| SPEED-CONNECT                           | Full thread                     | ✓             |
| Full thread                             | Full thread                     | ✓             |
| Full thread                             | SPEED-CONNECT                   | —             |

#### Function



G\_NC01\_XX\_00289

The cables must be removed from the drum without twisting, i.e. the cables must be unwound and must never be lifted over the drum flange in loops.

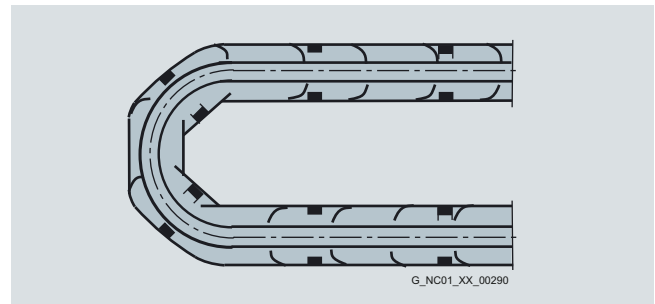


G\_NC01\_XX\_00291

To maximize the service life of the cable carrier and cables, cables in the carrier made from different materials must be separated by spacers in the cable carrier. The spacers must be filled evenly to ensure that the position of the cables does not change during operation. The cables should be distributed as symmetrically as possible according to their weights and dimensions. Cables with very different outer diameters should also be separated by spacers.

When inserting pre-assembled cables into the cable carrier, do **not** pull at the connector, as this may damage the strain relief or cable clamping.

The cables must not be fixed in the cable carrier. They must be freely movable.

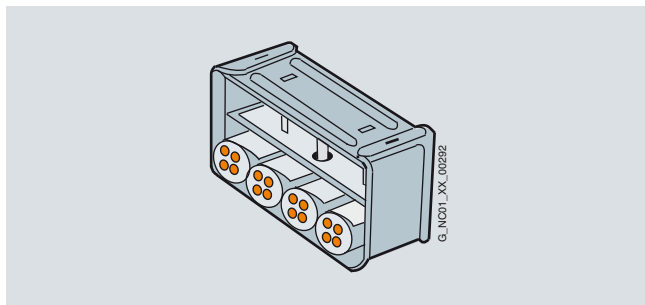


G\_NC01\_XX\_00290

The cables must be able to be moved without applying force in particular in the bending radii of the carrier. The specified minimum bending radii must be adhered to.

The cable fixings must be attached at both ends at an appropriate distance away from the end points of the moving parts in a dead zone.

## Function (continued)



MOTION-CONNECT cables are tested in a cable carrier. The cables are attached at one end by means of strain relief to the moving ends of the cable carrier. Strain relief is applied over a wide area of the cable jacket surface without crimping the cable.

Cables must be installed in accordance with the instructions supplied by the cable carrier manufacturer.

## Notes:

If, for example, pre-assembled cables are installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied (power and signal cables<sup>1)</sup>). In this case, the contacts of the cables are crimped and the connector enclosure is supplied separately. After installing the cables, the customer assembles the connector enclosure.

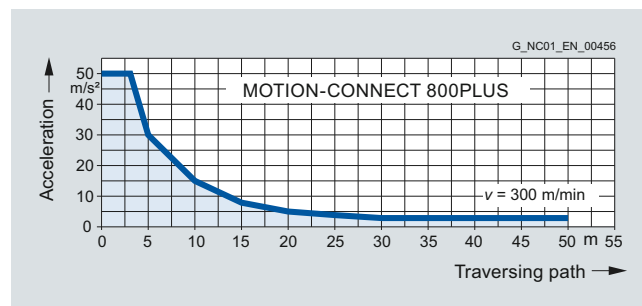
In case of vibration load and with horizontal or vertical cable entries, we recommend that the cable is additionally fixed if between the cable strain relief on the cable carrier and the terminal at the motor part of the cable is hanging loose or is not routed. To prevent machine vibrations being transmitted to the connectors, the cable should be fixed at the moving part where the motor is mounted.

## Representation in connection overviews

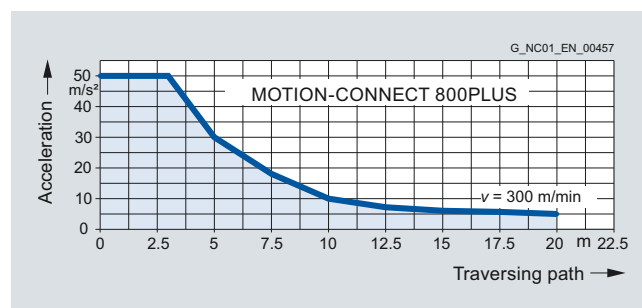
| Symbol | Explanation                                                                          |
|--------|--------------------------------------------------------------------------------------|
|        | Connector with pin contacts                                                          |
|        | Connector with socket contacts                                                       |
|        | Exposed core ends                                                                    |
|        | Cable not included in the scope of delivery. Cable must be supplied by the customer. |

## Characteristic curves for MOTION-CONNECT 800PLUS

The shaded area beneath the characteristic curve represents the potential range of use for the cables. The characteristic curves represent the tested operating points.



Acceleration for signal and power cables  
MOTION-CONNECT 800PLUS up to 16 mm<sup>2</sup>



Acceleration for power cables  
MOTION-CONNECT 800PLUS with 25 mm<sup>2</sup>, 35 mm<sup>2</sup> and 50 mm<sup>2</sup>

<sup>1)</sup> Not applicable to DRIVE-CLiQ signal cables.

# MOTION-CONNECT connection systems

## Introduction

### General information

#### More information

##### Current carrying capacity for power and signal cables

The current carrying capacity of PVC/PUR-insulated copper cables is specified for installation types B1, B2, C and E under continuous operating conditions in the table with reference to an ambient air temperature of 40 °C (104 °F). For other ambient temperatures, the values must be corrected by the derating factors from the table.

| Cross-section<br>mm <sup>2</sup> | Current carrying capacity<br>rms AC 50/60 Hz or DC in amps for installation type  |                                                                                  |                                                                                                                                                                     |                                                                                                                                                                                        |
|----------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | B1<br>Single-core<br>cables in<br>protection<br>tubes or<br>installation<br>ducts | B2<br>Multi-core<br>cables in<br>protection<br>tubes or<br>installation<br>ducts | C<br>Multi-core<br>cables, verti-<br>cally or hori-<br>zontally on<br>walls / open,<br>without protec-<br>tion tubes and<br>installation<br>ducts / with<br>contact | E<br>Multi-core<br>cables, hori-<br>zontally or<br>vertically on<br>perforated<br>cable racks /<br>open, without<br>protection<br>tubes and<br>installation<br>ducts / with<br>contact |
| <b>Electronics<sup>1)</sup></b>  |                                                                                   |                                                                                  |                                                                                                                                                                     |                                                                                                                                                                                        |
| 0.20                             | –                                                                                 | 4.3                                                                              | 4.4                                                                                                                                                                 | 4.4                                                                                                                                                                                    |
| 0.30                             | –                                                                                 | 7.5                                                                              | 7.5                                                                                                                                                                 | 7.8                                                                                                                                                                                    |
| 0.75                             | –                                                                                 | 9                                                                                | 9.5                                                                                                                                                                 | 10                                                                                                                                                                                     |
| <b>Power<sup>2)</sup></b>        |                                                                                   |                                                                                  |                                                                                                                                                                     |                                                                                                                                                                                        |
| 0.75                             | 8.6                                                                               | 8.5                                                                              | 9.8                                                                                                                                                                 | 10.4                                                                                                                                                                                   |
| 1.00                             | 10.3                                                                              | 10.1                                                                             | 11.7                                                                                                                                                                | 12.4                                                                                                                                                                                   |
| 1.50                             | 13.5                                                                              | 13.1                                                                             | 15.2                                                                                                                                                                | 16.1                                                                                                                                                                                   |
| 2.50                             | 18.3                                                                              | 17.4                                                                             | 21                                                                                                                                                                  | 22                                                                                                                                                                                     |
| 4                                | 24                                                                                | 23                                                                               | 28                                                                                                                                                                  | 30                                                                                                                                                                                     |
| 6                                | 31                                                                                | 30                                                                               | 36                                                                                                                                                                  | 37                                                                                                                                                                                     |
| 10                               | 44                                                                                | 40                                                                               | 50                                                                                                                                                                  | 52                                                                                                                                                                                     |
| 16                               | 59                                                                                | 54                                                                               | 66                                                                                                                                                                  | 70                                                                                                                                                                                     |
| 25                               | 77                                                                                | 70                                                                               | 84                                                                                                                                                                  | 88                                                                                                                                                                                     |
| 35                               | 96                                                                                | 86                                                                               | 104                                                                                                                                                                 | 110                                                                                                                                                                                    |
| 50                               | 117                                                                               | 103                                                                              | 125                                                                                                                                                                 | 133                                                                                                                                                                                    |
| 70                               | 149                                                                               | 130                                                                              | 160                                                                                                                                                                 | 171                                                                                                                                                                                    |
| 95                               | 180                                                                               | 165                                                                              | 194                                                                                                                                                                 | 207                                                                                                                                                                                    |
| 120                              | 208                                                                               | 179                                                                              | 225                                                                                                                                                                 | 240                                                                                                                                                                                    |

##### Derating factors for power and signal cables

| Ambient air temperature<br>°C (°F) | Derating factor<br>according to EN 60204-1, Table D.1 |
|------------------------------------|-------------------------------------------------------|
| 30 (86)                            | 1.15                                                  |
| 35 (95)                            | 1.08                                                  |
| 40 (104)                           | 1.00                                                  |
| 45 (113)                           | 0.91                                                  |
| 50 (122)                           | 0.82                                                  |
| 55 (131)                           | 0.71                                                  |
| 60 (140)                           | 0.58                                                  |

<sup>1)</sup> One control circuit pair.

<sup>2)</sup> One symmetrically loaded three-phase AC cable.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

### Overview



Power cable for connecting a SIMOTICS M-1PH8 motor with terminal box to a SINAMICS S120 Motor Module

The synchronous and asynchronous motors are connected to the Motor Modules or Power Modules by means of MOTION-CONNECT power cables.

The pre-assembled MOTION-CONNECT power cables are of high quality and offer safety with problem-free functioning.

Depending on the design, the MOTION-CONNECT power cables are either pre-assembled at one end or at both ends.

If pre-assembled power cables are to be installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied. In this case, the contacts of the cables are crimped and the connector enclosure is supplied separately. After installing the cables, the customer assembles the connector enclosure.

The 6FX.002-5.... power cables are available with crimped contacts and with the connector enclosure supplied separately (not in the case of DRIVE-CLiQ power cables).

Power cables with separately supplied motor-end connector enclosure. In this case, the 6th position of the Order No. must be changed from **0** to **4**: 6FX.042-5....

Power cables with separately supplied module-end connector enclosure. In this case, the 6th position of the Order No. must be changed from **0** to **1**: 6FX.012-5....



Power cable with supplied connector for connecting a SIMOTICS S-1FT7/-1FK7/SIMOTICS M-1PH8 motor to a SINAMICS S120 Motor Module

#### Type of delivery for pre-assembled power cables

Pre-assembled power cables can be ordered in units of 10 cm (3.94 in) up to a maximum length of 299.8 m (984 ft).

The cables are supplied on reels up to 30 kg or 100 m (66.2 lb or 328 ft). Above 30 kg or 100 m (66.2 lb or 328 ft), cable drums are used instead of reels. This applies to both pre-assembled power cables and for cables sold by the meter.

#### Type of delivery for power cables sold by the meter

##### Fixed lengths

| Cross-section       | Brake cores  | MOTION-CONNECT 500<br>MOTION-CONNECT 800PLUS                   |
|---------------------|--------------|----------------------------------------------------------------|
| 1.5 mm <sup>2</sup> | with/without | 50 m (164 ft), 100 m (328 ft), 200 m (656 ft), 500 m (1641 ft) |
| 2.5 mm <sup>2</sup> | with/without | 50 m (164 ft), 100 m (328 ft), 200 m (656 ft), 500 m (1641 ft) |

##### Variable length, available in exact meter lengths

| Cross-section       | Brake cores     | MOTION-CONNECT 500                   | MOTION-CONNECT 800PLUS |
|---------------------|-----------------|--------------------------------------|------------------------|
| 4 mm <sup>2</sup>   | with/without    | ≤ 500 m (1641 ft)                    | ≤ 500 m (1641 ft)      |
| 6 mm <sup>2</sup>   | with/without    | ≤ 500 m (1641 ft)                    | ≤ 500 m (1641 ft)      |
| 10 mm <sup>2</sup>  | with/without    | ≤ 500 m (1641 ft)                    | ≤ 500 m (1641 ft)      |
| 16 mm <sup>2</sup>  | with/without    | ≤ 200 m (656 ft)                     | ≤ 200 m (656 ft)       |
| 25 mm <sup>2</sup>  | without<br>with | ≤ 200 m (656 ft)<br>≤ 200 m (656 ft) | –<br>≤ 200 m (656 ft)  |
| 35 mm <sup>2</sup>  | without<br>with | ≤ 200 m (656 ft)<br>≤ 200 m (656 ft) | –<br>≤ 200 m (656 ft)  |
| 50 mm <sup>2</sup>  | without<br>with | ≤ 200 m (656 ft)<br>≤ 200 m (656 ft) | –<br>≤ 200 m (656 ft)  |
| 70 mm <sup>2</sup>  | without         | ≤ 100 m (328 ft)                     | ≤ 100 m (328 ft)       |
| 95 mm <sup>2</sup>  | without         | ≤ 100 m (328 ft)                     | ≤ 100 m (328 ft)       |
| 120 mm <sup>2</sup> | without         | ≤ 100 m (328 ft)                     | ≤ 100 m (328 ft)       |

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

### Technical specifications

| Power cables                                                        | MOTION-CONNECT 500<br>6FX500.-.....-.....                     | MOTION-CONNECT 800PLUS<br>6FX800.-.....-.....                                                       |
|---------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Approvals, according to</b>                                      |                                                               |                                                                                                     |
| • VDE <sup>1)</sup>                                                 | Yes                                                           | Yes                                                                                                 |
| • cURus or UR/CSA                                                   | UL 758, CSA-C22.2-N.210.2-M90                                 | UL 758, CSA-C22.2-N.210.2-M90                                                                       |
| • UR-CSA File No. <sup>2)</sup>                                     | Yes                                                           | Yes                                                                                                 |
| • RoHS conformity                                                   | Yes                                                           | Yes                                                                                                 |
| <b>Rated voltage <math>V_0/V</math> in accordance with EN 50395</b> |                                                               |                                                                                                     |
| • Power conductors                                                  | 600 V/1000 V                                                  | 600 V/1000 V                                                                                        |
| • Signal conductors                                                 | 24 V (EN) 1000 V (UL/CSA)                                     | 24 V (EN) 1000 V (UL/CSA)                                                                           |
| <b>Test voltage, rms</b>                                            |                                                               |                                                                                                     |
| • Power conductors                                                  | 4 kV                                                          | 4 kV                                                                                                |
| • Signal conductors                                                 | 2 kV                                                          | 2 kV                                                                                                |
| <b>Operating temperature on the surface</b>                         |                                                               |                                                                                                     |
| • Fixed installation                                                | -20 ... +80 °C (-4 ... +176 °F)                               | -50 ... +80 °C (-58 ... +176 °F)                                                                    |
| • Flexible installation                                             | 0 ... 60 °C (32 ... 140 °F)                                   | -20 ... +60 °C (-4 ... +140 °F)                                                                     |
| <b>Tensile stress, max.</b>                                         |                                                               |                                                                                                     |
| • Fixed installation                                                | 50 N/mm <sup>2</sup> (7252 lb <sub>f</sub> /in <sup>2</sup> ) | 50 N/mm <sup>2</sup> (7252 lb <sub>f</sub> /in <sup>2</sup> )                                       |
| • Flexible installation                                             | 20 N/mm <sup>2</sup> (2901 lb <sub>f</sub> /in <sup>2</sup> ) | 20 N/mm <sup>2</sup> (2901 lb <sub>f</sub> /in <sup>2</sup> )                                       |
| <b>Smallest bending radius</b>                                      |                                                               |                                                                                                     |
| • Fixed installation                                                | 5 × $D_{\max}$                                                | 4 × $D_{\max}$                                                                                      |
| • Flexible installation                                             | <a href="#">See selection and ordering data</a>               | <a href="#">See selection and ordering data</a>                                                     |
| <b>Torsional stress</b>                                             | Absolute 30°/m                                                | Absolute 30°/m                                                                                      |
| <b>Bending</b>                                                      | 100000                                                        | 10 million                                                                                          |
| <b>Traversing velocity</b>                                          | 30 m/min (98.4 ft/min)                                        | Up to 300 m/min (984 ft/min)                                                                        |
| <b>Acceleration</b>                                                 | 2 m/s <sup>2</sup> (6.56 ft/s <sup>2</sup> )                  | Up to 50 m/s <sup>2</sup> (164 ft/s <sup>2</sup> ), <a href="#">see characteristics on page 7/5</a> |
| <b>Insulation material, incl. jacket</b>                            | CFC/silicone-free                                             | CFC/halogen/silicone-free<br>IEC 60754-1/DIN VDE 0472-815                                           |
| <b>Oil resistance</b>                                               | EN 60811-2-1 (mineral oil only)                               | EN 60811-2-1                                                                                        |
| <b>Outer jacket</b>                                                 | PVC<br>DESINA color orange RAL 2003                           | PUR, HD22.10 S2 (VDE 0282, Part 10)<br>DESINA color orange RAL 2003                                 |
| <b>Flame-retardant</b>                                              | EN 60332-1-1 to 1-3                                           | EN 60332-1-1 to 1-3                                                                                 |

Degree of protection of pre-assembled power cables and their extensions when closed and connected: IP67.

<sup>1)</sup> The respective registration number is printed on the cable jacket (only applies to power cables).

<sup>2)</sup> The File No. is printed on the cable jacket.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for SIMOTICS S-1FT7/-1FK7/  
SIMOTICS M-1PH8 motors with SPEED-CONNECT connector

### Selection and ordering data

For SIMOTICS S-1FT7 motors without holding brake/SIMOTICS M-1PH808/-1PH810 motors with SPEED-CONNECT connector on SINAMICS S120 Motor Modules in booksize format

| Connection method,<br>Motor<br>Module end | No. of cores ×<br>cross-section<br><br>mm <sup>2</sup> | Connec-<br>tor size,<br>motor<br>end | Pre-assembled cable<br>without brake cores<br><br>Order No. | Cable sold by the<br>meter <sup>1)</sup><br>without brake cores<br><br>Order No. | D <sub>max</sub> |            | Weight<br>(without<br>connector) |                 | Smallest perm.<br>bending<br>radius <sup>2)</sup> |            |
|-------------------------------------------|--------------------------------------------------------|--------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------|------------------|------------|----------------------------------|-----------------|---------------------------------------------------|------------|
|                                           |                                                        |                                      |                                                             |                                                                                  | 6FX5             | 6FX8       | 6FX5                             | 6FX8            | 6FX5                                              | 6FX8       |
|                                           |                                                        |                                      |                                                             |                                                                                  | mm<br>(in)       | mm<br>(in) | kg/m<br>(lb/ft)                  | kg/m<br>(lb/ft) | mm<br>(in)                                        | mm<br>(in) |
| Connector <sup>3)</sup>                   | 4 × 1.5                                                | 1                                    | 6FX002-5CN01-....                                           | 6FX008-1BB11-....                                                                | 8.4              | 9.5        | 0.12                             | 0.15            | 155                                               | 75         |
|                                           |                                                        | 1.5                                  | 6FX002-5CN21-....                                           |                                                                                  | (0.33)           | (0.37)     | (0.08)                           | (0.10)          | (6.10)                                            | (2.95)     |
|                                           | 4 × 2.5                                                | 1                                    | 6FX002-5CN11-....                                           | 6FX008-1BB21-....                                                                | 10.0             | 11.0       | 0.21                             | 0.20            | 180                                               | 90         |
|                                           |                                                        | 1.5                                  | 6FX002-5CN31-....                                           |                                                                                  | (0.39)           | (0.43)     | (0.14)                           | (0.13)          | (7.09)                                            | (3.54)     |
|                                           | 4 × 4                                                  | 1.5                                  | 6FX002-5CN41-....                                           | 6FX008-1BB31-....                                                                | 11.4             | 12.3       | 0.27                             | 0.27            | 210                                               | 100        |
|                                           |                                                        |                                      |                                                             |                                                                                  | (0.45)           | (0.48)     | (0.18)                           | (0.18)          | (8.27)                                            | (3.94)     |
| Ring cable<br>lugs <sup>4)</sup>          | 4 × 6                                                  | 1.5                                  | 6FX002-5CN51-....                                           | 6FX008-1BB41-....                                                                | 13.6             | 14.9       | 0.37                             | 0.41            | 245                                               | 120        |
|                                           |                                                        |                                      |                                                             |                                                                                  | (0.54)           | (0.59)     | (0.25)                           | (0.28)          | (9.65)                                            | (4.72)     |
|                                           | 4 × 10                                                 | 1.5                                  | 6FX002-5CN61-....                                           | 6FX008-1BB51-....                                                                | 20.0             | 18.2       | 0.73                             | 0.62            | 360                                               | 140        |
|                                           |                                                        |                                      |                                                             |                                                                                  | (0.79)           | (0.72)     | (0.49)                           | (0.42)          | (14.17)                                           | (5.51)     |
|                                           | 4 × 6                                                  | 1.5                                  | 6FX002-5CN54-....                                           | 6FX008-1BB41-....                                                                | 13.6             | 14.9       | 0.37                             | 0.41            | 245                                               | 120        |
|                                           |                                                        |                                      |                                                             |                                                                                  | (0.54)           | (0.59)     | (0.25)                           | (0.28)          | (9.65)                                            | (4.72)     |
| Length code                               |                                                        |                                      | 5                                                           | 5                                                                                |                  |            |                                  |                 |                                                   |            |
|                                           |                                                        |                                      | 8                                                           | 8                                                                                |                  |            |                                  |                 |                                                   |            |

For SIMOTICS S-1FT7 motors with holding brake and with SPEED-CONNECT connector on SINAMICS S120 Motor Modules in booksize format

| Connection method,<br>Motor<br>Module end | No. of cores ×<br>cross-section<br><br>mm <sup>2</sup> | Connec-<br>tor size,<br>motor<br>end | Pre-assembled cable<br>with brake cores<br><br>Order No. | Cable sold by the<br>meter <sup>1)</sup><br>with brake cores<br><br>Order No. | D <sub>max</sub> |            | Weight<br>(without con-<br>nector) |                 | Smallest perm.<br>bending<br>radius <sup>2)</sup> |            |
|-------------------------------------------|--------------------------------------------------------|--------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------|------------------|------------|------------------------------------|-----------------|---------------------------------------------------|------------|
|                                           |                                                        |                                      |                                                          |                                                                               | 6FX5             | 6FX8       | 6FX5                               | 6FX8            | 6FX5                                              | 6FX8       |
|                                           |                                                        |                                      |                                                          |                                                                               | mm<br>(in)       | mm<br>(in) | kg/m<br>(lb/ft)                    | kg/m<br>(lb/ft) | mm<br>(in)                                        | mm<br>(in) |
| Connector <sup>3)</sup>                   | 4 × 1.5+2 × 1.5                                        | 0.5                                  | 6FX002-5DN20-....                                        | 6FX008-1BA11-....                                                             | 10.8             | 12.0       | 0.22                               | 0.16            | 195                                               | 90         |
|                                           |                                                        | 1                                    | 6FX002-5DN01-....                                        |                                                                               | (0.43)           | (0.47)     | (0.15)                             | (0.11)          | (7.68)                                            | (3.54)     |
|                                           |                                                        | 1.5                                  | 6FX002-5DN21-....                                        |                                                                               |                  |            |                                    |                 |                                                   |            |
|                                           | 4 × 2.5+2 × 1.5                                        | 1                                    | 6FX002-5DN11-....                                        | 6FX008-1BA21-....                                                             | 12.4             | 13.8       | 0.25                               | 0.30            | 225                                               | 105        |
|                                           |                                                        | 1.5                                  | 6FX002-5DN31-....                                        |                                                                               | (0.49)           | (0.54)     | (0.17)                             | (0.20)          | (8.86)                                            | (4.13)     |
|                                           | 4 × 4+2 × 1.5                                          | 1.5                                  | 6FX002-5DN41-....                                        | 6FX008-1BA31-....                                                             | 14.0             | 15.2       | 0.35                               | 0.38            | 255                                               | 115        |
| Ring cable<br>lugs <sup>4)</sup>          | 4 × 6+2 × 1.5                                          | 1.5                                  | 6FX002-5DN51-....                                        | 6FX008-1BA41-....                                                             | 16.1             | 17.3       | 0.49                               | 0.50            | 290                                               | 130        |
|                                           |                                                        |                                      |                                                          |                                                                               | (0.63)           | (0.68)     | (0.33)                             | (0.34)          | (11.42)                                           | (5.12)     |
|                                           | 4 × 10+2 × 1.5                                         | 1.5                                  | 6FX002-5DN61-....                                        | 6FX008-1BA51-....                                                             | 21.7             | 20.1       | 0.81                               | 0.71            | 395                                               | 150        |
|                                           |                                                        |                                      |                                                          |                                                                               | (0.85)           | (0.79)     | (0.54)                             | (0.48)          | (15.55)                                           | (5.91)     |
|                                           | 4 × 6+2 × 1.5                                          | 1.5                                  | 6FX002-5DN54-....                                        | 6FX008-1BA41-....                                                             | 16.1             | 17.3       | 0.49                               | 0.50            | 290                                               | 130        |
|                                           |                                                        |                                      |                                                          |                                                                               | (0.63)           | (0.68)     | (0.33)                             | (0.34)          | (11.42)                                           | (5.12)     |
| Length code                               |                                                        |                                      | 5                                                        | 5                                                                             |                  |            |                                    |                 |                                                   |            |
|                                           |                                                        |                                      | 8                                                        | 8                                                                             |                  |            |                                    |                 |                                                   |            |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.

<sup>4)</sup> For SINAMICS S120 Motor Modules 45 A and 60 A in booksize format.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for SIMOTICS S-1FT7/-1FK7/  
SIMOTICS M-1PH8 motors with SPEED-CONNECT connector

### Selection and ordering data (continued)

For SIMOTICS S-1FK7 motors without holding brake and with SPEED-CONNECT connector on  
SINAMICS S120 Power Modules

| Connection method,<br>Power Module end | No. of cores × cross-section<br><br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable <u>without</u> brake cores<br><br>Order No. | Cable sold by the meter <sup>1)</sup> <u>without</u> brake cores<br><br>Order No. | $D_{\max}$         |                    | Weight (without connector) |                         | Smallest perm. bending radius <sup>2)</sup> |                    |
|----------------------------------------|-----------------------------------------------------|---------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------|--------------------|----------------------------|-------------------------|---------------------------------------------|--------------------|
|                                        |                                                     |                           |                                                                 |                                                                                   | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in) | 6FX5<br>kg/m<br>(lb/ft)    | 6FX8<br>kg/m<br>(lb/ft) | 6FX5<br>mm<br>(in)                          | 6FX8<br>mm<br>(in) |
| Exposed core ends                      | 4 × 1.5                                             | 1                         | 6FX002-5CG10-....                                               | 6FX008-1BB11-....                                                                 | 8.4<br>(0.33)      | 9.5<br>(0.37)      | 0.12<br>(0.08)             | 0.15<br>(0.10)          | 155<br>(6.10)                               | 75<br>(2.95)       |
|                                        |                                                     | 1.5                       | 6FX002-5CG22-....                                               |                                                                                   |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 2.5                                             | 1                         | 6FX002-5CG12-....                                               | 6FX008-1BB21-....                                                                 | 10.0<br>(0.39)     | 11.0<br>(0.43)     | 0.21<br>(0.14)             | 0.20<br>(0.13)          | 180<br>(7.09)                               | 90<br>(3.54)       |
|                                        |                                                     | 1.5                       | 6FX002-5CG32-....                                               |                                                                                   |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 4                                               | 1.5                       | 6FX002-5CG42-....                                               | 6FX008-1BB31-....                                                                 | 11.4<br>(0.45)     | 12.3<br>(0.48)     | 0.27<br>(0.18)             | 0.27<br>(0.18)          | 210<br>(8.27)                               | 100<br>(3.94)      |
|                                        | 4 × 6                                               | 1.5                       | 6FX002-5CG52-....                                               | 6FX008-1BB41-....                                                                 | 13.6<br>(0.54)     | 14.9<br>(0.59)     | 0.37<br>(0.25)             | 0.41<br>(0.28)          | 245<br>(9.65)                               | 120<br>(4.72)      |
|                                        | 4 × 10                                              | 1.5                       | 6FX002-5CG62-....                                               | 6FX008-1BB51-....                                                                 | 20.0<br>(0.79)     | 18.2<br>(0.72)     | 0.73<br>(0.49)             | 0.62<br>(0.42)          | 360<br>(14.17)                              | 140<br>(5.51)      |
| MOTION-CONNECT 500                     |                                                     |                           | 5                                                               | 5                                                                                 |                    |                    |                            |                         |                                             |                    |
| MOTION-CONNECT 800PLUS                 |                                                     |                           | 8                                                               | 8                                                                                 |                    |                    |                            |                         |                                             |                    |
| Length code                            |                                                     |                           | ....                                                            | ....                                                                              |                    |                    |                            |                         |                                             |                    |

For SIMOTICS S-1FK7 motors with holding brake and with SPEED-CONNECT connector on  
SINAMICS S120 Power Modules

| Connection method,<br>Power Module end | No. of cores × cross-section<br><br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable <u>with</u> brake cores<br><br>Order No. | Cable sold by the meter <sup>1)</sup> <u>with</u> brake cores<br><br>Order No. | $D_{\max}$         |                    | Weight (without connector) |                         | Smallest perm. bending radius <sup>2)</sup> |                    |
|----------------------------------------|-----------------------------------------------------|---------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------|--------------------|----------------------------|-------------------------|---------------------------------------------|--------------------|
|                                        |                                                     |                           |                                                              |                                                                                | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in) | 6FX5<br>kg/m<br>(lb/ft)    | 6FX8<br>kg/m<br>(lb/ft) | 6FX5<br>mm<br>(in)                          | 6FX8<br>mm<br>(in) |
| Exposed core ends                      | 4 × 1.5+2 × 1.5                                     | 0.5                       | 6FX002-5DN30-....                                            | 6FX008-1BA11-....                                                              | 10.8<br>(0.43)     | 12.0<br>(0.47)     | 0.22<br>(0.15)             | 0.16<br>(0.11)          | 195<br>(7.68)                               | 90<br>(3.54)       |
|                                        | 4 × 1.5+2 × 1.5                                     | 1                         | 6FX002-5DG10-....                                            |                                                                                |                    |                    |                            |                         |                                             |                    |
|                                        |                                                     | 1.5                       | 6FX002-5DG22-....                                            |                                                                                |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 2.5+2 × 1.5                                     | 1                         | 6FX002-5DG12-....                                            | 6FX008-1BA21-....                                                              | 12.4<br>(0.49)     | 13.8<br>(0.54)     | 0.25<br>(0.17)             | 0.30<br>(0.20)          | 225<br>(8.86)                               | 105<br>(4.13)      |
|                                        |                                                     | 1.5                       | 6FX002-5DG32-....                                            |                                                                                |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 4+2 × 1.5                                       | 1.5                       | 6FX002-5DG42-....                                            | 6FX008-1BA31-....                                                              | 14.0<br>(0.55)     | 15.2<br>(0.60)     | 0.35<br>(0.24)             | 0.38<br>(0.26)          | 255<br>(10.04)                              | 115<br>(4.53)      |
|                                        | 4 × 6+2 × 1.5                                       | 1.5                       | 6FX002-5DG52-....                                            | 6FX008-1BA41-....                                                              | 16.1<br>(0.63)     | 17.3<br>(0.68)     | 0.49<br>(0.33)             | 0.50<br>(0.34)          | 290<br>(11.42)                              | 130<br>(5.12)      |
|                                        | 4 × 10+2 × 1.5                                      | 1.5                       | 6FX002-5DG62-....                                            | 6FX008-1BA51-....                                                              | 21.7<br>(0.85)     | 20.1<br>(0.79)     | 0.81<br>(0.54)             | 0.71<br>(0.48)          | 395<br>(15.55)                              | 150<br>(5.91)      |
| MOTION-CONNECT 500                     |                                                     |                           | 5                                                            | 5                                                                              |                    |                    |                            |                         |                                             |                    |
| MOTION-CONNECT 800PLUS                 |                                                     |                           | 8                                                            | 8                                                                              |                    |                    |                            |                         |                                             |                    |
| Length code                            |                                                     |                           | ....                                                         | ....                                                                           |                    |                    |                            |                         |                                             |                    |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for SIMOTICS S-1FT7/-1FK7/  
SIMOTICS M-1PH8 motors with SPEED-CONNECT connector

### Selection and ordering data (continued)

For SIMOTICS S-1FK7 motors *without* holding brake and with SPEED-CONNECT connector on  
SINAMICS S120 Combi Power Modules

| Connection method,<br>Power Module end | No. of cores x cross-section | Connector size, motor end | Pre-assembled cable without brake cores | Cable sold by the meter <sup>1)</sup> without brake cores | D <sub>max</sub> | Weight (without connector) |              | Smallest perm. bending radius <sup>2)</sup> |         |         |
|----------------------------------------|------------------------------|---------------------------|-----------------------------------------|-----------------------------------------------------------|------------------|----------------------------|--------------|---------------------------------------------|---------|---------|
|                                        |                              |                           |                                         |                                                           |                  | 6FX5                       | 6FX8         | 6FX5                                        | 6FX8    | 6FX5    |
|                                        | mm <sup>2</sup>              |                           | Order No.                               | Order No.                                                 | mm (in)          | mm (in)                    | kg/m (lb/ft) | kg/m (lb/ft)                                | mm (in) | mm (in) |
| Exposed core ends                      | 4 × 1.5                      | 1                         | 6FX002-5CF10-....                       | 6FX008-1BB11-....                                         | 8.4              | 9.5                        | 0.12         | 0.16                                        | 155     | 75      |
|                                        |                              | 1.5                       | 6FX002-5CF14-....                       |                                                           | (0.33)           | (0.37)                     | (0.08)       | (0.11)                                      | (6.10)  | (2.95)  |
| MOTION-CONNECT 500                     |                              |                           | 5                                       | 5                                                         |                  |                            |              |                                             |         |         |
| MOTION-CONNECT 800PLUS                 |                              |                           | 8                                       | 8                                                         |                  |                            |              |                                             |         |         |
| Length code                            |                              |                           | ....                                    | ....                                                      |                  |                            |              |                                             |         |         |

For SIMOTICS S-1FK7 motors *with* holding brake and with SPEED-CONNECT connector on  
SINAMICS S120 Combi Power Modules

| Connection method,<br>Power Module end | No. of cores x cross-section<br><br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable with brake cores | Cable sold by the meter <sup>1)</sup> with brake cores | $D_{max}$ | Weight (without connector) |         | Smallest perm. bending radius <sup>2)</sup> |              |         |         |
|----------------------------------------|-----------------------------------------------------|---------------------------|--------------------------------------|--------------------------------------------------------|-----------|----------------------------|---------|---------------------------------------------|--------------|---------|---------|
|                                        |                                                     |                           |                                      |                                                        |           | 6FX5                       | 6FX8    | 6FX5                                        | 6FX8         | 6FX5    | 6FX8    |
|                                        |                                                     |                           |                                      |                                                        |           | mm (in)                    | mm (in) | kg/m (lb/ft)                                | kg/m (lb/ft) | mm (in) | mm (in) |
| Exposed core ends                      | 4 × 1.5+2 × 1.5                                     | 1                         | 6FX 002-5DF10-....                   | 6FX 008-1BB11-....                                     | 10.8      | 12.0                       | 0.22    | 0.25                                        | 155          | 75      |         |
|                                        |                                                     | 1.5                       | 6FX 002-5DF14-....                   |                                                        | (0.43)    | (0.47)                     | (0.15)  | (0.17)                                      | (6.10)       | (2.95)  |         |
| MOTION-CONNECT 500                     |                                                     |                           | 5                                    |                                                        |           |                            |         |                                             |              |         |         |
| MOTION-CONNECT 800PLUS                 |                                                     |                           | 8                                    |                                                        |           |                            |         |                                             |              |         |         |
| Length code                            |                                                     |                           | ....                                 |                                                        |           |                            |         |                                             |              |         |         |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.



# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for SIMOTICS S-1FT7/-1FK7/  
SIMOTICS M-1PH8 motors with full-thread connector

### Selection and ordering data

*For SIMOTICS S-1FT7 motors without holding brake/SIMOTICS M-1PH808/-1PH810/-1PH813 motors with full-thread connector on SINAMICS S120 Motor Modules in booksize format*

| Connection method,<br>Motor<br>Module end | No. of cores ×<br>cross-section | Connec-<br>tor size,<br>motor<br>end | Pre-assembled cable<br>without brake cores | Cable sold by the<br>meter <sup>1)</sup><br>without brake cores | $D_{\max}$     | Weight<br>(without<br>connector) |                 | Smallest perm.<br>bending<br>radius <sup>2)</sup> |                |               |
|-------------------------------------------|---------------------------------|--------------------------------------|--------------------------------------------|-----------------------------------------------------------------|----------------|----------------------------------|-----------------|---------------------------------------------------|----------------|---------------|
|                                           |                                 |                                      |                                            |                                                                 |                | 6FX5                             | 6FX8            | 6FX5                                              | 6FX8           | 6FX5          |
|                                           | mm <sup>2</sup>                 |                                      | Order No.                                  | Order No.                                                       | mm<br>(in)     | mm<br>(in)                       | kg/m<br>(lb/ft) | kg/m<br>(lb/ft)                                   | mm<br>(in)     | mm<br>(in)    |
| Connector <sup>3)</sup>                   | 4 × 1.5                         | 1                                    | 6FX■002-5CS01-....                         | 6FX■008-1BB11-....                                              | 8.4<br>(0.33)  | 9.5<br>(0.37)                    | 0.12<br>(0.08)  | 0.15<br>(0.10)                                    | 155<br>(6.10)  | 75<br>(2.95)  |
|                                           |                                 | 1.5                                  | 6FX■002-5CS21-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           |                                 | e. c. <sup>4)</sup>                  | 6FX 5 002-5CS02-....                       |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 2.5                         | 1                                    | 6FX■002-5CS11-....                         | 6FX■008-1BB21-....                                              | 10.0<br>(0.39) | 11.0<br>(0.43)                   | 0.21<br>(0.14)  | 0.20<br>(0.13)                                    | 180<br>(7.09)  | 90<br>(3.54)  |
|                                           |                                 | 1.5                                  | 6FX■002-5CS31-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           |                                 | e. c. <sup>4)</sup>                  | 6FX 5 002-5CS12-....                       |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 4                           | 1.5                                  | 6FX■002-5CS41-....                         | 6FX■008-1BB31-....                                              | 11.4<br>(0.45) | 12.3<br>(0.48)                   | 0.27<br>(0.18)  | 0.27<br>(0.18)                                    | 210<br>(8.27)  | 100<br>(3.94) |
|                                           |                                 | e. c. <sup>4)</sup>                  | 6FX 5 002-5CS42-....                       |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 6                           | 1.5                                  | 6FX■002-5CS51-....                         | 6FX■008-1BB41-....                                              | 13.6<br>(0.54) | 14.9<br>(0.59)                   | 0.37<br>(0.25)  | 0.41<br>(0.28)                                    | 245<br>(9.65)  | 120<br>(4.72) |
|                                           |                                 | e. c. <sup>4)</sup>                  | 6FX 5 002-5CS52-....                       |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 10                          | 1.5                                  | 6FX■002-5CS61-....                         | 6FX■008-1BB51-....                                              | 20.0<br>(0.79) | 18.2<br>(0.72)                   | 0.73<br>(0.49)  | 0.62<br>(0.42)                                    | 360<br>(14.17) | 140<br>(5.51) |
|                                           |                                 | 3                                    | 6FX■002-5CS13-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
| e. c. <sup>4)</sup>                       |                                 | 6FX 5 002-5CS62-....                 |                                            |                                                                 |                |                                  |                 |                                                   |                |               |
| Ring cable<br>lugs <sup>5)</sup>          | 4 × 6                           | 1.5                                  | 6FX■002-5CS54-....                         | 6FX■008-1BB41-....                                              | 13.6<br>(0.54) | 14.9<br>(0.59)                   | 0.37<br>(0.25)  | 0.41<br>(0.28)                                    | 245<br>(9.65)  | 120<br>(4.72) |
|                                           |                                 | 3                                    | 6FX■002-5CS14-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 10                          | 1.5                                  | 6FX■002-5CS64-....                         | 6FX■008-1BB51-....                                              | 20.0<br>(0.79) | 18.2<br>(0.72)                   | 0.73<br>(0.49)  | 0.62<br>(0.42)                                    | 360<br>(14.17) | 140<br>(5.51) |
|                                           |                                 | 3                                    | 6FX■002-5CS14-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
|                                           | 4 × 16                          | 1.5                                  | 6FX 8 002-5CS24-....                       | 6FX■008-1BB61-....                                              | 24.2<br>(0.95) | 22.3<br>(0.88)                   | 1.10<br>(0.74)  | 1.01<br>(0.68)                                    | 440<br>(17.32) | 170<br>(6.69) |
|                                           |                                 | 3                                    | 6FX■002-5CS23-....                         |                                                                 |                |                                  |                 |                                                   |                |               |
| MOTION-CONNECT 500                        |                                 |                                      | 5                                          |                                                                 | 5              |                                  |                 |                                                   |                |               |
| MOTION-CONNECT 800PLUS                    |                                 |                                      | 8                                          |                                                                 | 8              |                                  |                 |                                                   |                |               |
| Length code                               |                                 |                                      | ....                                       |                                                                 | ....           |                                  |                 |                                                   |                |               |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.

<sup>4)</sup> e. c. = exposed core ends; suitable for motors with terminal box.

<sup>5)</sup> For SINAMICS S120 Motor Modules 45 A and 60 A in booksize format.

## Selection and ordering data (continued)

For SIMOTICS S-1FT7 motors with holding brake and with full-thread connector on  
SINAMICS S120 Motor Modules in booksize format

| Connection method,<br>Motor<br>Module end | No. of cores x<br>cross-section<br><br>mm <sup>2</sup> | Connec-<br>tor size,<br>motor<br>end | Pre-assembled cable<br>with brake cores<br><br>Order No. | Cable sold by the<br>meter <sup>1)</sup><br>with brake cores<br><br>Order No. | D <sub>max</sub>   |                | Weight<br>(without<br>connector) |                 | Smallest perm.<br>bending<br>radius <sup>2)</sup> |                |
|-------------------------------------------|--------------------------------------------------------|--------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------|--------------------|----------------|----------------------------------|-----------------|---------------------------------------------------|----------------|
|                                           |                                                        |                                      |                                                          |                                                                               | 6FX5               | 6FX8           | 6FX5                             | 6FX8            | 6FX5                                              | 6FX8           |
|                                           |                                                        |                                      |                                                          |                                                                               | mm<br>(in)         | mm<br>(in)     | kg/m<br>(lb/ft)                  | kg/m<br>(lb/ft) | mm<br>(in)                                        | mm<br>(in)     |
| Connector <sup>3)</sup>                   | 4 × 1.5+2 × 1.5                                        | 0.5                                  | 6FX 5 002-5DA20-....                                     | 6FX5008-1BA11-....                                                            | 10.8<br>(0.43)     | –              | 0.22<br>(0.15)                   | –               | 195<br>(7.68)                                     | –              |
|                                           |                                                        | 1                                    | 6FX 002-5DS01-....                                       | 6FX 008-1BA11-....                                                            | 10.8<br>(0.43)     | 12.0<br>(0.47) | 0.22<br>(0.15)                   | 0.16<br>(0.11)  | 195<br>(7.68)                                     | 90<br>(3.54)   |
|                                           |                                                        | 1.5                                  | 6FX 002-5DS21-....                                       |                                                                               |                    |                |                                  |                 |                                                   |                |
|                                           | 4 × 2.5+2 × 1.5                                        | 1                                    | 6FX 002-5DS11-....                                       | 6FX 008-1BA21-....                                                            | 12.4<br>(0.49)     | 13.8<br>(0.54) | 0.25<br>(0.17)                   | 0.30<br>(0.20)  | 225<br>(8.86)                                     | 105<br>(4.13)  |
|                                           |                                                        | 1.5                                  | 6FX 002-5DS31-....                                       |                                                                               |                    |                |                                  |                 |                                                   |                |
|                                           | 4 × 4+2 × 1.5                                          | 1.5                                  | 6FX 002-5DS41-....                                       | 6FX 008-1BA31-....                                                            | 14.0<br>(0.55)     | 15.2<br>(0.60) | 0.35<br>(0.24)                   | 0.38<br>(0.26)  | 255<br>(10.04)                                    | 115<br>(4.53)  |
|                                           | 4 × 6+2 × 1.5                                          | 1.5                                  | 6FX 002-5DS51-....                                       | 6FX 008-1BA41-....                                                            | 16.1<br>(0.63)     | 17.3<br>(0.68) | 0.49<br>(0.33)                   | 0.50<br>(0.34)  | 290<br>(11.42)                                    | 130<br>(5.12)  |
|                                           | 4 × 10+2 × 1.5                                         | 1.5                                  | 6FX 002-5DS61-....                                       | 6FX 008-1BA51-....                                                            | 21.7<br>(0.85)     | 20.1<br>(0.79) | 0.81<br>(0.54)                   | 0.71<br>(0.48)  | 395<br>(15.55)                                    | 150<br>(5.91)  |
|                                           |                                                        | 3                                    | 6FX 002-5DS13-....                                       |                                                                               |                    |                |                                  |                 |                                                   |                |
|                                           | Ring cable<br>lugs <sup>4)</sup>                       | 4 × 6+2 × 1.5                        | 1.5                                                      | 6FX 002-5DS54-....                                                            | 6FX 008-1BA41-.... | 16.1<br>(0.63) | 17.3<br>(0.68)                   | 0.49<br>(0.33)  | 0.50<br>(0.34)                                    | 290<br>(11.42) |
| 4 × 10+2 × 1.5                            |                                                        | 1.5                                  | 6FX 002-5DS64-....                                       | 6FX 008-1BA51-....                                                            | 21.7<br>(0.85)     | 20.1<br>(0.79) | 0.81<br>(0.54)                   | 0.71<br>(0.48)  | 395<br>(15.55)                                    | 150<br>(5.91)  |
|                                           |                                                        | 3                                    | 6FX 002-5DS14-....                                       |                                                                               |                    |                |                                  |                 |                                                   |                |
| 4 × 16+2 × 1.5                            |                                                        | 3                                    | 6FX 002-5DS23-....                                       | 6FX 008-1BA61-....                                                            | 25.0<br>(0.98)     | 23.8<br>(0.94) | 1.12<br>(0.75)                   | 1.03<br>(0.69)  | 450<br>(17.72)                                    | 180<br>(7.09)  |
| Exposed<br>core ends <sup>5)</sup>        | 4 × 16+2 × 1.5                                         | 3                                    | 6FX 002-5DG23-....                                       | 6FX 008-1BA61-....                                                            | 25.0<br>(0.98)     | 23.8<br>(0.94) | 1.12<br>(0.75)                   | 1.03<br>(0.69)  | 450<br>(17.72)                                    | 180<br>(7.09)  |
|                                           | 4 × 25+2 × 1.5                                         | 3                                    | 6FX 002-5DG33-....                                       | 6FX 008-1BA25-....                                                            | 29.4<br>(1.16)     | 27.6<br>(1.09) | 1.62<br>(1.09)                   | 1.47<br>(0.99)  | 530<br>(20.87)                                    | 280<br>(11.02) |
|                                           | 4 × 35+2 × 1.5                                         | 3                                    | 6FX 002-5DG43-....                                       | 6FX 008-1BA35-....                                                            | 32.6<br>(1.28)     | 31.9<br>(1.26) | 2.06<br>(1.38)                   | 1.92<br>(1.29)  | 590<br>(23.23)                                    | 320<br>(12.60) |
|                                           | 4 × 50+2 × 1.5                                         | 3                                    | 6FX 002-5DG53-....                                       | 6FX 008-1BA50-....                                                            | 38.0<br>(1.50)     | 35.0<br>(1.38) | 3.04<br>(2.04)                   | 2.56<br>(1.72)  | 685<br>(26.97)                                    | 350<br>(13.78) |
| MOTION-CONNECT 500                        |                                                        |                                      | 5                                                        |                                                                               | 5                  |                |                                  |                 |                                                   |                |
| MOTION-CONNECT 800PLUS                    |                                                        |                                      | 8                                                        |                                                                               | 8                  |                |                                  |                 |                                                   |                |
| Length code                               |                                                        |                                      | ....                                                     |                                                                               | ....               |                |                                  |                 |                                                   |                |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.

<sup>4)</sup> For SINAMICS S120 Motor Modules 45 A and 60 A in booksize format.

<sup>5)</sup> Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs, 1 M6 cable lug and 1 spring-loaded terminal are also included in the scope of supply of the cables.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for SIMOTICS S-1FT7/-1FK7/  
SIMOTICS M-1PH8 motors with full-thread connector

### Selection and ordering data (continued)

*For SIMOTICS S-1FT7 motors without holding brake/SIMOTICS S-1FK7 motors without holding brake/  
SIMOTICS M-1PH808/-1PH810/-1PH813 motors with full-thread connector on  
SINAMICS S120 Motor Modules in booksize compact format and Power Modules*

| Connection method,<br>Power Module end | No. of cores × cross-section<br><br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable <u>without</u> brake cores | Cable sold by the meter <sup>1)</sup> <u>without</u> brake cores | $D_{\max}$         |                    | Weight (without connector) |                         | Smallest perm. bending radius <sup>2)</sup> |                    |
|----------------------------------------|-----------------------------------------------------|---------------------------|------------------------------------------------|------------------------------------------------------------------|--------------------|--------------------|----------------------------|-------------------------|---------------------------------------------|--------------------|
|                                        |                                                     |                           | Order No.                                      | Order No.                                                        | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in) | 6FX5<br>kg/m<br>(lb/ft)    | 6FX8<br>kg/m<br>(lb/ft) | 6FX5<br>mm<br>(in)                          | 6FX8<br>mm<br>(in) |
| Exposed core ends                      | 4 × 1.5                                             | 1                         | 6FX 002-5CG01-....                             | 6FX 008-1BB11-....                                               | 8.4<br>(0.33)      | 9.5<br>(0.37)      | 0.12<br>(0.08)             | 0.15<br>(0.10)          | 155<br>(6.10)                               | 75<br>(2.95)       |
|                                        |                                                     | 1.5                       | 6FX 002-5CG21-....                             |                                                                  |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 2.5                                             | 1                         | 6FX 002-5CG11-....                             | 6FX 008-1BB21-....                                               | 10.0<br>(0.39)     | 11.0<br>(0.43)     | 0.21<br>(0.14)             | 0.20<br>(0.13)          | 180<br>(7.09)                               | 90<br>(3.54)       |
|                                        |                                                     | 1.5                       | 6FX 002-5CG31-....                             |                                                                  |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 4                                               | 1.5                       | 6FX 002-5CG41-....                             | 6FX 008-1BB31-....                                               | 11.4<br>(0.45)     | 12.3<br>(0.48)     | 0.27<br>(0.18)             | 0.27<br>(0.18)          | 210<br>(8.27)                               | 100<br>(3.94)      |
|                                        | 4 × 6                                               | 1.5                       | 6FX 002-5CG51-....                             | 6FX 008-1BB41-....                                               | 13.6<br>(0.54)     | 14.9<br>(0.59)     | 0.37<br>(0.25)             | 0.41<br>(0.28)          | 245<br>(9.65)                               | 120<br>(4.72)      |
|                                        | 4 × 10                                              | 1.5                       | 6FX 002-5CG61-....                             | 6FX 008-1BB51-....                                               | 20.0<br>(0.79)     | 18.2<br>(0.72)     | 0.73<br>(0.49)             | 0.62<br>(0.42)          | 360<br>(14.17)                              | 140<br>(5.51)      |
|                                        |                                                     | 3                         | 6FX 002-5CG13-....                             |                                                                  |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 16                                              | 3                         | 6FX 002-5CG23-....                             | 6FX 008-1BB61-....                                               | 24.2<br>(0.95)     | 22.3<br>(0.88)     | 1.10<br>(0.74)             | 1.01<br>(0.68)          | 440<br>(17.32)                              | 170<br>(6.69)      |
| MOTION-CONNECT 500                     |                                                     |                           | 5                                              | 5                                                                |                    |                    |                            |                         |                                             |                    |
| MOTION-CONNECT 800PLUS                 |                                                     |                           | 8                                              | 8                                                                |                    |                    |                            |                         |                                             |                    |
| Length code                            |                                                     |                           | ....                                           | ....                                                             |                    |                    |                            |                         |                                             |                    |

*For SIMOTICS S-1FT7 motors with holding brake/SIMOTICS S-1FK7 motors with holding brake and with full-thread connector on  
SINAMICS S120 Motor Modules in booksize compact format and Power Modules*

| Connection method,<br>Power Module end | No. of cores × cross-section<br><br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable <u>with</u> brake cores | Cable sold by the meter <sup>1)</sup> <u>with</u> brake cores | $D_{\max}$         |                    | Weight (without connector) |                         | Smallest perm. bending radius <sup>2)</sup> |                    |
|----------------------------------------|-----------------------------------------------------|---------------------------|---------------------------------------------|---------------------------------------------------------------|--------------------|--------------------|----------------------------|-------------------------|---------------------------------------------|--------------------|
|                                        |                                                     |                           | Order No.                                   | Order No.                                                     | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in) | 6FX5<br>kg/m<br>(lb/ft)    | 6FX8<br>kg/m<br>(lb/ft) | 6FX5<br>mm<br>(in)                          | 6FX8<br>mm<br>(in) |
| Exposed core ends                      | 4 × 1.5+2 × 1.5                                     | 0.5                       | 6FX 5 002-5DA30-....                        | 6FX 5 008-1BA11-....                                          | 10.8<br>(0.43)     | —                  | 0.22<br>(0.15)             | —                       | 195<br>(7.68)                               | —                  |
|                                        |                                                     | 1                         | 6FX 002-5DG01-....                          | 6FX 008-1BA11-....                                            | 10.8<br>(0.43)     | 12.0<br>(0.47)     | 0.22<br>(0.15)             | 0.16<br>(0.11)          | 195<br>(7.68)                               | 90<br>(3.54)       |
|                                        |                                                     | 1.5                       | 6FX 002-5DG21-....                          |                                                               |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 2.5+2 × 1.5                                     | 1                         | 6FX 002-5DG11-....                          | 6FX 008-1BA21-....                                            | 12.4<br>(0.49)     | 13.8<br>(0.54)     | 0.25<br>(0.17)             | 0.30<br>(0.20)          | 225<br>(8.86)                               | 105<br>(4.13)      |
|                                        |                                                     | 1.5                       | 6FX 002-5DG31-....                          |                                                               |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 4+2 × 1.5                                       | 1.5                       | 6FX 002-5DG41-....                          | 6FX 008-1BA31-....                                            | 14.0<br>(0.55)     | 15.2<br>(0.60)     | 0.35<br>(0.24)             | 0.38<br>(0.26)          | 255<br>(10.04)                              | 115<br>(4.53)      |
|                                        | 4 × 6+2 × 1.5                                       | 1.5                       | 6FX 002-5DG51-....                          | 6FX 008-1BA41-....                                            | 16.1<br>(0.63)     | 17.3<br>(0.68)     | 0.49<br>(0.33)             | 0.50<br>(0.34)          | 290<br>(11.42)                              | 130<br>(5.12)      |
|                                        | 4 × 10+2 × 1.5                                      | 1.5                       | 6FX 002-5DG61-....                          | 6FX 008-1BA51-....                                            | 21.7<br>(0.85)     | 20.1<br>(0.79)     | 0.81<br>(0.54)             | 0.71<br>(0.48)          | 395<br>(15.55)                              | 150<br>(5.91)      |
|                                        |                                                     | 3                         | 6FX 002-5DG13-....                          |                                                               |                    |                    |                            |                         |                                             |                    |
|                                        | 4 × 16+2 × 1.5                                      | 3                         | 6FX 002-5DG23-....                          | 6FX 008-1BA61-....                                            | 25.0<br>(0.98)     | 23.8<br>(0.94)     | 1.12<br>(0.75)             | 1.03<br>(0.69)          | 450<br>(17.72)                              | 180<br>(7.09)      |
|                                        | 4 × 25+2 × 1.5                                      | 3                         | 6FX 002-5DG33-....                          | 6FX 008-1BA25-....                                            | 29.4<br>(1.16)     | 27.6<br>(1.09)     | 1.62<br>(1.09)             | 1.47<br>(0.99)          | 530<br>(20.87)                              | 280<br>(11.02)     |
|                                        | 4 × 35+2 × 1.5                                      | 3                         | 6FX 002-5DG43-....                          | 6FX 008-1BA35-....                                            | 32.6<br>(1.28)     | 31.9<br>(1.26)     | 2.06<br>(1.38)             | 1.92<br>(1.29)          | 590<br>(23.23)                              | 320<br>(12.60)     |
|                                        | 4 × 50+2 × 1.5                                      | 3                         | 6FX 002-5DG53-....                          | 6FX 008-1BA50-....                                            | 38.0<br>(1.50)     | 35.0<br>(1.38)     | 3.04<br>(2.04)             | 2.56<br>(1.72)          | 685<br>(26.97)                              | 350<br>(13.78)     |
| MOTION-CONNECT 500                     |                                                     |                           | 5                                           | 5                                                             |                    |                    |                            |                         |                                             |                    |
| MOTION-CONNECT 800PLUS                 |                                                     |                           | 8                                           | 8                                                             |                    |                    |                            |                         |                                             |                    |
| Length code                            |                                                     |                           | ....                                        | ....                                                          |                    |                    |                            |                         |                                             |                    |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

## Accessories

## Extensions for power cables with SPEED-CONNECT or full-thread connector

| No. of cores × cross-section              |                                        | Connector size,<br>motor end | Basic cable for motors on SINAMICS S120 |                        | Extension           |           |      |
|-------------------------------------------|----------------------------------------|------------------------------|-----------------------------------------|------------------------|---------------------|-----------|------|
| without<br>brake cores<br>mm <sup>2</sup> | with<br>brake cores<br>mm <sup>2</sup> |                              | Motor Modules                           | Power Modules          |                     |           |      |
|                                           |                                        |                              | Type                                    | Type                   |                     | Order No. |      |
| –                                         | 4 × 1.5+2 × 1.5                        | 0.5                          | 6FX . 002-5DA20-....                    | 6FX . 002-5DA30-....   | 6FX 002-5ME05-....  |           |      |
| 4 × 1.5                                   | 4 × 1.5+2 × 1.5                        | 1                            | 6FX . 002-5 . S01-....                  | 6FX . 002-5 . G01-.... | 6FX 002-5 A05-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N01-....                  | 6FX . 002-5 . G10-.... | 6FX 002-5 N05-....  |           |      |
|                                           |                                        | 1.5                          | 6FX . 002-5 . S21-....                  | 6FX . 002-5 . G21-.... | 6FX 002-5 A28-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N21-....                  | 6FX . 002-5 . G22-.... | 6FX 002-5 Q28-....  |           |      |
| 4 × 2.5                                   | 4 × 2.5+2 × 1.5                        | 1                            | 6FX . 002-5 . S11-....                  | 6FX . 002-5 . G11-.... | 6FX 002-5 A15-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N11-....                  | 6FX . 002-5 . G12-.... | 6FX 002-5 Q15-....  |           |      |
|                                           |                                        | 1.5                          | 6FX . 002-5 . S31-....                  | 6FX . 002-5 . G31-.... | 6FX 002-5 A38-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N31-....                  | 6FX . 002-5 . G32-.... | 6FX 002-5 Q38-....  |           |      |
| 4 × 4                                     | 4 × 4+2 × 1.5                          | 1.5                          | 6FX . 002-5 . S41-....                  | 6FX . 002-5 . G41-.... | 6FX 002-5 A48-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N41-....                  | 6FX . 002-5 . G42-.... | 6FX 002-5 Q48-....  |           |      |
| 4 × 6                                     | 4 × 6+2 × 1.5                          | 1.5                          | 6FX . 002-5 . S51-....                  | 6FX . 002-5 . G51-.... | 6FX 002-5 A58-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . S54-....                  | –                      | 6FX 002-5 A58-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N51-....                  | 6FX . 002-5 . G52-.... | 6FX 002-5 Q58-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N54-....                  | –                      | 6FX 002-5 Q58-....  |           |      |
| 4 × 10                                    | 4 × 10+2 × 1.5                         | 1.5                          | 6FX . 002-5 . S61-....                  | 6FX . 002-5 . G61-.... | 6FX 002-5 A68-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . S64-....                  | –                      | 6FX 002-5 A68-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N61-....                  | 6FX . 002-5 . G62-.... | 6FX 002-5 Q68-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . N64-....                  | –                      | 6FX 002-5 Q68-....  |           |      |
|                                           |                                        | 3 <sup>1)</sup>              | 6FX . 002-5 . S13-....                  | 6FX . 002-5 . G13-.... | 6FX 002-5 X18-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . S14-....                  | –                      | 6FX 002-5 X18-....  |           |      |
| 4 × 16                                    | 4 × 16+2 × 1.5                         | 3 <sup>1)</sup>              | 6FX . 002-5 . S23-....                  | 6FX . 002-5 . G23-.... | 6FX 002-5 X28-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5CS24-....                    | –                      | 6FX 002-5 X28-....  |           |      |
|                                           |                                        |                              | 6FX . 002-5 . G23-....                  | –                      | 6FX 002-5 X28-....  |           |      |
| –                                         | 4 × 25+2 × 1.5                         | 3 <sup>1)</sup>              | 6FX . 002-5DG33-....                    | 6FX . 002-5DG33-....   | 6FX 002-5 DX38-.... |           |      |
| –                                         | 4 × 35+2 × 1.5                         | 3 <sup>1)</sup>              | 6FX . 002-5DG43-....                    | 6FX . 002-5DG43-....   | 6FX 002-5 DX48-.... |           |      |
| –                                         | 4 × 50+2 × 1.5                         | 3 <sup>1)</sup>              | 6FX . 002-5DG53-....                    | 6FX . 002-5DG53-....   | 6FX 002-5 DX58-.... |           |      |
| MOTION-CONNECT 500                        |                                        |                              |                                         |                        | 5                   |           |      |
| MOTION-CONNECT 800PLUS                    |                                        |                              |                                         |                        | 8                   |           |      |
| Without brake cores                       |                                        |                              |                                         |                        |                     | C         |      |
| With brake cores                          |                                        |                              |                                         |                        |                     | D         |      |
| Length code                               |                                        |                              |                                         |                        |                     |           | .... |

The maximum specified cable length (basic cable and extensions) must not be exceeded. The permissible maximum length of power cables with brake cores is reduced by 2 m (6.56 ft) for each interruption point.

<sup>1)</sup> Motor-end connector with full thread only.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for  
SIMOTICS M-1PH8 motors with terminal box

### Selection and ordering data

For SIMOTICS M-1PH808/-1PH810/-1PH813/-1PH816 motors with terminal box on SINAMICS S120 Motor Modules

| Motor                              | Thread             | No. of cores ×<br>cross-section | Connection<br>method<br>Motor<br>Module end | Pre-assembled cable                |                         | Cable sold by the<br>meter <sup>1)</sup> | D <sub>max</sub>   | Weight<br>(without<br>gland) | Smallest<br>perm. bend-<br>ing radius <sup>2)</sup> |
|------------------------------------|--------------------|---------------------------------|---------------------------------------------|------------------------------------|-------------------------|------------------------------------------|--------------------|------------------------------|-----------------------------------------------------|
| Type                               |                    |                                 |                                             |                                    |                         |                                          |                    |                              |                                                     |
| SIMOTICS                           |                    | mm <sup>2</sup>                 |                                             | Order No.                          | Order No.               |                                          | mm (in)            | kg/m (lb/ft)                 | mm (in)                                             |
| M-1PH808                           | M25                | 4 × 2.5                         | Connector <sup>3)</sup>                     | 6FX8002-5CP10-....                 | 6FX8008-1BB21-....      |                                          | 11.0 (0.43)        | 0.20 (0.13)                  | 90 (3.54)                                           |
|                                    |                    | 4 × 4                           |                                             | 6FX8002-5CP20-....                 | 6FX8008-1BB31-....      |                                          | 12.3 (0.48)        | 0.27 (0.18)                  | 100 (3.94)                                          |
| M-1PH810                           | M32                | 4 × 2.5                         | Connector <sup>3)</sup>                     | 6FX8002-5CP11-....                 | 6FX8008-1BB21-....      |                                          | 11.0 (0.43)        | 0.20 (0.13)                  | 90 (3.54)                                           |
|                                    |                    | 4 × 4                           |                                             | 6FX8002-5CP21-....                 | 6FX8008-1BB31-....      |                                          | 12.3 (0.48)        | 0.27 (0.18)                  | 100 (3.94)                                          |
|                                    |                    | 4 × 10                          |                                             | 6FX8002-5CP41-....                 | 6FX8008-1BB51-....      |                                          | 18.2 (0.72)        | 0.62 (0.42)                  | 140 (5.51)                                          |
|                                    |                    | 4 × 10                          | Exposed<br>core ends <sup>4)</sup>          | 6FX8002-5CR41-....                 |                         |                                          |                    |                              |                                                     |
|                                    |                    | M-1PH813                        | M40                                         | 4 × 10                             | Connector <sup>3)</sup> | 6FX8002-5CP42-....                       | 6FX8008-1BB51-.... |                              | 18.2 (0.72)                                         |
| Exposed<br>core ends <sup>4)</sup> | 6FX8002-5CR42-.... |                                 |                                             |                                    |                         |                                          |                    |                              |                                                     |
| M50                                | 4 × 10             |                                 | Connector <sup>3)</sup>                     | 6FX8002-5CP43-....                 |                         |                                          |                    |                              |                                                     |
|                                    |                    |                                 | Exposed<br>core ends <sup>4)</sup>          | 6FX8002-5CR43-....                 |                         |                                          |                    |                              |                                                     |
| M40                                | 4 × 16             |                                 | Exposed<br>core ends <sup>4)</sup>          | 6FX8002-5CR52-....                 | 6FX8008-1BB61-....      | 22.3 (0.88)                              | 1.01 (0.68)        | 170 (6.69)                   |                                                     |
| M50                                | 4 × 16             |                                 |                                             | 6FX8002-5CR53-....                 |                         |                                          |                    |                              |                                                     |
|                                    | 4 × 35             |                                 |                                             | 6FX5002-5CR73-....                 | 6FX5008-1BB35-....      | 31.5 (1.24)                              | 1.93 (1.30)        | 570 (22.44)                  |                                                     |
|                                    | 4 × 50             |                                 |                                             | 6FX5002-5CR83-....                 | 6FX5008-1BB50-....      | 38.0 (1.50)                              | 3.04 (2.04)        | 685 (26.97)                  |                                                     |
| M-1PH816                           | M50                |                                 | 4 × 16                                      | Exposed<br>core ends <sup>4)</sup> | 6FX8002-5CR53-....      | 6FX8008-1BB61-....                       | 22.3 (0.88)        | 1.01 (0.68)                  | 170 (6.69)                                          |
|                                    |                    |                                 |                                             |                                    | –                       | 6FX5008-1BB61-....                       | 24.2 (0.95)        | 1.10 (0.74)                  | 440 (17.32)                                         |
|                                    |                    | 4 × 35                          | 6FX5002-5CR73-....                          |                                    | 6FX5008-1BB35-....      | 31.5 (1.24)                              | 1.93 (1.30)        | 570 (22.44)                  |                                                     |
|                                    |                    |                                 | –                                           |                                    | 6FX8008-1BA35-....      | 29.6 (1.17)                              | 2.00 (1.34)        | 300 (11.81)                  |                                                     |
|                                    | 4 × 50             | 6FX5002-5CR83-....              | 6FX5008-1BB50-....                          |                                    | 38.0 (1.50)             | 3.04 (2.04)                              | 685 (26.97)        |                              |                                                     |
|                                    |                    | –                               | 6FX8008-1BA50-....                          |                                    | 34.4 (1.35)             | 2.66 (1.79)                              | 345 (13.58)        |                              |                                                     |
|                                    | M63                | 4 × 25                          | –                                           |                                    | 6FX5008-1BB25-....      | 28.0 (1.10)                              | 1.62 (1.09)        | 505 (19.88)                  |                                                     |
|                                    |                    |                                 | –                                           |                                    | 6FX8008-1BA25-....      | 27.6 (1.09)                              | 1.51 (1.01)        | 280 (11.02)                  |                                                     |
|                                    |                    | 4 × 35                          | –                                           |                                    | 6FX5008-1BB35-....      | 31.5 (1.24)                              | 1.93 (1.30)        | 570 (22.44)                  |                                                     |
|                                    |                    |                                 | –                                           |                                    | 6FX8008-1BA35-....      | 29.6 (1.17)                              | 2.00 (1.34)        | 300 (11.81)                  |                                                     |
|                                    |                    | 4 × 50                          | –                                           |                                    | 6FX5008-1BB50-....      | 38.0 (1.50)                              | 3.04 (2.04)        | 685 (26.97)                  |                                                     |
|                                    |                    |                                 | –                                           |                                    | 6FX8008-1BA50-....      | 34.4 (1.35)                              | 2.66 (1.79)        | 345 (13.58)                  |                                                     |
|                                    | 4 × 70             | –                               | 6FX5008-1BB70-....                          |                                    | 42.6 (1.68)             | 3.96 (2.66)                              | 770 (30.31)        |                              |                                                     |
| MOTION-CONNECT 500                 |                    |                                 |                                             |                                    | 5                       |                                          | 5                  |                              |                                                     |
| MOTION-CONNECT 800PLUS             |                    |                                 |                                             |                                    | 8                       |                                          | 8                  |                              |                                                     |
| Length code                        |                    |                                 |                                             |                                    | ....                    |                                          | ....               |                              |                                                     |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.

<sup>4)</sup> Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs and 4 M6 cable lugs are also included in the scope of supply of the cables.

## Selection and ordering data (continued)

For SIMOTICS M-1PH808/-1PH810/-1PH813/-1PH816 motors with terminal box on SINAMICS S120 Power Modules

| Motor                  | Thread | No. of cores × cross-section | Connection method<br>Power Module end | Pre-assembled cable | Cable sold by the meter <sup>1)</sup> | D <sub>max</sub> | Weight (without gland) | Smallest perm. bending radius <sup>2)</sup> |
|------------------------|--------|------------------------------|---------------------------------------|---------------------|---------------------------------------|------------------|------------------------|---------------------------------------------|
| Type                   |        |                              |                                       |                     |                                       |                  |                        |                                             |
| SIMOTICS               |        | mm <sup>2</sup>              |                                       | Order No.           | Order No.                             | mm (in)          | kg/m (lb/ft)           | mm (in)                                     |
| M-1PH808               | M25    | 4 × 2.5                      | Exposed core ends <sup>3)</sup>       | 6FX8002-5CR10-....  | 6FX8008-1BB21-....                    | 11.0 (0.43)      | 0.20 (0.13)            | 90 (3.54)                                   |
|                        |        | —                            |                                       | 6FX5008-1BB21-....  | 10.0 (0.39)                           | 0.21 (0.14)      | 180 (7.09)             |                                             |
|                        |        | 4 × 4                        |                                       | 6FX8002-5CR20-....  | 6FX8008-1BB31-....                    | 12.3 (0.48)      | 0.27 (0.18)            | 100 (3.94)                                  |
|                        |        |                              |                                       | —                   | 6FX5008-1BB31-....                    | 11.4 (0.45)      | 0.27 (0.18)            | 210 (8.27)                                  |
| M-1PH810               | M32    | 4 × 2.5                      | Exposed core ends <sup>3)</sup>       | 6FX8002-5CR11-....  | 6FX8008-1BB21-....                    | 11.0 (0.43)      | 0.20 (0.13)            | 90 (3.54)                                   |
|                        |        | —                            |                                       | 6FX5008-1BB21-....  | 10.0 (0.39)                           | 0.21 (0.14)      | 180 (7.09)             |                                             |
|                        |        | 4 × 4                        |                                       | 6FX8002-5CR21-....  | 6FX8008-1BB31-....                    | 12.3 (0.48)      | 0.27 (0.18)            | 100 (3.94)                                  |
|                        |        |                              |                                       | —                   | 6FX5008-1BB31-....                    | 11.4 (0.45)      | 0.27 (0.18)            | 210 (8.27)                                  |
|                        |        | 4 × 10                       |                                       | 6FX8002-5CR41-....  | 6FX8008-1BB51-....                    | 18.2 (0.72)      | 0.62 (0.42)            | 140 (5.51)                                  |
|                        |        | —                            | 6FX5008-1BB51-....                    | 20.0 (0.79)         | 0.73 (0.49)                           | 360 (14.17)      |                        |                                             |
| M-1PH813               | M40    | 4 × 10                       | Exposed core ends <sup>3)</sup>       | 6FX8002-5CR42-....  | 6FX8008-1BB51-....                    | 18.2 (0.72)      | 0.62 (0.42)            | 140 (5.51)                                  |
|                        |        |                              |                                       | —                   | 6FX5008-1BB51-....                    | 20.0 (0.79)      | 0.73 (0.49)            | 360 (14.17)                                 |
|                        | M50    | 6FX8002-5CR43-....           |                                       |                     |                                       |                  |                        |                                             |
|                        |        | —                            |                                       |                     |                                       |                  |                        |                                             |
|                        | M40    | 4 × 16                       |                                       | 6FX8002-5CR52-....  | 6FX8008-1BB61-....                    | 22.3 (0.88)      | 1.01 (0.68)            | 170 (6.69)                                  |
|                        |        |                              |                                       | —                   | 6FX5008-1BB61-....                    | 24.2 (0.95)      | 1.10 (0.74)            | 440 (17.32)                                 |
|                        | M50    | 6FX8002-5CR53-....           |                                       |                     |                                       |                  |                        |                                             |
|                        |        | —                            |                                       |                     |                                       |                  |                        |                                             |
|                        | M40    | 4 × 35                       |                                       | 6FX5002-5CR72-....  | 6FX5008-1BB35-....                    | 31.5 (1.24)      | 1.93 (1.30)            | 570 (22.44)                                 |
|                        |        |                              |                                       | 6FX5002-5CR73-....  | 6FX8008-1BA35-....                    | 29.6 (1.17)      | 2.00 (1.34)            | 300 (11.81)                                 |
| M50                    | 4 × 50 | 6FX5002-5CR83-....           | 6FX5008-1BB50-....                    | 38.0 (1.50)         | 3.04 (2.04)                           | 685 (26.97)      |                        |                                             |
|                        |        | —                            | 6FX8008-1BA50-....                    | 34.4 (1.35)         | 2.66 (1.79)                           | 345 (13.58)      |                        |                                             |
| M-1PH816               | M50    | 4 × 16                       | Exposed core ends <sup>3)</sup>       | 6FX8002-5CR53-....  | 6FX8008-1BB61-....                    | 22.3 (0.88)      | 1.01 (0.68)            | 170 (6.69)                                  |
|                        |        | —                            |                                       | 6FX5008-1BB61-....  | 24.2 (0.95)                           | 1.10 (0.74)      | 440 (17.32)            |                                             |
|                        |        | 4 × 35                       |                                       | 6FX5002-5CR73-....  | 6FX5008-1BB35-....                    | 31.5 (1.24)      | 1.93 (1.30)            | 570 (22.44)                                 |
|                        | —      | 6FX8008-1BA35-....           |                                       | 29.6 (1.17)         | 2.00 (1.34)                           | 300 (11.81)      |                        |                                             |
|                        | 4 × 50 | 6FX5002-5CR83-....           |                                       | 6FX5008-1BB50-....  | 38.0 (1.50)                           | 3.04 (2.04)      | 685 (26.97)            |                                             |
|                        |        | —                            |                                       | 6FX8008-1BA50-....  | 34.4 (1.35)                           | 2.66 (1.79)      | 345 (13.58)            |                                             |
|                        | M63    | 4 × 25                       |                                       | —                   | 6FX5008-1BB25-....                    | 28.0 (1.10)      | 1.62 (1.09)            | 505 (19.88)                                 |
|                        |        | —                            |                                       | 6FX8008-1BA25-....  | 27.6 (1.09)                           | 1.51 (1.01)      | 280 (11.02)            |                                             |
|                        |        | 4 × 35                       |                                       | —                   | 6FX5008-1BB35-....                    | 31.5 (1.24)      | 1.93 (1.30)            | 570 (22.44)                                 |
|                        |        | —                            |                                       | 6FX8008-1BA35-....  | 29.6 (1.17)                           | 2.00 (1.34)      | 300 (11.81)            |                                             |
| 4 × 50                 |        | —                            | 6FX5008-1BB50-....                    | 38.0 (1.50)         | 3.04 (2.04)                           | 685 (26.97)      |                        |                                             |
|                        | 4 × 70 | —                            | 6FX8008-1BA50-....                    | 34.4 (1.35)         | 2.66 (1.79)                           | 345 (13.58)      |                        |                                             |
|                        |        | —                            | 6FX5008-1BB70-....                    | 42.6 (1.68)         | 3.96 (2.66)                           | 770 (30.31)      |                        |                                             |
| MOTION-CONNECT 500     |        |                              |                                       | 5                   |                                       | 5                |                        |                                             |
| MOTION-CONNECT 800PLUS |        |                              |                                       | 8                   |                                       | 8                |                        |                                             |
| Length code            |        |                              |                                       | ....                |                                       |                  | ....                   |                                             |

1) Note type of delivery.

2) Valid for installation in a cable carrier.

3) Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs and 4 M6 cable lugs are also included in the scope of supply of the cables.

# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

### Power cables for SIMOTICS M-1PH8 motors with terminal box

#### Selection and ordering data (continued)

##### For SIMOTICS M-1PH808/-1PH810/-1PH813 motors with terminal box on SINAMICS S120 Combi Power Modules

| Motor                  | Thread | No. of cores<br>× cross-<br>section | Connection<br>method<br>Power<br>Module end | Pre-assembled cable | Cable sold by the<br>meter <sup>1)</sup> | $D_{\max}$         | Weight<br>(without<br>gland) |                         | Smallest perm. bend-<br>ing radius <sup>2)</sup> |                    |                    |
|------------------------|--------|-------------------------------------|---------------------------------------------|---------------------|------------------------------------------|--------------------|------------------------------|-------------------------|--------------------------------------------------|--------------------|--------------------|
| Type                   |        | mm <sup>2</sup>                     |                                             | Order No.           | Order No.                                | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in)           | 6FX5<br>kg/m<br>(lb/ft) | 6FX8<br>kg/m<br>(lb/ft)                          | 6FX5<br>mm<br>(in) | 6FX8<br>mm<br>(in) |
| M-1PH808               | M25    | 4 × 2.5                             | Exposed<br>core ends <sup>3)</sup>          | 6FX■002-5CE02-....  | 6FX8008-1BB21-....                       | 11.0<br>(0.43)     | 11.0<br>(0.43)               | 0.21<br>(0.14)          | 0.23<br>(0.16)                                   | 180<br>(7.09)      | 90<br>(3.54)       |
| M-1PH810               | M32    | 4 × 4                               | Exposed<br>core ends <sup>3)</sup>          | 6FX■002-5CE04-....  | 6FX8008-1BB31-....                       | 11.4<br>(0.45)     | 12.3<br>(0.48)               | 0.27<br>(0.18)          | 0.31<br>(0.21)                                   | 210<br>(8.27)      | 100<br>(3.94)      |
| M-1PH813               | M40    | 4 × 6                               | Exposed<br>core ends <sup>3)</sup>          | 6FX■002-5CE06-....  | 6FX8008-1BB41-....                       | 20.0<br>(0.79)     | 15.1<br>(0.59)               | 0.37<br>(0.25)          | 0.42<br>(0.28)                                   | 245<br>(9.65)      | 120<br>(4.72)      |
| MOTION-CONNECT 500     |        |                                     |                                             | 5                   |                                          |                    |                              |                         |                                                  |                    |                    |
| MOTION-CONNECT 800PLUS |        |                                     |                                             | 8                   |                                          | 8                  |                              |                         |                                                  |                    |                    |
| Length code            |        |                                     |                                             | ....                |                                          |                    |                              |                         |                                                  |                    | ....               |

##### Other cables sold by the meter for SIMOTICS M-1PH818/-1PH822/-1PH835 motors

|                           | No. of cores<br>× cross-<br>section | Connection<br>method<br>Power<br>Module end | Pre-assembled cable | Cable sold by the<br>meter <sup>1)</sup> | $D_{\max}$     | Weight<br>(without<br>gland) | Smallest<br>perm.<br>bending<br>radius <sup>2)</sup> |
|---------------------------|-------------------------------------|---------------------------------------------|---------------------|------------------------------------------|----------------|------------------------------|------------------------------------------------------|
|                           | mm <sup>2</sup>                     |                                             | Order No.           | Order No.                                | mm (in)        | kg/m (lb/ft)                 | mm (in)                                              |
|                           | 4 × 95                              |                                             | –                   | 6FX5008-1BB05-....                       | 51.7<br>(2.04) | 5.55<br>(3.73)               | 935<br>(36.81)                                       |
|                           | 4 × 120                             |                                             | –                   | 6FX5008-1BB12-....                       | 56.0<br>(2.20) | 6.60<br>(4.43)               | 1010<br>(39.76)                                      |
| <b>MOTION-CONNECT 500</b> |                                     |                                             |                     | 5                                        |                |                              |                                                      |
| Length code               |                                     |                                             |                     | ....                                     |                |                              |                                                      |

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs and 4 M6 cable lugs are also included in the scope of supply of the cables.

## Selection and ordering data

For SIMOTICS L-1FN3 linear motors, peak/continuous load versions, connection to SINAMICS S120 through adapter cable with full-thread connector

| No. of cores × cross-section | Thread | Pre-assembled adapter cable       | Connector size<br>Interface | Pre-assembled basic cable to the drive system | Cable sold by meter <sup>1)</sup> for pre-assembled adapter cable | D <sub>max</sub> | Weight (without connector) | Smallest perm. bending radius <sup>2)</sup> |
|------------------------------|--------|-----------------------------------|-----------------------------|-----------------------------------------------|-------------------------------------------------------------------|------------------|----------------------------|---------------------------------------------|
| mm <sup>2</sup>              |        | Order No. <sup>3)</sup>           |                             | Order No.                                     | Order No.                                                         | mm (in)          | kg/m (lb/ft)               | mm (in)                                     |
| 4 × 2.5                      | M20    | 6FX7002-5LM42-.... <sup>*)</sup>  | 1                           | 6FX8002-5CS11-....                            | 6FX8008-1BB21-....                                                | 11.0 (0.43)      | 0.20 (0.13)                | 90 (3.54)                                   |
| 4 × 2.5                      | M20    | 6FX7002-5LM62-.... <sup>**)</sup> | 1                           | 6FX8002-5CS11-....                            | 6FX8008-1BB21-....                                                | 11.0 (0.43)      | 0.20 (0.13)                | 90 (3.54)                                   |
| 4 × 4                        | M32    | 6FX7002-5LM72-....                | 1.5                         | 6FX8002-5CS41-.... <sup>***)</sup>            | 6FX8008-1BB31-....                                                | 12.3 (0.48)      | 0.27 (0.18)                | 100 (3.94)                                  |
| 4 × 6                        | M32    | 6FX7002-5LM82-....                | 1.5                         | 6FX8002-5CS54-....                            | 6FX8008-1BB41-....                                                | 14.9 (0.59)      | 0.41 (0.28)                | 120 (4.72)                                  |
| 4 × 10                       | M32    | 6FX7002-5LM32-....                | 1.5                         | 6FX8002-5CS64-....                            | 6FX8008-1BB51-....                                                | 18.2 (0.72)      | 0.62 (0.42)                | 140 (5.51)                                  |
| 4 × 16                       | M32    | 6FX7002-5LM02-....                | 1.5                         | 6FX8002-5CS24-....                            | 6FX8008-1BB61-....                                                | 22.3 (0.88)      | 1.01 (0.68)                | 170 (6.69)                                  |
| MOTION-CONNECT 700           |        | 7                                 |                             |                                               |                                                                   |                  |                            |                                             |
| MOTION-CONNECT 800PLUS       |        |                                   |                             | 8                                             | 8                                                                 |                  |                            |                                             |
| Length code                  |        | ....                              |                             | ....                                          | ....                                                              |                  |                            |                                             |

## Accessories

Power cable extensions for SIMOTICS L-1FN3 linear motors, peak/continuous load versions with full-thread connector

| No. of cores × cross-section<br>mm <sup>2</sup> | Connector size | Pre-assembled basic cable to the drive system<br>Type | Extension<br>Order No. |
|-------------------------------------------------|----------------|-------------------------------------------------------|------------------------|
| 4 × 2.5                                         | 1              | 6FX8002-5CS11-....                                    | 6FX8002-5CA15-....     |
| 4 × 4                                           | 1.5            | 6FX8002-5CS41-.... <sup>***)</sup>                    | 6FX8002-5CA48-....     |
| 4 × 6                                           | 1.5            | 6FX8002-5CS54-....                                    | 6FX8002-5CA58-....     |
| 4 × 10                                          | 1.5            | 6FX8002-5CS64-....                                    | 6FX8002-5CA68-....     |
| 4 × 16                                          | 1.5            | 6FX8002-5CS24-....                                    | 6FX8002-5YW12-....     |
| MOTION-CONNECT 800PLUS                          |                |                                                       | 8                      |
| Length code                                     |                |                                                       | ....                   |

The combinations of power cable extensions shown are only provided by way of example.

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>3)</sup> The 6FX7002-5LM... cables comprise MOTION-CONNECT 800PLUS cables which are sold by the meter.

<sup>\*)</sup> For SIMOTICS L-1FN30/-1FN31 motors only.

<sup>\*\*)</sup> For SIMOTICS L-1FN33/-1FN34/-1FN36/-1FN39 motors only.

<sup>\*\*\*)</sup> For SIMOTICS L-1FN3 linear motors in the peak load version, the pre-assembled basic cable 6FX8002-5CS54-.... (4 × 6 mm<sup>2</sup>) to the SINAMICS S120 drive system must be used.



# MOTION-CONNECT connection systems

## Power cables for SINAMICS S120

Power cables for  
SIMOTICS L-1FN6 motors

### Selection and ordering data

For SIMOTICS L-1FN6 linear motors with SPEED-CONNECT connector on SINAMICS S120

| No. of cores × cross-section<br>mm <sup>2</sup> | Connector size,<br>motor end | Pre-assembled cable<br>to the drive system<br>Order No. | Cable sold by the<br>meter <sup>1)</sup><br>Order No. | D <sub>max</sub><br>mm (in) | Weight<br>(without<br>connector)<br>kg/m (lb/ft) | Smallest perm.<br>bending<br>radius <sup>2)</sup><br>mm (in) |
|-------------------------------------------------|------------------------------|---------------------------------------------------------|-------------------------------------------------------|-----------------------------|--------------------------------------------------|--------------------------------------------------------------|
| 4 × 1.5                                         | 1                            | 6FX8002-5CN01-....                                      | 6FX8008-1BB11-....                                    | 9.5 (0.37)                  | 0.15 (0.10)                                      | 75 (2.95)                                                    |
| 4 × 2.5                                         | 1                            | 6FX8002-5CN11-....                                      | 6FX8008-1BB21-....                                    | 11.0 (0.43)                 | 0.20 (0.13)                                      | 90 (3.54)                                                    |
| 4 × 4                                           | 1.5                          | 6FX8002-5CN41-....                                      | 6FX8008-1BB31-....                                    | 12.3 (0.48)                 | 0.27 (0.18)                                      | 100 (3.94)                                                   |
| 4 × 10                                          | 1.5                          | 6FX8002-5CN64-.... <sup>*)</sup>                        | 6FX8008-1BB51-....                                    | 18.2 (0.72)                 | 0.62 (0.42)                                      | 140 (5.51)                                                   |
| <b>MOTION-CONNECT 800PLUS</b>                   |                              | <b>8</b>                                                | <b>8</b>                                              |                             |                                                  |                                                              |
| Length code                                     |                              | ....                                                    | ....                                                  |                             |                                                  |                                                              |

### Accessories

Power cable extensions for SIMOTICS L-1FN6 linear motors with SPEED-CONNECT connector

| No. of cores × cross-section<br>mm <sup>2</sup> | Connector size, motor end | Pre-assembled cable to the drive system<br>Type | Extension<br>Order No. |
|-------------------------------------------------|---------------------------|-------------------------------------------------|------------------------|
| 4 × 1.5                                         | 1                         | 6FX8002-5CN01-....                              | 6FX8002-5CN05-....     |
| 4 × 2.5                                         | 1                         | 6FX8002-5CN11-....                              | 6FX8002-5CQ15-....     |
| 4 × 4                                           | 1.5                       | 6FX8002-5CN41-....                              | 6FX8002-5DQ48-....     |
| 4 × 10                                          | 1.5                       | 6FX8002-5CN64-.... <sup>*)</sup>                | 6FX8002-5DQ68-....     |
| <b>MOTION-CONNECT 800PLUS</b>                   |                           |                                                 | <b>8</b>               |
| Length code                                     |                           |                                                 | ....                   |

The combinations of power cable extensions shown are only provided by way of example.

<sup>1)</sup> Note type of delivery.

<sup>2)</sup> Valid for installation in a cable carrier.

<sup>\*)</sup> Module end with ring cable lugs.

## Selection and ordering data

For SIMOTICS T-1FW6 built-in torque motors with connection via adapter cable with full-thread connector

| No. of cores × cross-section<br>mm <sup>2</sup> | Connector size,<br>motor end | Pre-assembled cable<br>to the drive system<br>Order No. | Cable sold by the<br>meter <sup>1)</sup><br>Order No. | D <sub>max</sub><br>mm (in) | Weight<br>(without<br>connector)<br>kg/m (lb/ft) | Smallest perm.<br>bending<br>radius <sup>2)</sup><br>mm (in) |
|-------------------------------------------------|------------------------------|---------------------------------------------------------|-------------------------------------------------------|-----------------------------|--------------------------------------------------|--------------------------------------------------------------|
| 4 × 2.5                                         | 1                            | 6FX8002-5CS11-....                                      | 6FX8008-1BB21-....                                    | 11.0 (0.43)                 | 0.20 (0.13)                                      | 90 (3.54)                                                    |
| 4 × 4                                           | 1.5                          | 6FX8002-5CS41-....                                      | 6FX8008-1BB31-....                                    | 12.3 (0.48)                 | 0.27 (0.18)                                      | 100 (3.94)                                                   |
| 4 × 6                                           | 1.5                          | 6FX8002-5CS54-....                                      | 6FX8008-1BB41-....                                    | 14.9 (0.59)                 | 0.41 (0.28)                                      | 120 (4.72)                                                   |
| 4 × 10                                          | 1.5                          | 6FX8002-5CS64-....                                      | 6FX8008-1BB51-....                                    | 18.2 (0.72)                 | 0.62 (0.42)                                      | 140 (5.51)                                                   |
| 4 × 16                                          | 1.5                          | 6FX8002-5CS24-....                                      | 6FX8008-1BB61-....                                    | 22.3 (0.88)                 | 1.01 (0.68)                                      | 170 (6.69)                                                   |
| <b>MOTION-CONNECT 800PLUS</b>                   |                              | 8                                                       | 8                                                     |                             |                                                  |                                                              |
| Length code                                     |                              | ....                                                    | ....                                                  |                             |                                                  |                                                              |

## Accessories

Power cable extensions for SIMOTICS T-1FW6 built-in torque motors with full-thread connector

| No. of cores × cross-section<br>mm <sup>2</sup> | Connector size | Pre-assembled cable to the drive system<br>Type | Extension<br>Order No. |
|-------------------------------------------------|----------------|-------------------------------------------------|------------------------|
| 4 × 2.5                                         | 1              | 6FX8002-5CS11-....                              | 6FX8002-5CA15-....     |
| 4 × 4                                           | 1.5            | 6FX8002-5CS41-....                              | 6FX8002-5CA48-....     |
| 4 × 6                                           | 1.5            | 6FX8002-5CS54-....                              | 6FX8002-5CA58-....     |
| 4 × 10                                          | 1.5            | 6FX8002-5CS64-....                              | 6FX8002-5CA68-....     |
| 4 × 16                                          | 1.5            | 6FX8002-5CS24-....                              | 6FX8002-5YW12-....     |
| <b>MOTION-CONNECT 800PLUS</b>                   |                |                                                 | 8                      |
| Length code                                     |                |                                                 | ....                   |

The combinations of power cable extensions shown are only provided by way of example.

<sup>1)</sup> Note type of delivery.<sup>2)</sup> Valid for installation in a cable carrier.

# MOTION-CONNECT connection systems

## Signal cables for SINAMICS S120

### Overview



MOTION-CONNECT DRIVE-CLiQ signal cable with IP20/IP67 connector  
Signal cables are pre-assembled and are sold by the meter for the connection of a variety of components.

The following different types of cable are available:

- DRIVE-CLiQ signal cables
- MOTION-CONNECT DRIVE-CLiQ signal cables
- MOTION-CONNECT pre-assembled signal cables

#### Type of delivery for pre-assembled signal cables

Pre-assembled signal cables are available in units of 10 cm (3.94 in).

The cables are supplied on reels up to 30 kg or 100 m (66.2 lb or 328 ft). Above 30 kg or 100 m (66.2 lb or 328 ft), cable drums are used instead of reels.

### Application

#### DRIVE-CLiQ signal cables

are used to connect components with DRIVE-CLiQ connections which have a separate or external 24 V DC power supply.

#### MOTION-CONNECT DRIVE-CLiQ signal cables

are used whenever components with DRIVE-CLiQ connections must meet high requirements such as mechanical stress and oil resistance, e.g. where a connection is made outside the cabinet between

- Motor Modules and Sensor Modules
- Motor Modules and motors with DRIVE-CLiQ interface
- Motor Modules and direct measuring systems with DRIVE-CLiQ interface (incl. third-party measuring systems)

MOTION-CONNECT DRIVE-CLiQ signal cables have 24 V DC cores.

#### MOTION-CONNECT pre-assembled signal cables

are used whenever motor encoders on motors without DRIVE-CLiQ interface are connected to Sensor Modules.

If pre-assembled signal cables are to be installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied. In this case, the contacts of the cables are crimped and the connector enclosure is supplied separately. After installing the cables, the customer assembles the connector enclosure.

The 6FX.002-2C...-.... and 6FX.002-2E...-.... signal cables are available with crimped contacts and with the connector enclosure supplied separately (not in the case of DRIVE-CLiQ signal cables).

Signal cables with separately supplied **motor-end** connector enclosure. In this case, the 6th position of the Order No. must be changed from **0** to **4**:  
6FX.042-2C...-....

Signal cables with separately supplied **module-end** connector enclosure. In this case, the 6th position of the Order No. must be changed from **0** to **1**:  
6FX.012-2C...-....

#### Note:

Once the contacts have latched into the insulator, they can no longer be removed.

# MOTION-CONNECT connection systems

## Signal cables for SINAMICS S120

### Technical specifications

| DRIVE-CLiQ signal cables                    | DRIVE-CLiQ                                                    | DRIVE-CLiQ<br>MOTION-CONNECT 500                               | DRIVE-CLiQ<br>MOTION-CONNECT 800PLUS                                                                   |
|---------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                                             | 6FX2...-1DC...-....                                           | 6FX5...-DC...-....                                             | 6FX8...-DC...-....                                                                                     |
| <b>Approvals, according to</b>              |                                                               |                                                                |                                                                                                        |
| • cURus or UR/CSA                           | UL STYLE 2502/CSA-N.210.2-M90                                 | UL STYLE 2502/CSA-N.210.2-M90                                  | UL STYLE 2502/CSA-N.210.2-M90                                                                          |
| • UR-CSA File No. <sup>1)</sup>             | Yes                                                           | Yes                                                            | Yes                                                                                                    |
| • RoHS conformity                           | Yes                                                           | Yes                                                            | Yes                                                                                                    |
| <b>Rated voltage according to EN 50395</b>  | 30 V                                                          | 30 V                                                           | 30 V                                                                                                   |
| <b>Test voltage, rms</b>                    | 500 V                                                         | 500 V                                                          | 500 V                                                                                                  |
| <b>Operating temperature on the surface</b> |                                                               |                                                                |                                                                                                        |
| • Fixed installation                        | -20 ... +80 °C (-4 ... +176 °F)                               | -20 ... +80 °C (-4 ... +176 °F)                                | -50 ... +80 °C (-58 ... +176 °F)                                                                       |
| • Flexible installation                     | –                                                             | 0 ... 60 °C (32 ... 140 °F)                                    | -20 ... +60 °C (-4 ... +140 °F)                                                                        |
| <b>Tensile stress, max.</b>                 |                                                               |                                                                |                                                                                                        |
| • Fixed installation                        | 45 N/mm <sup>2</sup> (6526 lb <sub>f</sub> /in <sup>2</sup> ) | 80 N/mm <sup>2</sup> (11603 lb <sub>f</sub> /in <sup>2</sup> ) | 50 N/mm <sup>2</sup> (7252 lb <sub>f</sub> /in <sup>2</sup> )                                          |
| • Flexible installation                     | –                                                             | 30 N/mm <sup>2</sup> (4351 lb <sub>f</sub> /in <sup>2</sup> )  | 20 N/mm <sup>2</sup> (2901 lb <sub>f</sub> /in <sup>2</sup> )                                          |
| <b>Smallest bending radius</b>              |                                                               |                                                                |                                                                                                        |
| • Fixed installation                        | 50 mm (1.97 in)                                               | 35 mm (1.38 in)                                                | 35 mm (1.38 in)                                                                                        |
| • Flexible installation                     | –                                                             | 125 mm (4.92 in)                                               | 75 mm (2.95 in)                                                                                        |
| <b>Torsional stress</b>                     | –                                                             | Absolute 30°/m                                                 | Absolute 30°/m                                                                                         |
| <b>Bending</b>                              | –                                                             | 100000                                                         | 10 million                                                                                             |
| <b>Traversing velocity</b>                  | –                                                             | 30 m/min (98.4 ft/min)                                         | 300 m/min (984 ft/min)                                                                                 |
| <b>Acceleration</b>                         | –                                                             | 2 m/s <sup>2</sup> (6.56 ft/s <sup>2</sup> )                   | Up to 50 m/s <sup>2</sup> (164 ft/s <sup>2</sup> ),<br><a href="#">see characteristics on page 7/5</a> |
| <b>Insulation material, incl. jacket</b>    | CFC/silicone-free                                             | CFC/silicone-free                                              | CFC/halogen/silicone-free<br>IEC 60754-1/DIN VDE 0472-815                                              |
| <b>Oil resistance</b>                       | EN 60811-2-1                                                  | EN 60811-2-1 (mineral oil only)                                | EN 60811-2-1                                                                                           |
| <b>Outer jacket</b>                         | PVC<br><br>Gray RAL 7032                                      | PVC<br><br>DESINA color green RAL 6018                         | PUR, HD22.10 S2<br>(VDE 0282, Part 10)<br><br>DESINA color green RAL 6018                              |
| <b>Flame-retardant</b>                      | EN 60332-1-1 to 1-3                                           | EN 60332-1-1 to 1-3                                            | EN 60332-1-1 to 1-3                                                                                    |

Degree of protection of pre-assembled signal cables and their extensions when closed and connected: IP67.

<sup>1)</sup> The File No. is printed on the cable jacket.

# MOTION-CONNECT connection systems

## Signal cables for SINAMICS S120

### Technical specifications (continued)

| Signal cables                               | MOTION-CONNECT 500<br>6FX500.-.....-.....                     | MOTION-CONNECT 800PLUS<br>6FX800.-.....-.....                                                          |
|---------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Approvals, according to</b>              |                                                               |                                                                                                        |
| • cURus or UR/CSA                           | UL758-CSA-C22.2-N.210.2-M90                                   | UL758-CSA-C22.2-N.210.2-M90                                                                            |
| • UR-CSA File No. <sup>1)</sup>             | Yes                                                           | Yes                                                                                                    |
| • RoHS conformity                           | Yes                                                           | Yes                                                                                                    |
| <b>Rated voltage according to EN 50395</b>  | 30 V                                                          | 30 V                                                                                                   |
| <b>Test voltage, rms</b>                    | 500 V                                                         | 500 V                                                                                                  |
| <b>Operating temperature on the surface</b> |                                                               |                                                                                                        |
| • Fixed installation                        | -20 ... +80 °C (-4 ... +176 °F)                               | -50 ... +80 °C (-58 ... +176 °F)                                                                       |
| • Flexible installation                     | 0 ... 60 °C (32 ... 140 °F)                                   | -20 ... +60 °C (-4 ... +140 °F)                                                                        |
| <b>Tensile stress, max.</b>                 |                                                               |                                                                                                        |
| • Fixed installation                        | 50 N/mm <sup>2</sup> (7252 lb <sub>f</sub> /in <sup>2</sup> ) | 50 N/mm <sup>2</sup> (7252 lb <sub>f</sub> /in <sup>2</sup> )                                          |
| • Flexible installation                     | 20 N/mm <sup>2</sup> (2901 lb <sub>f</sub> /in <sup>2</sup> ) | 20 N/mm <sup>2</sup> (2901 lb <sub>f</sub> /in <sup>2</sup> )                                          |
| <b>Smallest bending radius</b>              |                                                               |                                                                                                        |
| • Fixed installation                        | 60 mm (2.36 in)                                               | 4 × D <sub>max</sub>                                                                                   |
| • Flexible installation                     | 100 mm (3.94 in)                                              | 70 mm (2.76 in)                                                                                        |
| <b>Torsional stress</b>                     | Absolute 30°/m                                                | Absolute 30°/m                                                                                         |
| <b>Bending</b>                              | 2 million                                                     | 10 million                                                                                             |
| <b>Traversing velocity</b>                  | 180 m/min (591 ft/min)                                        | Up to 300 m/min (984 ft/min)                                                                           |
| <b>Acceleration</b>                         | 5 m/s <sup>2</sup> (16.41 ft/s <sup>2</sup> )                 | Up to 50 m/s <sup>2</sup> (164 ft/s <sup>2</sup> ),<br><a href="#">see characteristics on page 7/5</a> |
| <b>Insulation material, incl. jacket</b>    | CFC/silicone-free                                             | CFC/halogen/silicone-free<br>IEC 60754-1/DIN VDE 0472-815                                              |
| <b>Oil resistance</b>                       | EN 60811-2-1 (mineral oil only)                               | EN 60811-2-1                                                                                           |
| <b>Outer jacket</b>                         | PVC<br>DESINA color green RAL 6018                            | PUR, HD22.10 S2 (VDE 0282, Part 10)<br>DESINA color green RAL 6018                                     |
| <b>Flame-retardant</b>                      | EN 60332-1-1 to 1-3                                           | EN 60332-1-1 to 1-3                                                                                    |

Degree of protection of pre-assembled signal cables and their extensions when closed and connected: IP67.

<sup>1)</sup> The File No. is printed on the cable jacket.

## Selection and ordering data

Pre-assembled DRIVE-CLiQ signal cables without 24 V DC cores

| Type                                                                                | Length        | $D_{\max}$ | Degree of protection<br>Connector | DRIVE-CLiQ signal cable<br>without 24 V DC cores<br>Order No. |
|-------------------------------------------------------------------------------------|---------------|------------|-----------------------------------|---------------------------------------------------------------|
|                                                                                     | m (ft)        | mm (in)    |                                   |                                                               |
|    | 0.11 (0.36)   |            | IP20/IP20                         | <b>6SL3060-4AB00-0AA0</b>                                     |
|                                                                                     | 0.16 (0.52)   |            |                                   | <b>6SL3060-4AD00-0AA0</b>                                     |
|                                                                                     | 0.21 (0.69)   |            |                                   | <b>6SL3060-4AF00-0AA0</b>                                     |
|                                                                                     | 0.26 (0.85)   |            |                                   | <b>6SL3060-4AH00-0AA0</b>                                     |
|                                                                                     | 0.31 (1.02)   |            |                                   | <b>6SL3060-4AK00-0AA0</b>                                     |
|                                                                                     | 0.36 (1.18)   |            |                                   | <b>6SL3060-4AM00-0AA0</b>                                     |
|                                                                                     | 0.41 (1.35)   |            |                                   | <b>6SL3060-4AP00-0AA0</b>                                     |
|                                                                                     | 0.60 (1.97)   |            |                                   | <b>6SL3060-4AU00-0AA0</b>                                     |
|                                                                                     | 0.95 (3.12)   |            |                                   | <b>6SL3060-4AA10-0AA0</b>                                     |
|                                                                                     | 1.20 (3.94)   |            |                                   | <b>6SL3060-4AW00-0AA0</b>                                     |
|                                                                                     | 1.45 (4.76)   |            |                                   | <b>6SL3060-4AF10-0AA0</b>                                     |
|                                                                                     | 2.80 (9.19)   |            |                                   | <b>6SL3060-4AJ20-0AA0</b>                                     |
|                                                                                     | 5.00 (16.4)   |            |                                   | <b>6SL3060-4AA50-0AA0</b>                                     |
| To the meter                                                                        | max. 70 (230) | 7.0 (0.28) | IP20/IP20                         | <b>6FX2002-1DC00-....</b>                                     |
|   |               |            |                                   |                                                               |
|                                                                                     |               |            |                                   |                                                               |
| To the meter                                                                        | max. 70 (230) | 7.0 (0.28) | IP67/IP67                         | <b>6FX2002-1DC20-....</b>                                     |
|  |               |            |                                   |                                                               |
|                                                                                     |               |            |                                   |                                                               |
| Length code                                                                         |               |            |                                   | ....                                                          |

# MOTION-CONNECT connection systems

## Signal cables for SINAMICS S120

### MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores

#### Selection and ordering data

##### Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables for SINAMICS S120 and motors with 24 V DC cores

| Type                                                                                               | Application                                                                                                                                                                                                          | Connector/<br>Degree of<br>protection<br>motor end | Connector/<br>Degree of<br>protection<br>Module end | Length,<br>max.<br><br>m<br>(ft) | $D_{\max}$<br><br>mm<br>(in) | Cable<br>length<br><br>m<br>(ft) | MOTION-CONNECT<br>DRIVE-CLiQ signal cable<br>with 24 V DC cores<br><br>Order No. |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|----------------------------------|------------------------------|----------------------------------|----------------------------------------------------------------------------------|
| To the meter<br>  | For components with DRIVE-CLiQ interface in the control cabinet.                                                                                                                                                     | RJ45/IP20                                          | RJ45/IP20                                           | 100<br>(328)                     | 7.1<br>(0.28)                |                                  | <b>6FX5002-2DC00-....</b>                                                        |
|                                                                                                    | For example, for making the connection between SINAMICS S120 Motor Modules or Power Modules and the cabinet bushing.                                                                                                 | RJ45/IP20                                          | RJ45/IP20                                           | 75<br>(246)                      | 7.1<br>(0.28)                |                                  | <b>6FX8002-2DC00-....</b>                                                        |
| To the meter<br>  | For built-in or built-on encoder systems with DRIVE-CLiQ.                                                                                                                                                            | RJ45/IP20                                          | RJ45/IP67                                           | 100<br>(328)                     | 7.1<br>(0.28)                |                                  | <b>6FX5002-2DC10-....</b>                                                        |
|                                                                                                    | For example, for making the connection between SIMOTICS S-1FT7/-1FK7/ SIMOTICS M-1PH8/ SIMOTICS T-1FW3 motors and SINAMICS Motor Modules or Power Modules.                                                           | RJ45/IP20                                          | RJ45/IP67                                           | 75<br>(246)                      | 7.1<br>(0.28)                |                                  | <b>6FX8002-2DC10-....</b>                                                        |
| To the meter<br> | For built-in or built-on encoder systems with DRIVE-CLiQ.                                                                                                                                                            | RJ45/IP67                                          | RJ45/IP67                                           | 100<br>(328)                     | 7.1<br>(0.28)                |                                  | <b>6FX5002-2DC20-....</b>                                                        |
|                                                                                                    | For example, for making the connection between SIMOTICS S-1FT7/-1FK7/ SIMOTICS M-1PH8/ SIMOTICS T-1FW3 motors and SINAMICS S120 cabinet bushings, couplers or DME20 Hub Module or 2 couplers or 2 DME20 Hub Modules. | RJ45/IP67                                          | RJ45/IP67                                           | 75<br>(246)                      | 7.1<br>(0.28)                |                                  | <b>6FX8002-2DC20-....</b>                                                        |
|                 | For built-on encoder systems with DRIVE-CLiQ.                                                                                                                                                                        | RJ45/IP20                                          | M12/IP67                                            | 30<br>(98.4)                     | 7.1<br>(0.28)                | 3<br>(9.8)                       | <b>6FX0002-2DC30-1AD0</b>                                                        |
|                                                                                                    | For example, as a basic cable between third-party direct measuring systems with DRIVE-CLiQ interface and SINAMICS S120 Motor Modules and Power Modules.                                                              |                                                    |                                                     |                                  |                              | 6<br>(19.7)                      | <b>6FX0002-2DC30-1AG0</b>                                                        |
|                                                                                                    |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              | 15<br>(49.2)                     | <b>6FX0002-2DC30-1BF0</b>                                                        |
|                                                                                                    |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              | 30<br>(98.4)                     | <b>6FX0002-2DC30-1DA0</b>                                                        |
|                                                                                                    |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              |                                  |                                                                                  |
|                                                                                                    | For example, as an extension to the basic cable 6FX.002-2DC30. <sup>1)</sup>                                                                                                                                         | M12/IP67                                           | M12/IP67                                            | 30<br>(98.4)                     | 7.1<br>(0.28)                | 3<br>(9.8)                       | <b>6FX0002-2DC34-1AD0</b>                                                        |
|                                                                                                    |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              | 6<br>(19.7)                      | <b>6FX0002-2DC34-1AG0</b>                                                        |
| <b>MOTION-CONNECT 500</b>                                                                          |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              |                                  | <b>5</b>                                                                         |
| <b>MOTION-CONNECT 800PLUS</b>                                                                      |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              |                                  | <b>8</b>                                                                         |
| Length code                                                                                        |                                                                                                                                                                                                                      |                                                    |                                                     |                                  |                              |                                  | <b>....</b>                                                                      |

<sup>1)</sup> The total cable length (basic cable plus extension cable) must not exceed 30 m (98.4 ft).

## Selection and ordering data

## Pre-assembled MOTION-CONNECT signal cables for motors with SPEED-CONNECT connector

| Encoder system                                                             | Motor type           | Connection via | Length, max. | $D_{max}$  | Smallest bending radius flexible | Degree of protection Connector | Basic cable        | Extension           |
|----------------------------------------------------------------------------|----------------------|----------------|--------------|------------|----------------------------------|--------------------------------|--------------------|---------------------|
|                                                                            | SIMOTICS             |                | m (ft)       | mm (in)    | mm (in)                          |                                | Order No.          | Order No.           |
| Absolute encoder with EnDat                                                | S-1FK701             | SMC20          | 50 (164)     | 9.8 (0.39) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2EN20-.... | 6FX 8002-2EN24-.... |
| Absolute encoder with EnDat                                                | S-1FK7 <sup>1)</sup> | SMC20          | 100 (328)    | 9.8 (0.39) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2EQ31-.... | 6FX 002-2EQ34-....  |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R                     | S-1FK701             | SMC20          | 50 (164)     | 9.2 (0.36) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CN20-.... | 6FX 8002-2CN24-.... |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R with C and D tracks | S-1FK7 <sup>1)</sup> | SMC20          | 100 (328)    | 9.8 (0.39) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CQ31-.... | 6FX 002-2CQ34-....  |
| Resolver                                                                   |                      |                |              |            |                                  |                                |                    |                     |
| • Multi-pole                                                               | S-1FK701             | SMC10          | 50 (164)     | 9.2 (0.36) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2FN20-.... | 6FX 8002-2FN24-.... |
| • 2-pole                                                                   | S-1FK701             | SMC10          | 130 (426)    | 9.2 (0.36) | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2FN20-.... | 6FX 8002-2FN24-.... |
| <b>MOTION-CONNECT 500</b>                                                  |                      |                |              |            |                                  |                                | 5                  | 5                   |
| <b>MOTION-CONNECT 800PLUS</b>                                              |                      |                |              |            |                                  |                                | 8                  | 8                   |
| Length code                                                                |                      |                |              |            |                                  |                                | ....               | ....                |

## Pre-assembled signal cables for motors with full-thread connector

| Encoder system                            | Motor type                                     | Connection via | Length, max. | $D_{max}$   | Smallest bending radius flexible | Degree of protection Connector | Basic cable         | Extension            |
|-------------------------------------------|------------------------------------------------|----------------|--------------|-------------|----------------------------------|--------------------------------|---------------------|----------------------|
|                                           | SIMOTICS                                       |                | m (ft)       | mm (in)     | mm (in)                          |                                | Order No.           | Order No.            |
| Absolute encoder with EnDat               | S-1FK701                                       | SMC20          | 50 (164)     | 9.8 (0.39)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2EQ20-....  | 6FX 5002-2EQ24-....  |
| Absolute encoder with EnDat               | S-1FK7 <sup>2)</sup> /M-1PH8/1PH7/1PL6/ T-1FW3 | SMC20          | 100 (328)    | 9.8 (0.39)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2EQ10-....  | 6FX 002-2EQ14-....   |
| Absolute encoder with EnDat 5 V DC        |                                                | SME25          | 3 (9.84)     | 9.2 (0.36)  | 70 (2.76)                        | IP67/IP67                      | 6FX 002-2AD04-....  | —                    |
| Direct absolute encoder with EnDat        | L-1FN3/-1FN6/ T-1FW6                           | SME125         | 3 (9.84)     | 9.2 (0.36)  | 70 (2.76)                        | IP67/IP67                      | 6FX 8002-2AD04-.... | —                    |
| Resolver                                  | S-1FK701                                       | SMC10          | 50 (164)     | 9.2 (0.36)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CF20-....  | 6FX 5002-2CF 24-.... |
| Resolver                                  |                                                |                |              |             |                                  |                                |                     |                      |
| • Multi-pole                              | S-1FT/-1FK <sup>2)</sup> / T-1FW3              | SMC10          | 50 (164)     | 9.2 (0.36)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CF 02-.... | 6FX 002-2CF 04-....  |
| • 2-pole                                  | S-1FT/-1FK <sup>2)</sup> / 1PH7/1PL6           | SMC10          | 130 (426)    | 9.2 (0.36)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CF 02-.... | 6FX 002-2CF 04-....  |
| Absolute encoder with EnDat 6FX2001-5.E.. |                                                | SMC20          | 100 (328)    | 9.2 (0.36)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CH00-....  | 6FX 002-2AD04-....   |
| Absolute encoder with SSI 5 V DC          |                                                | SME25          | 3 (9.84)     | 9.2 (0.36)  | 70 (2.76)                        | IP67/IP67                      | 6FX 002-2AD04-....  | —                    |
| Absolute encoder with SSI 6FX2001-5.S..   |                                                |                |              |             |                                  |                                |                     |                      |
| Clock-pulse rate 100 ... 250 kHz          |                                                | SMC30          | 100 (328)    | 9.3 (0.37)  | 70 (2.76)                        | IP20/IP67                      | 6FX 002-2CC11-....  | 6FX 002-2CB54-....   |
| Temperature sensor                        | L-1FN3100... L-1FN3150 <sup>3)</sup>           | SME120/ SME125 | 10 (32.8)    | 11.9 (0.47) | 85 (3.35)                        | IP67/IP67                      | 6FX 7002-2SL10-.... | 6FX 7002-2SL01-....  |
| Temperature sensor                        | L-1FN3300... L-1FN3900 <sup>3)</sup>           | SME120/ SME125 | 10 (32.8)    | 11.9 (0.47) | 85 (3.35)                        | IP67/IP67                      | 6FX 7002-2SL10-.... | 6FX 7002-2SL02-....  |
| Temperature sensor                        | L-1FN6/ T-1FW6                                 | SME120/ SME125 | 10 (32.8)    | 11.9 (0.47) | 85 (3.35)                        | IP67/IP67                      | 6FX 7002-2SL10-.... | —                    |
| <b>MOTION-CONNECT 500</b>                 |                                                |                |              |             |                                  |                                | 5                   | 5                    |
| <b>MOTION-CONNECT 800PLUS</b>             |                                                |                |              |             |                                  |                                | 8                   | 8                    |
| Length code                               |                                                |                |              |             |                                  |                                | ....                | ....                 |

The combinations of signal cable extensions shown are only provided by way of example.

The maximum specified cable length (basic cable and extensions) must not be exceeded. The permissible total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

<sup>1)</sup> Possible for SIMOTICS M-1PH808/-1PH810/-1PH813 motors.

<sup>2)</sup> Not for SIMOTICS S-1FK701.

<sup>3)</sup> Continuous load version.



# MOTION-CONNECT connection systems

## Signal cables for SINAMICS S120

### Signal cables for motors with full-thread connector

#### Selection and ordering data

##### Pre-assembled signal cables for motors with full-thread connector

| Encoder system                                                                 | Motor type                             | Connection via | Length, max.            | $D_{max}$  | Smallest bending radius flexible | Degree of protection Connector | Basic cable        | Extension          |
|--------------------------------------------------------------------------------|----------------------------------------|----------------|-------------------------|------------|----------------------------------|--------------------------------|--------------------|--------------------|
|                                                                                | SIMOTICS                               |                | m (ft)                  | mm (in)    | mm (in)                          |                                | Order No.          | Order No.          |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R                         | S-1FK701                               | SMC20          | 50 (164)                | 9.8 (0.39) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2CA20-.... | 6FX5002-2CA24-.... |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 2048 S/R                         |                                        |                |                         |            |                                  |                                |                    |                    |
| • With C and D tracks                                                          | S-1FK7 <sup>1)</sup> /M-1PH8/1PH7/1PL6 | SMC20          | 100 (328)               | 9.8 (0.39) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2CA31-.... | 6FX0002-2CA34-.... |
| • Without C and D tracks                                                       | M-1PH8/1PH7/1PL6                       | SMC20          | 50 (164)                | 9.2 (0.36) | 70 (2.76)                        | IP20/IP67                      | 6FX8002-2CA80-.... | 6FX0002-2CA34-.... |
| HTL incremental encoder                                                        | M-1PH8/1PH7/1PL6                       | SMC30          | 300 (984) <sup>2)</sup> | 9.3 (0.37) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2AH00-.... | 6FX0002-2AH04-.... |
| HTL incremental encoder                                                        | M-1PH8/1PH7/1PL6                       | CU310-2 DP     | 100 (328)               | 9.3 (0.37) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2AH11-.... | —                  |
| Incremental encoder sin/cos 1 V <sub>pp</sub> without C and D tracks 6FX2001-3 |                                        | SMC20          | 50 (164)                | 9.3 (0.37) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2CG00-.... | 6FX0002-2CB54-.... |
| HTL incremental encoder 24 V DC 6FX2001-4                                      |                                        | SMC30          | 100 (328)               | 9.3 (0.37) | 70 (2.76)                        | —/IP67                         | 6FX5002-2CA12-.... | —                  |
| TTL incremental encoder RS422 6FX2001-2                                        |                                        |                |                         |            |                                  |                                |                    |                    |
| • 5 V DC                                                                       |                                        | SMC30          | 100 (328)               | 9.3 (0.37) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2CR00-.... | 6FX0002-2CB54-.... |
| • 24 V DC                                                                      |                                        | SMC30          | 100 (328)               | 9.3 (0.37) | 70 (2.76)                        | IP20/IP67                      | 6FX0002-2CD24-.... | 6FX0002-2CB54-.... |
| Incremental encoder sin/cos 1 V <sub>pp</sub> 5 V DC without C and D tracks    |                                        | SME20          | 3 (9.84) <sup>3)</sup>  | 9.3 (0.37) | 70 (2.76)                        | IP67/IP67                      | 6FX0002-2CB54-.... | —                  |
| Direct incremental encoder sin/cos 1 V <sub>pp</sub>                           | L-1FN3/-1FN6/T-1FW6                    | SME120         | 3 (9.84) <sup>3)</sup>  | 9.3 (0.37) | 70 (2.76)                        | IP67/IP67                      | 6FX8002-2CB54-.... | —                  |
| <b>MOTION-CONNECT 500</b>                                                      |                                        |                |                         |            |                                  |                                | 5                  | 5                  |
| <b>MOTION-CONNECT 800PLUS</b>                                                  |                                        |                |                         |            |                                  |                                | 8                  | 8                  |
| Length code                                                                    |                                        |                |                         |            |                                  |                                | ....               | ....               |

The combinations of signal cable extensions shown are only provided by way of example.

The maximum specified cable length (basic cable and extensions) must not be exceeded. The permissible total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

<sup>1)</sup> Not for SIMOTICS S-1FK701.

<sup>2)</sup> With evaluation of difference signals A\*, A, B\*, B, otherwise ≤ 100 m (328 ft).

<sup>3)</sup> Up to 10 m (32.8 ft) possible, depending on the encoder current consumption.

## Overview

| Data position in Order No.                                              | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14 | 15 | 16 |
|-------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----|----|----|
| <b>MOTION-CONNECT 500</b>                                               | <b>6</b> | <b>F</b> | <b>X</b> | <b>5</b> | <b>0</b> | .        | <b>2</b> | <b>-</b> | <b>5</b> | .        | .        | .        | -        | .  | .  | .  |
| <b>MOTION-CONNECT 800PLUS</b>                                           | <b>6</b> | <b>F</b> | <b>X</b> | <b>8</b> | <b>0</b> | .        | <b>2</b> | <b>-</b> | <b>5</b> | .        | .        | .        | -        | .  | .  | .  |
| Pre-assembled at motor and Module ends                                  |          |          |          |          |          | <b>0</b> |          |          |          |          |          |          |          |    |    |    |
| Pre-assembled at motor end, connector at Module end supplied separately |          |          |          |          |          | <b>1</b> |          |          |          |          |          |          |          |    |    |    |
| Pre-assembled at Module end, connector at motor end supplied separately |          |          |          |          |          | <b>4</b> |          |          |          |          |          |          |          |    |    |    |
| Without brake cores                                                     |          |          |          |          |          |          |          |          | <b>C</b> |          |          |          |          |    |    |    |
| With brake cores                                                        |          |          |          |          |          |          |          |          | <b>D</b> |          |          |          |          |    |    |    |
| <u>Basic cable between</u>                                              |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| <u>and</u>                                                              |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| SINAMICS S120 Motor Module, booksize format up to 30 A                  |          |          |          |          |          |          |          |          | <b>D</b> | <b>A</b> | <b>2</b> | <b>0</b> |          |    |    |    |
| Motor full-thread connector size 0.5                                    |          |          |          |          |          |          |          |          |          | <b>S</b> |          | <b>1</b> |          |    |    |    |
| Motor full-thread connector size 1/1.5                                  |          |          |          |          |          |          |          |          |          | <b>S</b> | <b>1</b> | <b>3</b> |          |    |    |    |
| Motor full-thread connector size 3                                      |          |          |          |          |          |          |          |          |          | <b>S</b> |          | <b>2</b> |          |    |    |    |
| Motor with terminal box (exposed core ends)                             |          |          |          |          |          |          |          |          |          | <b>D</b> | <b>N</b> | <b>2</b> | <b>0</b> |    |    |    |
| Motor SPEED-CONNECT connector size 0.5                                  |          |          |          |          |          |          |          |          |          | <b>N</b> |          | <b>1</b> |          |    |    |    |
| Motor SPEED-CONNECT connector size 1/1.5                                |          |          |          |          |          |          |          |          |          | <b>S</b> |          | <b>4</b> |          |    |    |    |
| SINAMICS S120 Motor Module, booksize format, 45 A or higher             |          |          |          |          |          |          |          |          |          | <b>S</b> | <b>2</b> | <b>3</b> |          |    |    |    |
| Motor full-thread connector size 1/1.5                                  |          |          |          |          |          |          |          |          |          | <b>N</b> |          | <b>4</b> |          |    |    |    |
| Motor full-thread connector size 3                                      |          |          |          |          |          |          |          |          |          | <b>D</b> | <b>A</b> | <b>3</b> | <b>0</b> |    |    |    |
| Motor SPEED-CONNECT connector size 0.5                                  |          |          |          |          |          |          |          |          |          | <b>G</b> |          | <b>1</b> |          |    |    |    |
| Motor SPEED-CONNECT connector size 1/1.5                                |          |          |          |          |          |          |          |          |          | <b>G</b> |          | <b>3</b> |          |    |    |    |
| SINAMICS S120 Power Module/Motor Module, booksize compact format        |          |          |          |          |          |          |          |          |          | <b>D</b> | <b>N</b> | <b>3</b> | <b>0</b> |    |    |    |
| Motor full-thread connector size 0.5                                    |          |          |          |          |          |          |          |          |          | <b>G</b> | <b>1</b> | <b>0</b> |          |    |    |    |
| Motor full-thread connector size 1/1.5                                  |          |          |          |          |          |          |          |          |          | <b>F</b> |          |          |          |    |    |    |
| Motor full-thread connector size 3                                      |          |          |          |          |          |          |          |          |          | <b>C</b> | <b>R</b> |          |          |    |    |    |
| Motor SPEED-CONNECT connector size 0.5                                  |          |          |          |          |          |          |          |          |          | <b>C</b> | <b>E</b> |          |          |    |    |    |
| Motor SPEED-CONNECT connector size 1/1.5                                |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| SINAMICS S120 Power Module, Combi format                                |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| SINAMICS S120 Power Module/Motor Module, booksize format                |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| SINAMICS S120 Power Module, Combi format                                |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| <u>Extension between basic cable with connector</u>                     |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| <u>and motor connector</u>                                              |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| Full-thread size 0.5                                                    |          |          |          |          |          |          |          |          | <b>M</b> | <b>E</b> | <b>0</b> | <b>5</b> |          |    |    |    |
| Full-thread size 1                                                      |          |          |          |          |          |          |          |          |          | <b>A</b> |          | <b>5</b> |          |    |    |    |
| Full-thread size 1.5                                                    |          |          |          |          |          |          |          |          |          | <b>A</b> |          | <b>8</b> |          |    |    |    |
| Full-thread size 3                                                      |          |          |          |          |          |          |          |          |          | <b>X</b> |          | <b>8</b> |          |    |    |    |
| SPEED-CONNECT size 0.5                                                  |          |          |          |          |          |          |          |          | <b>M</b> | <b>N</b> | <b>0</b> | <b>5</b> |          |    |    |    |
| SPEED-CONNECT size 1                                                    |          |          |          |          |          |          |          |          |          | <b>Q</b> |          | <b>5</b> |          |    |    |    |
| SPEED-CONNECT size 1.5                                                  |          |          |          |          |          |          |          |          |          | <b>Q</b> |          | <b>8</b> |          |    |    |    |
| Adapter cable for SIMOTICS L-1FN3                                       | <b>6</b> | <b>F</b> | <b>X</b> | <b>7</b> | <b>0</b> | <b>0</b> | <b>2</b> |          | <b>L</b> | <b>M</b> |          |          |          |    |    |    |
| Cross-section                                                           |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| <b>Length code</b>                                                      |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |
| Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths       |          |          |          |          |          |          |          |          |          |          |          |          |          |    |    |    |

# MOTION-CONNECT connection systems

## Order number code

### Signal cables

#### Overview

| Data position in Order No.    | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       | 16       |
|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>MOTION-CONNECT 500</b>     | <b>6</b> | <b>F</b> | <b>X</b> | <b>5</b> | <b>0</b> | <b>.</b> | <b>2</b> | <b>-</b> | <b>2</b> | <b>.</b> | <b>.</b> | <b>.</b> | <b>-</b> | <b>.</b> | <b>.</b> | <b>.</b> |
| <b>MOTION-CONNECT 800PLUS</b> | <b>6</b> | <b>F</b> | <b>X</b> | <b>8</b> | <b>0</b> | <b>.</b> | <b>2</b> | <b>-</b> | <b>2</b> | <b>.</b> | <b>.</b> | <b>.</b> | <b>-</b> | <b>.</b> | <b>.</b> | <b>.</b> |
| <b>6FX2 cables</b>            | <b>6</b> | <b>F</b> | <b>X</b> | <b>2</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>-</b> | <b>2</b> | <b>.</b> | <b>.</b> | <b>.</b> | <b>-</b> | <b>.</b> | <b>.</b> | <b>.</b> |

Pre-assembled at motor and Module ends

0

Pre-assembled at motor end, connector at Module end supplied separately

1

Pre-assembled at Module end, connector at motor end supplied separately

4

#### Variant: Signal cables for integrated encoder

DRIVE-CLiQ cables between and

Power Module/Motor Module/  
SMC with IP20 connector Power Module/Motor Module/SMC with IP20 connector

D C 0 0

Power Module/Motor Module/  
SMC with IP20 connector Motor/encoder/SME IP67 connector

D C 1 0

DME20/cabinet bushing/coupler Motor/encoder/SME IP67 connector

D C 2 0

Basic cable between and motor with

SMC20 Incremental encoder (sin/cos 1 V<sub>pp</sub>) full-thread connector M23

C A 3 1

SMC30 Incremental encoder (HTL) full-thread connector M23

A H 0 0

CU310-2 Incremental encoder (HTL) full-thread connector M23

A H 1 1

SMC20 Absolute encoder full-thread connector M23

E Q 1 0

SMC10 Resolver full-thread connector M23

C F 0 2

SMC20 Incremental encoder (sin/cos 1 V<sub>pp</sub>)  
SPEED-CONNECT connector M23

C Q 3 1

SMC20 Incremental encoder SPEED-CONNECT connector M17

C N 2 0

SMC20 Absolute encoder SPEED-CONNECT connector M23

E Q 3 1

SMC20 Absolute encoder SPEED-CONNECT connector M17

E N 2 0

SMC10 Resolver SPEED-CONNECT connector M17

C N 2 0

Extension between basic cable with connector and motor connector

Full-thread or SPEED-CONNECT Full-thread or SPEED-CONNECT

4

#### Variant: Signal cables for external encoder

Basic cable between and

SMC30 Incremental encoder 6FX2001-2 (TTL/5 V supply)  
full-thread connector

C R 0 0

SMC30 Incremental encoder 6FX2001-2 (TTL/24 V supply)  
full-thread connector

C D 2 4

SMC20 Incremental encoder 6FX2001-3 (sin/cos 1 V<sub>pp</sub>) full-thread connector

C G 0 0

SMC30 Incremental encoder 6FX2001-4 (HTL) full-thread connector

C A 1 2

SMC30 Absolute encoder 6FX2001-5.S (SSI) full-thread connector

C C 1 1

SMC20 Absolute encoder 6FX2001-5.E (EnDat) full-thread connector

E Q 1 0

Extension between basic cable with connector and motor connector

Full thread Full thread

4

#### Variant: Signal cables for temperature sensor

Basic cable between SME1xx and SIMOTICS L-1FN3

6 F X 7 0 0 2

S L 0

Extension to basic cable between SME1xx and SIMOTICS L-1FN3

6 F X 7 0 0 2

S L 1 0

Basic cable between SME1xx and SIMOTICS L-1FN6/T-1FW6

6 F X 7 0 0 2

S L 1 0

#### Length code

Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths

## Overview

| Data position in Order No.                                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |   |
|-------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|---|
| MOTION-CONNECT 500                                                | 6 | F | X | 5 | 0 | 0 | 8 | - | 1 | B  | .  | .  | .  | -  | .  | .  | . |
| MOTION-CONNECT 800PLUS                                            | 6 | F | X | 8 | 0 | 0 | 8 | - | 1 | B  | .  | .  | .  | -  | .  | .  | . |
| Power cable without brake cores, sold by the meter                |   |   |   |   |   |   |   |   |   |    | B  |    |    |    |    |    |   |
| Power cable with brake cores, sold by the meter                   |   |   |   |   |   |   |   |   |   |    | A  |    |    |    |    |    |   |
| No. of cores and cross-sections                                   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |   |
| Length code                                                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |   |
| Units of 10 cm (3.94 in) or 1 meter (3.28 ft) or in fixed lengths |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |   |

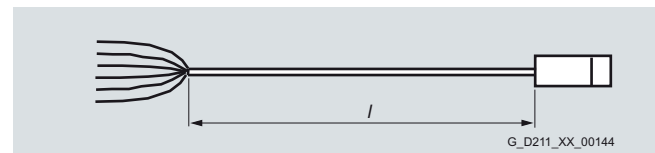
## Overview

| Description                                 | Order No. supplement            |
|---------------------------------------------|---------------------------------|
| <i>Length code for pre-assembled cables</i> | <b>6FX.0.2-.....-</b> ■ ■ ■ ■ ■ |
| 0 m                                         | 1                               |
| 100 m (328 ft)                              | 2                               |
| 200 m (656 ft)                              | 3                               |
| 0 m                                         | A                               |
| 10 m (32.8 ft)                              | B                               |
| 20 m (65.6 ft)                              | C                               |
| 30 m (98.4 ft)                              | D                               |
| 40 m (131 ft)                               | E                               |
| 50 m (164 ft)                               | F                               |
| 60 m (197 ft)                               | G                               |
| 70 m (230 ft)                               | H                               |
| 80 m (262 ft)                               | J                               |
| 90 m (295 ft)                               | K                               |
| 0 m                                         | A                               |
| 1 m (3.28 ft)                               | B                               |
| 2 m (6.56 ft)                               | C                               |
| 3 m (9.84 ft)                               | D                               |
| 4 m (13.1 ft)                               | E                               |
| 5 m (16.4 ft)                               | F                               |
| 6 m (19.7 ft)                               | G                               |
| 7 m (22.9 ft)                               | H                               |
| 8 m (26.3 ft)                               | J                               |
| 9 m (29.5 ft)                               | K                               |
| 0 m                                         | 0                               |
| 0.1 m (3.94 in)                             | 1                               |
| 0.2 m (7.87 in)                             | 2                               |
| 0.3 m (11.81 in)                            | 3                               |
| 0.4 m (15.75 in)                            | 4                               |
| 0.5 m (19.96 in)                            | 5                               |
| 0.6 m (23.62 in)                            | 6                               |
| 0.7 m (27.56 in)                            | 7                               |
| 0.8 m (31.5 in)                             | 8                               |
| Examples:                                   | 1.0 m (3.28 ft): 1 A B 0        |
|                                             | 2.2 m (7.22 ft): 1 A C 2        |
|                                             | 8.0 m (26.3 ft): 1 A J 0        |
|                                             | 299.0 m (981 ft): 3 K K 0       |

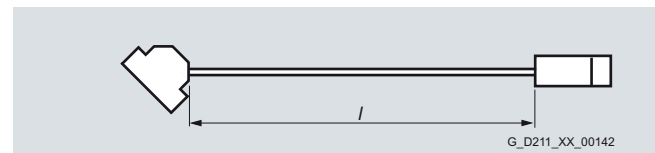
| Description                                                                    | Order No. supplement            |
|--------------------------------------------------------------------------------|---------------------------------|
| <i>Length code for power and signal cables, sold by the meter<sup>1)</sup></i> | <b>6FX.008-.....-</b> ■ ■ ■ A 0 |
| 50 m (164 ft)                                                                  | 1 F                             |
| 100 m (328 ft)                                                                 | 2 A                             |
| 200 m (656 ft)                                                                 | 3 A                             |
| 500 m (1640 ft)                                                                | 6 A                             |

## More information

## Definition of lengths for pre-assembled cables



Cable with exposed core ends and pre-assembled connector



Cable with pre-assembled connectors at both ends

Tolerances:

- Cable lengths up to 10 m (32.8 ft):  $\pm 2\%$
- Cable lengths of 10 m (32.8 ft) and longer:  $\pm 1\%$

<sup>1)</sup> Note type of delivery.

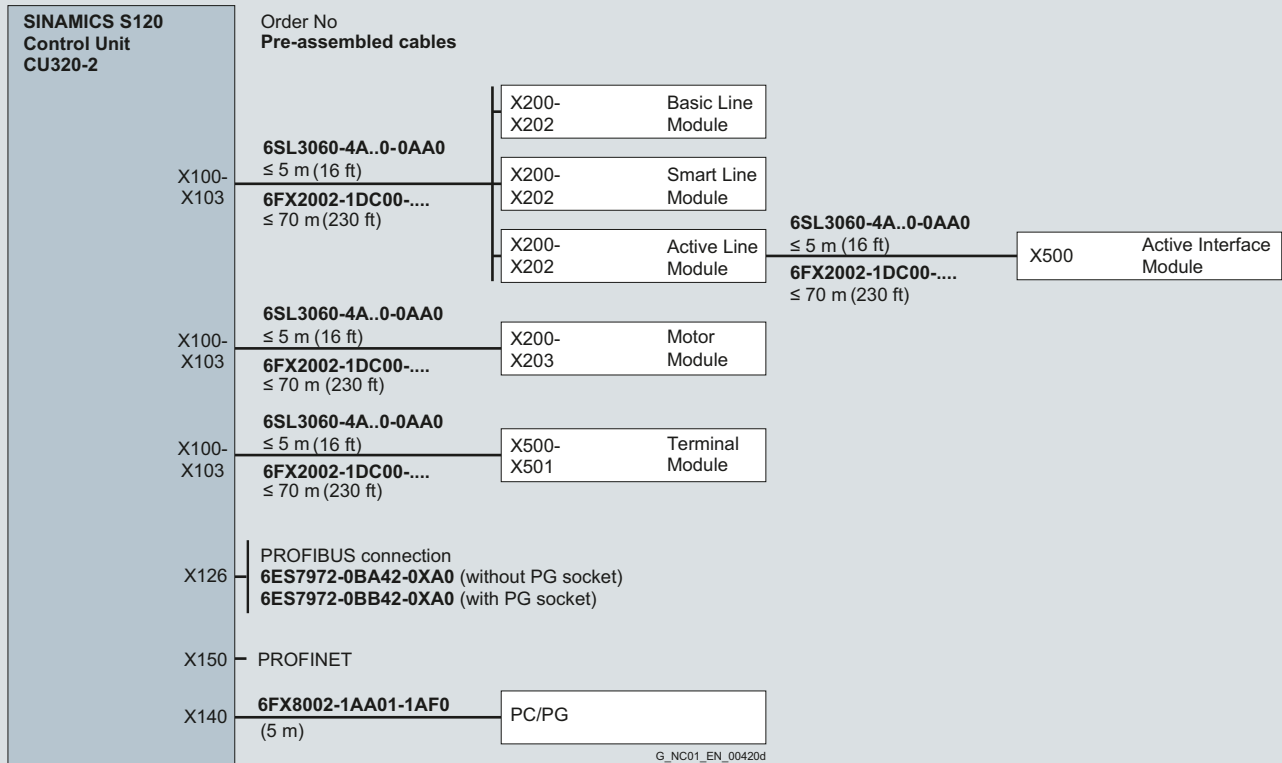
# MOTION-CONNECT connection systems

## Connection overviews

### Integration

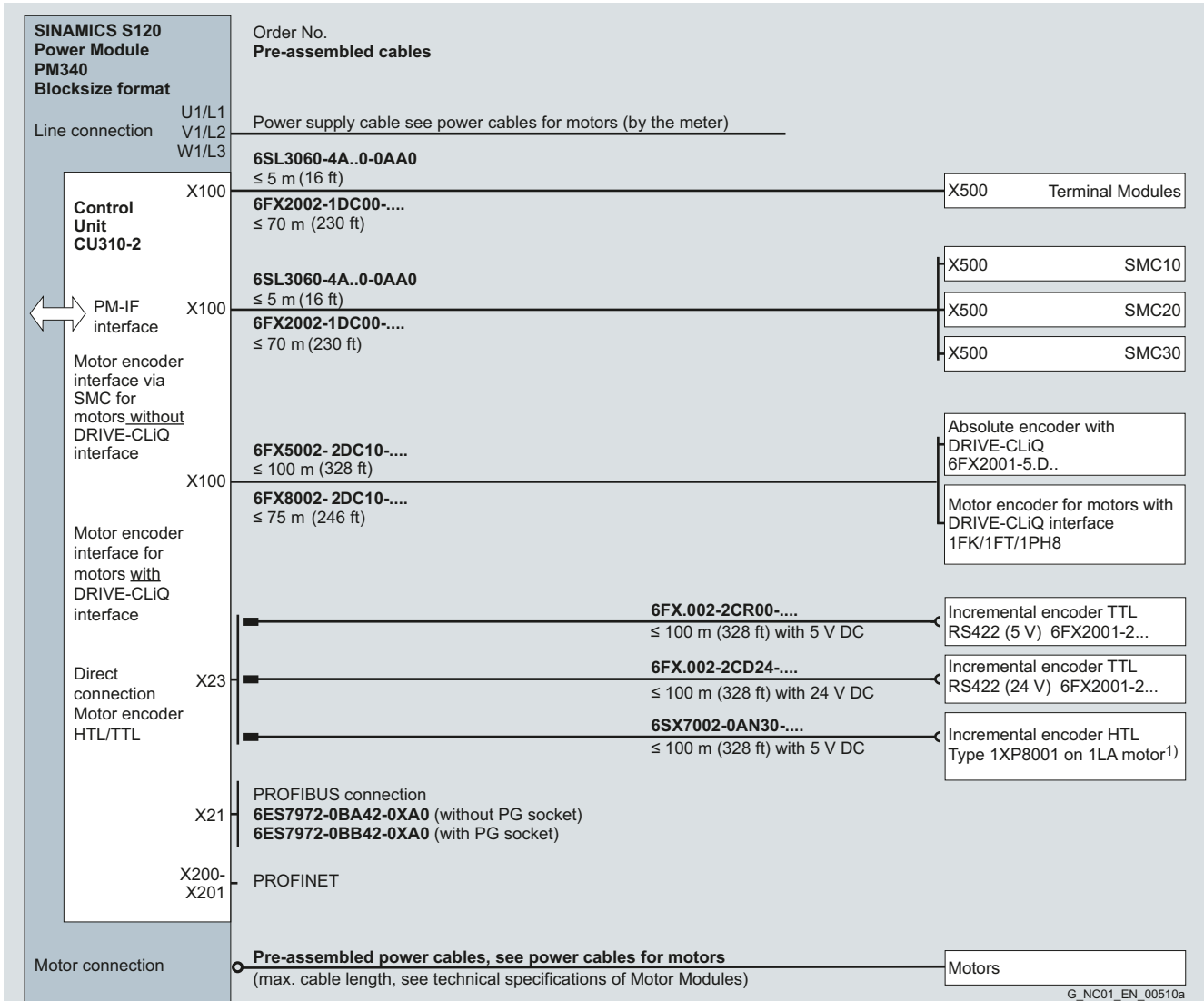
The DRIVE-CLiQ signal cables of type 6SL3060-4A..0-0AA0 required for the standard configuration are part of the scope of supply of the Line Modules and Motor Modules. In this case, the modules must be mounted directly adjacent to one another in a row.

#### Connection overview of SINAMICS S120 CU320-2 Control Unit in booksize format



### Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with CU310-2 Control Unit for SIMOTICS motors with/without DRIVE-CLiQ interface



<sup>1)</sup> Not for 2KG geared motors.

# MOTION-CONNECT connection systems

## Connection overviews

### Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in booksize format and SINUMERIK 840D sl Type 1B for SIMOTICS motors with/without DRIVE-CLiQ interface

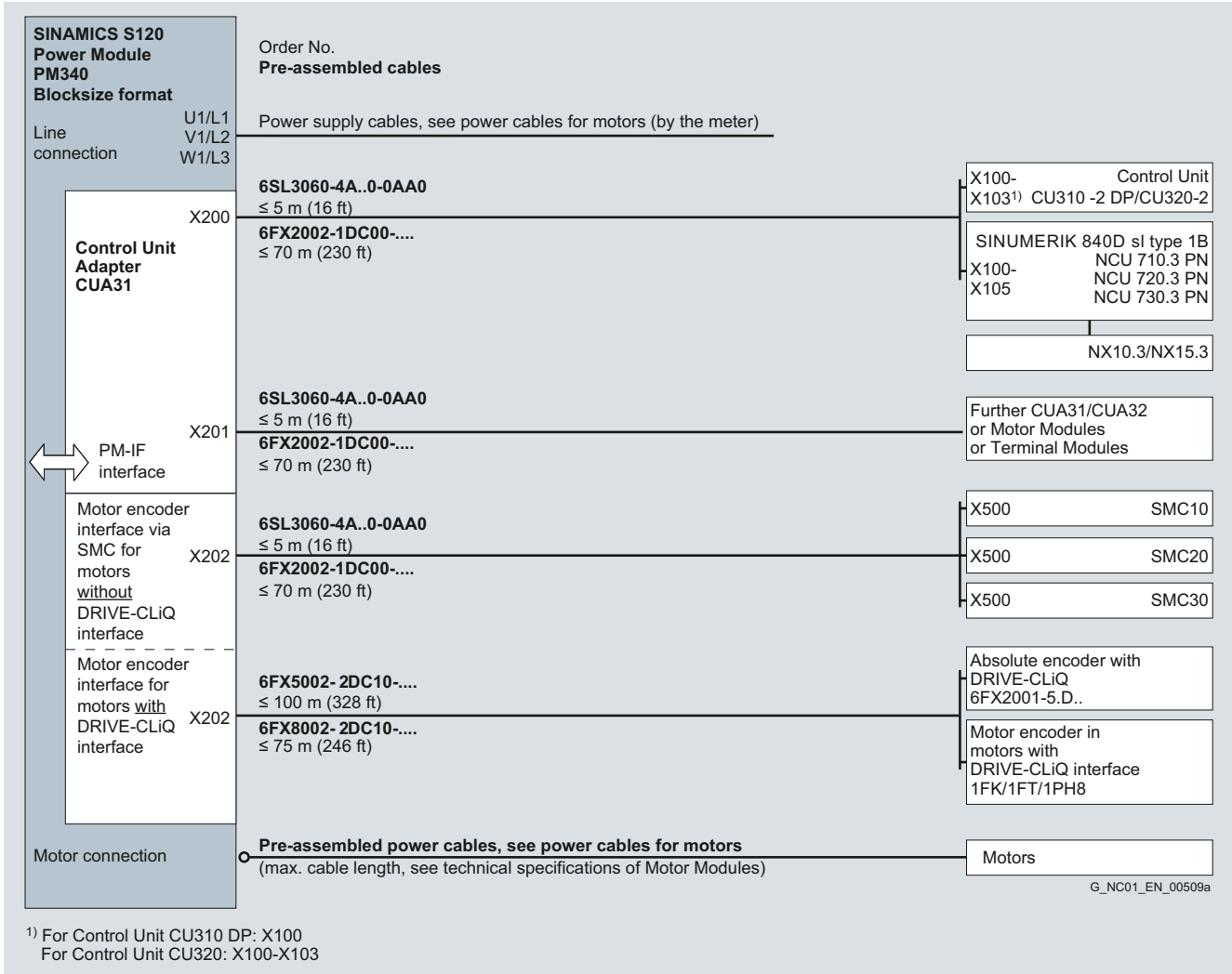
|                                                                                               |                             |                                                                                                                                      |                                                                                      |                          |
|-----------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------|
| SINAMICS S120<br>Motor Module<br>Booksize format                                              | X200-<br>X203 <sup>1)</sup> | Order No.<br><b>Pre-assembled cables</b>                                                                                             | X200-<br>X202                                                                        | Smart Line Module        |
|                                                                                               |                             | 6SL3060-4A..0-0AA0<br>≤ 5 m (16 ft)                                                                                                  | X200-<br>X202                                                                        | Active Line Module       |
|                                                                                               |                             | 6FX2002-1DC00-....<br>≤ 70 m (230 ft)                                                                                                | X200-<br>X203 <sup>1)</sup>                                                          | Motor Module             |
|                                                                                               |                             |                                                                                                                                      | SINUMERIK 840D sl type 1B<br>X100- NCU 710.3 PN<br>X105 NCU 720.3 PN<br>NCU 730.3 PN |                          |
|                                                                                               |                             |                                                                                                                                      | NX10.3/NX15.3                                                                        |                          |
|                                                                                               | X200-<br>X203 <sup>1)</sup> | 6SL3060-4A..0-0AA0<br>≤ 5 m (16 ft)                                                                                                  | X200-<br>X203 <sup>1)</sup>                                                          | Further<br>Motor Modules |
| Motor encoder<br>interface via<br>SMC for<br>motors <u>without</u><br>DRIVE-CLiQ<br>interface | X200-<br>X203 <sup>1)</sup> | 6SL3060-4A..0-0AA0<br>≤ 5 m (16 ft)                                                                                                  | X500                                                                                 | SMC10                    |
|                                                                                               |                             | 6FX2002-1DC00-....<br>≤ 70 m (230 ft)                                                                                                | X500                                                                                 | SMC20                    |
|                                                                                               |                             |                                                                                                                                      | X500                                                                                 | SMC30                    |
| Motor encoder<br>interface for<br>motors <u>with</u><br>DRIVE-CLiQ<br>interface               | X200-<br>X203 <sup>1)</sup> | 6FX5002- 2DC10-....<br>≤ 100 m (328 ft)                                                                                              | Absolute encoder with<br>DRIVE-CLiQ<br>6FX2001-5.D..                                 |                          |
|                                                                                               |                             | 6FX8002- 2DC10-....<br>≤ 75 m (246 ft)                                                                                               | Motor encoder in<br>motors with<br>DRIVE-CLiQ interface<br>1FK/1FT/1PH8              |                          |
| Motor connection                                                                              |                             | <b>Pre-assembled power cables, see power cables for motors</b><br>(max. cable length, see technical specifications of Motor Modules) | Motors                                                                               |                          |

G\_NC01\_EN\_00508a

<sup>1)</sup> For Single Motor Module: X200-X202  
For Double Motor Module: X200-X203

### Integration (continued)

Connection overview of SINAMICS S120 Power Modules in booksize format with CUA31 Control Unit Adapter and SINUMERIK 840D sl Type 1B for SIMOTICS motors with/without DRIVE-CLiQ interface



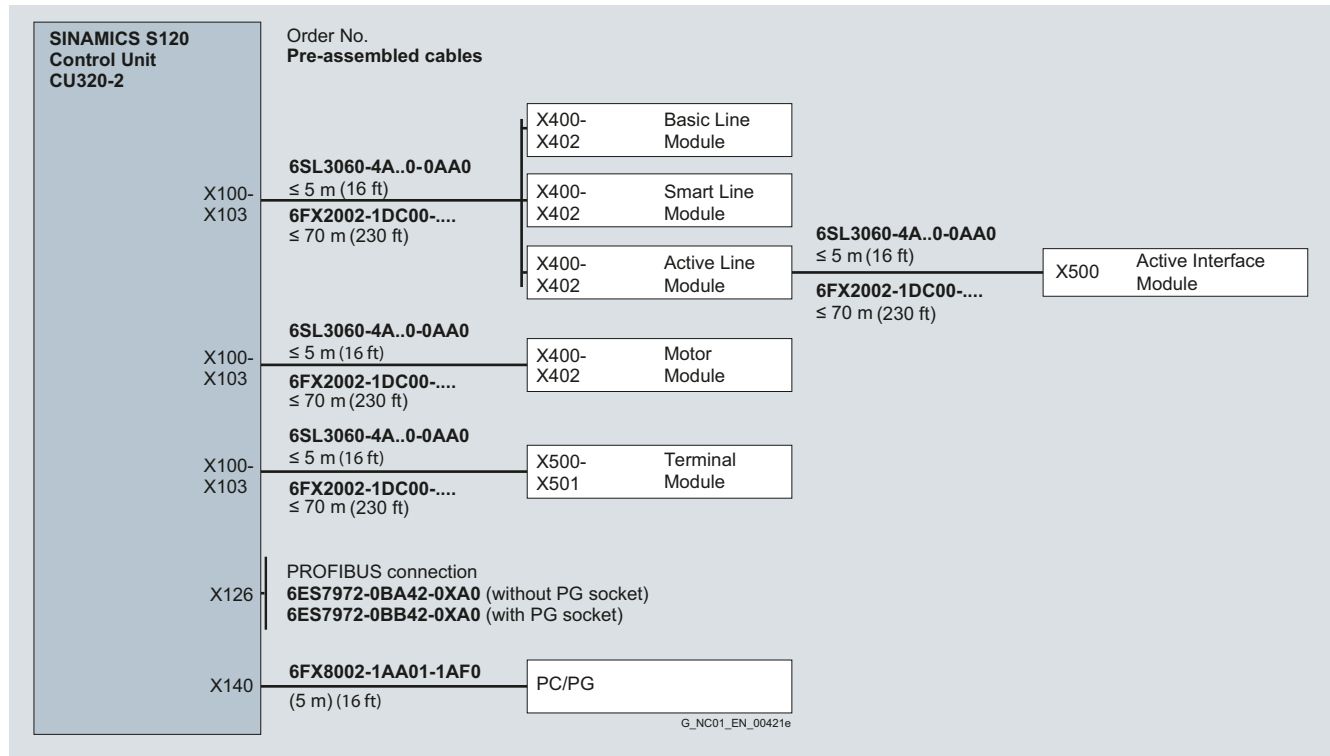


# MOTION-CONNECT connection systems

## Connection overviews

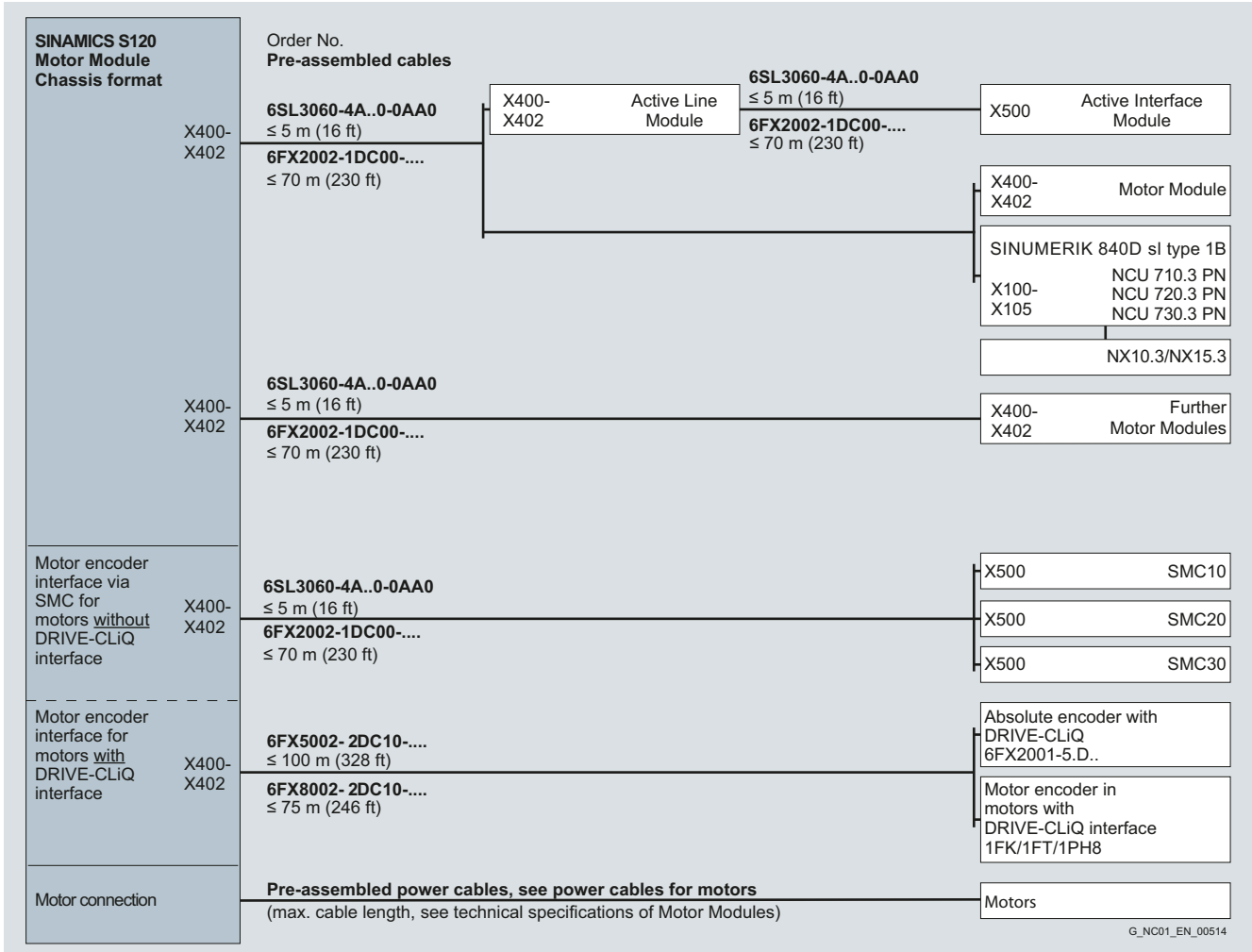
### Integration (continued)

#### Connection overview of SINAMICS S120 CU320-2 Control Unit in chassis format



### Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in chassis format and SINUMERIK 840D sl Type 1B for SIMOTICS motors with/without DRIVE-CLiQ interface



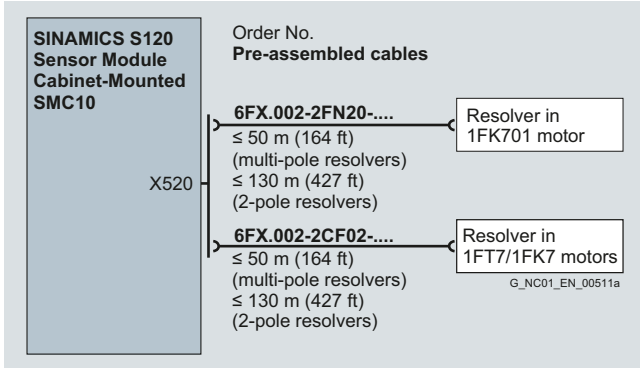
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# MOTION-CONNECT connection systems

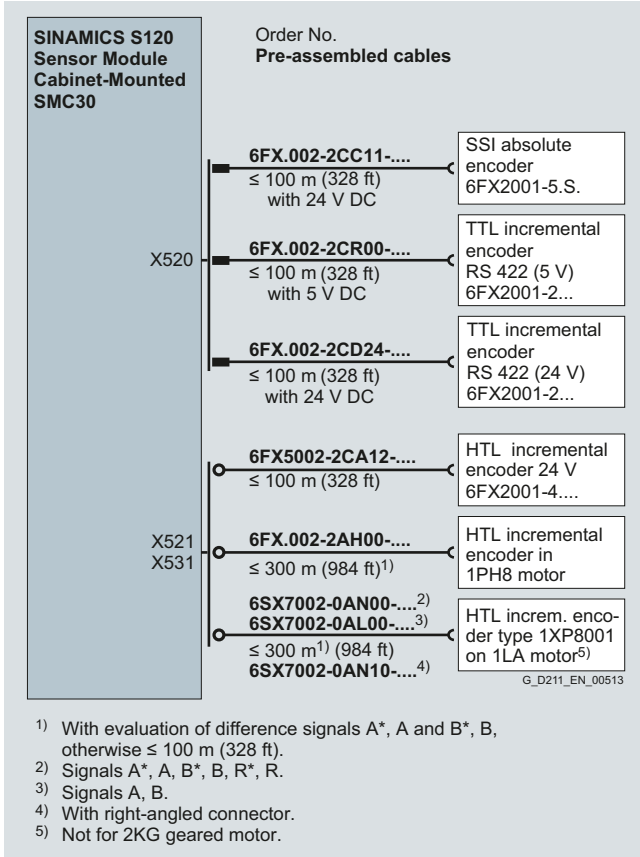
## Connection overviews

### Integration (continued)

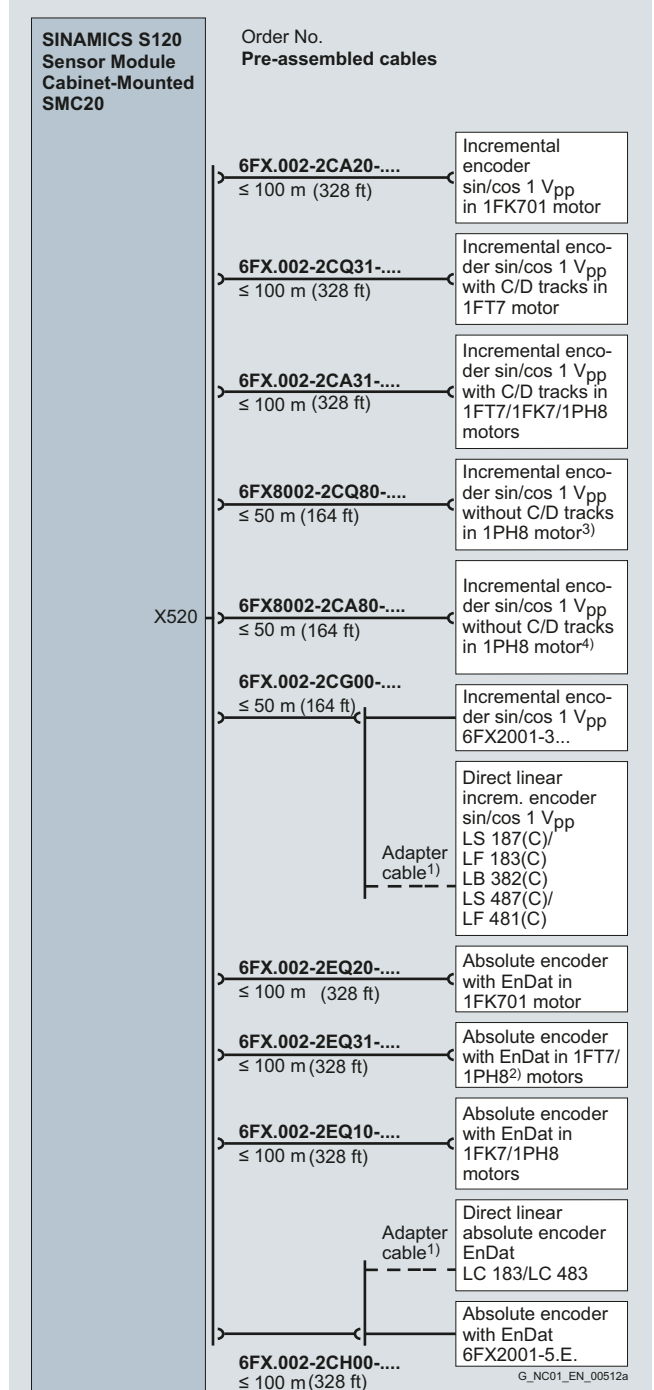
#### Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC10



#### Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC30



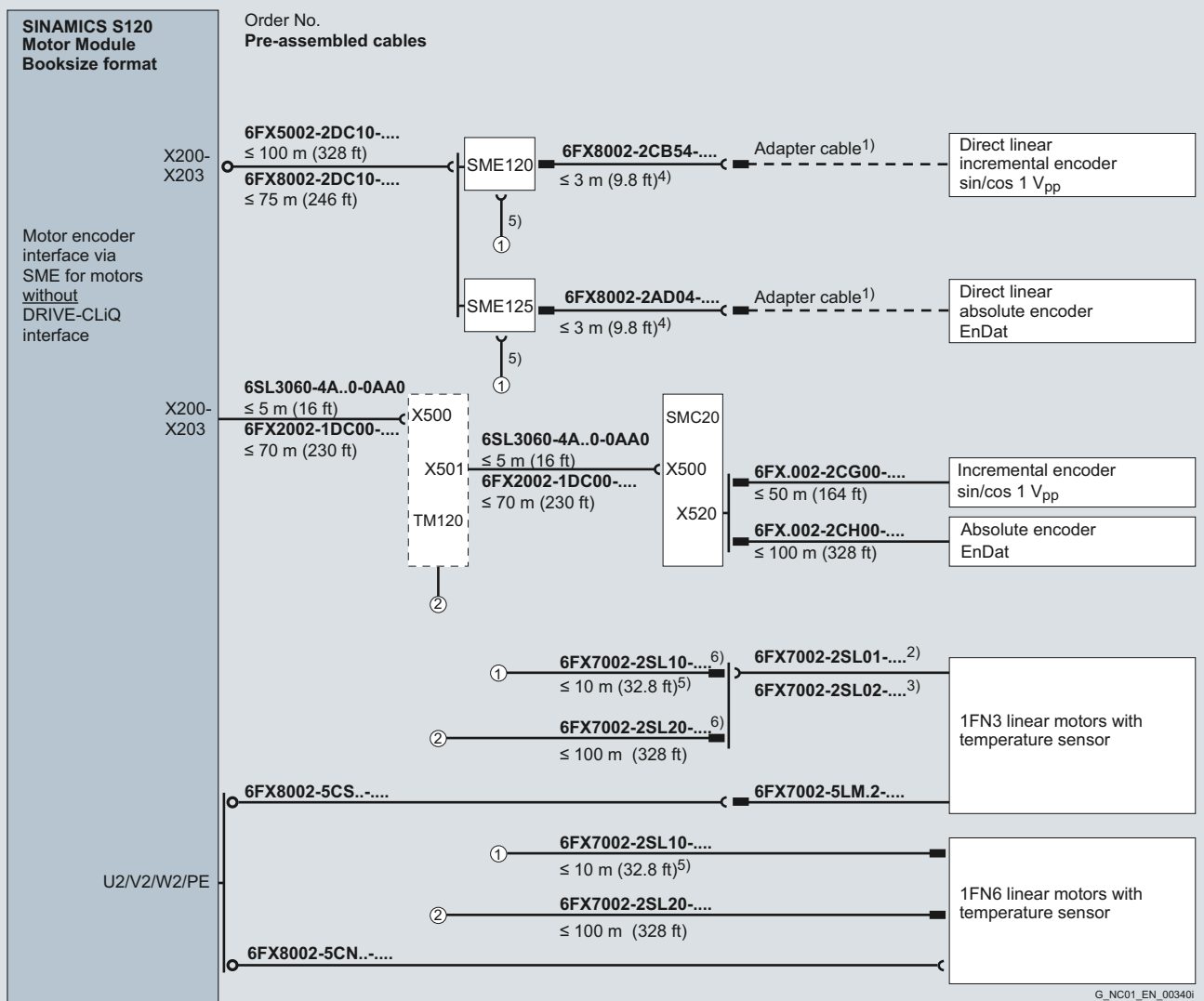
#### Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC20



- 1) Adapter cable available from measuring system manufacturer.  
2) Possible for 1PH808/1PH810/1PH813/1PH816 motors.  
3) Possible for 1PH808/1PH810/1PH813/1PH816 motors for encoders with 512 S/R and 256 S/R.  
4) Possible for 1PH8 motors for encoders with 512 S/R and 256 S/R.

## Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format with SME120/SME125 or TM120/SMC20 and SIMOTICS L-1FN3/-1FN6 linear motors



1) Adapter cable available from measuring system manufacturer.

2) For motors 1FN3100/1FN3150.

3) For motors 1FN3300 to 1FN3900.

4) Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

5) The total cable length between SME120/SME125 and 1FN3 must not exceed 10 m (32.8 ft).

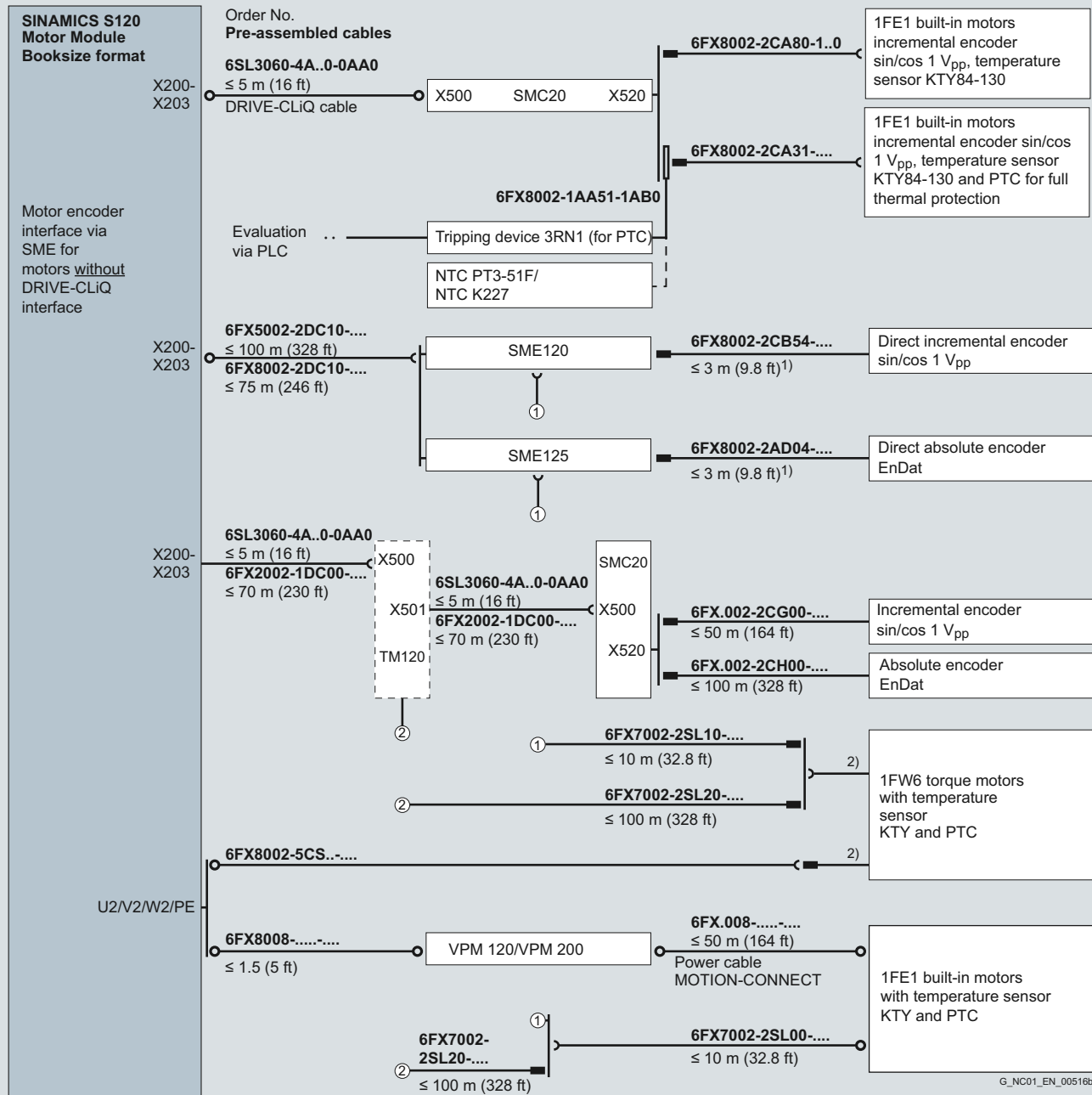
6) Extension cable, optional.

# MOTION-CONNECT connection systems

## Connection overviews

### Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format with SME120/SME125 or TM120/SMC20 and SIMOTICS L-1FW6 torque motors/SIMOTICS M-1FE1 built-in motors

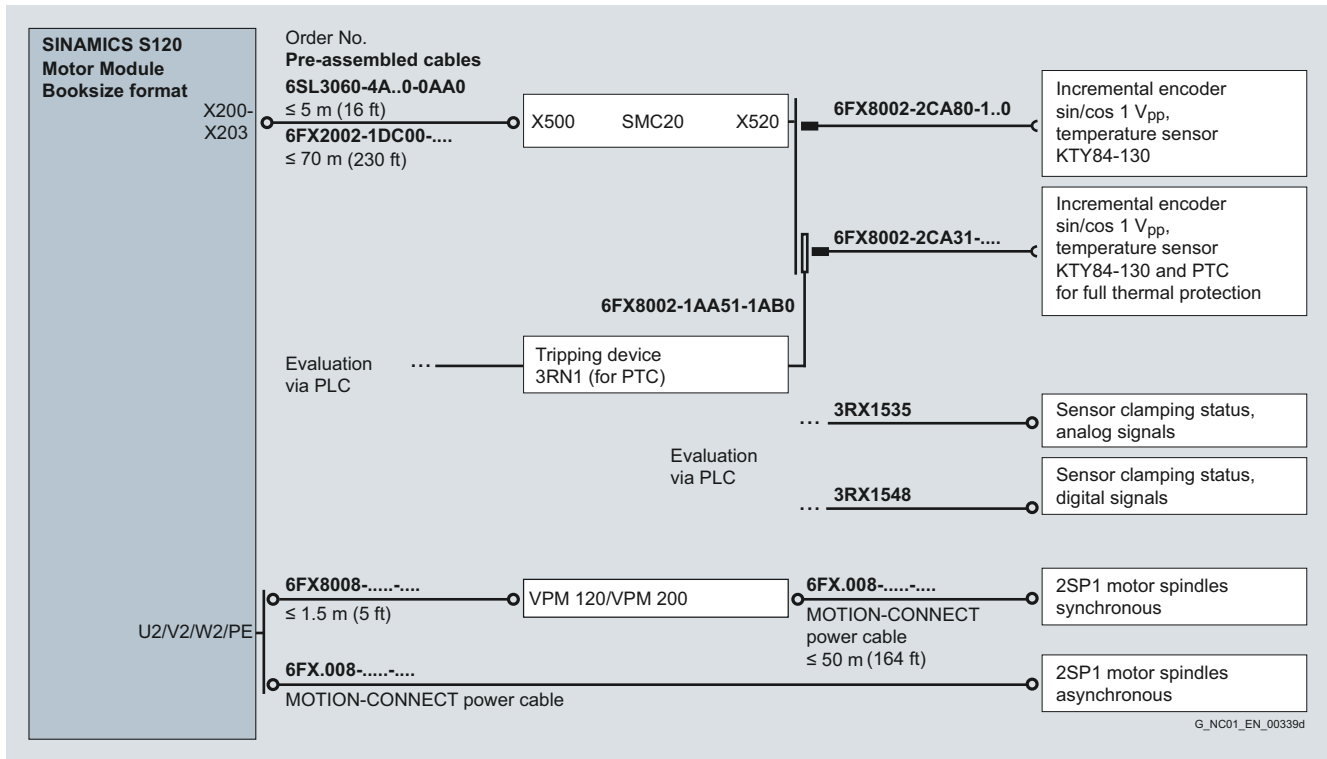


<sup>1)</sup> Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

<sup>2)</sup> For type of connection with exposed core ends, power and signal connectors are not included in the scope of supply of the motor, they must be ordered separately (see Accessories for power and signal cables).

### Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format and SIMOTICS 2SP1 main spindle motors

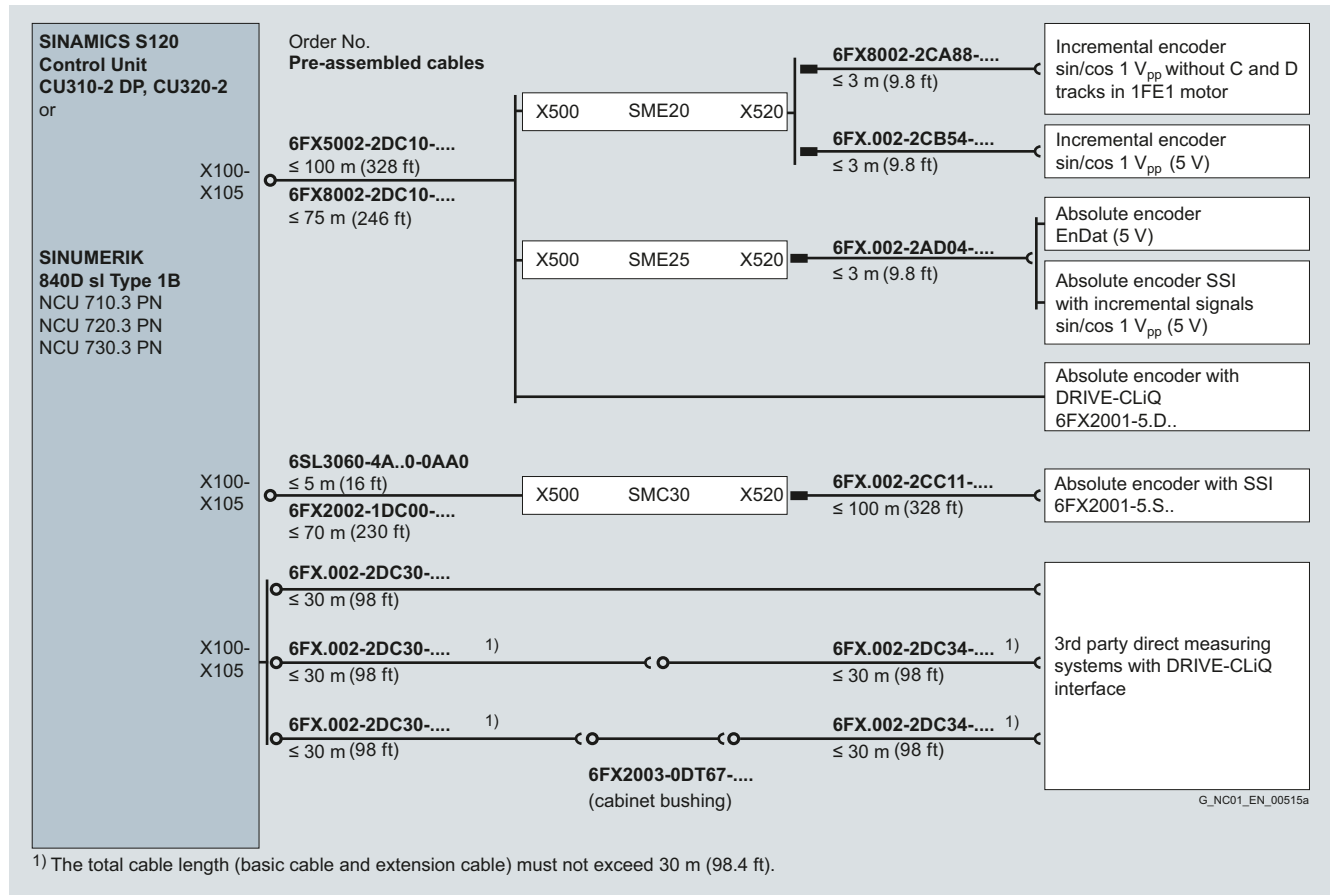


# MOTION-CONNECT connection systems

## Connection overviews

### Integration (continued)

#### Connection of a machine encoder (direct measuring system)



# MOTION-CONNECT connection systems

## Accessories for power and signal cables

### Power connector

#### Overview



Power connector with screw-type connection

3 A to 30 A Motor Modules in booksize format are shipped without power connector, as this is already connected to the MOTION-CONNECT power cables.

Power connectors can also be ordered separately, e.g. for applications where installation of the motor cable would be difficult if a power connector were attached.

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                  | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Power connector</b><br>For Motor Modules 3 ... 30 A<br>booksize format<br>with screw-type connection<br>(enclosure, insulator, 4 coding pins and<br>1 interlock bolt, screw-type connections<br>Motor: 1.5 ... 10 mm <sup>2</sup> ,<br>Holding brake: 1.5 mm <sup>2</sup> | <b>6SL3162-2MA00-0AA0</b> |

#### Overview



Power and signal connectors for SIMOTICS T-1FW6 built-in torque motors

Power and signal connectors 6FX2003 are designed to ensure optimum connection of SIMOTICS T-1FW6 built-in torque motors to the drive system.

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                                                                                                                                                           | Order No.                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>Power connectors for SIMOTICS T-1FW6 built-in torque motors</b> <ul style="list-style-type: none"> <li>Size 1<br/>for 4 × 2.5 mm<sup>2</sup><br/>connectors with pins and<br/>full external thread</li> <li>Size 1.5<br/>for 4 × 4 mm<sup>2</sup>/<br/>4 × 6 mm<sup>2</sup>/<br/>4 × 10 mm<sup>2</sup>/<br/>4 × 16 mm<sup>2</sup><br/>connectors with pins and<br/>full external thread</li> </ul> | <b>6FX2003-0LA00</b><br><br><b>6FX2003-0LA10</b> |
| <b>Signal connector for SIMOTICS T-1FW6 built-in torque motors</b> <ul style="list-style-type: none"> <li>M17<br/>for 5 × 0.5 mm<sup>2</sup> +<br/>1 × 1.0 mm<sup>2</sup><br/>connectors with socket and<br/>full-thread cap nut</li> </ul>                                                                                                                                                           | <b>6FX2003-0SU07</b>                             |

#### More information

A special tool is needed to crimp the contacts. For further information, please go to:

[www.intercontec.biz](http://www.intercontec.biz)



# MOTION-CONNECT connection systems

## Accessories for power and signal cables

### Mounting flange

#### Overview



Mounting flange for power connectors

Mounting flanges are used to route or fix connectors in IP67 degree of protection, for example, in control cabinets. With the exception of angled connectors, a mounting flange can be retro-mounted on connectors with a cap nut or with external thread.

### HF (high-frequency) clamp

#### Overview



HF (high-frequency) clamp for power connectors

To ensure correct grounding at the cable duct or cabinet wall, a ground clamp is optionally available together with the flanges for large-area discharging of high-frequency interferences. An HF (high-frequency) clamp is not required for size 3 power connectors.

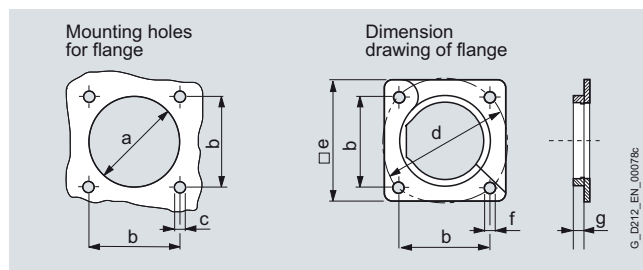
#### Selection and ordering data

| Description                                         | Order No.            |
|-----------------------------------------------------|----------------------|
| <b>Mounting flange for</b>                          |                      |
| • Power connector size 0.5 and signal connector M17 | <b>6FX2003-7HX00</b> |
| • Power connector size 1                            | <b>6FX2003-7BX00</b> |
| • Power connector size 1.5                          | <b>6FX2003-7CX00</b> |
| • Power connector size 3                            | <b>6FX2003-7AX00</b> |
| • Signal connector M23                              | <b>6FX2003-7DX00</b> |

#### Selection and ordering data

| Description                                         | Order No.            |
|-----------------------------------------------------|----------------------|
| <b>HF (high-frequency) clamp for</b>                |                      |
| • Power connector size 0.5 and signal connector M17 | <b>6FX2003-7FA00</b> |
| • Power connector size 1 and signal connector M23   | <b>6FX2003-7FX00</b> |
| • Power connector size 1.5                          | <b>6FX2003-7GX00</b> |

#### Dimensional drawings



| Dimensions | Power connector            |                          |                            |                          | Signal connector |                  |
|------------|----------------------------|--------------------------|----------------------------|--------------------------|------------------|------------------|
|            | Con-<br>nector<br>size 0.5 | Con-<br>nector<br>size 1 | Con-<br>nector<br>size 1.5 | Con-<br>nector<br>size 3 | M17              | M23              |
|            | mm (in)                    | mm (in)                  | mm (in)                    | mm (in)                  | mm (in)          | mm (in)          |
| a          | Ø 23<br>(0.91)             | Ø 28.6<br>(1.13)         | Ø 47<br>(1.85)             | Ø 66<br>(2.6)            | Ø 23<br>(0.91)   | Ø 27.6<br>(1.09) |
| b          | 22.6<br>(0.89)             | 28.3<br>(1.11)           | 42.4<br>(1.67)             | 75<br>(2.95)             | 22.6<br>(0.89)   | 28.3<br>(1.11)   |
| c          | 4 × M2.5                   | 4 × M3                   | 4 × M4                     | 4 × M4                   | 4 × M2.5         | 4 × M3           |
| d          | Ø 32<br>(1.26)             | Ø 40<br>(1.57)           | Ø 60<br>(2.36)             | Ø 63<br>(2.48)           | Ø 32<br>(1.26)   | Ø 40<br>(1.57)   |
| e          | 32<br>(1.26)               | 35<br>(1.38)             | 55<br>(2.17)               | 84.9<br>(3.34)           | 32<br>(1.26)     | 35<br>(1.38)     |
| f          | M3                         | M4                       | M5                         | M6                       | M3               | M4               |
| g          | 6.5<br>(0.26)              | 6.5<br>(0.26)            | 7<br>(0.28)                | 10<br>(0.39)             | 6.5<br>(0.26)    | 6.5<br>(0.26)    |

### DRIVE-CLiQ cabinet bushing (RJ45)

#### Overview



DRIVE-CLiQ cabinet bushing for signal cables (RJ45)

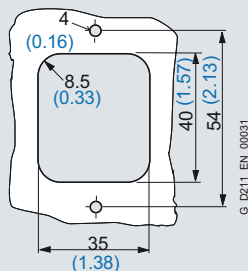
The DRIVE-CLiQ cabinet bushing (RJ45) provides the high IP67 degree of protection for the appropriate MOTION-CONNECT DRIVE-CLiQ signal cables routed through openings in control cabinets. The DRIVE-CLiQ cabinet bushing has IP54 degree of protection on the outside and IP20 on the inside of the control cabinet.

#### Selection and ordering data

| Description                                        | Order No.                 |
|----------------------------------------------------|---------------------------|
| <b>DRIVE-CLiQ cabinet bushing</b>                  | <b>6SL3066-2DA00-0AA0</b> |
| For MOTION-CONNECT DRIVE-CLiQ signal cables (RJ45) |                           |

#### Dimensional drawings

Cabinet cut-out for DRIVE-CLiQ cabinet bushing



Dimensions in mm (in)

### DRIVE-CLiQ cabinet bushing (M12)

#### Overview



DRIVE-CLiQ cabinet bushing for signal cables (M12)

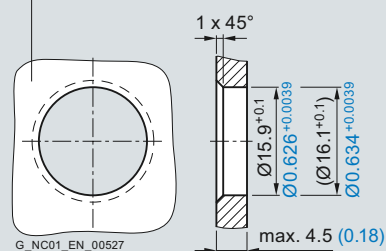
The DRIVE-CLiQ cabinet bushing (M12) provides the high IP67 degree of protection for the appropriate MOTION-CONNECT DRIVE-CLiQ signal cables routed through openings in control cabinets. The DRIVE-CLiQ cabinet bushing (M12) has degree of protection IP67 at both ends and is designed as a socket with internal thread on the outside of the cabinet and as pins with an external thread on the inside of the cabinet.

#### Selection and ordering data

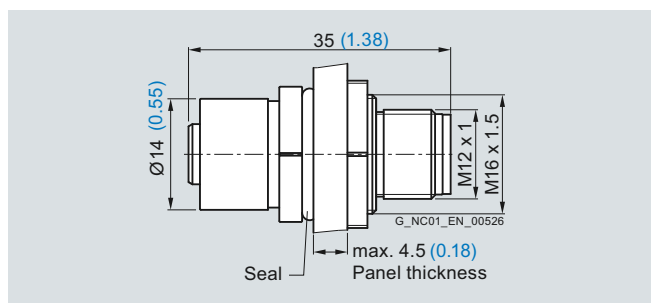
| Description                                       | Order No.            |
|---------------------------------------------------|----------------------|
| <b>DRIVE-CLiQ cabinet bushing</b>                 | <b>6FX2003-0DT67</b> |
| For MOTION-CONNECT DRIVE-CLiQ signal cables (M12) |                      |

#### Dimensional drawings

Mounting with O-ring  
(Through-hole with chamfer to be fixed from behind with nut)



Dimensions in mm (in)



Cutout in cabinet for DRIVE-CLiQ cabinet bushing

# MOTION-CONNECT connection systems

## Accessories for power and signal cables

### DRIVE-CLiQ coupler

#### Overview



DRIVE-CLiQ coupler for signal cables

The DRIVE-CLiQ coupler makes it possible to join two MOTION-CONNECT DRIVE-CLiQ signal cables with degree of protection IP67.

#### Selection and ordering data

| Description                                                                 | Order No.                 |
|-----------------------------------------------------------------------------|---------------------------|
| <b>DRIVE-CLiQ coupler</b><br>For MOTION-CONNECT<br>DRIVE-CLiQ signal cables | <b>6SL3066-2DA00-0AB0</b> |

# SINUMERIK

## Manufacturing Excellence



|             |                                                       |
|-------------|-------------------------------------------------------|
| <b>8/2</b>  | <b>Full-lifecycle services</b>                        |
| 8/3         | Machine Development                                   |
| 8/4         | Mechatronic Support                                   |
| 8/5         | SIMIT – Simulation platform for virtual commissioning |
| 8/6         | Manufacturing IT                                      |
| 8/8         | Condition Monitoring                                  |
| 8/9         | Extended Machine Contracts                            |
| 8/10        | Repair service contract RSC                           |
| 8/13        | Productivity Improvement                              |
| 8/14        | Machine Retrofit                                      |
| 8/15        | Spare parts services                                  |
| 8/15        | Delivery of spare parts                               |
| 8/16        | Delivery as exchange product                          |
| 8/16        | Repair                                                |
| 8/17        | Product upgrade service                               |
| 8/17        | General overhaul                                      |
| 8/18        | Function check                                        |
| 8/18        | Return of diagnostic parts                            |
| 8/19        | Stock reduction in spare parts store                  |
| 8/19        | Extended spare part availability                      |
| <b>8/20</b> | <b>Siemens Industry Online Support</b>                |
| <b>8/22</b> | <b>SINORIX al-deco PLUS</b>                           |
| 8/22        | Object protection systems for machine tools           |
| <b>8/23</b> | <b>Control cabinets</b>                               |
| 8/25        | Control cabinet certification                         |
| <b>8/26</b> | <b>Logistics solutions</b>                            |
| 8/26        | Logistics solutions for our customers                 |
| <b>8/27</b> | <b>Components for basic and further CNC training</b>  |
| 8/27        | SinuTrain for SINUMERIK Operate                       |
| 8/29        | eLearning/Training booklets for SINUMERIK Operate     |
| <b>8/30</b> | <b>Training equipment</b>                             |
| 8/30        | SINUMERIK 840D sl training case                       |
| 8/30        | SINUMERIK 840D sl OP training case                    |
| 8/31        | SINUMERIK 840D sl training rack                       |
| <b>8/32</b> | <b>Training</b>                                       |
| <b>8/33</b> | <b>Siemens Automation Cooperates with Education</b>   |
| 8/33        | Know-how based on practical experience                |
| <b>8/35</b> | <b>Documentation</b>                                  |
| 8/35        | General documentation                                 |
| 8/36        | SINUMERIK 840D sl                                     |
| 8/38        | SINAMICS S120                                         |
| 8/39        | SIMOTICS motors for SINAMICS                          |
| 8/39        | Measuring systems                                     |
| 8/40        | CAD Creator                                           |
|             | Dimension drawing and 2D/3D CAD generator             |

# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Overview



#### *SINUMERIK Manufacturing Excellence – the portfolio of services for your machines and processes*

Innovative services for machines offer enormous potential for optimizing the lifecycle costs. Siemens accompanies machines over their entire lifecycle – from the initial idea and design to operation and retrofit. The service package SINUMERIK Manufacturing Excellence plays an important role in optimizing the manufacturing process – regardless of the technologies used, the degree of automation, and the planning and manufacturing strategies.

### Benefits

#### *For the machine manufacturer:*

- Shorter machine development time
- Cost-optimized machine development
- Better machine servicing
- Machines with optimized dynamic response
- Creation of new service potentials
- Reduced warranty costs

#### *For the machine operator:*

- Reduced costs per item
- Process optimization
- Increased availability and productivity
- Quality optimization

### More information

More information is available on the Internet at:

[www.siemens.com/sinumerik/manufacturing-excellence](http://www.siemens.com/sinumerik/manufacturing-excellence)

or please contact your local Siemens sales office or Regional Company.

### Overview

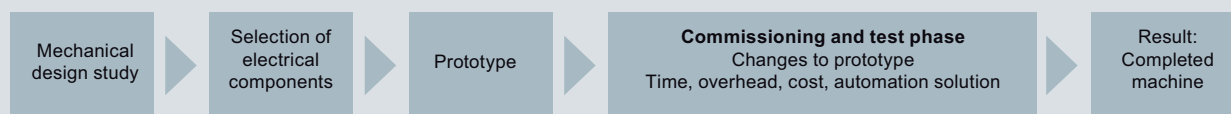


### *Achieve the next generation of machines faster using Machine Development*

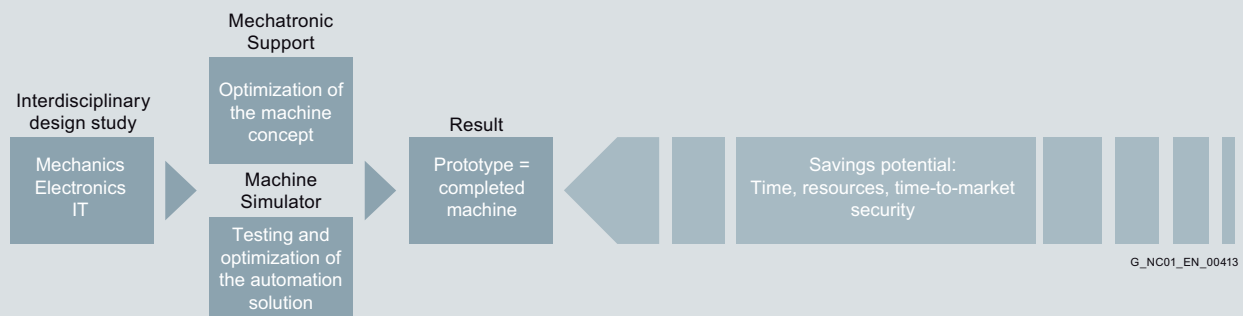
The Machine Development module has been developed in the context of SINUMERIK Manufacturing Excellence for the simulation, construction and commissioning of machines. Here, we meet the demands of machine manufacturers to minimize development risk. In addition, the first machine prototype is available much more quickly than in the traditional sequential development process.

In the simplest case, we can advise you on drive design and dimensioning. Our services can also go as far as the development of the control, operation or safety concept of a new machine, configuration of the control cabinet, or complete PLC/CNC/HMI programming.

#### Traditional approach, mechanical construction



#### Virtual prototyping



# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Mechatronic Support

#### Overview

##### *Achieve the optimum machine quicker and more efficiently with Mechatronic Support*

The Mechatronic Support service ensures that already at the design stage of new machines, all the systems involved in mechanics, electronics, and IT are tested and optimized in a simulation environment in terms of their functionality and interaction, before they are actually built.

Mechatronic Support is thus the intelligent alternative to "trial and error". Innovative machine concepts are mutually compared, modified and optimized at the outset – a process which of course also takes account of your ideas for new mechatronic components.

##### *Virtual simulation, real construction*

With the help of the Mechatronic Support service, machinery ideas and new developments can be mechatronically tested and modified in a short time at low expense. The first real prototype can be built immediately afterwards as a functioning machine.

As the machine manufacturer, you have the benefit of shorter development phases and faster time-to-market; or as the end customer, you benefit from an optimized high-performance machine solution.

#### Benefits

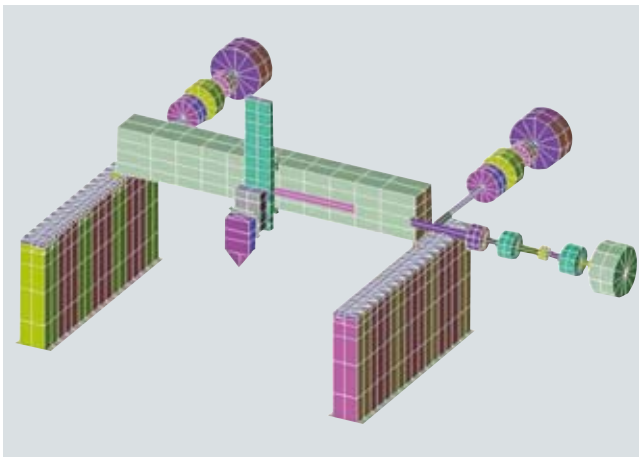
- Shorter development times – shorter time to market
- Reliable achievement of development objectives
- Risk-free testing of innovative machine concepts
- Higher quality and productivity from the outset
- Get to the finished machine more quickly with specialist support

#### Selection and ordering data

| Description                                                                                                             | Order No.            |
|-------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Consulting</b><br>Technical consultation with customer                                                               | <b>6FC5088-1....</b> |
| <b>Machine optimization</b><br>Optimum setting of control and drives on the customer's machine                          | <b>6FC5088-2....</b> |
| <b>Machine analysis and optimization</b><br>Analysis of the machine and its limits.<br>Recommendations for manufacturer | <b>6FC5088-3....</b> |
| <b>Machine simulation</b><br>Simulation of individual axes and the dynamic response on the machine                      | <b>6FC5088-4....</b> |
| <b>Machine simulation with interpolating axes</b><br>Simulation of interpolating axes                                   | <b>6FC5088-5....</b> |
| <b>Machine simulation with FE model</b><br>Modeling of machine using the Finite Element method                          | <b>6FC5088-6....</b> |

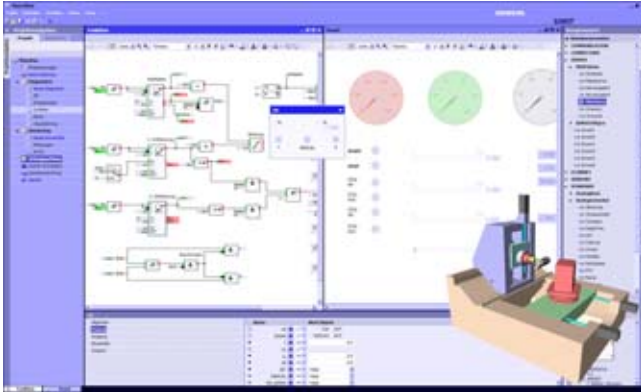
#### More information

Please contact your local Siemens sales office or Regional Company for more information.





### Overview



#### *SIMIT for simulating a new machine during development*

SIMIT allows you to simulate the interaction between your machine tool or production machine and your automation system at all stages of product development, from commissioning through to sales and after-sales.

Long before you finish developing a machine and building a prototype, you can simulate its performance under realistic conditions using SIMIT. For this purpose, the automation system is simply coupled with a virtual behavioral model of the machine. This coupling has been optimized for high-performance machine tools and production machines with state-of-the-art control technology such as SIMATIC and SINUMERIK.

#### *Your automation system – fully integrated*

SIMIT is a simulation system that supports a wide range of hardware and software interfaces to the automation system. If you want to connect the entire control unit, e.g. including the CNC, PLC and the Human Machine Interface to a machine model in SIMIT, you can simply use a hardware interface for PROFIBUS.

SIMIT provides consistent support for the exchange of data with the engineering environment of your automation system.

The 2-channel interface IM-PBDP-2 is used to simulate PROFIBUS DP standard slaves and S7 slaves, as well as fail-safe SIMATIC slaves. A total of 125 DP slaves in a DP master system can be simulated in each channel. The interface is connected to the PC via Ethernet.

#### *SIMIT makes simulation as simple as it can be.*

Even though computer simulation is often regarded as a highly complex process, you do not need to be a simulation specialist to work effectively with SIMIT. All you need to do is operate the ergonomically designed, graphical user interface of SIMIT, while the application itself processes all mathematical and IT procedures associated with the simulation invisibly in the background.

### Overview (continued)

#### *SIMIT – modeling the machine*

The simulation model of the machine works according to a simple modular principle, i.e. it is created on the SIMIT graphical user interface by the joining together of individual components and controls. Simulation elements are simply dragged from the library and dropped into the machine model. The extensive basic library supplied with SIMIT provides you not only with standard arithmetic and logic functions, but also blocks for interfacing a broad range of I/Os of your automation system.

Using SIMIT's component type editor, you can create completely new types of component and use them in your simulations. You can freely define the connections and states of these component types as well as their functional and graphical response, allowing you to work extremely efficiently even when your machine models are complex.

### Benefits

- SIMIT combines savings in time and cost with enhanced product quality in machine tool and production machine building. SIMIT supports you during key phases of the development of machine tool and production machine products: during development, commissioning, testing and servicing.
- The automation solution used, including all the software modules developed by the machine manufacturer, can be tested with SINUMERIK SIMIT in advance and in a reproducible manner – and all without having the real "steel and iron" version of the machine at hand.
- A new machine can be tested without being subjected to any risk since proper functioning is checked in virtual reality. After the development work on the new machine has been completed, the virtual machine that has been generated can be used again for training, pre-sales and after-sales purposes.

### Integration

#### *Requirements*

- Operating system
  - Windows XP Professional, 32 bit
  - Windows 7 Professional, 32 bit

### Selection and ordering data

| Description                                                                                                                | Order No.            |
|----------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>SIMIT MS Basic V7.0</b><br>For operating systems<br>Windows XP/7 Professional, 32-bit                                   | <b>9AP1416-1BB10</b> |
| <b>SIMIT MS OPEN V7.0</b><br>For operating systems<br>Windows XP/7 Professional, 32-bit<br>incl. component type editor CTE | <b>9AP1426-1BB10</b> |
| <b>SIMIT interface IM-PBDP-2</b><br>Connection to the PC via Ethernet                                                      | <b>9AP2440-1AB10</b> |

### More information

More information is available on the Internet at:

[www.siemens.com/simit](http://www.siemens.com/simit)

Or please contact:

#### **Siemens AG**

Industry Sector  
SIMIT Infoline  
Tel.: +49 9131 7-43406  
E-mail: [simit.industry@siemens.com](mailto:simit.industry@siemens.com)



# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Manufacturing IT

#### Overview



#### *Optimize production, servicing and maintenance with integrated IT solutions!*

Within the framework of SINUMERIK Manufacturing Excellence, Manufacturing IT offers you a holistic approach for optimizing your production-related processes involving machine tools with integrated IT solutions.

The building blocks are the IT products from SINUMERIK Integrate and extensive consultancy services for IT security and data security. We support you with our know-how during project implementation and operation of your solution.

Manufacturing IT supports your production and service processes with a wide range of consistently coordinated modular services that are based on SINUMERIK Integrate.

#### **Production**

##### **Job management and preparation with SINUMERIK Integrate Analyze MyPerformance**

The work in hand is flexibly controlled by a job management system based on Analyze MyPerformance (for example, with SIMATIC IT). Specifications and acknowledgements are exchanged between the ERP system (e.g. SAP) and production. Availability of the current information supports optimization of the manufacturing sequence and manufacturing resources. Further benefits are faster job throughput and reduced stock levels for materials.

##### **Machine data acquisition and evaluation with SINUMERIK Integrate Analyze MyPerformance**

Transparency is improved significantly by the use of machine data acquisition and evaluation (Analyze MyPerformance). This allows you to determine optimization potentials. Targeted analyses such as machine availability (OEE), cycle times, degree of utilization or alarm statistics prevent disturbances and result in longer machine runtimes.

##### **Parts tracking and archiving with SINUMERIK Integrate Analyze MyPerformance**

The functions for parts tracking and archiving based on Analyze MyPerformance and with SIMATIC IT support intelligent parts management as well as convenient parts tracking. This ensures that you are well-prepared for any warranty claims and product recalls. A reduction in costs accompanied by an increase in overall quality can also be expected.

##### **Tool management with SINUMERIK Integrate Manage MyTools**

Whether for individual machines, flexible transfer lines, or for the complete machine park – with our tool management (Manage MyTools), you have access to all tool data all the time. Through interfaces, the system ensures that the right data is at the right place at the right time. Tool statistics make your tool inventory transparent. You can detect potentials for rationalization with regard to tools much more easily and can achieve savings much more readily.

##### **CNC program management and transfer with SINUMERIK Integrate Manage MyPrograms**

CNC program management (Manage MyPrograms) offers you system-wide networking of your CNC machines and supports CNC program handling on transfer to and from the machine. It reduces costs in the CNC organization through secure and convenient CNC data archiving with versioning and administration functions.

##### Additional advantages:

- Optimized use of resources
- Shorter setup times and enhanced efficiency
- Reduced machine downtimes
- Automatic fault analyses
- Transparency in manufacturing down to the machine level

#### **Maintenance**

##### **Preventive maintenance with SINUMERIK Integrate Manage MyMaintenance**

The software module for maintenance management (Manage MyMaintenance) supports condition-oriented and/or preventive maintenance and optimizes servicing by early notification of the need for maintenance jobs such as cleaning, inspection and/or repair. This increases the machine runtime and reduces costs. The machine operators support the maintenance department by accepting responsibility for maintenance activities.

##### **Data backup and archiving with SINUMERIK Integrate Access MyBackup**

Data management supports backup, comparison and administration of control systems. This means: central data management with maximum fault tolerance and availability as well as efficient archiving of all machine data. When components are replaced, all the relevant data that is required for operation of these components is available again immediately. With Access MyBackup, we are providing an interface for accessing all the relevant backup data of a SINUMERIK 840D sl system. Manufacturers of data backup software can base their applications on this interface and are therefore authorized to implement SINUMERIK backup systems.

You will find Solution Partners at:

[www.siemens.com/automation/partnerfinder](http://www.siemens.com/automation/partnerfinder)

### Overview (continued)

#### Condition Monitoring with SINUMERIK Integrate Analyze MyCondition (local or ASP<sup>1)</sup>)

The investment decision depends increasingly on the analysis of costs over the complete lifecycle of a machine. Costs caused by machine downtime and unplanned maintenance dominate the calculation increasingly in accordance with the TCO principle (Total Cost of Ownership). The technical and organizational controlling of maintenance processes therefore becomes more and more important.

By means of standardized test procedures, Condition Monitoring supports machine operators, maintenance technicians and service engineers in determining the machine's condition and monitoring the wear on the machine over time. Through continuous evaluation of the status of the machine tools, trends can be detected early and measures can be taken or planned on time. Individual machine components can also be monitored cyclically.

The integrated maintenance model is used to optimize downtimes resulting from maintenance work through a complete overview of preventive and/or condition-oriented maintenance. The optimum time for maintenance can then be selected and productivity can be further improved.

#### Additional advantages:

- Transparency and efficiency through optimization of the maintenance measures for your machine
- Reduction in inventory costs through forward scheduling of spare parts based on condition monitoring and evaluation of machine components
- Increased productivity through the implementation of condition-oriented maintenance measures

### Service

#### Diagnostic Services with SINUMERIK Integrate Access MyMachine /Diagnosis (as ASP)

With Diagnostic Services, you can organize your service help desk and monitor the condition of your machines worldwide.

From tachograph data through to complex PLC logic, standard diagnostic cases can be preconfigured, stored as a template in the system and loaded onto your machines during commissioning.

On the control monitors you can trace the machine history in Diagnostic Services and thus find and analyze the causes of a fault quicker.

Your machines in the field are automatically synchronized with the servers on a regular basis. In the event of a fault, you can configure more specific diagnoses and transfer them to the machines. You are then able to further pinpoint faults dynamically.

If the results do not lead to a resolution of the problem, you can investigate the fault further by means of teleservice, rectify it online or consult other experts by means of a teleconference.

### Overview (continued)

Worldwide and without need for time-consuming installation of software, as easy as web mail, as secure as online banking. And if fault rectification on-site is unavoidable, you will have planned your maintenance job optimally based on the machine status determined online and can deploy your resources effectively.

#### Additional advantages:

- Enhanced customer retention thanks to optimized service processes
- Remote operation and monitoring of the control systems using standard browsers helps to cut travel expenses
- Troubleshooting is speeded up by intelligent fault diagnostics supported by data and notification services

#### Internet service platform with SINUMERIK Integrate (ASP)

As an alternative to a local installation, Siemens offers the functions and services described above, including the entire IT infrastructure, in the form of an ASP model:

In other words, an Internet-based infrastructure with high-performance servers, storage media and links to e-mail/text message systems.

The service platform supports you with:

- Availability of data and software functionality between different companies
- Assuring security for data access
- No need to change the security guidelines of participating companies

This type of environment is essential for quick and easy access to the knowledge of experts beyond corporate boundaries. A uniform view of the data of the machines and use of the same software enables faults to be rectified more quickly, resources to be implemented optimally, and costs to be reduced.

The infrastructure and services are compatible with today's IT security regulations. Periodic security audits ensure that our systems are always up-to-date in terms of security technology.

#### Additional advantages:

- Low IT costs, and therefore cost-effective from the first machine onwards
- Accounting and investment security due to fixed prices
- High level of data security due to extremely fault-tolerant servers and multi-level access protection

### More information

Additional information on the software modules described above can be found in chapter SINUMERIK Integrate.

#### Security note

In the case of software for remote maintenance or connection to higher-level networks, suitable protection measures must be taken (including industrial security, e.g. network segmentation) to guarantee safe operation of the system. You can find more information on Industrial Security on the Internet at:

[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

<sup>1)</sup> ASP: **A**pplication **S**ervice **P**roviding

# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Condition Monitoring

#### Overview



#### *Innovation potential for servicing and maintenance*

Innovative, successful manufacturing enterprises focus their efforts on increasing the productivity and availability of machines and optimizing service and maintenance processes. Condition Monitoring makes an important contribution to the attainment of these goals.

#### *Condition Monitoring*

The investment decision depends increasingly on the analysis of costs over the complete lifecycle of a machine. Costs caused by machine downtime and unplanned maintenance dominate the calculation increasingly in accordance with the TCO principle (Total Cost of Ownership). The technical and organizational controlling of maintenance processes therefore becomes more and more important.

By means of standardized test procedures, Condition Monitoring supports machine operators, maintenance technicians and service engineers in determining the machine's condition and monitoring the wear on the machine over time. Through continuous evaluation of the status of the machine tools, trends can be detected early and measures can be taken or planned on time. Individual machine components can also be monitored cyclically.

The integrated maintenance model is used to optimize downtimes resulting from maintenance work through a complete overview of preventative and/or status-oriented maintenance. The optimum time for maintenance can then be selected and productivity can be further improved.

By utilizing the full scope of Condition Monitoring functions, it is possible to optimize the costs incurred for production machine maintenance as well as the Total Cost of Ownership (TCO), and so benefit in the following ways:

- Increased plant availability
- Increased productivity
- Reduced overheads for inspection and maintenance
- Lower investment costs
- Freedom to concentrate on the core business

#### *Monitoring of relevant components*

In order to prevent undesirable machine downtimes and reduce unscheduled maintenance costs, the causes of prolonged outages and the drivers of lifecycle costs must also be included in the condition monitoring system.

#### Overview (continued)

On machine tools, this applies in equal measure to the linear axes and main spindles, the tool magazine, the chip conveyor and the automation system with pneumatic components and fluid technology.

Further advantages are gained by monitoring relevant components:

- Reduced risk of failure and consequential costs
- Lower spare parts costs through full utilization of wear margin
- Smaller spare part inventories particularly of expensive components
- Early notification when essential maintenance is required
- More effective planning of your resources

#### *Condition monitoring methods*

Condition Monitoring offers a variety of methods by which you can determine the exact condition of your machine tool.

Automated test procedures monitor the synchronism, friction, dynamic response and accuracy of linear axes. The variable monitor tracks freely selected PLC or NC variables accordingly without needing to make any changes to programs. All of this can be done with tools that are already integrated in the control system of your machine. The results of the measurements are stored and analyzed. They are displayed as individual measurements but also visualized in measurement series with trend display.

Furthermore, it is possible to integrate additional sensors into the overall process in order to incorporate more detailed information into the analysis of the machine's condition.

The test procedures can be planned to suit requirements by means of the integrated maintenance planning function and performed if necessary with PLC support.

#### *Workflow processes*

Condition Monitoring automatically tracks the trend in significant performance characteristics and monitors them for violation of limit values. If a measurement delivers an inadmissible result, the application automatically informs the relevant partners by text message or e-mail. Where appropriate, it might even trigger a maintenance request directly for your machines.

You can of course integrate Condition Monitoring via interfaces into your maintenance system so that the maintenance request can also be issued there.

With Condition Monitoring you are laying the foundation for the creation of a condition-oriented maintenance system, thereby fulfilling one of the requirements for optimized production.

#### *The platform*

Siemens is offering Condition Monitoring as a standard client-server application for operation in the customer's own network, or via an Internet-based infrastructure with high-performance servers, storage media and links to e-mail/text message systems.

The infrastructure and services are compatible with today's IT security regulations. Periodic security audits ensure that our systems are always up-to-date in terms of security technology.

#### More information

You can find more information on Industrial Security on the Internet at:

[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

### Overview

#### Calculable costs for maintenance and service

This is what we are offering to machine tool manufacturers, machine distributors and machine tool users with the Extended Machine Contracts option.

In these individually agreed contracts, maintenance concepts are assembled from the following modules: preventative measures, repair, access to Siemens service personnel, service intervals, and spare parts logistics/management.

Here, Siemens accepts the risk of costs through fixed-price invoicing of the services provided (contract cost). With the sole objective of providing tailor-made, efficient support with maintenance.

You remove the risk of unexpected costs and can rely on a high degree of machine availability. The joint agreement ensures access to qualified Siemens service personnel for fault elimination on site as well as professional spare parts logistics, which ensures proximity to the customer.

#### Additional advantages:

- Security of planning, reduced costs and transparency of costs
- Higher productivity thanks to minimal downtimes
- Service packages tailored to requirements
- Supplementing and relieving the service personnel at the manufacturer or end user
- Access to the worldwide service structure of Siemens AG

#### Repair Service Contract RSC: Subsequent repairs at fixed prices

We have developed the Repair Service Contract RSC especially for machine manufacturers and machine distributors. It offers subsequent rectification of defects at the site of the machine at fixed prices. With these contract-based services, you can cover the personnel costs and materials costs that are incurred for rectifying any faults on our products after the second commissioning phase at the end customer. The service period can be freely selected.

The personnel services comprise the provision of service personnel, error diagnostics and fault rectification on site as well as verification of fault rectification. The runtime of the contract can extend the period of liability for defects to up to 5 years.

In the case of services that exceed the RSC scope, you can use the regional service or add-on services. This includes extended service periods, agreed response times and preventative measures.

#### The benefits of the Repair Service Contract RSC:

- Risks that result from liability for defects are limited by fixed prices
- Fault rectification at the installation site of the machine, without the need for verification of the defect by the machine tool manufacturer or distributor
- Reduced downtimes at the customer site due to stored product data and final destination information

#### Local service contract LSC: the modular service package

With the local service contract LSC, we offer machine users an individual, modular service package that reliably ensures the availability of machine tools and manufacturing systems and therefore makes an important contribution to efficient production.

### Overview (continued)

The scope of the service contract is individually matched to the service concept. We can also offer you our contract-based services outside normal office hours – up to 24 hours a day, 365 days a year. Alternatively, we can offer you our services with faster response times: from the normal "next day" to a 4-hour response time.

#### The benefits of the local service contract LSC:

- Assured availability through reduction of the machine downtimes
- Plannable costs thanks to agreed service contract prices
- Services tailored to requirements

#### Life Cycle Check

Our Life Cycle Check service assists you in optimizing your spare parts strategy so as to safeguard your productivity.

An overview of our services:

- Acquisition of all modules in your installation which have control or drive relevance
- The acquired Siemens modules are analyzed with respect to their availability as a spare/replacement or repair part. Information about estimated phase-out and discontinuation dates and possible follow-on types is collected and recorded in a report.
- Support for an optimum spare parts strategy:
  - Demand-based ordering of the Siemens spare parts service
  - Optimization of customer's spare parts inventory (stock reduction)
  - Buyback of spare parts by Siemens on request
  - Punctual availability of upgrades
  - Definition of follow-on solutions/general overhaul
  - Retrofit scheduling

For example, we compare the components in your spare parts stores with the components installed on your machines and inform you by way of a report of any components held in your stores which have become obsolete for your machines. Or we will show you which of the stored components are compatible as spare parts so that you can reduce your inventory accordingly.

As part of the local service contract, we will send you an annual report which specifies the spare part availability of your components which you can use as a guide for adjusting your spare parts inventory.

#### Benefits of the Life Cycle Check:

- Increased productivity because plant outages are rare: An optimized spare parts supply keeps downtimes to a minimum
- Reduction in asset and warehousing costs: Use of the Siemens spare parts service
- You only store selected spare parts on site: Reduce stocks of superfluous parts
- Extension of the plant lifecycle: Installation of suitable follow-on types

### More information

Please contact your local Siemens sales office or Regional Company for more information.



# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Repair service contract RSC

#### Overview

##### *RSC description of performance*

In the context of the repair service contract (RSC), Siemens eliminates faults on components from Siemens Industry Sector, I IA&DT specified in the contract (with the exception of complete motor spindles) at the machine location on behalf of the machine tool/production machinery manufacturer and dealer.

##### *RSC services*

- Provision of service personnel
- On-site diagnostics
- On-site fault rectification
- Proof of fault rectification

**Diagnostics** refers to the components specified in the parts list of the final destination certificate. Diagnostics is carried out on the basis of a technical fault message clarified in advance by the manufacturer or dealer with specification of the contract number.

**Fault correction** is carried out by repairing and/or replacing faulty components. In the event of a machine standstill, fault correction is carried out with the response time specified for the country group.

Siemens provides qualified personnel to perform diagnostics and fault rectification on our products. If mechanical work is also necessary, this must be provided or arranged by the manufacturer/dealer. Example: Dismantling/mounting of motors or other components.

The services are provided during the usual working hours in the country of installation. Waiting times of longer than one hour that are not caused by Siemens will be invoiced separately. The RSC contract holder is responsible for initiating the service request unless otherwise stipulated in the contract (e.g. by a Direct service response).

**Spare parts** are provided from our central or regional spare parts stores using our worldwide spare parts logistics infrastructure. All essential spare parts are stocked in our central spare parts stores. Regional spare parts stores are adapted to include the components specified in the final destination certificate<sup>1)</sup>.

The following components are not defined as spare parts:

- Motors<sup>2)</sup>
- Cables<sup>3)</sup>
- Special or customer-specific modules and components not available from Siemens as spare parts.

Defective components are replaced free of charge within the agreed<sup>4)</sup> contract period. See under Service exclusions.

##### *Contract prerequisites*

- Final destination certificate
- Data backup at the user
- Parts lists for the individual components
- Access to the machine/components

The manufacturer/dealer provides the final destination information in good time prior to commencement of the contract, and ensures that all machine data is backed up and available at the user. Particular data for the final destination certificate are: Machine No., machine type, machining technology, control system, drive system, number of measuring circuits, data for OEM application, date of commissioning at end user's site, country of end user, if possible full address of end user and parts list of components used with order/serial number.

The manufacturer/dealer is responsible for providing the possibility for rapid implementation of the services and unobstructed access to the components including any software safety features, such as Lock-it! for carrying out the diagnostics/fault correction whenever necessary, as well as for naming a person in charge of software-protected machines that can be reached at any time.

To simplify data handling, the specified data from systems with SINUMERIK Operate can be stored on the CNC system with the function identSNAPSHOT and transferred to Siemens by online registration.

[www.siemens.com/sinumerik/register](http://www.siemens.com/sinumerik/register)

On existing SINUMERIK CNC systems, data handling can also be simplified and an online registration performed by means of the PC tool identSNAPSHOT – these data can also be remain with the machine as a data backup. For further information about the PC tool and handling the parts list of components used, please contact your Siemens sales office.

##### *RSC certificate*

As the RSC contract partner, the manufacturer or dealer is provided with a certificate with contract number (the contract number must be specified when requesting service) once the final destination certificate has been handed over (prerequisite for provision of services at the end customer site). This certificate contains the contract number and essential contract data such as machine number, machine type, contract start date, contract end date, and address for the provision of services.

##### *Period of validity*

The RSC commences on the date registered with Siemens for completion of the second commissioning procedure at the end customer's site, and ends on expiry of the selected RSC period<sup>5)</sup>.

##### *Contract periods*

The RSC is offered for the warranty period that our customers (manufacturers/dealers) provide to their end customers. Various RSC periods permit you to satisfy different market requirements. In the case of RSC periods exceeding the limitation period originally granted for Siemens I IA&DT components, the limitation period is extended with respect to claims for subsequent fulfillment of performance, with the exclusion of further rights and claims, corresponding to the extended RSC period. An existing RSC can be extended once by 6 or 12 months. The extension must be ordered during the period of the basic RSC.

<sup>1)</sup> Since the export of standard versions (components/systems) is subject to time-intensive approval procedures by authorities, and since this also applies to the delivery of components subject to approval in the context of services and spare part deliveries, it is recommended that **export versions should be used whenever possible**. This applies in particular in cases where the control can be exported without official approval after the machine manufacturer has installed it in a machine tool. Please note in this regard the **Export control information**.

<sup>2)</sup> For selected motors, we centrally stock components for fast delivery in Germany and the USA. These motors can be manufactured and delivered within a few working days. You can obtain the current list from your Siemens sales partner.

<sup>3)</sup> The delivery times known to you usually apply.

<sup>4)</sup> Examples for service exclusions:

- Non-compliance with the Siemens project engineering and user guidelines, e.g. incorrect installation, incorrect grounding, or incorrect operating characteristics
- Function-critical fouling, e.g. oil, conductive substances, rust
- Mechanical damage
- External electrical influence, e.g. effects of overvoltage, compensation system without reactor, or line harmonics
- Machine commissioning or optimization
- Intentional destruction

<sup>5)</sup> For example, in the case of an RSC with 12 months contract period, maximum of 24 months from the transfer of risk (delivery of the components).

### Overview (continued)

#### Contract versions

Two versions of the RSC are available.

- The master contract is for machine manufacturers who agree to order one RSC for all machines with Siemens equipment.
- The individual contract is for machine manufacturers who order an RSC only for certain machines equipped by Siemens.

#### Service exclusions

The contract shall not be deemed to have been performed in all cases of subclause VIII./7 Defects as to Quality of the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"<sup>1)</sup>. In the case of parts subject to wear (e.g., motor bearings and fans or cables), replacements will be provided free-of-charge within 12 months of commencement of the RSC in the case of proper use, irrespective of the actual duration of the RSC.

#### Export license

Fulfillment of the service call may be subject to authorization due to the application or the type of replacement parts, equipment and documentation required. The service call is, therefore, subject to the granting of the necessary export licenses and the absence of any other obstacles relating to German or other applicable export regulations.

#### Response time

As a rule, the following response times apply when the RSC is implemented in the case of a machine standstill:

| Country group           |                                                                                                                            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1                       | Next working day                                                                                                           |
| 2                       | Within two working days                                                                                                    |
| 3                       | Depending on country-specific conditions                                                                                   |
| Countries not mentioned | Depending on country-specific conditions, only for customers with master contract for the price of the individual contract |

We define the response time as the time from when your clarified order is placed until our service engineer begins the journey to the site stated in the order, or until troubleshooting commences using teleservice. The specified response times apply to "technically clarified fault notifications" within the usual working hours of the region (e.g., Monday to Friday 8:00 to 17:00) excluding public holidays.

#### Country list

The repair service is offered for the following countries:

| Continent                                                        | Country/region                                                                                                                                                                                                                           |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Country group 1</b>                                           |                                                                                                                                                                                                                                          |
| Americas                                                         | Brazil, Mexico, USA                                                                                                                                                                                                                      |
| Asia                                                             | China, India, Japan, South Korea, Taiwan, Thailand                                                                                                                                                                                       |
| Australia                                                        | Australia                                                                                                                                                                                                                                |
| Europe                                                           | Andorra, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Italy, Liechtenstein, Luxembourg, Monaco, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey |
| <b>Country group 2</b>                                           |                                                                                                                                                                                                                                          |
| Africa                                                           | South Africa                                                                                                                                                                                                                             |
| Americas                                                         | Argentina, Canada                                                                                                                                                                                                                        |
| Asia                                                             | Indonesia, Malaysia, Singapore                                                                                                                                                                                                           |
| Australia                                                        | New Zealand                                                                                                                                                                                                                              |
| Europe                                                           | Bulgaria, Estonia, Ireland, Latvia, Lithuania, Norway, Slovenia                                                                                                                                                                          |
| <b>Country group 3</b>                                           |                                                                                                                                                                                                                                          |
| Africa                                                           | Egypt                                                                                                                                                                                                                                    |
| Americas                                                         | Bolivia, Chile, Columbia, Costa Rica, Ecuador, El Salvador, Panama, Peru, Venezuela                                                                                                                                                      |
| Asia                                                             | Bahrain, Israel, Kuwait, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, United Arab Emirates (Dubai), Vietnam                                                                                                                         |
| Europe                                                           | Belarus, Bosnia-Herzegovina, Croatia, Greece, Malta, Macedonia, Russia, Serbia and Montenegro, Ukraine                                                                                                                                   |
| <b>Countries not mentioned</b>                                   |                                                                                                                                                                                                                                          |
| Remaining countries.<br>Only for customers with master contract. |                                                                                                                                                                                                                                          |

#### OEM service levels

To guarantee repair service for OEM applications, an assessment is necessary based on the OEM service guideline. The assessment grades the OEM application from 0 to 4. A surcharge will be levied for OEM service levels 1 to 4.

<sup>1)</sup> Examples for service exclusions:

- Non-compliance with the Siemens project engineering and user guidelines, e.g. incorrect installation, incorrect grounding, or incorrect operating characteristics
- Function-critical fouling, e.g. oil, conductive substances, rust
- Mechanical damage
- External electrical influence, e.g. effects of overvoltage, compensation system without reactor, or line harmonics
- Machine commissioning or optimization
- Intentional destruction

# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Repair service contract RSC

#### Selection and ordering data

| Description                                                                                                            | Order No.                 |
|------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Repair Service Contract RSC</b>                                                                                     |                           |
| For Siemens I IA&DT components on machine tools for countries in country groups 1 to 3                                 |                           |
| • 12 month contract period <sup>1)</sup>                                                                               | <b>6FC8506-1 X0 -0AA0</b> |
| • 24 month contract period <sup>2)</sup>                                                                               | <b>6FC8506-2 X0 -0AA0</b> |
| • Master contract                                                                                                      | <b>R</b>                  |
| • Individual contract                                                                                                  | <b>E</b>                  |
| • 0 to 4 measuring circuits <sup>3)</sup>                                                                              | <b>1</b>                  |
| • 5 to 6 measuring circuits <sup>3)</sup>                                                                              | <b>2</b>                  |
| • 7 to 8 measuring circuits <sup>3)</sup>                                                                              | <b>3</b>                  |
| • 9 measuring circuits <sup>3)</sup><br>(basic RSC for ≥ 9 measuring circuits <sup>3)</sup> )                          | <b>8</b>                  |
| • > 9 measuring circuits <sup>3)</sup><br>(measuring circuit supplement for RSC > 9 measuring circuits <sup>4)</sup> ) | <b>0</b>                  |
| <b>Repair Service Contract RSC<br/>Extension of contract by 6 or 12 months</b>                                         |                           |
| For Siemens I IA&DT components on machine tools for countries in country groups 1 to 3                                 |                           |
| • Basic RSC 12 months                                                                                                  | <b>6FC8506-0 X0 -AA1</b>  |
| • Basic RSC 24 months                                                                                                  | <b>6FC8506-0 X0 -AA2</b>  |
| • Master contract                                                                                                      | <b>R</b>                  |
| • Individual contract                                                                                                  | <b>E</b>                  |
| • 0 to 4 measuring circuits <sup>3)</sup>                                                                              | <b>1</b>                  |
| • 5 to 6 measuring circuits <sup>3)</sup>                                                                              | <b>2</b>                  |
| • 7 to 8 measuring circuits <sup>3)</sup>                                                                              | <b>3</b>                  |
| • 9 measuring circuits <sup>3)</sup><br>(basic RSC for ≥ 9 measuring circuits <sup>3)</sup> )                          | <b>8</b>                  |
| • > 9 measuring circuits <sup>3)</sup><br>(measuring circuit supplement for RSC > 9 measuring circuits <sup>4)</sup> ) | <b>0</b>                  |
| <u>Contract extension</u><br>(possible once per RSC)                                                                   |                           |
| • By 6 months                                                                                                          | <b>6</b>                  |
| • By 12 months                                                                                                         | <b>1</b>                  |

| Description                                                                                                                                                              | Order No.                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>OEM service levels</b>                                                                                                                                                |                           |
| Surcharge for Repair Service Contract for Siemens components on machine tools with OEM applications.<br>Measuring circuits 1 to n for countries in country groups 1 to 4 |                           |
| • Surcharge for OEM service level 1                                                                                                                                      | <b>6FC8506-3SX01-0AA0</b> |
| • Surcharge for OEM service level 2                                                                                                                                      | <b>6FC8506-3SX02-0AA0</b> |
| • Surcharge for OEM service level 3                                                                                                                                      | <b>6FC8506-3SX03-0AA0</b> |
| • Surcharge for OEM service level 4                                                                                                                                      | <b>6FC8506-3SX04-0AA0</b> |

<sup>1)</sup> Max. 24 months from the transfer of risk (delivery of components).

<sup>2)</sup> Max. 36 months from the transfer of risk (delivery of components).

<sup>3)</sup> Physical axes and spindles count as measuring circuits.

<sup>4)</sup> Example for 17 measuring circuits: (basic RSC for ≥ 9 measuring circuits) plus 8 x (measuring circuit supplement for RSC > 9 measuring circuits).

### Overview



#### **Productivity Improvement: increasing the productivity of your machine tools**

Productivity Improvement aims to improve the productivity of older machine tools whose warranty period has expired. Their productivity can be increased by up to 15 percent – at a previously agreed, profit-related price and with a contractually assured machine standstill period.

#### **When is Productivity Improvement viable?**

In general, Productivity Improvement pays for itself in the case of machines that are used intensively, with high capacity utilization, high numbers of machine service hours, or long running times per part. Overall, the lifecycle costs are reduced and the manufactured quantities are increased.

### Overview (continued)

#### **Where is Productivity Improvement applied?**

In CNC, the service is used as follows: The higher computing performance achieved by modernization of the control system hardware shortens all system-related dead times and also supports the use of new software. This, in turn, incorporates the important technological advances of recent years. On your machines, therefore, high-quality, efficient control algorithms and new productivity-enhancing CNC functions can be used. The required productivity improvement is often achieved with just these two measures.

When hardware and software updating are insufficient, CAD/CAM integration as well as the post processor can also be optimized.

All these measures shorten the main process times and ancillary times without subjecting the overall mechanical system to higher levels of wear or the electrical system to critical thermal overloading.

#### **How is Productivity Improvement actually performed?**

The organizational process for Productivity Improvement follows a defined, quality-assured process:

The general procedure is to disturb normal operation as little as possible. All optimization measures are prepared by Siemens first in the laboratory and verified in a simulation – production at the customer site continues to run normally during this phase. Implementation at the machine is then performed in the shortest possible time.

Success is guaranteed by Siemens with Performance Contracting in accordance with the Bonus Malus model. This means: We accept responsibility for the project results and you only pay us for what we actually achieve.

### Benefits

- Selective control system update (software and hardware)
- Reduced part production time while maintaining the same quality level
- Only a short machine standstill, thanks to systematic and time-optimized project processing
- Suitable for improving the productivity of older machine tools

### More information

Please contact your local Siemens sales office or Regional Company for more information.



# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Machine Retrofit

#### Overview

##### *Machine Retrofit: For a longer machine service life*

Machine modernization – also known as retrofit – gives the machinery a second lease of life and extends the utilization period. When a machine has been in operation for ten or more years, control technology and drive systems have undergone fundamental further development. Whether in terms of energy costs or new functions that make operation of the machine tool more efficient. Furthermore, new components have better spare parts availability and this can be decisive for safe operation of the machine tool in many cases.

The mechanical system for older machines is generally still in good to excellent condition, so it is more economical to modernize the control technology and drive system than to make a new purchase.

With Machine Retrofit, Siemens offers machine modernization in which the individual components are modernized and the machine is brought up to date technically, i.e.:

- New control technology and drive systems with SINUMERIK and/or SINAMICS
- Shopfloor-based programming with ShopMill and ShopTurn
- Mechanical overhauls where necessary

New technologies and possibilities ensure much more flexible manufacturing. Through complete mechanical and electrical overhauls, the machine and plant investment is secured over the long-term.

Even existing older NC part programs can be reused after a retrofit, because even the service of program conversion is included in our controls offer as an optional item. Further benefits of our retrofit services are the ability to network the machines in the existing IT infrastructure and the provision of Condition Monitoring services.

#### Benefits

- Increased machine availability and therefore increased productivity
- Secure, long-term, worldwide supply of spare parts and service expertise
- Low-cost alternative to a completely new purchase
- Enhanced operating and programming comfort
- Faster processing cycles when processing complex components
- Greater precision
- The use of Safety Integrated improves safety for personnel and machines
- Reliable data management and higher memory capacity
- Networking possibilities and integration of machines in the IT environment

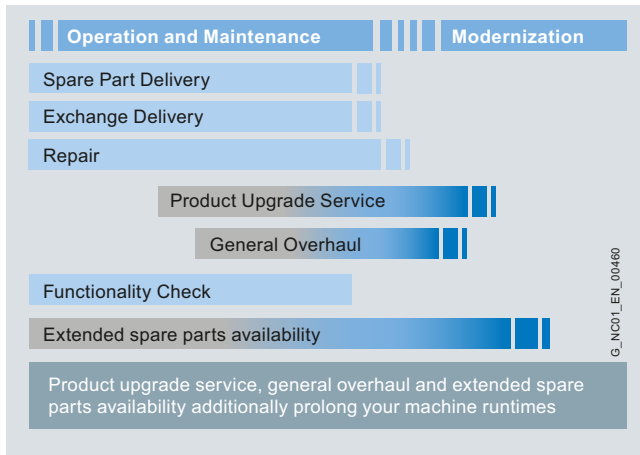


Machine Retrofit: before – after

### Spare parts services

### Spare parts services Delivery of spare parts

#### Overview



Spare parts services during the lifecycle

Siemens also provides constant support to customers after delivery of the machines or plants. This includes spare parts, repairs, as well as other supplementary services, and has a positive effect on machine operating times, inventories and costs.

When customers purchase a high-quality machine or plant, they intend to use it as intensively as possible, preferably for three shifts a day over many years. Under such circumstances, it is normal for parts to fail eventually. It is essential to replace the part as quickly as possible, because every hour of a plant stoppage costs money. To satisfy the multi-faceted requirements in the different areas, we have created comprehensive spare parts services.

You can sign up for the spare parts service that suits your requirements perfectly:

- Delivery of spare parts
- Delivery as exchange product
- Repair
- Product upgrade service
- General overhaul
- Function check
- Return of diagnostic parts
- Extended spare part availability and
- Stock reduction of your spare parts store

#### Benefits

- Optimum price/performance ratio and top quality
- Lifecycle management over the complete lifecycle
- Outstanding quality and availability of your machines and plants using Siemens original spare parts
- Global network and optimized logistics chains – 24 hours a day, 365 days a year
- Additional services from Siemens

#### More information

More information is available on the Internet at:

[www.siemens.com/motioncontrol/spareparts](http://www.siemens.com/motioncontrol/spareparts)

Please contact your local Siemens sales office for more information.

Contact information is available on the Internet at:

[www.siemens.com/automation/partner](http://www.siemens.com/automation/partner)

#### Overview

In every industry worldwide, plants and systems are required to operate with constantly increasing reliability. Lack of a specific spare part can result in considerable costs. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

| Ordering mode            | Logistics service                               | Comment                                                                                                                                                                                                            |
|--------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Standard</b>          | Cost-optimized:<br>Contracted shipping company  | Delivery within the normal national delivery times through the contracted shipping company                                                                                                                         |
| <b>Plant stoppage</b>    | Time-optimized:<br>Express, courier, collection | You choose the shortest possible delivery time for your own benefit: <ul style="list-style-type: none"> <li>• Delivery by means of collection or courier service</li> <li>• Delivery by express service</li> </ul> |
| <b>Emergency service</b> | Special logistics:<br>Courier                   | You can also order the spare parts from us outside normal working hours, as well as on weekends or national holidays round-the-clock. Your delivery will arrive by courier                                         |

#### Benefits

- New liability for defects for the spare part
- Long-term spare parts availability
- Optimum system compatibility

# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Spare parts services Delivery as exchange product

#### Overview

In addition to the simple delivery of spare parts, with many products, we also offer you the option of an exchange. This has the advantage that you not only receive the spare part quickly, but are able to return the defective device to us for a credit. You therefore receive our spare part at the lower exchange price.

A credit will be awarded on condition that the repair code indicates that repurchasing is admissible, a replacement is obtained from the spare parts store, and that the returned product is repairable.

The ordering mode and logistics service determine the delivery of spare parts:

| Ordering mode            | Logistics service                               | Comment                                                                                                                                                                                                            |
|--------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Standard</b>          | Cost-optimized:<br>Contracted shipping company  | Delivery within the normal national delivery times through the contracted shipping company                                                                                                                         |
| <b>Plant stoppage</b>    | Time-optimized:<br>Express, courier, collection | You choose the shortest possible delivery time for your own benefit: <ul style="list-style-type: none"> <li>• Delivery by means of collection or courier service</li> <li>• Delivery by express service</li> </ul> |
| <b>Emergency service</b> | Special logistics:<br>Courier                   | You can also order the spare parts from us outside normal working hours, as well as on weekends or national holidays round-the-clock. Your delivery will arrive by courier                                         |

#### Product returns

For product returns, we require the following information:

- Reason for return
- If defective: detailed description of the fault
- Machine number
- Machine/system manufacturer
- End customer

We will then be able to provide you with additional information in the repair report/inspection report regarding the diagnosis/inspection as well as information about the completed repair.

#### Benefits

- Price benefit through the option of returning defective parts
- A spare part is available immediately in the event of failure
- New liability for defects for the spare part
- Long-term spare parts availability
- Optimum system compatibility

### Spare parts services Repair

#### Overview

Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum – with our worldwide repair facilities. The advantage for you: Defects can be rectified before they cause further harm.

Repair is a favorable option when you have specific reasons for not replacing the defective device or part with a new one (delivery as exchange product).

We maintain a global network of Siemens repair shops and certified partners to ensure that we will always be able to process your repairs quickly.

We can offer you different types of repair depending on your requirements:

#### Normal repair

Normal repair at standard conditions normally takes 10 working days following receipt of the defective item at our repair shop.

#### Fast repair

In particularly urgent cases, we offer you the option of a fast repair within 1 or 2 working days for many products at additional cost.

#### Turnaround repair

With a turnaround repair, we organize on your behalf collection of the device/component to be repaired.

#### Mobile repair service

We come to you and perform the required repairs on site, for example, when the device/component cannot be removed due to its weight.

#### Function repair

A function repair is the same as a normal repair but excludes the repair of cosmetic defects, e.g. scratches, labels, discoloration. The conditions applicable to function repairs should be observed in this case.

For repairs, we require the following information:

- Reason for return
- If defective: detailed fault report
- Machine number
- Machine/system manufacturer
- End customer

#### Benefits

- Short downtimes for machines and plants
- Only certified original parts are used
- Additional services from Siemens:
  - Longer availability of your machine/plant through the preventive replacement of wear parts and aging parts
  - Highest standards of quality
  - Use of the comprehensive test concept of series production, including software, firmware, ASICs, complex function blocks, etc.
  - Implementation of all the hardware and software/firmware enhancements known by development, production, service and quality management departments, as well as suppliers
- Information supplied by repair report/inspection report

### Spare parts services Product upgrade service

### Spare parts services General overhaul

#### Overview



Product upgrade service: From OLD to NEW

A long service life is expected from machines and plants. The service life of the electronic components is, however, limited and normally shorter than the planned machine/plant operating times. To ensure that the required extended availability of the machine/plant is achieved, we offer you the product upgrade service at an attractive price.

In the course of their lifecycle, electronic components are normally redesigned/upgraded several times. With the product upgrade service, you will always receive the latest technology.

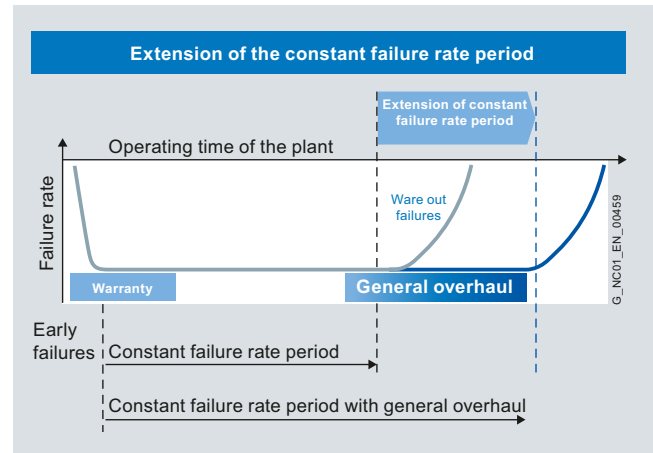
A planned product upgrade from OLD to NEW helps to prevent unplanned machine stoppages and supports a safer and longer machine/plant availability. The upgrade service is mainly offered for older components that will soon be discontinued.

For information about potential upgrades from the latest upgrade list, please ask your regional Siemens contact.

#### Benefits

- Price benefit through upgrade service
- New liability for defects for the new component
- Extended availability of your machines/plants
- Prevention of component failures due to wear and aging
- Prevention of machine stoppages due to unavailability of spare parts
- Reduced spare parts inventories
- Latest technology
- Easier servicing due to fewer variants
- Future service and support through Siemens is assured

#### Overview



Extension of the period with a constant failure rate

A long service life is expected from machines and plants. The service life of electronic components and mechanical parts is, however, limited and normally shorter than the planned machine/plant operating times. For higher availability of the machines or plants, we offer a general overhaul (preventive maintenance) for electronic components and motors at favorable conditions.

During the planned general overhaul, wear parts and aging parts are replaced in accordance with their stated service life so as to reduce unplanned downtimes. In the case of motors, in addition to a general overhaul, replacement of bearings and encoders is also offered.

If a fault is detected during a general overhaul, troubleshooting and repair will be performed at the repair price without requesting confirmation or interrupting the process. In the case of extensive wear or damage, a general overhaul/repair will not be performed. A fixed lump sum for expenses will be charged in this case.

#### Benefits

- Preventive replacement of wear parts and aging parts in accordance with their stated service life
- Reduction in unplanned plant stoppages
- Enhanced production reliability
- Extended availability of your machines/plants
- New liability for defects for 12 months for the components subjected to a general overhaul
- Low price

# SINUMERIK Manufacturing Excellence

## Full-lifecycle services

### Spare parts services Function check

#### Overview

It is checked that the components function reliably.

The first step involves cleaning the component. Then all the hardware and software/firmware enhancements are implemented that are known by development, production, suppliers, service and quality management departments. Using the comprehensive test concept of series production, all the functions of the software, firmware, ASICs, complex and less complex function blocks are checked.

If a fault is detected during the function check, troubleshooting and repair will be performed at the repair price without requesting confirmation or interrupting the process. In the case of extensive wear or damage, no repairs will be performed. A fixed lump sum for expenses will be charged.

#### Benefits

- The component is checked and can be deployed again
- The component contains all the known improvements
- The customer's own spare parts stock is up-to-date
- Low price

### Spare parts services Return of diagnostic parts

#### Overview



Spare parts used for diagnostic purposes from the spare parts store can be returned within 3 months and a credit note for up to 85 % is issued.

For unused spare parts in their original packaging, you will receive a credit of 100 % in which case you will be charged a fixed price for handling.

#### Benefits

- Can be used for diagnostics
- Reduced spare parts inventories
- Low costs



### Spare parts services Stock reduction in spare parts store

### Spare parts services Extended spare part availability

#### Overview



Thanks to fast delivery of spare parts from Siemens, manufacturers and plant operators are able to reduce their spare parts inventories. Siemens offers an analysis for this purpose exactly indicating which parts must be available in the customer's stores for a specific combination of machines and which should be obtained directly from Siemens

#### Benefits

- Reduced costs
- Stock optimization
- Minimization of fault downtimes

#### Overview

We normally retain spare parts for all products and systems for a period of 10 years after discontinuation of product marketing.

In individual cases, when we do not carry spare parts, we will offer a repair.

For a wide range of products and systems, we extend the availability of spare parts. We can provide you with the current spare parts availability for your machines/plants as a service once you have registered online with identSNAPSHOT.

[www.siemens.com/identsnapshot/register](http://www.siemens.com/identsnapshot/register)

If you require longer availability of spare parts, please contact your regional sales representative.

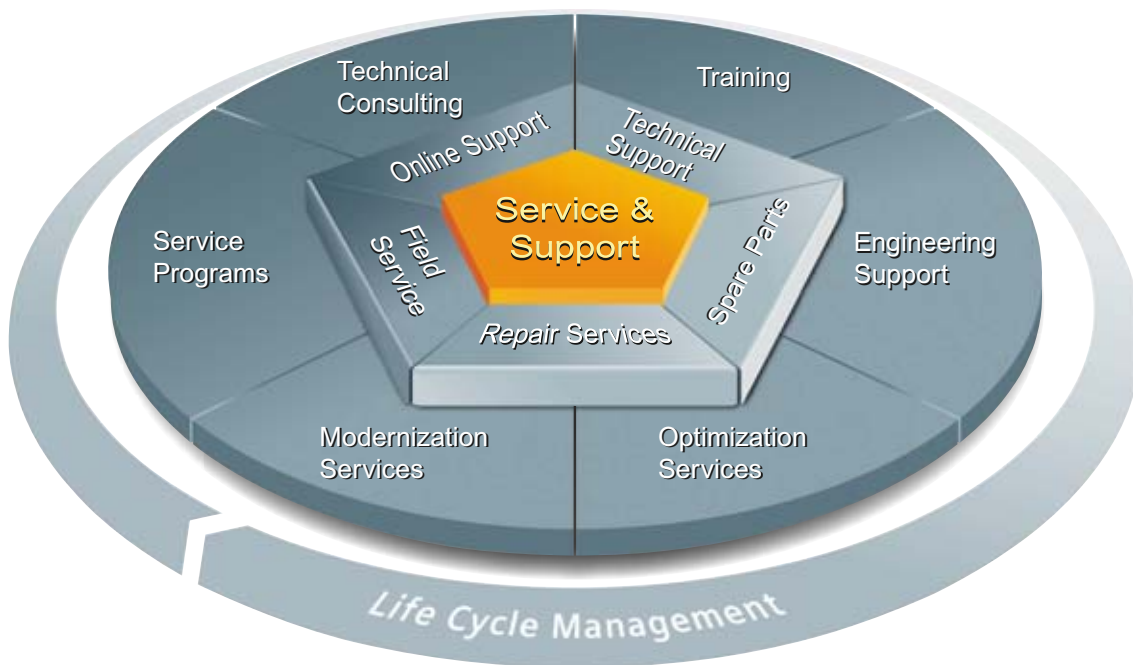
#### Benefits

- Higher plant availability
- Investment protection
- Reduction of lifecycle costs

# SINUMERIK Manufacturing Excellence

## Siemens Industry Online Support

Unmatched complete service  
for the entire life cycle



For machine constructors, solution providers and plant operators: The service offering from Siemens Industry, Automation and Drive Technologies includes comprehensive services for a wide range of different users in all sectors of the manufacturing and process industry.

To accompany our products and systems, we offer integrated and structured services that provide valuable support in every phase of the life cycle of your machine or plant – from planning and implementation through commissioning as far as maintenance and modernization.

Our Service & Support accompanies you worldwide in all matters concerning automation and drives from Siemens. We provide direct on-site support in more than 100 countries through all phases of the life cycle of your machines and plants.

You have an experienced team of specialists at your side to provide active support and bundled know-how. Regular training courses and intensive contact among our employees – even across continents – ensure reliable service in the most diverse areas.

### Online Support



The comprehensive online information platform supports you in all aspects of our Service & Support at any time and from any location in the world.

[www.siemens.com/automation/service&support](http://www.siemens.com/automation/service&support)

### Technical Consulting



Support in planning and designing your project: From detailed actual-state analysis, definition of the goal and consulting on product and system questions right through to the creation of the automation solution.

### Technical Support



Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.

[www.siemens.com/automation/support-request](http://www.siemens.com/automation/support-request)

### Training

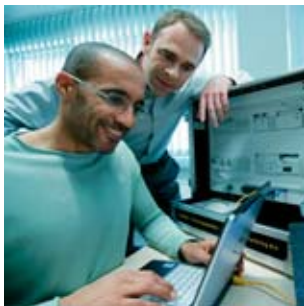


Extend your competitive edge – through practical know-how directly from the manufacturer.

[www.siemens.com/sitrain](http://www.siemens.com/sitrain)

Contact information is available in the Internet at:  
[www.siemens.com/automation/partner](http://www.siemens.com/automation/partner)

### Engineering Support



Support during project engineering and development with services fine-tuned to your requirements, from configuration through to implementation of an automation project.

### Modernization



You can also rely on our support when it comes to modernization – with comprehensive services from the planning phase all the way to commissioning.

### Field Service



Our Field Service offers you services for commissioning and maintenance – to ensure that your machines and plants are always available.

### Service programs



Our service programs are selected service packages for an automation and drives system or product group. The individual services are coordinated with each other to ensure smooth coverage of the entire life cycle and support optimum use of your products and systems.

The services of a service program can be flexibly adapted at any time and used separately.

### Spare parts



In every sector worldwide, plants and systems are required to operate with constantly increasing reliability. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

Examples of service programs:

- Service contracts
- Plant IT Security Services
- Life Cycle Services for Drive Engineering
- SIMATIC PCS 7 Life Cycle Services
- SINUMERIK Manufacturing Excellence
- SIMATIC Remote Support Services

Advantages at a glance:

- Reduced downtimes for increased productivity
- Optimized maintenance costs due to a tailored scope of services
- Costs that can be calculated and therefore planned
- Service reliability due to guaranteed response times and spare part delivery times
- Customer service personnel will be supported and relieved of additional tasks
- Comprehensive service from a single source, fewer interfaces and greater expertise

### Repairs



Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum – with our worldwide repair facilities.

### Optimization



During the service life of machines and plants, there is often a great potential for increasing productivity or reducing costs. To help you achieve this potential, we are offering a complete range of optimization services.

Contact information is available in the Internet at:  
[www.siemens.com/automation/partner](http://www.siemens.com/automation/partner)



# SINUMERIK Manufacturing Excellence

## SINORIX al-deco PLUS

### Object protection systems for machine tools

#### Overview



SINORIX al-deco PLUS are automated object protection systems for machine tools. SINORIX al-deco PLUS fights the fire where it breaks out – in the machine tool – without posing a risk to people, the environment, or technical components.

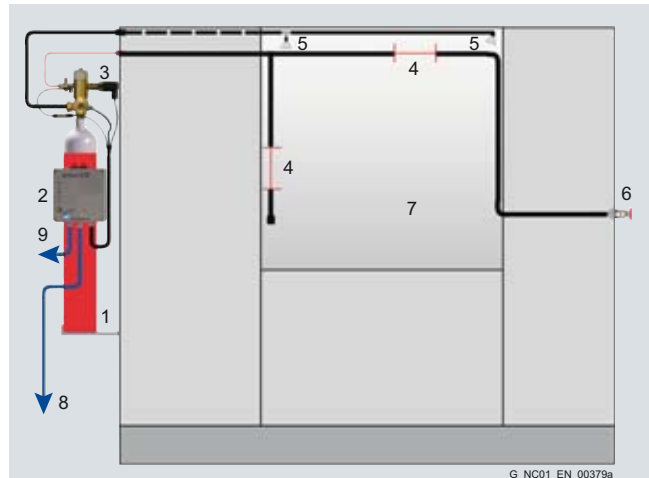
European law requires fire protection for fire-endangered machine tools and their equipment. SINORIX al-deco PLUS object protection systems meet the highest safety requirements in accordance with the new Machinery Directive 2006/42/EC. SINORIX al-deco PLUS is characterized by unique operator protection, current-free operation with regard to detection and extinguishing, online monitoring as well as automatic recording of all safety-related functions.

Moreover, SINORIX al-deco PLUS object protection systems are CE-compliant, meet all the relevant EU standards and are approved by the German Technical Inspectorate (TÜV).

#### Benefits

- Maximum safety for personnel, machine and environment
- Unique operator protection according to the latest machine directives
- Insensitive to all kinds of technical interferences
- Online monitoring for fast intervention
- Recording of all system data as safety-related proof
- Redundant monitoring of all safety-related functions
- Use of VdS-certified valves and self-monitoring components
- Efficiency based on well-proven control standards
- Double-secured prevention of tripping when machine door is open
- Only a qualified person is allowed to unlock the machine door after tripping of the system

#### Design



- 1 Extinguishing agent container
- 2 Safety box with pneumatic double disconnection of the detection line
- 3 DIMES measuring probe and valve
- 4 Detection line, flexible (LIFDES sensor)
- 5 Extinguishing nozzles
- 6 Manual release with pressure gauge
- 7 Hazardous working area
- 8 Interface for programming unit of the machine control system (visualization via display)
- 9 230 V AC

#### Function

SINORIX al-deco PLUS object protection systems meet the highest safety requirements in accordance with the new Machinery Directive 2006/42/EC and offer unique operator protection. This is ensured by double-secured cable routing in conjunction with redundant and self-monitoring components. Thanks to this technology, the machine tool cannot be operated until successful completion of a system check – and the machine door is unlocked only after successful and tested blocking of the extinguishing activation.

SINORIX al-deco PLUS ensures that the intended functions are carried out only if they do not endanger the safety and health of persons. This applies in particular if oxygen suppressing extinguishing media are used.

With SINORIX al-deco PLUS, fires are detected and extinguished purely pneumatically – with no electrical source and independently of the machine tool. As a result, SINORIX al-deco PLUS is insensitive to all kinds of technical interferences, and it is foolproof. This ensures continuous machine operation and reduces the maintenance overhead.

#### More information

More information is available on the Internet at:

[www.siemens.com/sinorix](http://www.siemens.com/sinorix)

### Overview

#### *Complete equipment for machine tools and production systems*

Our supplied range of products and services also includes complete equipment for machine tools and production systems with all services in the process chain from consulting through to after-sales service.

We support you in the areas of engineering, production and logistics:

#### *Engineering support*

Siemens supports you with advice on design in accordance with standards and concepts for drive systems, control, operation and safety.

Our engineers configure for you in EPLAN P8 and other commonly used CAD systems, execute projects designed to cost and adapt your documents where necessary to UL or new systems.

Our Technical Competence Center Cabinets in Chemnitz supports you with selecting and optimizing the suitable control cabinet air-conditioning system. Apart from calculation and simulation, we also use instrumentation testing in our heat laboratory with load simulation.

We also offer the following services:

- Vibration measurements and control cabinet certification in the field
- Measurement of conducted interference voltages in our laboratory

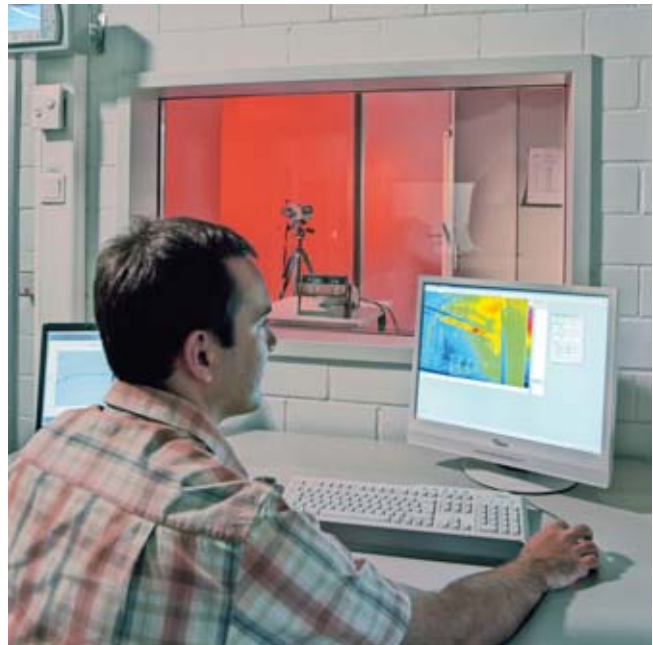
#### *Production at a high level of quality*

Complete equipment is manufactured at a high industrial level. This means:

- Examining consistency of the job documentation
- Checking for adherence to current regulations
- Collision check in 3D layout, taking into account the free space required thermally and electrically
- Automatic preparation of enclosures, cables and cable bundles
- Automated inspection and shipment free of faults
- Documentation and traceability
- Declaration of conformity regarding the Low-Voltage Directive and manufacturer's declaration on machinery directive
- UL label on request



Cabinet engineering



Testing in the heat laboratory

# SINUMERIK Manufacturing Excellence

## Control cabinets

### Overview (continued)

#### Superior logistics

Everything from a single source offers you the following advantages:

- Cost savings for procurement, stockkeeping, financing
- Reduction in throughput times
- Justintime delivery

#### Individual support and maximum flexibility

Our technical consultants for complete equipment support customers and sales departments in the various regions. Our control cabinet customers are supported in the Systems Engineering Plant Chemnitz (WKC) by ordering centers and production teams that are permanently assigned to customers.

Distance does not present a problem; we also use web cams for consulting our customers.

Customer-specific logistics models, flexible production capacity and production areas as well as change management in all process phases ensure maximum flexibility.

#### Customized supplementary products

As part of its complete equipment program, Siemens also offers the development and construction of customized supplementary products, e.g. special operator panels and power supply systems.

#### Liability for defects

Of course we accept the same liability for defects for our complete equipment as for our SINUMERIK, SIMODRIVE and SINAMICS products.

Furthermore, you can use our worldwide repair service anywhere and at any time.

#### Your benefits

One partner, one quotation, one order, one delivery, one invoice, and one contact partner for liability of defects.

For series production or individual items, Siemens is your competent partner for complete equipment.



Worldwide repair service



Control cabinet with SINAMICS S120 in booksize format

### Overview

#### *Increase plant availability through certification of control cabinets*

With our control cabinet certification service, we offer to inspect the control cabinet documentation to ascertain compliance with the planning guidelines defined for the components. You receive the result of the inspection in the form of a report which contains specific recommendations as to how the control cabinet design needs to be improved.

With this information as a guide, the control cabinet design can be improved and the cabinet subsequently constructed to the highest quality standards.

When the machine manufacturer has completed assembling the control cabinet, the control cabinet design is inspected and subsequently certified at the manufacturer's site.

This certification process is primarily intended for series control cabinets, but could also be applied to single cabinets.

#### *Certification sequence*

- Inspection of the control cabinet documentation and presentation of results in a report
- Inspection of a fully assembled control cabinet with inspection report and certification at the manufacturer's site (single cabinet or sample of a series control cabinet)
- In the case of a series control cabinet, another inspection is performed on a cabinet from the type series after approximately 12 months.

### Benefits

- The control cabinet certification service helps to ensure a high quality of cabinet design, to prevent early failure of components as a result, for example, of inadequate cooling and to detect potential EMC problems.
- Certified control cabinet quality

### Selection and ordering data

| Description                                                    | Order No.                 |
|----------------------------------------------------------------|---------------------------|
| <b>Visual inspection of control cabinet schematic diagrams</b> | <b>6FC8500-0BX01-0AA0</b> |
| Inspection result report to the control cabinet designer       |                           |
| <b>Individual certification</b>                                |                           |
| • On-site inspection of control cabinet                        | <b>6FC8500-0EE01-0AA0</b> |
| • Each additional control cabinet                              | <b>6FC8500-0EE02-0AA0</b> |
| <b>Series certification</b>                                    |                           |
| On-site inspection of control cabinet                          |                           |
| • Up to 10 control cabinets                                    | <b>6FC8500-0SE01-0AA0</b> |
| • Up to 20 control cabinets                                    | <b>6FC8500-0SE02-0AA0</b> |
| • Up to 30 control cabinets                                    | <b>6FC8500-0SE03-0AA0</b> |
| • Up to 50 control cabinets                                    | <b>6FC8500-0SE05-0AA0</b> |
| • Up to 100 control cabinets                                   | <b>6FC8500-0SE10-0AA0</b> |
| • More than 100 control cabinets                               | <b>6FC8500-0SE11-0AA0</b> |
| <b>Follow-up for series certification</b>                      | <b>6FC8500-0FE01-0AA0</b> |
| Repeat certification after 12 months                           |                           |

### More information

Please contact your local Siemens sales office or Regional Company for more information.



# SINUMERIK Manufacturing Excellence

## Logistics solutions

### Logistics solutions for our customers

#### Overview



#### *Flexible, uniform, successful*

With this motto we offer powerful logistics for our products individually tailored to your requirements, and uniformly from order up to delivery.

We optimize the complete logistics process between Siemens I DT Motion Control Systems and you.

This helps you to design your own processes faster, more simply and more cost-effectively.

Many of our customers have already chosen these solutions in various combinations.

#### Benefits

##### *Customer-oriented logistics solutions:*

- Modular range of services
- Tailored to your own logistics
- Flexible and reliable fulfillment of demands

##### *Customer-specific configuration:*

- Provision of complete packages
- Customizing

##### *Production-based delivery:*

- Machine-based generation of package
- Oriented according to your assembly sequence
- Low packaging overhead due to reusable containers for scheduled deliveries

##### *Global network for integrated logistics:*

- Utilization of Siemens transport network
- Tracking and tracing throughout the complete transport route
- Competence in export and customs processes

##### *Optimized customer connections:*

- Delivery on exact date according to schedule
- Directly to assembly location using ship-to-line

| Modules                                 | Service                                                                                                                                                                                                                                      | Specification                                                                                                                                                                                                   |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Complete delivery                       | <ul style="list-style-type: none"> <li>• Packages, bundling</li> <li>• Total equipment</li> <li>• Procurement</li> </ul>                                                                                                                     | Combination into complete equipment packages; procurement of material from other production locations.                                                                                                          |
| Customer-specific configuration/sorting | <ul style="list-style-type: none"> <li>• Machine package</li> <li>• Stowage plan</li> <li>• Mounting</li> <li>• Testing</li> </ul>                                                                                                           | Machine packages, also assembled according to stowage plan; pre-assembly of components into units, and their testing.                                                                                           |
| Labeling<br>Delivery notes              | <ul style="list-style-type: none"> <li>• Customer material number/ID No.</li> <li>• Customer designation</li> <li>• Barcode</li> <li>• Language</li> </ul>                                                                                   | Customer specification in form of number and text on the delivery note, plus barcode (DIN 39) on product packaging. Language can be selected according to Siemens guideline.                                    |
| Packaging versions                      | <ul style="list-style-type: none"> <li>• Standard carton</li> <li>• Pallet</li> <li>• Reusable container</li> <li>• Air freight container</li> <li>• Sea freight container</li> <li>• Wooden boxes compliant with IPPC regulation</li> </ul> | Application-oriented packaging from standard cartons to freight containers. Special packaging for pre-assembled units. We always select our packaging materials according to their environmental compatibility. |
| Export handling                         | <ul style="list-style-type: none"> <li>• Export declaration</li> <li>• Customs formalities</li> <li>• Worldwide</li> <li>• Multi-partner/region handling</li> </ul>                                                                          | Export handling up to the customer and also to his partner in a third country, based on the export and customs specifications of the respective countries.                                                      |
| Direct shipment<br>(volume-dependent)   | <ul style="list-style-type: none"> <li>• Fixed date</li> <li>• Tour</li> <li>• Ship-to-line</li> </ul>                                                                                                                                       | Direct shipment on fixed, agreed days, directly to the assembly site if required. Exchange of reusable packaging.                                                                                               |

# SINUMERIK Manufacturing Excellence

## Components for basic and further CNC training

### SinuTrain for SINUMERIK Operate

#### Overview



SinuTrain for SINUMERIK Operate is a PC-based CNC training/ CNC programming software package. SinuTrain for SINUMERIK Operate enables completely identical operator control and CNC programming as on SINUMERIK CNC systems that are equipped with graphical user interface SINUMERIK Operate.

SinuTrain for SINUMERIK Operate taps into the following applications:

- Self-study or professional training of SINUMERIK operation and CNC programming
- Offline CNC program creation and simulation
- Professional presentation of SINUMERIK operation and CNC programming

To allow you to experience the advantages of using SinuTrain for SINUMERIK Operate, we can provide a trial version for 60 days. The trial version can be ordered on DVD-ROM for a nominal charge, or downloaded free of charge from the Internet.

#### Benefits

- User-friendly, accurate simulation of operation and CNC programming of SINUMERIK controls on the PC
- Maximum compatibility thanks to integrated original SINUMERIK CNC software
- Accurate simulation of machine operation with inexpensive virtual machine control panel
- State-of-the-art fully graphical CNC user interface with moving picture sequences for clarification of technological sequences (Animated Elements)
- Optimum training software with a wide CNC programming spectrum – from ISO and CNC high-level language to fully graphical machining step programming
- High process safety through realistic graphical CNC simulation – including multi-channel machining operations

#### Function

##### Technologies

SinuTrain for SINUMERIK Operate can be used for the following machining technologies:

- Milling (SinuTrain ShopMill and SinuTrain complete package)
- Turning (SinuTrain ShopTurn and SinuTrain complete package)
- Other technologies<sup>1)</sup> and multi-channel capability (SinuTrain complete package)

##### Adaptation to the machine

CNC programs created with SinuTrain for SINUMERIK Operate can be used on real machines. However, in this case, SinuTrain must be adapted to the actual SINUMERIK configuration of the machine. This adaptation can be made either by the user with the configuration tool or by a Siemens service specialist.

To allow operation of a larger array of machinery, several different configurations can be stored in SinuTrain for SINUMERIK Operate. In order to ensure maximum compatibility with different SINUMERIK software versions on the machine, multiple copies of SinuTrain for SINUMERIK Operate can be installed in the relevant software versions on one PC.

##### Accurate simulation of real operator control on the machine

With its fully-fledged, virtual machine control panel, SinuTrain for SINUMERIK Operate offers functions such as CNC Start, CNC Stop or feedrate and spindle override and can therefore be operated just like a real machine.

##### Online help

Like a SINUMERIK CNC, SinuTrain for SINUMERIK Operate also offers a comprehensive online help. In addition, the SinuTrain DVD-ROM includes training manuals for the self-study of SINUMERIK operating and programming procedures.

##### Programming, simulation and printing

- DIN/ISO programming with programGUIDE
- ShopMill/ShopTurn machining step programming
- Multi-channel programming with programSYNC (SinuTrain complete package only)
- Fully-fledged graphical CNC simulation
- TCP/IP Ethernet networking with machines
- Print function for DIN/ISO and ShopMill/ShopTurn machining step programs
- Integrated CAD reader for importing DXF files

<sup>1)</sup> For other technologies, consultation with the relevant machine manufacturer is recommended to ensure that the software can be optimally adapted to the CNC of the machine.

# SINUMERIK Manufacturing Excellence

## Components for basic and further CNC training

### SinuTrain for SINUMERIK Operate

#### Integration

SinuTrain for SINUMERIK Operate 2.6 SP1 can be used for:

- SINUMERIK 828D BASIC T
- SINUMERIK 828D software version 4.3 and higher<sup>1)</sup>
- SINUMERIK 840D sl from CNC software release 2.6 SP1

#### Requirements

Hardware:

- PC with 1.5 GHz processor (single core)
- RAM: 1 GB
- Hard disk: 2 GB of free memory space
- DVD drive for installation from DVD
- Graphic card: Minimum resolution 640 × 480 pixels
- USB port
- Mouse, keyboard
- Training keyboard (optional)

Software:

- Operating system Windows XP SP3 32-bit Professional/Home Edition (operating system Windows 7 32/64-bit available soon)
- Adobe Acrobat Reader

#### More information

The first steps in working with SINUMERIK Operate can be learned quickly and easily through a web-based training program.

You can download a free trial version of SinuTrain for SINUMERIK Operate from the Internet.

More information is available on the Internet at:

[www.cnc4you.siemens.com](http://www.cnc4you.siemens.com)

#### Selection and ordering data

| Description                                                                                                                                                                                                                                      | Order No.                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>SinuTrain for SINUMERIK Operate, for SINUMERIK 828D BASIC/828D/840D sl</b><br>On DVD-ROM<br>Languages:<br>Chinese Simplified, English, French, German, Italian, Spanish<br>• SinuTrain trial version for 60 days<br>Specific software version | <b>6FC5870-0YC2-■-■YA0</b>                                   |
| <b>SinuTrain ShopMill</b><br>On DVD-ROM<br>Languages:<br>Chinese Simplified, English, French, German, Italian, Spanish<br>• Single-user license<br>Specific software version<br>• Classroom license<br>Specific software version                 | <b>6FC5870-2YC2-■-■YA0</b><br><br><b>6FC5870-6YC2-■-■YA0</b> |
| <b>SinuTrain ShopTurn</b><br>On DVD-ROM<br>Languages:<br>Chinese Simplified, English, French, German, Italian, Spanish<br>• Single-user license<br>Specific software version<br>• Classroom license<br>Specific software version                 | <b>6FC5870-3YC2-■-■YA0</b><br><br><b>6FC5870-7YC2-■-■YA0</b> |

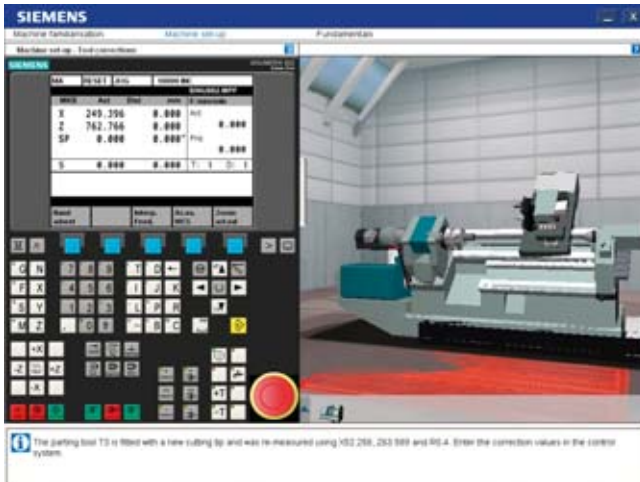
Software version 2.6 SP1 of the SinuTrain training software is required for SINUMERIK 828D BASIC, software version 4.3. To order this, enter "0-0" in the positions of the blue boxes, e.g.:

6FC5870-0YC2**0-0**YA0

If you want a different software version of the SinuTrain training software, please contact your local Siemens sales office or Regional Company.

<sup>1)</sup> In this case, software version 4.3 refers to the SINUMERIK 828D and not to SinuTrain.

### Overview



eLearning/training booklets offer you interactive learning concepts, which can be used in professional training from the basics right through to specialist training.

The interactive learning concept covers:

- Training booklets including examples in 6 different languages
- Interesting, graphically advanced training software on CD and the Internet.

The training software consists of high-quality, interactive multimedia programs, which guide the user from the basics of turning and milling through to operating and programming a SINUMERIK, and are also available as a self-study program. The Digital Prize has been awarded to this software.

### Training booklets

The training booklets are designed to offer the simplest introduction to programming/operating. They are primarily addressed to beginners, those who will use ShopMill/ShopTurn in the future or those starting out in its programming/operation. The booklets are also used for basic and further training.

### Self-study CDs

Training is now supported by the latest multimedia learning software. This software, which enables users to teach themselves the most important relationships and operation methods for ShopMill and ShopTurn, is called computer-based training (CBT). The instruction-based introduction saves you a great deal of time and, without expensive training, brings you interactively much closer to your goals than experimenting without any guidance on the control would do. These CDs should be used in conjunction with SinuTrain. They are increasingly used in schools and chambers of trade/chambers of industry and commerce for basic training. To this end, there is a test module to test the material covered, with a certificate awarded if the test is passed. The new SITRAIN tutorials offer you instructive software based on a virtual machine, providing a quick and easy introduction to CNC technology.

### Selection and ordering data

| Description                                          | Order No.          |
|------------------------------------------------------|--------------------|
| <b>ShopMill training booklet – Milling Made Easy</b> |                    |
| • Print version:                                     |                    |
| - Black/white                                        | 6FC5095-0AB50-0 P0 |
| - Color                                              | 6FC5095-0AB50-1 P0 |
| <b>ShopTurn training booklet – Turning Made Easy</b> |                    |
| • Print version:                                     |                    |
| - Black/white                                        | 6FC5095-0AB80-0 P0 |
| - Color                                              | 6FC5095-0AB80-1 P0 |
| • Languages: <sup>1)</sup>                           |                    |
| - Chinese Simplified                                 | R                  |
| - Chinese traditional                                | M                  |
| - German                                             | A                  |
| - English                                            | B                  |
| - French                                             | D                  |
| - Italian                                            | C                  |
| - Korean                                             | L                  |
| - Dutch                                              | J                  |
| - Polish                                             | N                  |
| - Russian                                            | P                  |
| - Spanish                                            | E                  |
| - Hungarian                                          | Q                  |

### More information

More information is available on the Internet at:

[www.siemens.com/sinumerik/training](http://www.siemens.com/sinumerik/training)

[www.siemens.com/jobshop](http://www.siemens.com/jobshop)

<sup>1)</sup> Other languages on request.



# SINUMERIK Manufacturing Excellence

## Training equipment

### SINUMERIK 840D sl training case

#### Overview



The SINUMERIK 840D sl training case is used for practicing the commissioning and servicing of the SINUMERIK 840D sl under realistic conditions. It can also be used in presentations.

The SINUMERIK 840D sl OP training case is required for operation (see right-hand side of page).

#### Design

- Case with rollers
- SINUMERIK 840D sl (NCU 720.2)
- SINAMICS drive for 2 axes
- 2 × 1FK7022-5AK71 motors with DRIVE-CLiQ interface
- 1 incremental and 1 absolute measuring system

The SINUMERIK 840D sl training case is supplied with the PLC program ready for demonstration. The SINUMERIK 840D sl OP training case is used as an operator control unit.

### SINUMERIK 840D sl OP training case

#### Overview



The SINUMERIK 840D sl OP training case and the SINUMERIK 840D sl training case are used together as an operating unit in order to practice the commissioning and servicing of the SINUMERIK 840D sl under realistic conditions. Both training cases can also be used in presentations.

#### Design

- Hard-top case
- SINUMERIK OP 010C operator panel with SINUMERIK PCU 50.3
- SINUMERIK MCP 483C IE machine control panel

The SINUMERIK 840D sl OP training case can only be used in conjunction with the SINUMERIK 840D sl training case.

8

#### Technical specifications

|                                                                          |                                                  |
|--------------------------------------------------------------------------|--------------------------------------------------|
| Product name                                                             | SINUMERIK 840D sl training case<br>6ZB2410-0BA00 |
| Degree of protection according to DIN VDE 0470 Part 1/EN 60529/IEC 60529 | IP00                                             |
| Ambient temperature                                                      |                                                  |
| • Storage                                                                | -5 ... +60 °C (23 ... 140 °F)                    |
| • Transport                                                              | -5 ... +60 °C (23 ... 140 °F)                    |
| • Operation                                                              | 5 ... 40 °C (41 ... 104 °F)                      |
| Dimensions                                                               |                                                  |
| • Width                                                                  | 320 mm (12.60 in)                                |
| • Height                                                                 | 650 mm (25.59 in)                                |
| • Depth                                                                  | 330 mm (12.99 in)                                |
| Weight, approx.                                                          | 30 kg (66.2 lb)                                  |

#### Selection and ordering data

| Description                            | Order No.            |
|----------------------------------------|----------------------|
| <b>SINUMERIK 840D sl training case</b> | <b>6ZB2410-0BA00</b> |

#### Technical specifications

|                                                                          |                                                     |
|--------------------------------------------------------------------------|-----------------------------------------------------|
| Product name                                                             | SINUMERIK 840D sl OP training case<br>6ZB2410-0BB00 |
| Degree of protection according to DIN VDE 0470 Part 1/EN 60529/IEC 60529 | IP00                                                |
| Ambient temperature                                                      |                                                     |
| • Storage                                                                | -5 ... +60 °C (23 ... 140 °F)                       |
| • Transport                                                              | -5 ... +60 °C (23 ... 140 °F)                       |
| • Operation                                                              | 5 ... 40 °C (41 ... 104 °F)                         |
| Dimensions                                                               |                                                     |
| • Width                                                                  | 770 mm (30.31 in)                                   |
| • Height                                                                 | 630 mm (24.80 in)                                   |
| • Depth                                                                  | 320 mm (12.60 in)                                   |
| Weight, approx.                                                          | 23 kg (50.7 lb)                                     |

#### Selection and ordering data

| Description                               | Order No.            |
|-------------------------------------------|----------------------|
| <b>SINUMERIK 840D sl OP training case</b> | <b>6ZB2410-0BB00</b> |

Overview



The SINUMERIK 840D sl training rack is used by trainees to practice operating, programming, commissioning and service tasks under realistic conditions.

Design

- Simulation panel including SIMATIC ET 200S input, output and IM modules
- SINUMERIK OP 012 operator panel front with SINUMERIK PCU 50.3
- SINUMERIK MCP 483 IE machine control panel
- SINUMERIK 840D sl (NCU 720.2)
- SINAMICS S120
  - Smart Line Module 5 kW
  - 1-axis module 3 A
  - 2-axis module 2 x 5 A
- 1 x 1FK7044-7AF71 synchronous motor with incremental encoder
- 1 x 1FK7060-5AF71 synchronous motor with absolute encoder
- 1 x 1LA7070-4AB00 standard asynchronous motor with HTL encoder
- Wiring prepared for Safety Integrated functionality.

The SINUMERIK 840D sl training rack is fully equipped and carries the CE mark; the adaptation programs are installed.

Customer-specific adaptations can be made.

Technical specifications

|                                                                          |                                                  |
|--------------------------------------------------------------------------|--------------------------------------------------|
| Product name                                                             | SINUMERIK 840D sl training rack<br>6ZB2410-0BC00 |
| Degree of protection according to DIN VDE 0470 Part 1/EN 60529/IEC 60529 | IP00                                             |
| Ambient temperature                                                      |                                                  |
| • Storage                                                                | -20 ... +60 °C (-4 ... +140 °F)                  |
| • Transport                                                              | -20 ... +60 °C (-4 ... +140 °F)                  |
| • Operation                                                              | 5 ... 40 °C (41 ... 104 °F)                      |
| Dimensions                                                               |                                                  |
| • Width                                                                  | 600 mm (23.62 in)                                |
| • Height                                                                 | 1696 mm (66.77 in)                               |
| • Depth                                                                  | 660 mm (25.98 in)                                |
| Weight, approx. incl. SINUMERIK 840D sl                                  | 150 kg (331 lb)                                  |

Selection and ordering data

|                                 |               |
|---------------------------------|---------------|
| Description                     | Order No.     |
| SINUMERIK 840D sl training rack | 6ZB2410-0BC00 |

# SINUMERIK Manufacturing Excellence Training

## Overview

*Faster and more applicable know-how:  
Hands-on training from the manufacturer*

**SITRAIN** – Training for Industry – provides you with comprehensive support in solving your tasks.

Training by the market leader in the industry enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.



First-class know-how directly pays for itself: In shorter startup times, high-quality end products, faster troubleshooting and reduced downtimes. In other words, increased profits and lower costs.

### Achieve more with SITRAIN

- Shorter times for startup, maintenance and servicing
- Optimized production operations
- Reliable configuration and startup
- Minimization of plant downtimes
- Flexible plant adaptation to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

### SITRAIN highlights

#### Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

#### Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

#### Wide variety

With a total of about 300 local attendance courses, we train the complete range of Siemens Industry products as well as interaction of the products in systems.

## Overview (continued)

### Tailor-made training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

### The right mixture: Blended learning

"Blended learning" is a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.



## Contact

Visit our site on the Internet at:

<http://www.siemens.com/sitrain>

or let us advise you personally.

### SITRAIN Customer Support Germany:

Phone: +49 (911) 895-7575

Fax: +49 (911) 895-7576

E-Mail: [info@sitrain.com](mailto:info@sitrain.com)

**Comprehensive teaching support for educational institutions**

Cooperates  
with Education

Automation

**SIEMENS**

**Siemens Automation Cooperates with Education (SCE)**

offers a global system for sustained support of technical skills. SCE supports educational institutions in their teaching assignment in the industrial automation sector and offers added value in the form of partnerships, technical expertise, and know-how. As the technological leader, our comprehensive range of services can support you in the transfer of industrial knowledge.

**Our services at a glance**

- Training curriculums for your lessons
- Trainer packages for hands-on learning
- Courses convey up-to-date, specialist knowledge
- Support for your projects/textbooks
- Complete didactic solutions from our partners
- Personal contact for individual support

**Training curriculums for your lessons**


Use our profound industrial know-how for practice-oriented and individual design of your course. We offer you more than 90 didactically prepared training documents on the topics of automation and drives technology free of charge. These materials are perfectly matched to your curricula and syllabuses, and optimally suited for use with our trainer packages. This takes into account all aspects of a modern industrial solution: installation, configuration, programming, and commissioning. All documents, including projects, can be individually matched to your specific requirements.

Particular highlight: the new SIMATIC PCS 7 curriculums and trainer packages. Using plant simulation, you can pass on basic, practice-oriented PCS 7 knowledge at universities within about 60 hours (= 1 semester).

[www.siemens.com/sce/documents](http://www.siemens.com/sce/documents)

**Trainer packages for hands-on learning**


Our SCE trainer packages offer a specific combination of original industrial components which are perfectly matched to your requirements and can be conveniently used in your course. These price reduced bundles available exclusively to schools include innovative and flexible hardware and software packages. SCE can currently offer more than 80 SCE trainer packages including related equipment. These cover both the factory and process automation sectors. You can use them to impart the complete course contents on industrial automation at a very low cost.

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- Introduction to automation technology with LOGO! compact controller and SIMATIC S7-1200
- PLC engineering with SIMATIC S7 hardware and STEP 7 software
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- Industrial networking over bus systems with SIMATIC NET
- Sensor systems with VISION, RFID, and SIWAREX
- Process automation with SIMATIC PCS 7
- Networked drive and motion technologies with SINAMICS and SIMOTION
- CNC programming with SinuTrain

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Only the following institutions are authorized to obtain trainer packages: vocational schools, Colleges and Universities, in-house vocational training departments, non commercial research institutions and non commercial training departments.

To purchase a trainer package, you require a specific end-use certificate, which you can obtain from your regional sales office.

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# SINUMERIK Manufacturing Excellence

## Siemens Automation Cooperates with Education

Know-how based on practical experience

### Comprehensive teaching support for educational institutions (continued)

#### *Courses convey up-to-date specialist knowledge*



Profit from our excellent know-how as the leader in industrial technologies. We offer you specific courses for automation and drive technology worldwide. These support you in the practice-oriented transferring of product and system know-how, are in conformance with curriculums, and derived from the training fields. Compact technical courses especially for use at universities are also available.

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In some countries we are offering classes based on our training documents. Please inquire with your SCE contact partner.

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We can provide you with consulting for selected projects and support from your personal SCE contact as well as our web based and regional Customer Support.

As a particular service, SCE supports technical authors with our know-how as well as with intensive technical consulting. Siemens library of special textbooks covering the industrial automation sector provides an additional resource for you and your students. These can be found at the SCE web site.

[www.siemens.com/sce/contact](http://www.siemens.com/sce/contact)  
[www.siemens.com/sce/books](http://www.siemens.com/sce/books)

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#### *Contact for individual support*

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If a direct SCE contact is not listed for your country, please contact your local Siemens office.

[www.siemens.com/sce/contact](http://www.siemens.com/sce/contact)

#### *SCE Support Finder for your Internet request*

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Scan the QR  
code for further  
information  
(SCE homepage)



### Overview

A high-quality programmable controller or drive system can only be used to maximum effect if the user is aware of the performance of the CNC machine tool control and the machine tool drives as a result of intensive training and good technical documentation.

This is becoming more important due to the shorter innovation cycles of modern automation products and the convergence of electronics and mechanical engineering.

Comprehensive documentation is available for the SINUMERIK CNC systems and the SINAMICS S120 drive system, ranging from the Operating Manual, Programming Manual or Configuration Manual up to the Commissioning Manual.

Information is available in the following formats:

- Paper version, printed copy
- PDF file available for download on the Internet at:

[www.siemens.com/automation/support](http://www.siemens.com/automation/support)

More information is available on the Internet at:

[www.siemens.com/motioncontrol/docu](http://www.siemens.com/motioncontrol/docu)

### Customizing information

Whether for turning, milling, grinding or nibbling – machine manufacturers and machine operators can assemble their individual operating instructions on the Internet, for specific topics, such as programming and commissioning.

Machine manufacturers and end customers are not only able to assemble their own customized technical documents for a specific product or system, they can also generate complete libraries with individually configured contents. The content that matches your topic can be found from the full range of I IA&DT documentation stored under Service & Support using the operator interface and assembled using Drag & Drop into application-based libraries, generated and even combined with your own documentation. The self-generated collections can be saved in the commonly used RTF, PDF or XML formats.

More information is available on the Internet at:

[www.siemens.com/mdm](http://www.siemens.com/mdm)

### More information

Please send any queries or suggestions to:

[docu.motioncontrol@siemens.com](mailto:docu.motioncontrol@siemens.com)

### Selection and ordering data

| Description                                          | Order No.                                               |
|------------------------------------------------------|---------------------------------------------------------|
| <b>Catalogs</b>                                      |                                                         |
| <b>Catalog NC 62 · 2012</b>                          |                                                         |
| <b>SINUMERIK 840D sl Equipment for Machine Tools</b> |                                                         |
| • German                                             | <b>E86060-K4462-A101-A1</b>                             |
| • English                                            | <b>E86060-K4462-A101-A1-7600</b>                        |
| • French <sup>1)</sup>                               | <b>E86060-K4462-A101-A1-7700</b>                        |
| • Italian <sup>1)</sup>                              | <b>E86060-K4462-A101-A1-7200</b>                        |
| • Spanish <sup>1)</sup>                              | <b>E86060-K4462-A101-A1-7800</b>                        |
| <b>Decentralization with PROFIBUS DP/DPV1</b>        | <b>Via book trade</b><br><b>ISBN: 978-3-89578-218-3</b> |

| Description                                                                                                                                                                              | Order No.                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>User/Manufacturer documentation</b>                                                                                                                                                   |                                                        |
| <b>DOConCD</b><br>SINUMERIK 840D sl/828D<br>SINAMICS S120<br>Motors<br>User and Manufacturer documentation on CD-ROM with Help Tool<br>Edition: 02/2012<br>Languages:<br>English, German | <b>6FC5398-0AC10-0YA7</b>                              |
| <b>DOConCD</b><br>The up-to-date version will be supplied<br>Languages:<br>English, German                                                                                               | <b>6FC5298-0CD00-0YG0</b>                              |
| <b>Update service for DOConCD</b><br>Languages:<br>English, German                                                                                                                       | <b>6FC5298-0CD00-0YG2</b>                              |
| <b>EMC Design Guidelines</b><br>SINUMERIK, SIROTEC,<br>SIMODRIVE, SIMOTION,<br>SINAMICS S120<br>• German<br>• English                                                                    | <b>6FC5297-0AD30-0AP2</b><br><b>6FC5297-0AD30-0BP2</b> |

<sup>1)</sup> Available soon.

# SINUMERIK Manufacturing Excellence

## Documentation

### SINUMERIK 840D sl

#### Selection and ordering data

| Description                                                                                                                                                                                                                                                          | Order No.                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <i>User documentation</i>                                                                                                                                                                                                                                            |                           |
| <b>User Manual Collection</b><br>SINUMERIK 802S/802C/802D<br>SINUMERIK 810D/840Di/840D<br>SINUMERIK 802D sl/840Di sl/ 840D sl<br>SINUMERIK 828D<br>User documentation on<br>CD-ROM<br>Edition: 01/2012<br>Languages:<br>English, French, German, Italian,<br>Spanish | <b>6FC5298-7CA00-0YG7</b> |
| <b>User Guide</b><br><b>My SINUMERIK Operate</b>                                                                                                                                                                                                                     |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                                                                                                                                                                                             | <b>6FC5095-0AA84-0AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                                                                                                                                                                                            | <b>6FC5095-0AA84-0BA0</b> |
| <b>Operating Manual</b><br><b>HMI-Advanced</b><br><b>SINUMERIK 840D sl/840D/840Di sl/ 810D</b>                                                                                                                                                                       |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-2AP10-3AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-2AP10-3BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-2AP10-3DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-2AP10-3CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-2AP10-3EA0</b> |
| <b>Operating Manual</b><br><b>SINUMERIK Operate universal</b><br><b>SINUMERIK 840D sl</b>                                                                                                                                                                            |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-6AP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-6AP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-6AP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-6AP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-6AP40-2EA0</b> |
| <b>Operating Manual</b><br><b>SINUMERIK Operate Turning</b><br><b>SINUMERIK 840D sl/828D</b>                                                                                                                                                                         |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-8CP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-8CP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-8CP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-8CP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-8CP40-2EA0</b> |
| <b>Operating Manual</b><br><b>SINUMERIK Operate Milling</b><br><b>SINUMERIK 840D sl/828D</b>                                                                                                                                                                         |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-7CP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-7CP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                                                                                                                                                                                             | <b>6FC5398-7CP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-7CP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                                                                                                                                                                                            | <b>6FC5398-7CP40-2EA0</b> |

| Description                                                                                        | Order No.                 |
|----------------------------------------------------------------------------------------------------|---------------------------|
| <i>User documentation</i>                                                                          |                           |
| <b>Programming Manual</b><br><b>Fundamentals</b><br><b>SINUMERIK 840D sl/828D</b>                  |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-1BP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-1BP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                           | <b>6FC5398-1BP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                          | <b>6FC5398-1BP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                          | <b>6FC5398-1BP40-2EA0</b> |
| <b>Programming Manual</b><br><b>Job Planning</b><br><b>SINUMERIK 840D sl/828D</b>                  |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-2BP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-2BP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                           | <b>6FC5398-2BP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                          | <b>6FC5398-2BP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                          | <b>6FC5398-2BP40-2EA0</b> |
| <b>User Manual</b><br><b>SINUMERIK 840D sl/828D</b><br><b>Measuring Cycles</b>                     |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-4BP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-4BP40-2BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                           | <b>6FC5398-4BP40-2DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                          | <b>6FC5398-4BP40-2CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                          | <b>6FC5398-4BP40-2EA0</b> |
| <b>Programming Manual</b><br><b>ISO Milling</b><br><b>SINUMERIK 840D sl/840Di sl/828D/ 802D sl</b> |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-7BP10-1AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-7BP10-1BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                           | <b>6FC5398-7BP10-1DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                          | <b>6FC5398-7BP10-1CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                          | <b>6FC5398-7BP10-1EA0</b> |
| <b>Programming Manual</b><br><b>ISO Turning</b><br><b>SINUMERIK 840D sl/840Di sl/828D/ 802D sl</b> |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-5BP10-1AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-5BP10-1BA0</b> |
| <ul style="list-style-type: none"> <li>French</li> </ul>                                           | <b>6FC5398-5BP10-1DA0</b> |
| <ul style="list-style-type: none"> <li>Italian</li> </ul>                                          | <b>6FC5398-5BP10-1CA0</b> |
| <ul style="list-style-type: none"> <li>Spanish</li> </ul>                                          | <b>6FC5398-5BP10-1EA0</b> |
| <b>Diagnostics Manual</b><br><b>SINUMERIK 840D sl</b><br><b>SINAMICS S120</b>                      |                           |
| <ul style="list-style-type: none"> <li>German</li> </ul>                                           | <b>6FC5398-6BP40-2AA0</b> |
| <ul style="list-style-type: none"> <li>English</li> </ul>                                          | <b>6FC5398-6BP40-2BA0</b> |

## Selection and ordering data (continued)

| Description                                                                                                          | Order No.          |
|----------------------------------------------------------------------------------------------------------------------|--------------------|
| <i>Manufacturer and service documentation</i>                                                                        |                    |
| <b>Manual NCU<br/>SINUMERIK 840D sl</b>                                                                              |                    |
| • German                                                                                                             | 6FC5397-1EP40-0AA0 |
| • English                                                                                                            | 6FC5397-1EP40-0BA0 |
| <b>Manual<br/>Operator Components and<br/>Networking<br/>SINUMERIK 840D sl</b>                                       |                    |
| • German                                                                                                             | 6FC5397-1AP10-6AA0 |
| • English                                                                                                            | 6FC5397-1AP10-6BA0 |
| <b>Manual<br/>ADI 4 – Analog Drive Interface for<br/>4 Axes</b>                                                      |                    |
| • German                                                                                                             | 6FC5297-0BA01-0AP5 |
| • English                                                                                                            | 6FC5297-0BA01-0BP5 |
| <b>Commissioning Manual<br/>CNC: NCK, PLC, Drive<br/>SINUMERIK 840D sl<br/>SINAMICS S120</b>                         |                    |
| • German                                                                                                             | 6FC5397-2AP40-2AA0 |
| • English                                                                                                            | 6FC5397-2AP40-2BA0 |
| • French                                                                                                             | 6FC5397-2AP40-2DA0 |
| • Italian                                                                                                            | 6FC5397-2AP40-2CA0 |
| • Spanish                                                                                                            | 6FC5397-2AP40-2EA0 |
| <b>Commissioning Manual<br/>CNC: Basesoftware and<br/>HMI-Advanced<br/>SINUMERIK 840D sl/840D/840Di sl/<br/>810D</b> |                    |
| • German                                                                                                             | 6FC5397-0DP10-3AA0 |
| • English                                                                                                            | 6FC5397-0DP10-3BA0 |
| • French                                                                                                             | 6FC5397-0DP10-3DA0 |
| • Italian                                                                                                            | 6FC5397-0DP10-3CA0 |
| • Spanish                                                                                                            | 6FC5397-0DP10-3EA0 |
| <b>Commissioning Manual<br/>CNC: Basesoftware and<br/>Operating Software<br/>SINUMERIK 840D sl</b>                   |                    |
| • German                                                                                                             | 6FC5397-1DP40-2AA0 |
| • English                                                                                                            | 6FC5397-1DP40-2BA0 |
| • French                                                                                                             | 6FC5397-1DP40-2DA0 |
| • Italian                                                                                                            | 6FC5397-1DP40-2CA0 |
| • Spanish                                                                                                            | 6FC5397-1DP40-2EA0 |
| <b>Lists (Book 1)<br/>SINUMERIK 840D sl</b>                                                                          |                    |
| • German                                                                                                             | 6FC5397-7AP40-2AA0 |
| • English                                                                                                            | 6FC5397-7AP40-2BA0 |
| <b>Lists (Book 2)<br/>SINUMERIK 840D sl</b>                                                                          |                    |
| • German                                                                                                             | 6FC5397-3CP40-2AA0 |
| • English                                                                                                            | 6FC5397-3CP40-2BA0 |
| <b>Lists<br/>System variables<br/>SINUMERIK 840D sl</b>                                                              |                    |
| • German                                                                                                             | 6FC5397-6AP40-2AA0 |
| • English                                                                                                            | 6FC5397-6AP40-2BA0 |

| Description                                                                                            | Order No.          |
|--------------------------------------------------------------------------------------------------------|--------------------|
| <i>Manufacturer and service documentation</i>                                                          |                    |
| <b>Function Manual<br/>SINUMERIK 840D sl/828D<br/>Basic Functions</b>                                  |                    |
| • German                                                                                               | 6FC5397-0BP40-2AA0 |
| • English                                                                                              | 6FC5397-0BP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl/828D<br/>Extended Functions</b>                               |                    |
| • German                                                                                               | 6FC5397-1BP40-2AA0 |
| • English                                                                                              | 6FC5397-1BP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl<br/>Special Functions</b>                                     |                    |
| • German                                                                                               | 6FC5397-2BP40-2AA0 |
| • English                                                                                              | 6FC5397-2BP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl<br/>Tool Management</b>                                       |                    |
| • German                                                                                               | 6FC5397-6BP40-2AA0 |
| • English                                                                                              | 6FC5397-6BP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl<br/>Safety Integrated</b>                                     |                    |
| • German                                                                                               | 6FC5397-4BP40-2AA0 |
| • English                                                                                              | 6FC5397-4BP40-2BA0 |
| <b>System Manual<br/>SINUMERIK 840D sl/828D<br/>Ctrl-Energy</b>                                        |                    |
| • German                                                                                               | 6FC5397-0EP40-2AA0 |
| • English                                                                                              | 6FC5397-0EP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl<br/>Synchronized Actions</b>                                  |                    |
| • German                                                                                               | 6FC5397-5BP40-2AA0 |
| • English                                                                                              | 6FC5397-5BP40-2BA0 |
| <b>Function Manual<br/>SINUMERIK 840D sl/840Di sl/828D/<br/>802D sl<br/>ISO Dialects for SINUMERIK</b> |                    |
| • German                                                                                               | 6FC5397-7BP10-1AA0 |
| • English                                                                                              | 6FC5397-7BP10-1BA0 |
| <b>Function Manual<br/>Motion Control Information System<br/>RPC Computer Link</b>                     |                    |
| • German                                                                                               | 6FC5297-6AD61-0AP1 |
| • English                                                                                              | 6FC5297-6AD61-0BP1 |
| <b>Function Manual<br/>Motion Control Information System<br/>SinTDI Tool Management</b>                |                    |
| • German                                                                                               | 6FC5297-6AE00-0AP0 |
| • English                                                                                              | 6FC5297-6AE00-0BP0 |
| <b>Function Manual<br/>Motion Control Information System<br/>TDI Ident Connection</b>                  |                    |
| • German                                                                                               | 6FC5297-1AE60-0AP0 |
| • English                                                                                              | 6FC5297-1AE60-0BP0 |



# SINUMERIK Manufacturing Excellence

## Documentation

### SINAMICS S120

#### Selection and ordering data

| Description                                                                                                                                                                                                                                           | Order No.                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <i>Manufacturer and service documentation</i>                                                                                                                                                                                                         |                                                                                      |
| <b>Function Manual</b><br><b>Motion Control Information System</b><br><b>NC Program Management DNC</b><br><b>Machine</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> </ul>                                                    | 6FC5297-1AE81-0AP0<br>6FC5297-1AE81-0BP0                                             |
| <b>Function Manual</b><br><b>Motion Control Information System</b><br><b>NC Program Management DNC</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> </ul>                                                                      | 6FC5297-2AE80-0AP4<br>6FC5297-2AE80-0BP4                                             |
| <b>Function Manual</b><br><b>Motion Control Information System</b><br><b>Preventive Maintenance</b><br><b>TPM</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> </ul>                                                           | 6FC5260-2FX28-0AG2<br>6FC5260-2FX28-0BG2                                             |
| <b>Operating Manual</b><br><b>Motion Control Information System</b><br><b>Tool Data Information TDI</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                                    | 6FC5297-6AE01-0AP4<br>6FC5297-6AE01-0BP4<br>6FC5297-6AE01-0DP4<br>6FC5297-6AE01-0CP4 |
| <b>Function Manual</b><br><b>Motion Control Information System</b><br><b>Tool Data Communication SinTDC</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> </ul>                                                                 | 6FC5297-5AF30-0AP0<br>6FC5297-5AF30-0BP0                                             |
| <i>User documentation</i>                                                                                                                                                                                                                             |                                                                                      |
| <b>SINAMICS Manual Collection</b><br>on DVD-ROM<br>with full text search using the<br>complete DVD<br>Network-enabled (storage of the PDFs<br>on a central server),<br>Edition: 05/2012<br>Languages:<br>English, French, German, Italian,<br>Spanish | 6SL3097-4CA00-0YG1                                                                   |
| <i>Manufacturer and service documentation</i>                                                                                                                                                                                                         |                                                                                      |
| <b>Manual</b><br><b>SINAMICS S120</b><br><b>Control Units and Additional System</b><br><b>Components</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                                   | 6SL3097-4AH00-0AP1<br>6SL3097-4AH00-0BP1<br>6SL3097-4AH00-0DP1<br>6SL3097-4AH00-0CP1 |
| <b>Manual</b><br><b>SINAMICS S120</b><br><b>Booksize Power Units</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> </ul>                                                                                                        | 6SL3097-4AC00-0AP3<br>6SL3097-4AC00-0BP3                                             |

| Description                                                                                                                                                                           | Order No.                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <i>Manufacturer and service documentation</i>                                                                                                                                         |                                                                                      |
| <b>Manual</b><br><b>SINAMICS S120</b><br><b>Chassis Power Units</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>        | 6SL3097-4AE00-0AP1<br>6SL3097-4AE00-0BP1<br>6SL3097-4AE00-0DP1<br>6SL3097-4AE00-0CP1 |
| <b>Function Manual</b><br><b>SINAMICS S120</b><br><b>Drive Functions</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>   | 6SL3097-4AB00-0AP1<br>6SL3097-4AB00-0BP1<br>6SL3097-4AB00-0DP1<br>6SL3097-4AB00-0CP1 |
| <b>Commissioning Manual</b><br><b>SINAMICS S120</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                        | 6SL3097-4AF00-0AP1<br>6SL3097-4AF00-0BP1<br>6SL3097-4AF00-0DP1<br>6SL3097-4AF00-0CP1 |
| <b>Function Manual</b><br><b>SINAMICS S120</b><br><b>Safety Integrated</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul> | 6SL3097-4AR00-0AP2<br>6SL3097-4AR00-0BP2<br>6SL3097-4AR00-0DP2<br>6SL3097-4AR00-0CP2 |
| <b>Manual</b><br><b>SINAMICS S120</b><br><b>AC Drive</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                   | 6SL3097-4AL00-0AP0<br>6SL3097-4AL00-0BP0<br>6SL3097-4AL00-0DP0<br>6SL3097-4AL00-0CP0 |
| <b>List Manual</b><br><b>SINAMICS S120/150</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                             | 6SL3097-4AP00-0AP2<br>6SL3097-4AP00-0BP2<br>6SL3097-4AP00-0DP2<br>6SL3097-4AP00-0CP2 |
| <b>Getting Started</b><br><b>SINAMICS S120</b> <ul style="list-style-type: none"> <li>German</li> <li>English</li> <li>French</li> <li>Italian</li> </ul>                             | 6SL3097-2AG00-0AP3<br>6SL3097-2AG00-0BP3<br>6SL3097-2AG00-0DP3<br>6SL3097-2AG00-0CP3 |

## SIMOTICS motors for SINAMICS

## Measuring systems

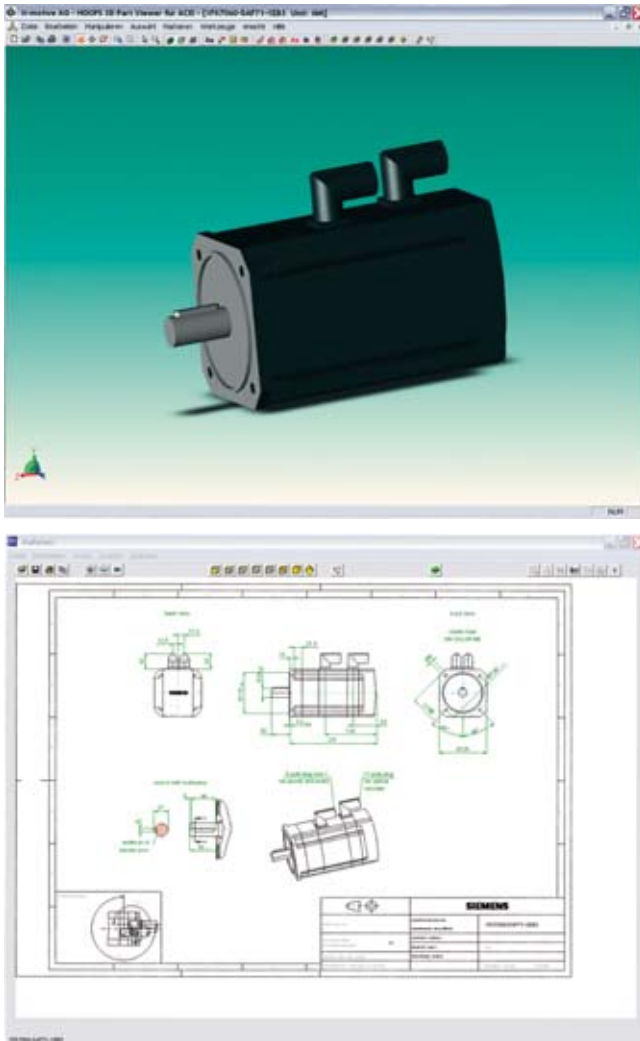
## Selection and ordering data

| Description                                                                          | Order No.          |
|--------------------------------------------------------------------------------------|--------------------|
| <i>SIMOTICS motors for SINAMICS</i>                                                  |                    |
| <b>Configuration Manual<br/>1FT7 Synchronous Motors</b>                              |                    |
| • German                                                                             | 6SN1197-0AD13-0AP4 |
| • English                                                                            | 6SN1197-0AD13-0BP4 |
| <b>Configuration Manual<br/>1FK7 Synchronous Motors</b>                              |                    |
| • German                                                                             | 6SN1197-0AD16-0AP4 |
| • English                                                                            | 6SN1197-0AD16-0BP4 |
| • French                                                                             | 6SN1197-0AD16-0DP4 |
| • Italian                                                                            | 6SN1197-0AD16-0CP4 |
| • Spanish                                                                            | 6SN1197-0AD16-0EP4 |
| <b>Configuration Manual<br/>1PH8 Synchronous/<br/>Asynchronous Motors</b>            |                    |
| • German                                                                             | 6SN1197-0AD74-0AP0 |
| • English                                                                            | 6SN1197-0AD74-0BP0 |
| <b>Configuration Manual<br/>1PH2 Synchronous/<br/>Asynchronous Motors</b>            |                    |
| • German                                                                             | 6SN1197-0AC63-0AP0 |
| • English                                                                            | 6SN1197-0AC63-0BP0 |
| • French                                                                             | 6SN1197-0AC63-0DP0 |
| • Italian                                                                            | 6SN1197-0AC63-0CP0 |
| • Spanish                                                                            | 6SN1197-0AC63-0EP0 |
| <b>Configuration Manual<br/>1FN3 Linear Motors<br/>Peak Load and Continuous Load</b> |                    |
| • German                                                                             | 6SN1197-0AB86-0AP0 |
| • English                                                                            | 6SN1197-0AB86-0BP0 |
| <b>Configuration Manual<br/>1FN6 Linear Motors</b>                                   |                    |
| • German                                                                             | 6SN1197-0AB78-0AP3 |
| • English                                                                            | 6SN1197-0AB78-0BP3 |
| <b>Configuration Manual<br/>1FE1 Synchronous Built-In Motors</b>                     |                    |
| • German                                                                             | 6SN1197-0AC00-1AP0 |
| • English                                                                            | 6SN1197-0AC00-1BP0 |
| • French                                                                             | 6SN1197-0AC00-0DP7 |
| • Italian                                                                            | 6SN1197-0AC00-0CP7 |
| • Spanish                                                                            | 6SN1197-0AC00-0EP7 |
| <b>Configuration Manual<br/>1FW6 Built-In Torque Motors</b>                          |                    |
| • German                                                                             | 6SN1197-0AE00-0AP5 |
| • English                                                                            | 6SN1197-0AE00-0BP3 |
| • French                                                                             | 6SN1197-0AE00-0DP3 |
| • Italian                                                                            | 6SN1197-0AE00-0CP3 |
| • Spanish                                                                            | 6SN1197-0AE00-0EP3 |
| <b>Configuration Manual<br/>2SP1 ECS Motor Spindles</b>                              |                    |
| • German                                                                             | 6SN1197-0AD04-0AP5 |
| • English                                                                            | 6SN1197-0AD04-0BP5 |
| • French                                                                             | 6SN1197-0AD04-0DP3 |
| • Italian                                                                            | 6SN1197-0AD04-0CP3 |
| • Spanish                                                                            | 6SN1197-0AD04-0EP3 |

## Selection and ordering data

| Description                                                                             | Order No.          |
|-----------------------------------------------------------------------------------------|--------------------|
| <i>Measuring systems</i>                                                                |                    |
| <b>User Manual<br/>SIMODRIVE sensor<br/>Absolute Value Encoder with<br/>PROFIBUS DP</b> |                    |
| • English/German                                                                        | 6SN1197-0AB10-0YP4 |

#### Overview



#### CAD CREATOR – Dimension drawing and 2D/3D CAD generator

Thanks to the user-friendly operator interface of the CAD CREATOR, it is easy to configure controls, drives and motors. With the support of the CAD CREATOR, product-specific dimension drawings and 2D/3D CAD models can be created quickly. The CAD CREATOR assists the machine manufacturer's designers, offer drafting engineers and project engineers.

#### Benefits

- Provision of dimension drawings as 2D/3D-CAD models in mm and inches
- Display of 2D/3D CAD models and dimension drawings on integrated viewers
- With the online version, 3D models and dimension drawings can also be displayed in the form of a direct downloadable PDF
- Support for all general geometry interfaces STEP, IGES, Parasolid, SAT, VDA, and for special interfaces such as Ideas, NX, Solid Edge, Pro/Engineer, Autocad, Inventor, Mechanical Desktop, Catia and Solidworks
- Multi-language operator interface in English, French, German, Italian and Spanish, and direct Help (German, English)
- Dimension drawings and 2D/3D CAD models for:
  - Motors
    - 1FT6/1FT7/1FK7 synchronous motors
    - 1FE1 built-in synchronous motors
    - 1FW3 torque motors
    - 1FW6 built-in torque motors
    - 1FT6/1FT7/1FK7 geared motors
    - 1PH8 synchronous/asynchronous motors
    - 1PH7/1PH4/1PL6/1PM4/1PM6 asynchronous motors
    - 2SP1 motor spindles
    - 1FN3, 1FN6 linear motors
  - SINAMICS S110, SINAMICS S120
    - Control Units
    - Power Modules (Blocksize/Chassis/Combi)
    - Line Modules (Blocksize/Chassis)
    - Line-side components
    - Motor Modules (Blocksize/Chassis)
    - DC link components
    - Additional system components
    - Load-side power components
    - Encoder system connection
    - MOTION-CONNECT connection systems
  - SINUMERIK
    - CNC systems
    - Operator components for CNC systems
  - SIMOTION
    - SIMOTION D
    - SIMOTION C

The CAD CREATOR offers a variety of options for configuring, but also for conducting product searches:

- According to order number
- According to technical description

After successful configuration of the product, the dimension drawings and models are displayed with the integrated viewer and made available for export.

#### Selection and ordering data

| Description                                          | Order No.                 |
|------------------------------------------------------|---------------------------|
| <b>CAD CREATOR</b>                                   | <b>6SL3075-0AA00-0AG0</b> |
| Dimension drawing and 2D/3D CAD generator on DVD-ROM |                           |
| English, French, German, Italian, Spanish            |                           |

#### More information

The CAD CREATOR is available on DVD-ROM and as an Internet application.

More information is available on the Internet at:

[www.siemens.com/cadcreator](http://www.siemens.com/cadcreator)

# SINUMERIK Solution Partners



|             |                                                                                 |
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| <b>9/3</b>  | <b>Solution Partners for specific add-on functions</b>                          |
| 9/3         | ARTIS GmbH<br>CTM tool and process monitoring                                   |
| 9/3         | ARTIS GmbH<br>Genior Modular tool and process monitoring                        |
| 9/4         | Balance Systems S.r.l.<br>Measuring and monitoring system for grinding machines |
| 9/4         | Comara KG<br>Intelligent feedrate control                                       |
| 9/5         | Dittel Messtechnik GmbH<br>Balancing and process monitoring system              |
| 9/5         | HOFMANN GmbH & Co. KG<br>Measuring and balancing technology                     |
| 9/6         | Kai Müller GmbH<br>Teleservice with video                                       |
| 9/6         | MARPOSS S.p.A.<br>Laser tool monitoring                                         |
| 9/7         | MCU GmbH & Co. KG<br>Tool and process monitoring                                |
| 9/7         | Montronix GmbH<br>Tool and process monitoring                                   |
| 9/8         | OMATIVE Systems<br>Real-time feedrate optimization                              |
| 9/8         | Renishaw Plc.<br>Non-contact tool monitoring                                    |
| 9/9         | PROMETEC GmbH<br>PROMOS 2                                                       |
| 9/9         | PROMETEC GmbH<br>PROSIN PLUS                                                    |
| 9/10        | PROMETEC GmbH<br>ACfeed                                                         |
| 9/10        | PROMETEC GmbH<br>MCI (Machine Condition Indicator)                              |
| 9/11        | SEQUOIA IT S.r.l.<br>Vibration monitoring and collision detection               |
| <b>9/12</b> | <b>Solution Partners with adapted services</b>                                  |
| 9/12        | LQ Mechatronik-Systeme GmbH<br>Complete mechatronic installation systems        |
| 9/13        | mz robolab GmbH<br>rcs1 robot control                                           |
| <b>9/14</b> | <b>Solution Partners with supplementary add-on components</b>                   |
| 9/14        | EMUGE-FRANKEN GmbH & Co. KG<br>Precision tools                                  |
| 9/15        | ETALON AG<br>Testing/calibrating/compensating of machine tools                  |
| 9/16        | KUKA Roboter GmbH<br>Industrial robots                                          |

# SINUMERIK Solution Partners

## Introduction

### Overview

The SINUMERIK Solution Partners supplement the open SINUMERIK control with their own solutions:

- Specific add-on functions, e.g. tool break monitoring
- Tailored services for the CNC machine tool, e.g. machine modernization
- Supplementary components, e.g. robots, tools or measuring instruments

The solutions of the SINUMERIK Solution Partners are certified and tested and therefore offer maximum reliability and compatibility in productive use with the SINUMERIK control in production.

SINUMERIK Solution Partners assume responsibility for their own solutions, products and services.

### More information

More information is available on the Internet at:

[www.siemens.com/sinumerik/solutionpartner](http://www.siemens.com/sinumerik/solutionpartner)

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

### ARTIS GmbH

#### CTM tool and process monitoring

#### Overview



#### CTM tool and process monitoring

The autonomous CTM system (Computer integrated Tool and Machine Monitoring) from ARTIS can be integrated into the CNC and is used to monitor tools, machines and processes.

#### Benefits

- Fast integration resulting from minimized hardware and fieldbus technology
- Simple, fast installation of software
- No additional wiring in the solution without a sensor
- 4 independent monitoring channels on one CTM card
- Autonomous mode of operation, thus minimum load on the control
- System and sensors from a single source

Operator control of CTM as well as visualization can be integrated into the user interface of the CNC. Operation is clear, informative and easy to master following a short period of training.

Tool monitoring prevents the production of faulty parts or the occurrence of other damage resulting from worn, broken or missing tools. Bearing damage on motor spindles, tool unbalance and collisions are detected by the machine monitoring functions. The functions for process monitoring are responsible for observation of quality criteria, for example, the tolerances of tap-drill sizes and thread depths.

#### More information

Please contact:

#### ARTIS GmbH

Contact for Sales and Marketing: Mr. Volker Meyer  
Contact for Engineering: Dr. Dirk Lange

Sellhorner Weg 28-30  
29646 BISPINGEN-BEHRINGEN, Germany

Tel.: +49 5194 950-0  
Fax: +49 5194 7825  
E-mail: [volker.meyer@artis.marposs.com](mailto:volker.meyer@artis.marposs.com)  
E-mail: [dirk.lange@artis.marposs.com](mailto:dirk.lange@artis.marposs.com)  
[www.artis.de](http://www.artis.de)

### ARTIS GmbH

#### Genior Modular tool and process monitoring

#### Overview



#### Genior Modular tool and process monitoring with no settings required for the SINUMERIK 840D sl control

Genior Modular is the ideal product for monitoring and controlling cutting processes in machine tools. The system is predominantly deployed for applications which demand automatic adaptation of monitoring functions to the process as well as operation without intervention by the operator.

Genior Modular increases productivity and reduces the operating costs of machine tools.

#### Benefits

- Protects metal-cutting processes
- Easy to use
- Requires no training
- Machine operator does not need to make adjustments
- Cycle times are shortened by optional adaptive control
- Simple to install and commission thanks to modular design
- Few adjustments required in the NC program
- Optimum utilization of tool life
- Automatic adaptation to cutting processes
- Can be expanded and scaled
- Future-oriented architecture with standard bus technologies
- Monitors tool breakage and missing tools
- Monitors tool wear
- Tool and machine protection
- Suitable for use in series production
- Visualization of signals on Siemens operator panels

#### More information

Please contact:

#### ARTIS GmbH

Contact for Sales and Marketing: Mr. Volker Meyer  
Contact for Engineering: Mr. Torsten Knack

Sellhorner Weg 28-30  
29646 BISPINGEN-BEHRINGEN, Germany

Tel.: +49 5194 950-0  
Fax: +49 5194 7825  
E-mail: [volker.meyer@artis.marposs.com](mailto:volker.meyer@artis.marposs.com)  
E-mail: [torsten.knack@artis.marposs.com](mailto:torsten.knack@artis.marposs.com)  
[www.artis.de](http://www.artis.de)



# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

### Balance Systems S.r.l. – Measuring and monitoring system for grinding machines

#### Overview

*Versatile building block system for measuring and monitoring grinding machines – VM25 for the SINUMERIK 840D sl control*

The VM25 system contains the hardware and software components required to ensure productivity, economy and quality of the grinding process – using either manual or automatic operations.

#### Software package – VM25-HMI

The user interface VM25-HMI can be easily integrated by the user into his application program, or activated as independent task that can be used immediately.

Thanks to a complete programming interface, based on an Active X library, the program can interact with the devices and the operator for managing the following functions:

- Balancing the grinding wheel at 1 or 2 planes, made possible by high precision balancing heads without torque effect (patented), to achieve the maximum surface quality of the ground workpiece
- Using acoustic, hydrophone and power sensors:
  - Determining the grinding wheel contact to optimize the machining and finishing cycles
  - Recording of the normal cutting characteristic patterns to monitor and signal process irregularities
- Comparative in-process measurement of the workpiece, with immediate correction feedback signal to the CNC/PLC for the diameter, the lengths and the current positions, as well as for roundness deviations (patented), to avoid missing parts and to secure consistent production quality
- FFT analysis to monitor machine vibration levels and diagnose faulty components
- Data collection referred to measurements, internal and external events – with subsequent transfer of this data to other suitable media for process analysis
- Network connection to a remote PC, in the master or slave mode, via teleservice

#### Benefits

- **Complete**  
Full, customized adaptation of the user interface using graphics libraries for data display, configuration and operation.
- **Flexible**  
Creation of different application levels through to complex, user-specific structures with the help of supplied templates.
- **Integrable**  
A Windows application enables monitoring of the control and process to be integrated into the HMI environment of the SINUMERIK 840D sl without the need for additional display devices.
- **Intelligent**  
Effective process control through comprehensive acquisition of process data.
- **Available**  
Open for additional expansions.

#### More information

Please contact:

#### Balance Systems S.r.l.

Contact: Dr. Ing. Andrea Guidotti

Via Ruffilli 8/10  
20060 Pessano con Bornago (MI)  
ITALY

Tel.: +39 02 9504955  
Fax: +39 02 9504977  
E-mail: [info@balancesystems.it](mailto:info@balancesystems.it)  
[www.balancesystems.com](http://www.balancesystems.com)

### Comara KG Intelligent feedrate control

#### Overview



#### Intelligent feedrate control

The intelligent software solution iCut tracks the stock removal process and intervenes automatically when required.

iCut measures the spindle output up to 500 times per second and adjusts the feedrate automatically to the current cutting conditions. Variations in allowance or cutter contact angle, different depths of cut, increased hardness or tool wear – the feedrate is as fast as possible, but as slow as necessary. The ideal feedrate in any situation. With a unique response time.

iCut always calculates on the basis of the programmed feedrate, which corresponds to 100 %. From the load values measured on the tool, iCut computes the ideal feedrate for the prevailing cutting conditions and increases or reduces the feedrate fully automatically (e.g. 70 % or 120 %).

#### Benefits

- Production time savings combined with high process stability

#### More information

Please contact:

#### Comara KG

Contact: Mr. Markus Gruber

Industriestrasse 21  
78112 ST. GEORGEN/SCHWARZWALD, Germany

Tel.: +49 7724 9158-0  
Fax: +49 7724 9158-10  
E-mail: [info@comara.de](mailto:info@comara.de)  
[www.comara.de](http://www.comara.de)

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

**Dittel Messtechnik GmbH**  
Balancing and process monitoring system

**HOFMANN GmbH & Co. KG**  
Measuring and balancing technology

### Overview



#### Fully automatic balancing and process monitoring system 6000

The fully automatic balancing and process monitoring system 6000 can be completely remote-controlled from the control, and process signals can be displayed on the machine screen. All data of the balancing procedure and the structure-borne noise signals (AE) are therefore available online for the machine operator.

### Benefits

- User-friendly balancing system with non-contact transmission of signals and power makes it wear-free and maintenance-free
- 2 out-of-balance, 2 speed and 4 AE signal limits can be programmed
- Balancing heads are available with built-in AE sensor and neutral position of the balancing weights (spindle mounting, attachment and ring balancing systems), large balancing capacity within very small space, speeds up to 15000 rpm
- Tools for machine diagnostics (compliance, resonance)
- Connection facility for 4 structure-borne noise sensors, stationary or rotary
- AE sensor technology positioned directly at place of occurrence, resulting in high signal quality
- State-of-the-art evaluation of structure-borne noise for by-passing air grinding, monitoring of grinding process and dressing, 31 different settings can be permanently saved
- Envelope curve monitoring for dressing and grinding processes
- Representation of AE level over axis position
- Storage of measured AE signals on control PC or external PC
- Connection via RS232C interface or Ethernet

### More information

Please contact:

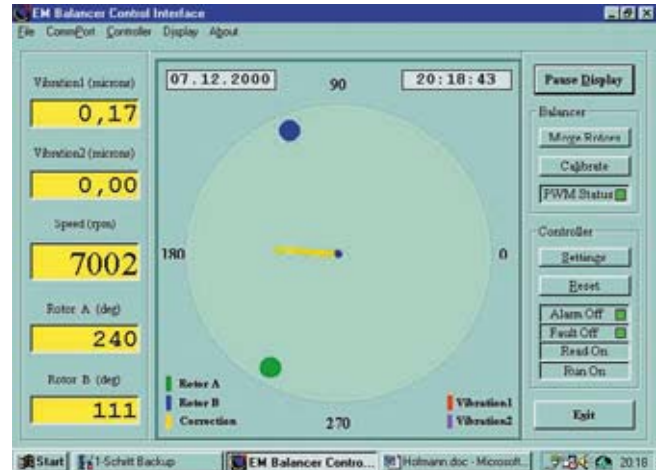
**Dittel Messtechnik GmbH**

Contact: Mr. Adalbert Sporer

Erpfinger Strasse 36  
86899 LANDSBERG AM LECH, Germany

Tel.: +49 8191 3351-17  
Fax: +49 8191 3351-49  
E-mail: [adi.sporer@dittel.com](mailto:adi.sporer@dittel.com)  
[www.dittel.com](http://www.dittel.com)

### Overview



#### Ring balancing system EMB 7000

The EMB 7000 ring balancing system is based on a simple concept. The vibrations generated on rotating systems due to imbalance are actively eliminated during rotation in fractions of seconds. Two unbalanced disks are permanently mounted on the machine spindle via thin ring bearings. A fast, intelligent controller senses the imbalance in the spindle, calculates and controls the two disks in the optimum position for compensating the imbalance. The two disks are electromagnetically adjusted by the stators into the calculated position extremely quickly.

### Benefits

- Works at spindle speeds up to 51000 rpm
- Positioning of the compensation rings in tenths of a second, even during the non-stationary acceleration phase
- Spindle monitoring systems
- 2-level balancing technology

### More information

Please contact:

**HOFMANN Mess- und Auswuchttechnik GmbH & Co. KG**

Contact for Sales and Marketing: Dr. Axel Rückert

Werner-von-Siemens-Strasse 21  
64319 PFUNGSTADT, Germany

Tel.: +49 6157 949-0  
Fax: +49 6157 949-120  
E-mail: [vertrieb@hofmann-balancing.com](mailto:vertrieb@hofmann-balancing.com)  
[www.hofmann-balancing.com](http://www.hofmann-balancing.com)



# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

**Kai Müller GmbH**  
Teleservice with video

**MARPOSS S.p.A.**  
Laser tool monitoring

### Overview



#### Teleservice with video

VIDEO VISION is a video conferencing system that can be used worldwide and has been developed specifically for machine servicing. It enables the service engineers to operate the control as though they were on site. Through the simultaneous audio and video connection, the engineer is able to examine the machine and to provide the user with expert support in order to carry out repairs by means of remote instructions.

VIDEO VISION NM permits flexible use. This video conferencing system contains all the VIDEO VISION functions, but can also be installed on devices such as notebooks, and permits connection via ISDN, an analog line, GSM, or the Internet.

In the case of larger machines and production systems, the audio-video-radio link is recommended, which can transmit sound and video images wirelessly over distances of up to 70 m (230 ft). The supplied ear-phones and an integrated directional microphone even permit use in a very loud production environment.

VIDEO VISION EVI is appropriate for pure video monitoring of the machine. You can monitor your complete machine environment from the control using up to 7 pan-and-tilt zoom cameras.

#### Requirements for VIDEO VISION:

- Telecommunications link (ISDN connection recommended)

### More information

Please contact:

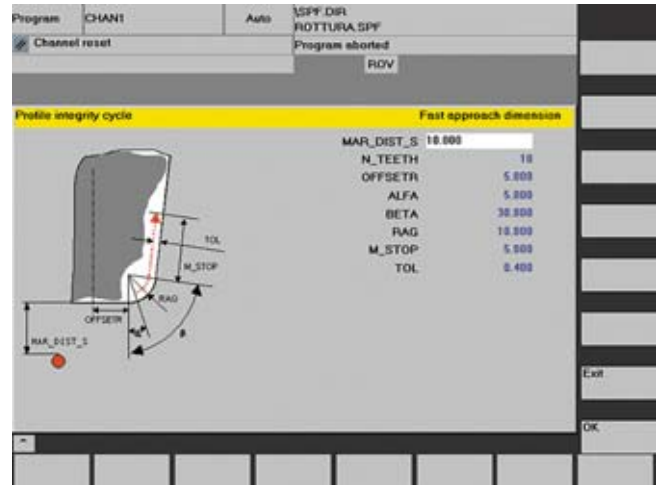
**Kai Müller GmbH**

Contact: Mr. Kai Müller

Rübteile 12  
72574 BAD URACH-HENGEN, Germany

Tel.: +49 7125 94688-0  
Fax: +49 7125 94688-40  
E-mail: [info@kaimueller.biz](mailto:info@kaimueller.biz)  
[www.kaimueller.biz](http://www.kaimueller.biz)

### Overview



#### Software for Marposs spindle measurements, monitoring of contact tools and laser tool monitoring on machine tools

Measuring cycles for part and tool measuring cycles with Marposs Mida measuring heads and Mida lasers. Easy programming thanks to the special user interface. All the necessary measurements can be performed on the part and on the tool for rapid setup of the machine, high-speed monitoring of the part before and after the machining cycle as well as continuous monitoring of the safe range of stress.

Tool measurements with Mida laser:

- Tool status and breakage
- Measuring the length and diameter of the tool
- Checking and updating the length and diameter of the tool
- Checking the condition of the cutting profile of the tool
- Measuring and updating the cutting radius and determining the deflection range
- Compensating the thermal deviation of the machine axes

Part measurements with Mida spindle measuring heads:

- Protected positioning of the measuring head
- Measuring of drilled holes, pins, pockets and shoulders
- Single surface measurement
- Measuring the internal and external cross-arm

### More information

Please contact:

**MARPOSS S.p.A.**

Contact for Sales and Marketing: Dipl. Ing. Horst Peipers  
Contact for Engineering: Dipl. Ing. (FH) Georg Schulte-Hubbert

Mercedesstrasse 10, 71384 WEINSTADT, Germany

Tel.: +49 7151 2054151  
Fax: +49 7151 2054552  
E-mail: [horst.peipers@de.marposs.com](mailto:horst.peipers@de.marposs.com)  
E-mail: [georg.schulte-hubbert@de.marposs.com](mailto:georg.schulte-hubbert@de.marposs.com)

International contact: Andrea Turrini

MARPOSS S.p.A. Tel.: +39 051 899253  
Via Saliceto, 13 Fax.: +39 051 899950  
40010 Bentivoglio (BO) E-mail: [andrea.turrini@marposs.com](mailto:andrea.turrini@marposs.com)  
ITALY [www.marposs.com](http://www.marposs.com)

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

**MCU GmbH & Co. KG**  
Tool and process monitoring

**Montronix GmbH**  
Tool and process monitoring

### Overview



#### Tool and process monitoring

The Toolinspect module communicates with the SINUMERIK CNC with software version V04.02.x and higher over PROFIBUS DP or also via analog signals. Visualization on the operator panel of the control is implemented with the module via a TCP/IP or RS232C interface.

### Benefits

- No need to set parameters and limits
- Easy operation using 3 function keys
- MDE data acquisition
- Adaptive control
- Diagnostics tool for process optimization
- 19 languages available online

The Toolinspect module monitors tools on cutting machines. The data required for this task is transferred preferably via a PROFIBUS DP interface from a CNC to the Toolinspect module.

The monitoring strategy is selected autonomously by the integrated software, depending on the tool or machining mode. The necessary parameters are determined and entered once only and machine-specifically, in consultation with the machine manufacturer. Thereafter, no changes or adaptation of parameters and limits are necessary.

### More information

Please contact:

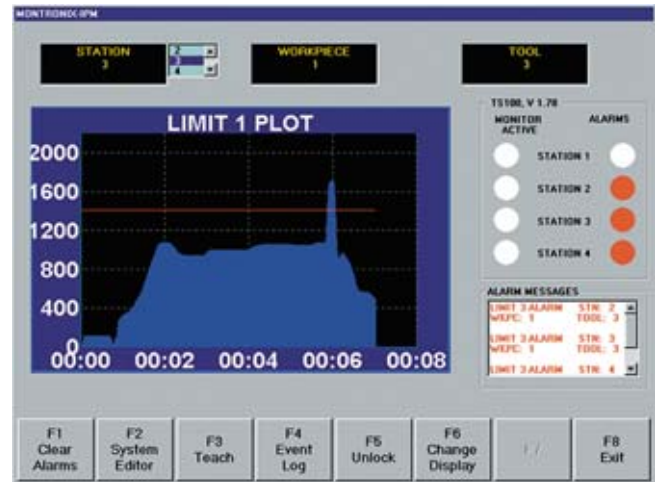
#### MCU GmbH & Co. KG

Contact: Mr. Uwe Schröter

Max-Eyth-Strasse 51  
71364 WINNENDEN, Germany

Tel.: +49 7195 137538  
Fax: +49 7195 137539  
E-mail: [vertrieb@mcu-gmbh.de](mailto:vertrieb@mcu-gmbh.de)  
[www.toolinspect.de](http://www.toolinspect.de)

### Overview



#### Tool and process monitoring

Montronix monitoring systems and the support of the Montronix employees will ensure that you have your machining process under control. Montronix is your competent partner worldwide for all machining tasks.

Montronix systems provide you with the following advantages:

- Tool monitoring and protection
- Shorter machine downtimes
- Avoidance of faults and reduction in rejects
- Improvement in quality
- Optimization of machining process

The visualization software (M-View) enables the machine operator to evaluate the machining process rapidly and precisely. The graphic display indicates process deviations, broken tools, increasing wear, and collisions which can be statistically recorded and evaluated.

The IPM (Integrated Process Monitor) operator control and visualization software combines operation and simultaneous visualization. Communication is implemented via an RS232C or RS485 interface.

It is possible to switch from the machining process to process visualization at any time. A fast, reliable working method is ensured by the clear and simple operation.

### More information

Please contact:

#### Montronix GmbH

Contact: Mr. Brunmeier

Benzstrasse 7  
71720 OBERSTENFELD, Germany

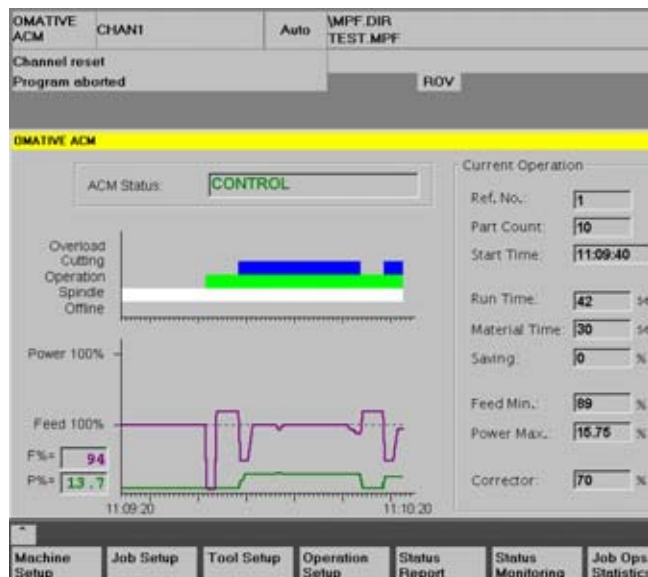
Tel.: +49 7062 679300  
Fax: +49 7062 679310  
E-mail: [info@montronix.de](mailto:info@montronix.de)  
[www.montronix.de](http://www.montronix.de)

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

### OMATIVE Systems Real-time feedrate optimization

#### Overview



#### ADAPTIVE CONTROL & MONITORING (ACM) for real-time feedrate optimization

The OMATIVE ACM system is fully integrated into SINUMERIK NCK version 6.5 or higher and into the SINUMERIK HMI environment's user interface purely as a software solution.

ACM can be used for every cutting operation in feedrate-control, monitoring and event-recording modes.

In **feedrate-control** mode, ACM measures the current spindle load and continuously calculates the optimum feedrate for each individual tool and material. The feedrate is set to the highest possible value automatically and in real time. This reduces cycle times and also prevents tool breakage and damage to the tool and spindle, particularly during critical roughing operations and in rough-finishing applications. If the tool becomes overloaded, ACM stabilizes to an acceptable value automatically. This value is defined via algorithms in the internal expert system and, if necessary, the feed is suspended. In this way, tool breakage can also be detected.

In **monitoring** mode, the spindle load is monitored without adaptation of the feedrate. If the spindle becomes underloaded or overloaded, an alarm is triggered and, if necessary, the machine is stopped. Missing tools or tool breakages are also detected.

In **event-recording** mode, the machine's event data are saved or transferred via the PC network using the OMATIVE Pro software and can be analyzed as machine and production reports. Event recording is performed automatically in feedrate-control and monitoring modes.

#### More information

Please contact:

**OMATIVE Systems**  
OMATIVE Systems Head Office  
P.O. Box 34272  
Jerusalem 91341  
ISRAEL

Tel.: +972 2 651 0310  
Fax: +972 2 651 1786  
E-mail: [omative@omative.com](mailto:omative@omative.com)  
[www.omative.com](http://www.omative.com)

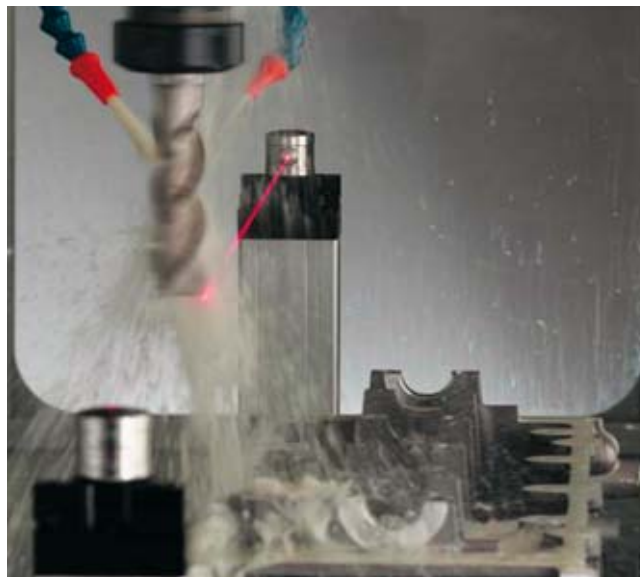
European office:

**OMATIVE Systems  
Europe GmbH**  
Contact:  
Ms. Oxana Lerich  
Rudolf-Diesel-Strasse 12  
78048 VILLINGEN  
SCHWENNINGEN  
Germany

Tel.: +49 7721 88789-3  
Fax: +49 7721 88789-50  
E-mail: [info@omative-europe.de](mailto:info@omative-europe.de)  
[www.omative-europe.de](http://www.omative-europe.de)

### Renishaw Plc. Non-contact tool monitoring

#### Overview



#### Non-contact tool monitoring

Renishaw has developed software that can be used in conjunction with the systems for non-contact tool control NC1, NC3 and NC4.

The program routines contain the following functions:

- Static length measurement, e.g. drill, tap
- Length determination with spindle rotating, e.g. end mill, milling heads
- High-speed tool-breakage monitoring
- Automatic tool measuring
- Monitoring of the cutting edge geometry and profile monitoring for breakage of a single edge
- Temperature compensation

Renishaw systems for tool monitoring are available as carrier systems or module systems which cover a wide range of different applications. All systems use the MicroHole technology that provides protection to IP68 even during the measuring procedure. The NC4 system also offers an integrated PassiveSeal, which maintains full protection even if the compressed air supply is interrupted. Active drip suppression prevents false response caused by drops of coolant.

#### More information

Please contact:

**Renishaw GmbH**

Contact: Dr.-Ing. Jan Linnenbürger

Karl-Benz-Strasse 12  
72124 PLIEZHAUSEN, Germany

Tel.: +49 7127 9810  
Fax: +49 7127 88237  
E-mail: [jan.linnenbuerger@renishaw.com](mailto:jan.linnenbuerger@renishaw.com)  
[www.renishaw.com](http://www.renishaw.com)

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

PROMETEC GmbH  
PROMOS 2

PROMETEC GmbH  
PROSIN PLUS

### Overview



#### PROMOS 2 modular tool and process monitoring system with PROVIS software

The modular process monitoring system provides fast collision detection and reliable tool monitoring for all machining processes:

- Detection of tool breakage
- Detection of idle passes
- Detection of tool contact
- Detection of tool wear

This functionality can be achieved in particular for machining centers, rotary indexing machines and transfer lines without the need for special sensors if the control system is equipped with digital drives, e.g., SIMODRIVE 611 digital.

Furthermore, additional functions are available for the visualization and, therefore, diagnosis and optimization of the machining operations. For the user, this means:

- Avoidance of most tool breakage incidents by prompt, automatic tool replacement
- Tool or workpiece damage is minimized, consequential damage prevented
- Increase in productivity without increased use of personnel
- Increase in quality through process optimization

In addition to machine and tool protection, PROMOS 2 also helps to reduce machining times and improve part quality. Operator inputs are made centrally using the operator panel of the control.

The modular PROMOS 2 system is available with different performance data (e.g., available monitoring functions, number of monitorable tools, crash data recorder) to permit optimum matching to the machining task with regard to cost and function. PROMOS 2 can be operated with all PROMETEC sensors (force, expansion, distance, active power, torque, vibration, structure-borne noise, sound emission, fluid noise).

### More information

Please contact:

#### PROMETEC GmbH

Contact: Dr.-Ing. Werner Kluft  
Jülicher Strasse 338  
52070 AACHEN, Germany

Tel.: +49 241 16609-0  
Fax: +49 241 16609-50  
E-mail: [kluft@prometec.com](mailto:kluft@prometec.com)  
[www.prometec.com](http://www.prometec.com)

### Overview



#### PROSIN PLUS tool monitoring as integrated software solution for the SINUMERIK 840D sl control

The low-cost PROSIN PLUS software permits direct access to the current values of the digital drives of the machine tool. If a tool breaks, the current of the associated drive changes; this value is increased in the case of a blunt tool. With PROSIN PLUS, additional sensors and even complete monitoring units can be omitted.

Features:

- Break detection for drills, from approx. 2 mm (0.08 in) (depending on rated spindle power)
- Operator control using SINUMERIK operator panels
- No additional hardware required
- Only one operator side and extremely easy to operate
- Very easy to retrofit
- Up to 120 different cuts of a CNC program can be monitored with 3 thresholds for missing tool, tool in contact with workpiece, tool wear, and tool overload
- Monitoring of the working value of the currents of the main and feed drives and therefore the cutting work of the tool for qualified in-process detection of tool breakage and tool wear
- Workpiece-related saving of monitoring settings in the machine control

PROSIN PLUS can protect the machine, tool holder, and tool from overload and therefore reduce secondary damage resulting from tool breakage, tool wear, incorrect CNC parameter entries, incorrect clamping of the workpieces, etc.

PROSIN PLUS is therefore just as suitable for mass production of metal parts, e.g. in the automotive subsupplier industry, to achieve enhanced quality and cost reductions at the same time, as for production of small batches, because only one workpiece is needed for training the tools.

A particular highlight of PROSIN PLUS is the reliable detection of wear on rough-machining tools. This assumes mass production in which the batch size is significantly larger than the number of working tools.

PROSIN PLUS is patented according to EP 1 276 027 and its derivations.



# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

**PROMETEC GmbH**  
ACfeed

### Overview



*Adaptive control for intelligent automatic feed optimization as integrated software solution for the SINUMERIK 840D sl control*

From the load values measured on the tool, ACfeed computes the ideal feedrate for the prevailing cutting conditions and increases or reduces the feedrate fully automatically (e.g. 70 % or 140 %). The spindle load is always set to an optimum 100 %. This not only saves time and significantly increases the number of pieces machined between tool resharpening, but also protects tools against overloading.

ACfeed is used primarily for milling operations, but has proven increasingly successful as a tool for other types of machining, e.g. as a cutting force control for turning operations. An integrated monitoring system completes the ACfeed function package.

Optimized for automotive production: Enormous time savings and increased process stability thanks to feed optimization. The total cycle time is reduced on average by 5 %.

Optimized for aircraft production: Increased reliability of machining because tools are not overloaded and due to individually adjustable limiting of machining forces (even without feedrate increase) with same degree of precision.

Intelligent feedrate control for compensating tool loading with:

- Variations in allowance on cast or forged parts
- Variations in material hardness and structure
- Contours with varying cutting depths or uneven surfaces
- Materials, e.g. stainless steel, tool steel, that are difficult to cut
- Wide variations in surface properties, e.g. hard casting skin, flame-cut edges
- Varying cutting widths

### More information

Please contact:

**PROMETEC GmbH**

Contact: Dr.-Ing. Werner Klufft

Jülicher Strasse 338  
52070 AACHEN, Germany

Tel.: +49 241 16609-0  
Fax: +49 241 16609-50  
E-mail: [klufft@prometec.com](mailto:klufft@prometec.com)  
[www.prometec.com](http://www.prometec.com)

**PROMETEC GmbH**  
MCI (Machine Condition Indicator)

### Overview



*MCI – Machine Condition Indicator with MCIview software: Machine status monitoring through evaluation of a single vibration sensor*

Using a sensor mounted on the spindle housing, MCI acquires the vibration signals from a machine tool fully automatically and continuously in all the different machine states of the production process, e.g., cutting, tool changes, spindle run-up, acceleration and braking of axes.

MCI also tests the spindle and slide during no-load operation at predefined intervals.

The MCI hardware acquires and stores the sensor data and processes them using an integrated digital signal processor. The signals are conditioned by a variety of analytical processes, e.g. Fast Fourier Transformation, RMS,  $\hat{F}$ , and can also be monitored on the basis of predefined threshold values.

The objective is to generate, store and monitor trends. Characteristics measured for each cycle, cut or tool are stored; these include, for example, maximum values, performance values, average values, standard deviations. If these characteristic values exceed a defined threshold, a warning or alarm is displayed. This system allows early detection of typical symptoms of wear on the machine and critical changes in the cutting process.

Furthermore, MCI triggers a crash limit at extreme vibration acceleration levels to shut down the machine immediately.

Separating the measurements into "machining" and "non-machining" means that causes of problems can be identified quickly: For example, if extremely high values are measured during the machining process, but the values measured are perfectly normal during tool changes, axis traversal and when the same spindle is running under no load, it is clear that the tool cutting conditions need to be optimized as the spindle and axes are obviously not the cause of the problem.

The MCI data which can be viewed online on the control can be displayed and stored at any time via an interface installed on the housing of the machine or control cabinet.

The trends can then be analyzed for non-conformances in offline mode and compared with the data of other machines of the same type. Data can be archived centrally and accessed via the company's intranet.

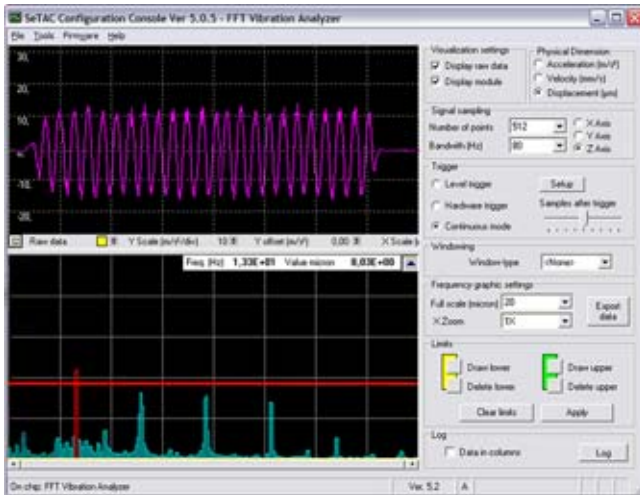
Condition monitoring requires only one vibration sensor in the machine if this is optimally positioned – further sensors can be fitted for supplementary functions such as tool imbalance or tool seat detection (TSD).

# SINUMERIK Solution Partners

## Solution Partners for specific add-on functions

SEQUOIA IT S.r.l.  
Vibration monitoring and collision detection

### Overview



### SeTAC, the triaxial system for vibration monitoring and collision detection

Identification of abnormal collisions and vibrations through digital real-time alarms (response time less than 1 ms), directly integrated into the machine.

#### Main characteristics of SeTAC:

- Built-in self-diagnostics able to ensure full measurement reliability
- Triaxial analysis with a measurement range of  $\pm 18$  g per axis
- High precision of both high and low frequency analysis
- Ability to permanently store up to 12000 vibration events, indicating the time and amplitude of phenomena
- Configurable for all types of industrial application

### Overview (continued)

#### Main applications of SeTAC:

- Reduces and avoids damage to the machine tool by triggering an alarm in the case of a machine standstill as soon as an abnormal collision or vibration occurs (digital alarm triggered in less than 1 ms from the start of the event)
- Black box function. The course of the collisions and vibrations on the monitored machine is reconstructed
- Detection of the degree of unbalance through digital alarms with several thresholds
- Monitoring of specific mechanical components or specific behaviors, e.g. chattering
- The instrument can be integrated with the machine control chain through change in behavior depending on the vibration data

### More information

Please contact:

**SEQUOIA IT S.r.l.**

Contact: Mr. Massimiliano Titolo

Via Einaudi 25  
10024 Moncalieri (TO)  
ITALY

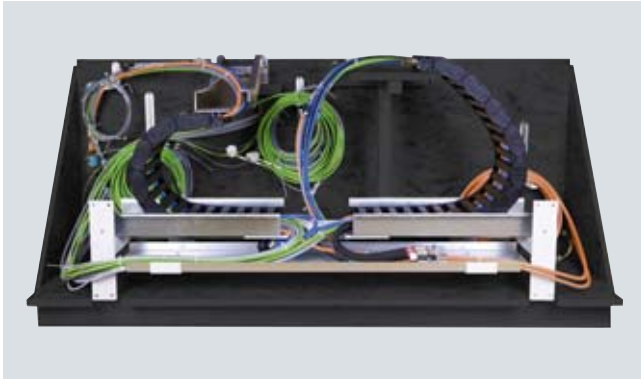
Tel.: +39 011 6402992  
Fax: +39 011 6402985  
E-mail: [info@sequoia.it](mailto:info@sequoia.it)  
[www.sequoia.it](http://www.sequoia.it)

# SINUMERIK Solution Partners

## Solution Partners with adapted services

**LQ Mechatronik-Systeme GmbH**  
Complete mechatronic installation systems

### Overview



**Complete mechatronic installation systems**  
*Versatile and profitable.*

Complete installation systems pay for themselves. And not just the electrical system, but also the mechanical, hydraulic and pneumatic systems. For this reason, we have developed solutions that make it easy for you to switch to greater efficiency in development and installation, step-by-step.

#### *Ready to install and functionally tested.*

MOTION-CONNECT cables, carrier, media hoses, sheet metal parts and add-on parts, strain-relief systems – all these components will be assembled by us into a complete energy management system, perfectly tuned to the application and motion of the machine, and tested for 100 % functionality. We operate our own development laboratory for the purpose of promoting standardization and modularization with a simultaneous increase in quality.

#### *Modern logistics system for more reliable installation.*

Flexible manufacturing processes ensure fast single-item and batch production with a high degree of quality. With our modern materials logistics systems, we can respond to customer requests quickly. Thanks to our own fleet, we can meet delivery deadlines to an accuracy of one hour.

#### *Available worldwide.*

We deliver power carrier systems that are ready to install and develop special installation and transport frames for them, for national and international shipping. In accordance with your requirements, we can deliver the carriers to any location in the world in a condition that is fully ready for final assembly.

#### Products and services:

- Preassembled and ready to install energy management systems with MOTION-CONNECT connection systems
- Installation modules and cable sets
- Fluid and pneumatic modules
- Completely preassembled machine installations, e.g. equipment plates
- Development, design, including construction of prototypes
- Documentation (2 and 3-dimensional)
- Logistics: State-of-the-art materials logistics is supplemented by machine-specific transport trolleys
- Update service: Planning and implementation of the inbound and outbound control logistics in response to parts list changes
- Service: Spare parts supply, repairs, refurbishments, commissioning and maintenance contracts

### Benefits

- Certified SINUMERIK Solution Partner with outstanding experience in offering integrated, perfectly tailored solutions
- Use of original products, e.g. MOTION-CONNECT cables
- Reduce the number of suppliers and orders
- Reduce stockholding costs for cables, carriers, hoses, plates, etc. down to zero
- Reduce throughput times in production
- React to changes in the flow of orders with flexibility
- Minimize machine standstill times with complete systems
- 100 % tested energy management systems
- 2 year warranty on the complete power carrier system
- Delivery on special transport frames – economical and environmentally friendly

### More information

Are you interested in complete systems from LQ, which make machine installation easier, better and more cost-effective? We look forward to your call. Contact LQ Mechatronik-Systeme for expert advice.

#### **LQ Mechatronik-Systeme GmbH**

Systems house for electromechanical equipment in machine building and plant construction

Contact: Mr. Steffen Fink

Carl-Benz-Strasse 6  
74354 BESIGHEIM, Germany

Tel.: +49 7143 9683-0

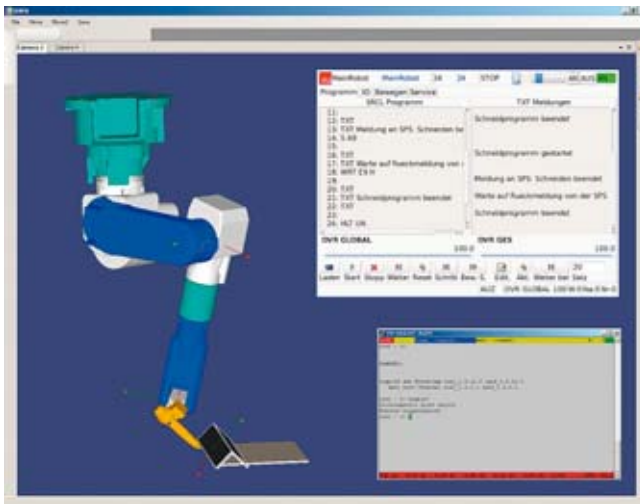
Fax: +49 7143 9683-99

E-mail: [steffen.fink@de.lq-group.com](mailto:steffen.fink@de.lq-group.com)

[www.lq-group.com](http://www.lq-group.com)



### Overview



#### Professional automation solutions with the rcs1 robot control

- Retrofitting of proven, reliable hardware (robots and machines) with the latest control technology
- New robots with the user-friendly, extremely flexible rcs1 control
- Sensory automation solutions for complex, innovative applications

#### Hardware concept

As an open, universal PC-based robot control, the rcs1 control is based on the latest, proven Siemens standards.

#### Sensor motor technology

The rcs1 is designed to allow the versatile integration of sensor technology. Apart from extensions for optical sensors, e.g. for real-time seam tracing, in particular stable processes for a hard contact force control robolab sensing system (rss1) are available as an extension, which simplify numerous robotic applications, or even make them possible for the first time.

### Overview (continued)

#### Controllable axes

In its standard configuration, the rcs1 is designed as a 6-axis control, but it can be expanded considerably, e.g. up to a 16-axis control with coordinated control of additional axes and belt synchronization.

#### Kinematics

The rcs1 control is not limited to classic manipulator kinematics: Kinematics can be custom defined, e.g. for Cartesian robots, gantry robots, swivel/rotating tables.

#### Programming

Various user interfaces are available as options for programming the robot system:

- Hand-held unit (HHU) with touch screen
- Graphic user interface
- 3D simulation and programming system
- Programming interface in C/C++

#### Programming languages

- Manual programming with a 6D force sensor
- SRCL program interpreter
- C/C++ program library

### More information

Please contact:

#### mz robolab GmbH

Marie-Curie-Straße 1  
53359 RHEINBACH, Germany

Tel.: +49 2226 83600-00

Fax: +49 2226 83600-11

E-mail: [kontakt@robolab.de](mailto:kontakt@robolab.de)

[www.robolab.de](http://www.robolab.de)



# SINUMERIK Solution Partners

## Solution Partners with supplementary add-on components

**EMUGE-FRANKEN GmbH & Co. KG**  
Precision tools

### Overview



#### *Precision tools that save time and money*

EMUGE-FRANKEN is a group of companies that offers state-of-the-art thread cutting, testing, clamping and milling technology – and has done so for over 90 years.

Our products:

- Taps
- Thread gauges
- Thread cutters
- Tapping chucks
- Twist drills
- HSS milling cutters
- VHM milling cutters
- Threading dies
- Workpiece clamping

The broadly based customer sectors include, alongside the automotive industry, also the power plant and aeronautical industry, as well as mechanical and plant engineering. 50 % of the products are exported throughout the world.

Over 1000 employees in Lauf and Rückersdorf, Germany, as well as 300 employees worldwide are responsible for the extensive range of products and services offered. All activities are targeted at optimizing manufacturing processes, to show the customer solutions that will save time and money.

With a range of tools that comprises more than 110000 items, EMUGE-FRANKEN covers a broad spectrum in order to satisfy the growing requirements of the market. Apart from the ex-stock standard product range, special tools are developed in cooperation with customers which are tuned to the respective process and to the machine requirements.

### Overview (continued)

This team of experts provides the following services for the products offered by EMUGE-FRANKEN:

- Worldwide hotline advice and support for the solution of technical problems
- Cooperation for planning overall concepts and suggestions for optimizing the production procedure at the customer's site
- Trials are implemented free-of-charge with customer-specific materials in a purpose-built test area for optimum tool selection and recommendation
- Development and construction of customer-specific special tools
- Deployment of service technicians
- Provision of product-related training and seminars worldwide

### More information

EMUGE-FRANKEN is represented in 43 countries. You can find your local contact through our service centers in Lauf and Rückersdorf in Germany, or on the Internet.

#### **EMUGE-Werk Richard Glimpel GmbH & Co. KG**

Factory for precision tools

Contact: Mr. Markus Seydaack

Nürnberg Strasse 96-100  
91207 LAUF, Germany

Tel.: +49 9123 186-0  
Fax: +49 9123 14313  
E-mail: [info@emuge.de](mailto:info@emuge.de)  
[www.emuge-franken.de](http://www.emuge-franken.de)

#### **FRANKEN GmbH & Co. KG**

Factory for precision tools

Frankenstrasse 7/9a  
90607 RÜCKERSDORF, Germany

Tel.: +49 911 9575-5  
Fax: +49 911 9575-327  
E-mail: [info@emuge-franken.de](mailto:info@emuge-franken.de)  
[www.emuge-franken.de](http://www.emuge-franken.de)

# SINUMERIK Solution Partners

## Solution Partners with supplementary add-on components

**ETALON AG – Testing/calibrating/  
compensating of machine tools**

### Overview



The LaserTRACER in a large gantry milling machine

Using the ETALON system, the geometric variations of a machine can be measured quickly and very accurately. The traversing paths of the machine are automatically traced in space by the LaserTRACER and evaluated using a patented process. Extremely high accuracy is achieved as a result of distance measurements in space using a high-resolution interferometer. The procedure is also used to calibrate highly accurate coordinate measuring devices.



The LaserTRACER-MT can be used as an alternative.

### Overview (continued)

The automatically generated compensation data can be directly transferred to a SINUMERIK CNC. Using the SINUMERIK Volumetric Compensation System (VCS) option, systematic deviations are compensated throughout the working area. This usually multiplies the spatial accuracy of the machine.



Comparison of kinematic single errors (according to ISO 230) of an uncompensated and a compensated machine (ETALON compensation data and VCS application)

### Benefits

- Extensive, highly-accurate analysis of the geometry of the machine in the shortest possible time
- Significant increase in accuracy of the machine due to total error compensation in combination with the SINUMERIK option Volumetric Compensation System (VCS)
- Recalibration of the machine provides maximum accuracy even after a long operating time, collision, or lowering of the foundations
- Calibration of linear and rotary axes
- High-speed machine testing in accordance with ISO 230, diagonal measuring according to ISO 230-6, and circularity test without manual alignment

### Application

Machine tools and measuring devices in various sizes and types and all accuracy classes.

### More information

For detailed information, contact the system supplier directly:

#### ETALON AG

Contact: Dipl.-Ing. (FH) Daniel Raschke

Bundesallee 100  
38116 BRAUNSCHWEIG, Germany

Tel.: +49 531 592-1974

Fax: +49 531 592 1979

E-mail: [info@etalon-ag.com](mailto:info@etalon-ag.com)

[www.etalon-ag.com](http://www.etalon-ag.com)

# SINUMERIK Solution Partners

## Solution Partners with supplementary add-on components

### KUKA Roboter GmbH Industrial robots

#### Overview



#### *KUKA – leading global supplier of industrial robots*

KUKA Roboter GmbH with headquarters in Augsburg, Germany, is part of KUKA Aktiengesellschaft and one of the leading global suppliers of industrial robots. Their core area of expertise is the development, production and marketing of industrial robots, controls and software.

The company is the market leader in Germany and Europe, and is in third place worldwide. KUKA Roboter GmbH is represented by its 25 subsidiaries in the most important markets in Europe, America and Asia.

The mxAutomation interface, a product of KUKA Roboter GmbH, enables KUKA robots to interface easily with SINUMERIK 840D sl. Operation of the robot, including parts management, is implemented on a SINUMERIK operating panel front. The operator therefore has a "Single point of operation".

#### Benefits

- Fast integration of robot automation in production
- Easy operation and programming with SINUMERIK
- Dedicated channel for handling
- Programming in the NC program or teaching of the robot with SINUMERIK
- SINUMERIK 840D sl as a central operating station: Single point of operation
- Easy retooling
- Integration of alarm system and diagnostics

#### Application

Possible application areas in machine tool automation:

- Loading and unloading of machines
- Chaining several machines
- Handling workpiece pallets
- Tool change
- Cleaning workpieces
- Blowing off assemblies
- Sorting
- Quality control and measuring
- Labeling
- Deburring

Industries and target groups:

- Electrical engineering
- Plastics industry
- Clean-room sector
- Photovoltaics

#### More information

Please contact:

#### **KUKA Roboter GmbH**

Contact: Mr. Andreas Schuhbauer  
Key Technology Manager  
Machine Tool Automation

Hery-Park 3000  
86368 GERSTHOFEN, Germany

Tel.: +49 821 4533-2812

Fax: +49 821 4533-3461

E-mail: [andreasschuhbauer@kuka-roboter.de](mailto:andreasschuhbauer@kuka-roboter.de)  
[www.kuka-robotics.com](http://www.kuka-robotics.com)

# Appendix



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# Appendix

## Approvals

### Overview



*Many products in this catalog are in compliance with UL/CSA requirements and are labeled with the appropriate certification markings.*

All certifications, certificates, declarations of conformance, test certificates, e.g. CE, UL, Safety Integrated have been performed with the associated system components as they are described in the Catalogs and Configuration Manuals.

The certificates are only valid if the products are used with the described system components, are installed according to the Installation Guidelines and are used for their intended purpose.

For cases that deviate from these conditions, the company or person marketing these products is responsible in having the certificates appropriately re-issued.

**UL: Underwriters Laboratories**  
*Independent public testing institution in North America*

Approval marks:

- **UL** for end-products, tested by UL in accordance with UL standard
- **cUL** for end-products, tested by UL in accordance with CSA standard
- **cULus** for end-products, tested by UL in accordance with UL and CSA standards
- **UR** for mounting parts in end products, tested by UL in accordance with UL standard
- **cUR** for mounting parts in end products, tested by UL in accordance with CSA standard
- **cURus** for mounting parts in end-products, tested by UL in accordance with UL and CSA standards

Test standards:

- SINUMERIK: Standard UL 508
- SINAMICS: Standard UL 508C
- Motors: Standard UL 547

Product category/File No.:

- SINUMERIK: E164110
- SINAMICS: E192450
- Motors: E93429

**TUV: TUV Rheinland of North America Inc.**  
*Independent public testing institution in North America*  
*National recognized testing laboratory (NRTL)*

Approval mark:

- **cTUVus** tested by TUV in accordance with UL and CSA standards

**CSA: Canadian Standard Association**  
*Independent public testing institution in Canada*

Approval mark:

- **CSA** Tested by CSA in accordance with CSA standard

Test standard:

- Standard CAN/CSA-C22.2 No. 0-M91/No. 14-05/No. 142-M1987



## Partners at Industry Automation and Drive Technologies

## Overview



At Siemens Industry Automation and Drive Technologies, more than 85 000 people are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts ... on the entire Industry Automation and Drive Technologies range.

Your personal contact can be found in our Contacts Database at:

[www.siemens.com/automation/partner](http://www.siemens.com/automation/partner)

You start by selecting a

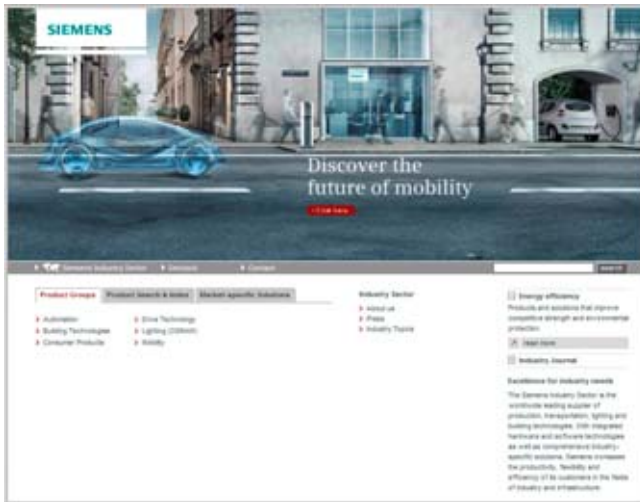
- Country,
- City/Region,
- Service.



# Appendix Online Services

## Information and Ordering in the Internet and on DVD

### Siemens Industry Automation and Drive Technologies in the WWW



A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

[www.siemens.com/industry](http://www.siemens.com/industry)

you will find everything you need to know about products, systems and services.

### Product Selection Using the Interactive Catalog CA 01 of Industry



Detailed information together with convenient interactive functions:

The interactive catalog CA 01 covers more than 80 000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives. All information is linked into a user interface which is easy to work with and intuitive.

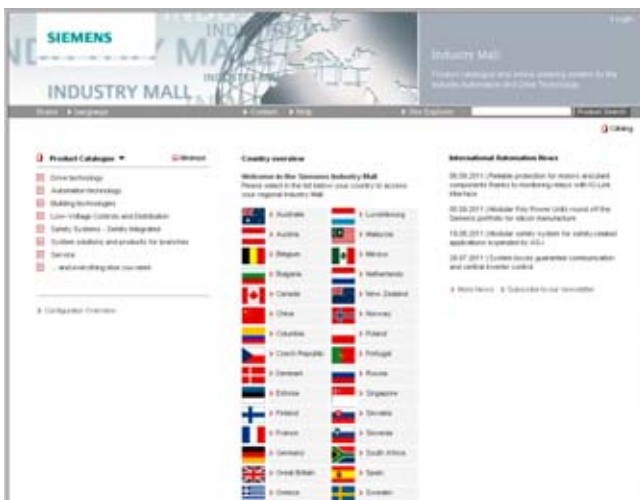
After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01 can be found in the Internet under

[www.siemens.com/automation/ca01](http://www.siemens.com/automation/ca01)

or on DVD.

### Easy Shopping with the Industry Mall



The Industry Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

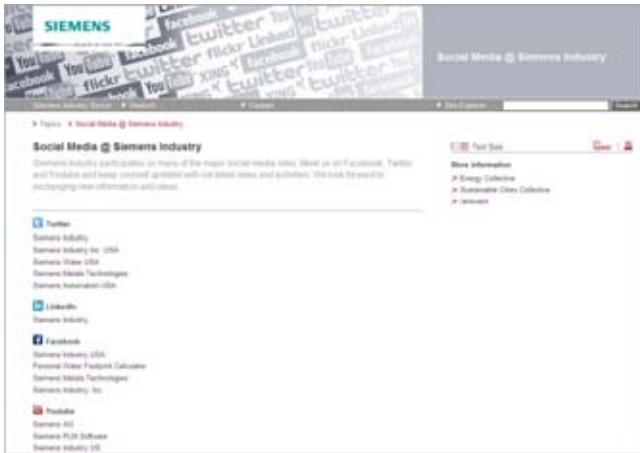
For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the Industry Mall on the Internet under:

[www.siemens.com/industrymall](http://www.siemens.com/industrymall)



## Social Media



Connect with Siemens through social media: visit our social networking sites for a wealth of useful information, demos on products and services, the opportunity to provide feedback, to exchange information and ideas with customers and other Siemens employees, and much, much more. Stay in the know and follow us on the ever-expanding global network of social media.

Connect with Siemens Industry at our central access point:

[www.siemens.com/industry/socialmedia](http://www.siemens.com/industry/socialmedia)

Or via our product pages at:

[www.siemens.com/automation](http://www.siemens.com/automation)

or

[www.siemens.com/drives](http://www.siemens.com/drives)

To find out more about Siemens' current social media activities visit us at:

[www.siemens.com/socialmedia](http://www.siemens.com/socialmedia)

## Mobile Media



We are also constantly expanding our offering of cross-platform apps for smartphones and tablets. You will find the current Siemens apps at your app store.

# Appendix

## DT Configurator selection guide

### Overview

#### Product description



The DT Configurator has been developed to support selection of drive train products from the product range. It is available as a selection guide offline within the interactive Catalog CA 01 (DVD-ROM), and online in the Industry Mall. The DT Configurator makes it easier to find the appropriate drive solution. The preselection helps you narrow down the product spectrum and determine the right product group. Motors and drives can be selected according to the specific application.



The DT Configurator supplies the correct order number as well as the associated documentation.

## SIEMENS

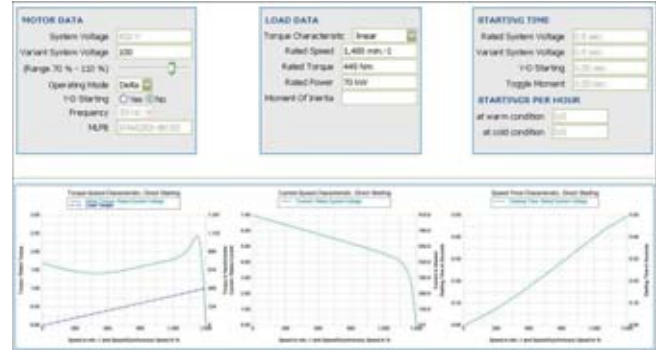
### Data sheet for three-phase Squirrel-Cage-Motors

Datenblatt für Drehstrom-Käfigläufermotoren

**Ordering data / Bestelldaten:**  
1LE1001-1AD52-2AA4

| Electrical data / Elektrische Daten:                                       | general data / Allgemeine Daten:                                                                 |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| rated motor voltage<br>Nennspannung 380/400 V AC, 50/60 Hz                 | frame size<br>Rahmen 100L                                                                        |
| frequency<br>Frequenz 50 Hz                                                | type of construction<br>Bauart B3                                                                |
| rated motor power<br>Nennleistung 1,10 kW                                  | weight in kg, without optional accessories<br>Gewicht in kg, ohne optionale Zubehörteile 20,0 kg |
| rated motor speed<br>Nennmotorleistung 700 1/min                           | frame material<br>Rahmenmaterial Aluminium                                                       |
| rated motor torque<br>Nennmoment 14,0 Nm                                   | degree of protection<br>Schutzart IP 55                                                          |
| rated motor current<br>Nennstrom 2,6 A                                     | method of cooling, TEFC<br>Kühlverfahren, TEFC                                                   |
| starting / rated motor current<br>AC/DC Nennstrom 5,8 A                    | isolation class<br>Isolationsklasse 1000 V to 1000 V                                             |
| breakdown / rated motor<br>Nennstrom 2,6 A                                 | rotation<br>Drehrichtung 30° to 360°                                                             |
| starting / rated motor torque<br>Nennmoment 1,7                            | duty type<br>Arbeitsart S1 - continuous operation                                                |
| efficiency class<br>Effizienzkategorie                                     | direction of rotation<br>Drehrichtung                                                            |
| efficiency<br>Effizienz                                                    | <b>terminal box / Klemmenkasten:</b>                                                             |
| power factor<br>Leistungsfaktor                                            | material of terminal box<br>Klemmenkastenmaterial Aluminium                                      |
| motor protection<br>Motorschutz                                            | type<br>Bauart                                                                                   |
| terminal box position<br>Klemmenkastenposition                             | terminal screw thread<br>Klemmenverschraubung                                                    |
| noise 50 Hz/100 Hz<br>Schallleistungsdruck 80/80 dB                        | max. cable cross-sectional area<br>max. Drahtquerschnitt 4,0 mm²                                 |
| moment of inertia<br>Trägheitsmoment                                       | cable diameter from ... to ...<br>Drahtdurchmesser von ... bis ...                               |
| bearing A3<br>Lager A3                                                     | cable entry<br>Drahtführung                                                                      |
| bearing B5<br>Lager B5                                                     | valve gland<br>Armaturenschraubung                                                               |
| cooling bearing<br>Kühlung Lager                                           | <b>special configurations / Sonderausführung:</b>                                                |
| stator cooling<br>Statorkühlung                                            |                                                                                                  |
| expansion device<br>Ausdehnungsvorrichtung                                 |                                                                                                  |
| type of lubrication<br>Schmiermittel                                       |                                                                                                  |
| lubrication interval at 40°C<br>Schmierintervall bei 40°C                  |                                                                                                  |
| quantity of grease for lubrication at 40°C<br>Menge Schmiermittel bei 40°C |                                                                                                  |
| external wiring<br>Äußere Verdrahtung                                      |                                                                                                  |
| explosion protection / Explosionschutz:                                    |                                                                                                  |
| site conditions / Umgebungsbedingungen:                                    |                                                                                                  |
| ambient temperature<br>Umgebungstemperatur                                 |                                                                                                  |
| altitude above sea level<br>Höhe über Meeresspiegel                        |                                                                                                  |
| standards and specifications<br>Normen und Vorschriften                    |                                                                                                  |

It can display operating instructions, factory test certificates, terminal box documentation, etc. and generates data sheets, dimension drawings and a start-up calculation for the relevant products. It can also be used to identify a suitable drive for the selected motor.



3D models in a wide variety of 3D formats are also available.



The comprehensive help system not only explains the program functions, but also provides access to detailed technical background knowledge.

# Appendix

## DT Configurator selection guide

### Overview (continued)

#### Product range

The DT Configurator encompasses the following:

- Product range for low-voltage motors
- MICROMASTER 4 inverters
- SINAMICS G110 standard inverters
- SINAMICS G120 standard inverters
- SINAMICS G110D distributed inverters
- SINAMICS G120D distributed inverters
- SINAMICS S110 servo drives

including:

- 2D/3D model generator for motors and drives
- Data sheet generator
- Start-up calculation
- Comprehensive product-specific documentation

#### System requirements

- PC with 1.5 GHz CPU or faster
- Operating system:
  - Windows XP
  - Windows NT 4.0 (SP6 and higher)
  - Windows Vista
  - Windows 7
- At least 1 GB RAM (2 GB recommended)
- Screen resolution 1024 × 768, graphics with more than 256 colors, small fonts
- DVD drive for offline version (CA 01)
- Windows-compatible sound card
- Windows-compatible mouse

#### Offline access in the interactive catalog CA 01



The interactive catalog CA 01 – the offline mall of Siemens Industry Automation & Drive Technologies – contains over 100000 products with approximately 5 million possible drive system product variants.

The CA 01 catalog can be installed as a light or full version from the DVD-ROM directly onto your hard disk or network. The DT Configurator can then be found in the main menu of the CA 01 under the "Selection guide" tab.

### Overview (continued)

#### Online access in the Siemens Mall

In addition, the DT Configurator can be used in the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

[www.siemens.com/dt-configurator](http://www.siemens.com/dt-configurator)



#### Selection and ordering data

| Description                                                         | Order No.                        |
|---------------------------------------------------------------------|----------------------------------|
| <b>Interactive catalog CA 01</b>                                    | <b>E86060-D4001-A510-D2-7600</b> |
| DVD-ROM<br>including selection guide<br>DT Configurator,<br>English |                                  |

#### More information

The electronic CA 01 catalog can be ordered from the relevant Siemens sales office or via the Internet:

[www.siemens.com/automation/CA01](http://www.siemens.com/automation/CA01)

Links to tips, tricks and downloads for functional or content updates can also be found at this address.

For technical advice, you can also contact our hotline for catalog CA 01:

E-mail: [adsupport@siemens.com](mailto:adsupport@siemens.com)

# Appendix

## Siemens Industry Online Support

### Knowledge Base on DVD



For locations without online connections to the Internet there are excerpts of the free part of the information sources available on DVD (Service & Support Knowledge Base). This DVD contains all the latest product information at the time of production (FAQs, Downloads, Tips and Tricks, Updates) as well as general information on Service & Support..

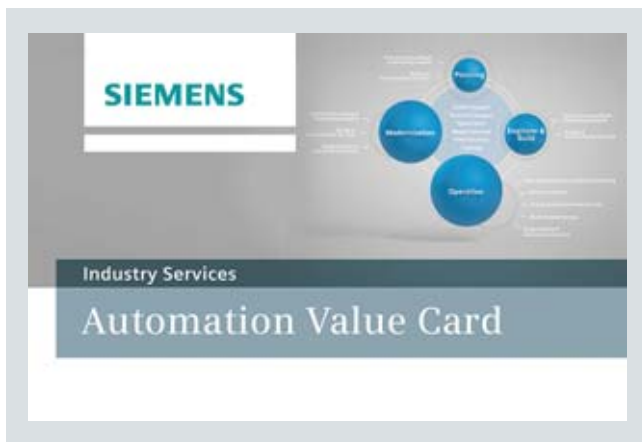
You can run the Knowledge Base DVD Edition without installation. The DVD also includes a full-text search and will be updated every 4 months.

Just the same as our online offer in the Internet, the Service & Support Knowledge Base on DVD comes complete in 5 languages (English, French, German, Italian, Spanish).

You can order the **Service & Support Knowledge Base DVD** from your Siemens contact.

| Description                                               | Order No.                 |
|-----------------------------------------------------------|---------------------------|
| <b>Service &amp; Support Knowledge Base</b><br>On DVD-ROM | <b>6ZB5310-0EP30-0BA2</b> |

### Automation Value Card



#### Small card – great support

The Automation Value Card is an integral component of the comprehensive service concept with which Siemens Automation and Drives will accompany you in each phase of your automation project.

It doesn't matter whether you want just specific services from our Technical Support or want to purchase something on our Online portal, you can always pay with your Automation Value Card. No invoicing, transparent and safe. With your personal card number and associated PIN you can view the state of your account and all transactions at any time.

Services on card. This is how it's done.

Card number and PIN are on the back of the Automation Value Card. When delivered, the PIN is covered by a scratch field, guaranteeing that the full credit is on the card.

By entering the card number and PIN you have full access to the Service & Support services being offered. The charge for the services procured is debited from the credits on your Automation Value Card.

All the services offered are marked in currency-neutral credits, so you can use the Automation Value Card worldwide.

Order your Automation and Value Card easily and comfortably like a product with your sales contact.

| Description                  | Order No.                 |
|------------------------------|---------------------------|
| <b>Automation Value Card</b> |                           |
| 200 Credits                  | <b>6ES7997-0BA00-0XA0</b> |
| 500 Credits                  | <b>6ES7997-0BB00-0XA0</b> |
| 1 000 Credits                | <b>6ES7997-0BC00-0XA0</b> |
| 10 000 Credits               | <b>6ES7997-0BG00-0XA0</b> |

Detailed information on the services offered is available on our Internet site at:

[www.siemens.com/automation/service&support](http://www.siemens.com/automation/service&support)

Service & Support à la Card: Examples

| Technical Support                                                                                                                            |                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| „Priority“                                                                                                                                   | Priority processing for urgent cases                            |
| „24 h“                                                                                                                                       | Availability round the clock                                    |
| „Extended“                                                                                                                                   | Technical consulting for complex questions                      |
| „Mature Products“                                                                                                                            | Consulting service for products that are not available any more |
| Online Support: Applications / Tools                                                                                                         |                                                                 |
| We provide AVC customers with customizable and ready-to-use applications which will accelerate the development of your system significantly. |                                                                 |

### Overview

#### Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

#### Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing. Data generated with engineering software and executable programs can be duplicated for your own use or for use by third parties free-of-charge.

#### Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc. The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge. You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc. Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

#### License types

Siemens Industry Automation & Drive Technologies offers various types of software license:

- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

#### Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

#### Single license

Unlike the floating license, a single license permits only one installation of the software per license. The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc. One single license is required for each type of use defined.

#### Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive). One license is required for each installation of the software.

#### Rental floating license

The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

#### Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

#### Demo license

The demo license support the "sporadic use" of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required. One license is required per installation of the software.

#### Demo floating license

The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

#### Certificate of license (CoL)

The CoL is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

#### Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

#### Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

#### PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed. A separate PowerPack must be purchased for each original license of the software to be replaced.



# Appendix

## Notes on software

### Software Licenses

#### Overview (continued)

##### *Upgrade*

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

##### *ServicePack*

ServicePacks are used to debug existing products.

ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

##### *License key*

Siemens Industry Automation & Drive Technologies supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

##### *Software Update Service (SUS)*

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from [www.siemens.com/automation/salesmaterial-as/catalog/en/terms\\_of\\_trade\\_en.pdf](http://www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf)

#### Overview

The "General License Conditions for Software Products for Automation and Drives" are applicable for supplies and deliveries of I DT software products.

#### *Legal notes during setup for new software products*

All software products feature a uniform reference to the license conditions. The license conditions are enclosed either with the documentation or in the software pack. When software is downloaded from the Internet, the license contract is displayed before the ordering procedure and must be accepted by the user before downloading can continue.

#### Note:

This software is protected by German and/or US copyright laws and the regulations of international agreements. Unauthorized reproduction or sale of this software or parts of it is a criminal offense. This will lead to criminal and civil prosecution, and may result in significant fines and/or claims for damages. Prior to installing and using the software, please read the applicable license conditions for this software. You will find these in the documentation or packaging.

If you have received this software on a CD-ROM that is marked "Trial version", or accompanying software that is licensed for your use, the software is only permitted to be used for test and validation purposes in accordance with the accompanying conditions for the trial license. To this end, it is necessary for programs, software libraries, etc. are installed on your computer. We therefore urgently recommend that installation is performed on a single-user computer or on a computer that is not used in the production process or for storing important data, since it cannot be completely excluded that existing files will be modified or overwritten. We accept no liability whatsoever for damage and/or data losses that result from this installation or the non-observance of this warning. Every other type of use of this software is only permitted if you are in possession of a valid license from Siemens is obtained.

If you are not in possession of a valid license that can be proven by presenting an appropriate Certificate of License/software product certificate, please abort installation immediately and contact a Siemens office without delay to avoid claims for damages.

#### Overview (continued)

#### *Software Update Services*

##### **Order**

To order the Software Update Service, an order number must be specified. The Software Update Service can be ordered when the software products are ordered or at a later date. Subsequent orders require that the ordering party is in possession at least of a single license.

##### Note:

It is recommended that the Software Update Service is ordered as early as possible. If a new software version of a software product is released for delivery by Siemens, only those customers will receive it automatically who are entered in the appropriate delivery list at Siemens at this time. Previous software versions, or the current software version are not supplied when the Software Update Service is ordered. The Software Update Service requires that the software product is up-to-date at the time of completion of the contract for the Software Update Service.

##### **Delivery**

When a Software Update Service is ordered, you will be sent the contractual conditions of this service and the price is due for payment. At the same time, you will be included in a delivery list for the software product to be updated. If Siemens releases a new software version for the corresponding software product for general sale (function version or product version), it will be delivered automatically to the goods recipient specified in the delivery address within the contract period.

#### More information

##### *Security note*

Bei Software zur Fernwartung oder Anbindung an übergeordnete Netze sind geeignete Schutzmaßnahmen (u. a. Industrial-Security, z. B. Netzwerksegmentierung) zu ergreifen, um einen sicheren Betrieb der Anlage zu gewährleisten. Additional information about Industrial Security can be found in the Internet under

[www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)



# Appendix

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| C01 ... C09 | 2/23                     | M03      | 2/32, 6/34   | N12      | 2/50               | S33      | 2/34                     |
| C11 ... C19 | 2/23                     | M04      | 2/36         | N13      | 2/36, 2/50         | S40      | 2/34                     |
| C61, C62    | 2/54                     | M05      | 2/30         | N15      | 2/51               | <b>V</b> |                          |
| C71 ... C78 | 2/54                     | M06      | 2/30         | N16      | 2/51, 6/34         | V40      | 6/65                     |
| <b>D</b>    |                          | M07      | 2/30         | N17      | 2/51               | V42      | 6/65                     |
| D01 ... D06 | 2/23                     | M08      | 2/34         | N26      | 2/32               | V90      | 6/118                    |
| D11 ... D18 | 2/52                     | M10      | 2/23         | N31      | 2/51               | V91      | 6/132                    |
| <b>F</b>    |                          | M13      | 2/30         | N34      | 2/33               | V92      | 6/118                    |
| F01         | 5/24, 5/28               | M15      | 2/31         | N36      | 2/33               | <b>X</b> |                          |
| F02         | 5/28                     | M18      | 2/31         | N46      | 2/51               | X01      | 6/17, 6/34, 6/118, 6/132 |
| F03         | 5/28                     | M21      | 2/31         | N51      | 2/35               | X02      | 6/17, 6/34, 6/118, 6/132 |
| F04         | 5/28                     | M24      | 2/31         | N54      | 2/33               | X03      | 6/17, 6/34, 6/118, 6/132 |
| F05         | 5/28                     | M25      | 2/33         | N61      | 2/44               | X04      | 6/17, 6/34, 6/118, 6/132 |
| F06         | 5/28                     | M27      | 2/33         | N74      | 2/36               | X05      | 6/17, 6/34, 6/118, 6/132 |
| <b>G</b>    |                          | M28      | 2/33         | N76      | 2/35               | X06      | 6/17, 6/34, 6/118, 6/132 |
| G00         | 6/117                    | M30      | 2/34         | <b>P</b> |                    | X08      | 6/17, 6/34, 6/118, 6/132 |
| G02         | 6/117                    | M31      | 2/33         | P00      | 2/47, 6/118, 6/132 | X09      | 6/17                     |
| G14         | 6/117, 6/132             | M32      | 2/33         | P01      | 6/118, 6/132       | X27      | 6/34                     |
| <b>J</b>    |                          | M33      | 2/34         | P02      | 6/118              | <b>Y</b> |                          |
| J02         | 6/54, 6/59               | M34      | 2/34         | P03      | 2/36, 6/118        | Y84      | 6/17, 6/118, 6/132       |
| J03         | 6/54, 6/59               | M36      | 2/35         | P04      | 6/118              |          |                          |
| J05         | 6/54, 6/59               | M37      | 2/35         | P05      | 2/39               |          |                          |
| J09         | 6/54, 6/59               | M38      | 2/35         | P10      | 2/35               |          |                          |
| J12         | 6/56, 6/61, 6/62         | M39      | 6/34         | P12      | 2/23, 2/41, 2/44   |          |                          |
| J13         | 6/56, 6/61, 6/62         | M40      | 2/35         | P13      | 2/39               |          |                          |
| J15         | 6/56, 6/61, 6/62         | M41      | 2/35         | P14      | 2/39               |          |                          |
| J16         | 6/56, 6/61, 6/62         | M42      | 2/35         | P17      | 2/39               |          |                          |
| J17         | 6/56, 6/61, 6/62         | M43      | 2/35         | P18      | 2/33               |          |                          |
| J22         | 6/54, 6/59               | M48      | 2/42         | P22      | 2/40               |          |                          |
| J23         | 6/54, 6/59               | M51      | 2/33         | P25      | 2/40               |          |                          |
| J25         | 6/54, 6/59               | M52      | 2/50         | P28      | 2/33               |          |                          |
| J29         | 6/54, 6/59               | M53      | 2/50         | P30      | 2/56               |          |                          |
| J32         | 6/56, 6/61, 6/62         | M54      | 2/51         | P37      | 2/43               |          |                          |
| J33         | 6/56, 6/61, 6/62         | M55      | 2/51         | P41      | 2/44               |          |                          |
| J35         | 6/56, 6/61, 6/62         | M57      | 2/51         | P47      | 2/36               |          |                          |
| J36         | 6/56, 6/61, 6/62         | M61      | 2/50         | P52      | 2/43               |          |                          |
| J37         | 6/56, 6/61, 6/62         | M62      | 2/50         | P53      | 2/48               |          |                          |
| <b>K</b>    |                          | M63      | 2/54         | P54      | 2/39               |          |                          |
| K08         | 6/117, 6/132             | M64      | 2/54         | P60      | 2/36               |          |                          |
| K09         | 6/117, 6/132             | M65      | 2/35         | P64      | 2/36               |          |                          |
| K10         | 6/117, 6/132             | M67      | 2/36         | P66      | 2/36               |          |                          |
| K16         | 6/117                    | M72      | 2/32         | <b>Q</b> |                    |          |                          |
| K18         | 6/117, 6/132             | M73      | 2/32         | Q12      | 6/17               |          |                          |
| K23         | 6/17, 6/34, 6/118, 6/132 | M74      | 2/32         | Q31      | 6/34               |          |                          |
| K24         | 6/17, 6/34, 6/118, 6/132 | M75      | 2/32         |          |                    |          |                          |
| K40         | 6/117, 6/132             | M76      | 2/34         |          |                    |          |                          |
| K45         | 6/117                    | M81      | 2/32         |          |                    |          |                          |
| K69         | 6/117                    | M83      | 6/118        |          |                    |          |                          |
| K70         | 6/117                    | M88      | 2/43         |          |                    |          |                          |
| K71         | 6/117                    |          |              |          |                    |          |                          |
| K80         | 6/117                    |          |              |          |                    |          |                          |
| K83         | 6/118, 6/132             |          |              |          |                    |          |                          |
| K84         | 6/118, 6/132             |          |              |          |                    |          |                          |
| K85         | 6/118, 6/132             |          |              |          |                    |          |                          |
| K90         | 6/118, 6/132             |          |              |          |                    |          |                          |

# Appendix

## Catalog improvement suggestions

Fax form

**To**

Siemens AG  
I DT MC RMC MK 1  
NC 62 · 2012  
Postfach 31 80  
91050 Erlangen

Fax: +49 9131 98-1145

**E-mail: docu.motioncontrol@siemens.com**

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**Did you find any printing errors? – Improvement suggestions?**



# Appendix

Notes

### Explanation of the raw material/metal surcharges<sup>1)</sup>

#### Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium<sup>2)</sup> and/or neodym<sup>2)</sup>, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The surcharges are calculated in accordance with the following criteria:

- Basic official price of the raw material  
Basic official price from the day prior to receipt of the order or prior to release order (daily price) for<sup>3)</sup>  
- Silver (sales price, processed)  
- Gold (sales price, processed)  
and for<sup>4)</sup>  
- Copper (lower DEL notation + 1 %)  
- Aluminum (aluminum in cables)  
- Lead (lead in cables)
- Metal factor of the products  
Certain products are displayed with a metal factor. The metal factor determines the official price (for those raw materials concerned) as of which the metal surcharges are applied and the calculation method used (weight or percentage method). An exact explanation is given below.

#### Structure of the metal factor

The metal factor consists of several digits; the first digit indicates whether the percentage method of calculation refers to the list price or a possible discounted price (customer net price) (L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a "-" is used.

|           |                                                        |
|-----------|--------------------------------------------------------|
| 1st digit | List or customer net price using the percentage method |
| 2nd digit | for silver (AG)                                        |
| 3rd digit | for copper (CU)                                        |
| 4th digit | for aluminum (AL)                                      |
| 5th digit | for lead (PB)                                          |
| 6th digit | for gold (AU)                                          |
| 7th digit | for dysprosium (Dy) <sup>2)</sup>                      |
| 8th digit | for neodym (Nd) <sup>2)</sup>                          |

#### Weight method

The weight method uses the basic official price, the daily price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the daily price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

#### Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased – dependent on the deviation of the daily price compared with the basic official price – using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

#### Metal factor examples

|                        |                                                   |
|------------------------|---------------------------------------------------|
| <b>L E A - - - -</b>   |                                                   |
| ↑ ↑ ↑                  | Basis for % surcharge: List price                 |
| ↑                      | Silver Basis 150 €, Step 50 €, 0.5 %              |
| ↑                      | Copper Basis 150 €, Step 50 €, 0.1 %              |
|                        | No surcharge for aluminum                         |
|                        | No surcharge for lead                             |
|                        | No surcharge for gold                             |
|                        | No surcharge for dysprosium                       |
|                        | No surcharge for neodym                           |
| <b>N - A 6 - - - -</b> |                                                   |
| ↑ ↑ ↑                  | Basis for % surcharge: Customer net price         |
| ↑                      | No surcharge for silver                           |
| ↑                      | Copper Basis 150 €, Step 50 €, 0.1 %              |
| ↑                      | Aluminum acc. to weight, basic offic. price 225 € |
|                        | No surcharge for lead                             |
|                        | No surcharge for gold                             |
|                        | No surcharge for dysprosium                       |
|                        | No surcharge for neodym                           |
| <b>- - 3 - - - -</b>   |                                                   |
| ↑                      | No basis necessary                                |
|                        | No surcharge for silver                           |
|                        | Copper acc. to weight, basic official price 150 € |
|                        | No surcharge for aluminum                         |
|                        | No surcharge for lead                             |
|                        | No surcharge for gold                             |
|                        | No surcharge for dysprosium                       |
|                        | No surcharge for neodym                           |

<sup>1)</sup> Refer to the separate explanation on the next page regarding the raw materials dysprosium and neodym (= rare earths).

<sup>2)</sup> For a different method of calculation, refer to the separate explanation for these raw materials on the next page.

<sup>3)</sup> Source: Umicore, Hanau ([www.metalsmanagement.umicore.com](http://www.metalsmanagement.umicore.com)).

<sup>4)</sup> Source: German Trade Association for Cables and Conductors ([www.kabelverband.org](http://www.kabelverband.org)).

# Appendix

## Metal surcharges

### Explanation of the raw material/metal surcharges for dysprosium and neodym (rare earths)

#### Surcharge calculation

To compensate for variations in the price of the raw materials silver<sup>1)</sup>, copper<sup>1)</sup>, aluminum<sup>1)</sup>, lead<sup>1)</sup>, gold<sup>1)</sup>, dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. The surcharge for dysprosium and neodym is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The surcharge is calculated in accordance with the following criteria:

- Basic official price of the raw material<sup>2)</sup>  
Three-month basic average price (see below) in the period before the quarter in which the order was received or the release order took place (= average official price) for  
- dysprosium (Dy metal, 99 % min. FOB China; USD/kg)  
- neodym (Nd metal, 99 % min. FOB China; USD/kg)
- Metal factor of the products  
Certain products are displayed with a metal factor. The metal factor indicates (for those raw materials concerned) the basic official price as of which the surcharges for dysprosium and neodym are calculated using the weight method. An exact explanation of the metal factor is given below.

#### Three-month average price

The prices of rare earths vary according to the foreign currency, and there is no freely accessible stock exchange listing. This makes it more difficult for all parties involved to monitor changes in price. In order to avoid continuous adjustment of the surcharges, but to still ensure fair, transparent pricing, an average price is calculated over a three-month period using the average monthly foreign exchange rate from USD to EUR (source: European Central Bank). Since not all facts are immediately available at the start of each month, a one-month buffer is allowed before the new average price applies.

Examples of calculation of the average official price:

| Period for calculation of the average price: | Period during which the order/release order is effected and the average price applies: |
|----------------------------------------------|----------------------------------------------------------------------------------------|
| Sep 2012 – Nov 2012                          | Q1 in 2013 (Jan – Mar)                                                                 |
| Dec 2012 – Feb 2013                          | Q2 in 2013 (Apr – Jun)                                                                 |
| Mar 2013 – May 2013                          | Q3 in 2013 (Jul – Sep)                                                                 |
| Jun 2013 – Aug 2013                          | Q4 in 2013 (Oct – Dec)                                                                 |

#### Structure of the metal factor

The metal factor consists of several digits; the first digit is not relevant to the calculation of dysprosium and neodym.

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a "-" is used.

|           |                                                        |
|-----------|--------------------------------------------------------|
| 1st digit | List or customer net price using the percentage method |
| 2nd digit | for silver (AG) <sup>1)</sup>                          |
| 3rd digit | for copper (CU) <sup>1)</sup>                          |
| 4th digit | for aluminum (AL) <sup>1)</sup>                        |
| 5th digit | for lead (PB) <sup>1)</sup>                            |
| 6th digit | for gold (AU) <sup>1)</sup>                            |
| 7th digit | for dysprosium (Dy)                                    |
| 8th digit | for neodym (Nd)                                        |

#### Weight method

The weight method uses the basic official price, the average price and the raw material weight. In order to calculate the surcharge, the basic official price must be subtracted from the average price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. Your Sales contact can inform you of the raw material weight.

#### Metal factor examples

|         |                                                       |
|---------|-------------------------------------------------------|
| -----71 |                                                       |
| ↑       | No basis necessary                                    |
| ↑       | No surcharge for silver                               |
| ↑       | No surcharge for copper                               |
| ↑       | No surcharge for aluminum                             |
| ↑       | No surcharge for lead                                 |
| ↑       | No surcharge for gold                                 |
| ↑       | Dysprosium acc. to weight, basic official price 300 € |
| ↑       | Neodym acc. to weight, basic official price 50 €      |

<sup>1)</sup> For a different method of calculation, refer to the separate explanation for these raw materials on the previous page.

<sup>2)</sup> Source: Asian Metal Ltd ([www.asianmetal.com](http://www.asianmetal.com))

### Values of the metal factor

| Percentage method       | Basic official price in €                                           | Step range in €                          | % surcharge 1st step | % surcharge 2nd step | % surcharge 3rd step | % surcharge 4th step | % sur-charge per addi-tional step |
|-------------------------|---------------------------------------------------------------------|------------------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------------------------|
|                         |                                                                     |                                          | Price in €           | Price in €           | Price in €           | Price in €           |                                   |
|                         |                                                                     |                                          | 150.01 – 200.00      | 200.01 – 250.00      | 250.01 – 300.00      | 300.01 – 350.00      |                                   |
| A                       | 150                                                                 | 50                                       | 0.1                  | 0.2                  | 0.3                  | 0.4                  | 0.1                               |
| B                       | 150                                                                 | 50                                       | 0.2                  | 0.4                  | 0.6                  | 0.8                  | 0.2                               |
| C                       | 150                                                                 | 50                                       | 0.3                  | 0.6                  | 0.9                  | 1.2                  | 0.3                               |
| D                       | 150                                                                 | 50                                       | 0.4                  | 0.8                  | 1.2                  | 1.6                  | 0.4                               |
| E                       | 150                                                                 | 50                                       | 0.5                  | 1.0                  | 1.5                  | 2.0                  | 0.5                               |
| F                       | 150                                                                 | 50                                       | 0.6                  | 1.2                  | 1.8                  | 2.4                  | 0.6                               |
| G                       | 150                                                                 | 50                                       | 1.0                  | 2.0                  | 3.0                  | 4.0                  | 1.0                               |
| H                       | 150                                                                 | 50                                       | 1.2                  | 2.4                  | 3.6                  | 4.8                  | 1.2                               |
| I                       | 150                                                                 | 50                                       | 1.6                  | 3.2                  | 4.8                  | 6.4                  | 1.6                               |
| J                       | 150                                                                 | 50                                       | 1.8                  | 3.6                  | 5.4                  | 7.2                  | 1.8                               |
|                         |                                                                     |                                          | 175.01 – 225.00      | 225.01 – 275.00      | 275.01 – 325.00      | 325.01 – 375.00      |                                   |
| O                       | 175                                                                 | 50                                       | 0.1                  | 0.2                  | 0.3                  | 0.4                  | 0.1                               |
| P                       | 175                                                                 | 50                                       | 0.2                  | 0.4                  | 0.6                  | 0.8                  | 0.2                               |
| R                       | 175                                                                 | 50                                       | 0.5                  | 1.0                  | 1.5                  | 2.0                  | 0.5                               |
|                         |                                                                     |                                          | 225.01 – 275.00      | 275.01 – 325.00      | 325.01 – 375.00      | 375.01 – 425.00      |                                   |
| S                       | 225                                                                 | 50                                       | 0.2                  | 0.4                  | 0.6                  | 0.8                  | 0.2                               |
| U                       | 225                                                                 | 50                                       | 1.0                  | 2.0                  | 3.0                  | 4.0                  | 1.0                               |
| V                       | 225                                                                 | 50                                       | 1.0                  | 1.5                  | 2.0                  | 3.0                  | 1.0                               |
| W                       | 225                                                                 | 50                                       | 1.2                  | 2.5                  | 3.5                  | 4.5                  | 1.0                               |
|                         |                                                                     |                                          | 150.01 – 175.00      | 175.01 – 200.00      | 200.01 – 225.00      | 225.01 – 250.00      |                                   |
| Y                       | 150                                                                 | 25                                       | 0.3                  | 0.6                  | 0.9                  | 1.2                  | 0.3                               |
|                         |                                                                     |                                          | 400.01 – 425.00      | 425.01 – 450.00      | 450.01 – 475.00      | 475.01 – 500.00      |                                   |
| Z                       | 400                                                                 | 25                                       | 0.1                  | 0.2                  | 0.3                  | 0.4                  | 0.1                               |
| Price basis (1st digit) |                                                                     |                                          |                      |                      |                      |                      |                                   |
| L                       | Calculation based on the list price                                 |                                          |                      |                      |                      |                      |                                   |
| N                       | Calculation based on the customer net price (discounted list price) |                                          |                      |                      |                      |                      |                                   |
| Weight method           | Basic official price in €                                           |                                          |                      |                      |                      |                      |                                   |
| 1                       | 50                                                                  | Calculation based on raw material weight |                      |                      |                      |                      |                                   |
| 2                       | 100                                                                 |                                          |                      |                      |                      |                      |                                   |
| 3                       | 150                                                                 |                                          |                      |                      |                      |                      |                                   |
| 4                       | 175                                                                 |                                          |                      |                      |                      |                      |                                   |
| 5                       | 200                                                                 |                                          |                      |                      |                      |                      |                                   |
| 6                       | 225                                                                 |                                          |                      |                      |                      |                      |                                   |
| 7                       | 300                                                                 |                                          |                      |                      |                      |                      |                                   |
| 8                       | 400                                                                 |                                          |                      |                      |                      |                      |                                   |
| 9                       | 555                                                                 |                                          |                      |                      |                      |                      |                                   |
| Miscella-neous          |                                                                     |                                          |                      |                      |                      |                      |                                   |
| -                       | No metal surcharge                                                  |                                          |                      |                      |                      |                      |                                   |

# Appendix

## Conditions of sale and delivery

### 1. General Provisions

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Please note that the scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

#### 1.1 For customers with a seat or registered office in Germany

For customers with a seat or registered office in Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"<sup>1)</sup> and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office in Germany"<sup>1)</sup> and,
- for other supplies and services, the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"<sup>1)</sup>.

#### 1.2 For customers with a seat or registered office outside Germany

For customers with a seat or registered office outside Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"<sup>1)</sup> and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office outside of Germany"<sup>1)</sup> and
- for other supplies and/or services, the "General Conditions for Supplies of Siemens Industry for Customers with a Seat or Registered Office outside of Germany"<sup>1)</sup>.

### 2. Prices

The prices are in € (Euro) ex point of delivery, exclusive of packaging.

The sales tax (value added tax) is not included in the prices. It shall be charged separately at the respective rate according to the applicable statutory legal regulations.

Prices are subject to change without prior notice. We will charge the prices valid at the time of delivery.

To compensate for variations in the price of raw materials (e.g. silver, copper, aluminum, lead, gold, dysprosium and neodym), surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation.

You will find a detailed explanation of the metal factor on the page headed "Metal surcharges".

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

### 3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

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Insofar as there are no remarks on the individual pages of this catalog – especially with regard to data, dimensions and weights given – these are subject to change without prior notice.

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## Industry Automation, Drive Technologies and Low-Voltage Power Distribution

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Siemens AG  
Industry Sector  
Drive Technologies Division  
Motion Control Systems  
Postfach 3180  
91050 ERLANGEN  
GERMANY

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