SIEMENS

SINUMERIK 840D sl Type 1B

Equipment for Machine Tools

Motion Control

Catalog
NC 62

Edition
2012

Answers for industry.

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  found under:
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- Dimensional drawings of our motors in PDF/
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- Glossary for the explanation of terms and
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- Catalog NC 62 · 2012 in electronic form
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Motion Control

SINUMERIK 840D sl Type 1B Equipment for Machine Tools

Catalog NC 62 · 2012

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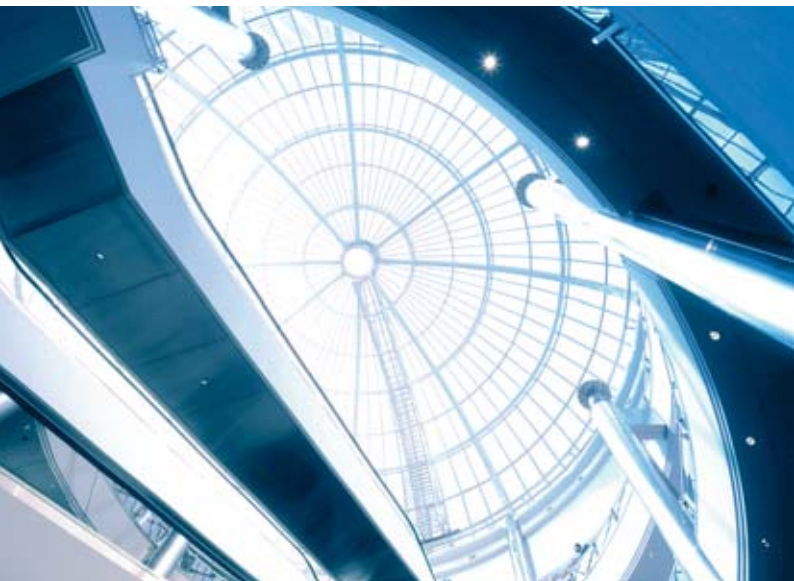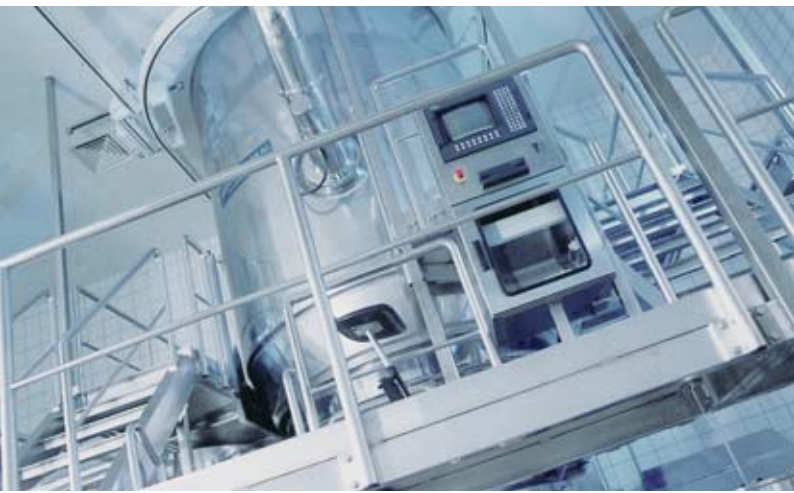
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Answers for industry.

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.

The high quality of our products sets industry-wide benchmarks. High environmental aims are part of our eco-management, and we implement these aims consistently. Right from product design, possible effects on the environment are examined. Hence many of our products and systems are RoHS compliant (Restriction of Hazardous Substances). As a matter of course, our production sites are certified according to DIN EN ISO 14001, but to us, environmental protection also means most efficient utilization of valuable resources. The best example are our energy-efficient drives with energy savings up to 60 %.

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

ERP – Enterprise Resource Planning

PLM – Product Lifecycle Management

- Product Design
- Production Planning and Simulation
- Data Management

Management Level

MES – Manufacturing Execution Systems

SIMATIC IT

Operations Level

SIMATIC PCS 7
Operator System

INTERNET

Maintenance/
Asset Management

Engineering
Station

Energy
Management

TIA Portal

Control Level

SIMATIC PCS 7
Automation
Systems

SINUMERIK
Computer Numeric Control

SIMOTION
Motion Control

SIMATIC NET
Industrial
Communication

SIMATIC Controllers
Modular / PC-based

Field Level

■ PROFIBUS PA

Process Instrumentation

SIMATIC Ident
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Automation**

□ HART

■ IO-Link

Setting standards in productivity and competitiveness.

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**Totally
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SIMOTICS Motors

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

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)

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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.

1

■ **Design** (continued)

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

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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	
• Advanced Surface	• Advanced Surface
• User memory on user CF card	• User memory on user CF card
• Spline interpolation	• Spline interpolation
• Transmit and cylinder surface transformation	• Transmit and cylinder surface transformation
• Automatic measuring cycles	• Automatic measuring cycles
• Simultaneous recording of 3D simulation	• Simultaneous recording of 3D simulation
• ShopMill/ShopTurn machining step programming	• ShopMill/ShopTurn machining step programming
• Residual material detection	• Residual material detection
	• 5-axis machining package
	• 3D tool radius compensation
	• Measure kinematics
Optional functions	
• Measure kinematics	• Volumetric compensation system (VCS)
• Volumetric compensation system (VCS)	

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

■ **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

2

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.)

2

■ **Integration** (continued)

SINUMERIK 840D sl NCU 7x0.3 PN		Connected device / module		
DRIVE-CLiQ	X100 X101 X102 X103 X104[1] X105[1]	SINAMICS S120		
		NX10.3/NX15.3		
Digital I/O	X122	6 digital inputs and 4 digital inputs/outputs		
	X132	6 digital inputs and 4 digital inputs/outputs		
	X142	8 digital inputs/outputs		
24 V DC	X124	Power supply		
		SIMATIC PROFINET IO periphery		
PROFINET	X150 P1 X150 P2	SINAMICS S120 via CU3x0-2		
		I/O module PP 72/48D PN		
		SINUMERIK TCU/PCU		[3] SINUMERIK Operator panel front
Ethernet	X120	Connection box/ connection module PN	Emergency-Stop/enabling circuit	
			6FX1440-4B...	SINUMERIK HT 2/HT 8
		SINUMERIK MCP 310C PN/MCP 310 PN MCP 483C PN/MCP 483 PN MPP 310 IEH/MPP 483 IE	6FC5348-0AA08-3AA0 6FX8002-2CP00-... 25 m (82 ft)	Electronic handwheel
				Connection kit 6FX2006-1BG11
Option slot		CBE30-2 module	IN OUT NCU link	Emergency stop/ enabling circuit [3] Mini handheld unit
		COM01.3 module		
		SINUMERIK MCP 483C/MCP 483/ MCP 310/MPP 483		Devices with RS232C interface
			6FX8002-2CP00-... 25 m (82 ft)	Electronic handwheel
		SINAMICS S120 via CU3x0-2		
PROFIBUS DP	X126	ADI 4		Mini handheld unit [3]
		I/O module PP 72/48	Emergency stop/enabling circuit PLC inputs	
		SIMATIC I/O PROFIBUS DP		
		Handwheel connection module[2]	6FX8002-2CP00-.... 25 m (82 ft)	Connection kit 6FX2006-1BG03
		SIMATIC I/O PROFIBUS DP	6FX8002-2CP00-.... 25 m (82 ft)	Electronic handwheel
PROFIBUS DP/MP	X136			
USB	X125 X135			
Ethernet	X130	Plant network	6FX8002-2CP00-.... 25 m (82 ft)	Distribution BHG Type MPI 6FX2006-1BC01 6FX2006-1BH01
Ethernet	X127	Programming device PG/ TS adapter		
CF card	X109		Emergency stop/enabling circuit [3]	
Measuring socket	X141			Handheld unit Typ B-MPI
RS232C	X140 (service)			

Order No.
Pre-assembled cable

[1] Not for NCU 710.3 PN.
[2] Does not apply for the connection of the handwheel via MCP or MPP.
[3] Cable included in the scope of supply.

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Connection overview for SINUMERIK 840D sl
More information about cables can be found under MOTION-CONNECT connection systems.

2

■ 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.

NCU 7x0.3 PN

■ **Technical specifications**

	SINUMERIK 840D sl; NCU 710.3 PN with PLC 317-3 PN/DP	SINUMERIK 840D sl; NCU 720.3 PN with PLC 317-3 PN/DP	SINUMERIK 840D sl; NCU 730.3 PN with PLC 317-3 PN/DP
Product name	6FC5371-0AA30-0AA1	6FC5372-0AA30-0AA1	6FC5373-0AA30-0AA1
RAM	1 GB DRAM; 1 MB NVSRAM	1 GB DRAM; 1 MB NVSRAM	1 GB DRAM; 1 MB NVSRAM
SIMATIC S7 – integrated	PLC 317-3 PN/DP	PLC 317-3 PN/DP	PLC 317-3 PN/DP
Input voltage	24 V DC	24 V DC	24 V DC
Degree of protection to DIN EN 60529 (IEC 60529)	IP20	IP20	IP20
Humidity class based on DIN EN 60721-3-3	Class 3K3 condensation and icing excluded. Low air temperature 0 °C (32 °F)	Class 3K3 condensation and icing excluded. Low air temperature 0 °C (32 °F)	Class 3K3 condensation and icing excluded. Low air temperature 0 °C (32 °F)
Relative atmospheric humidity			
• 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
Ambient temperature			
• 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)
Dimensions			
• 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)
Weight, approx.	3.8 kg (8.38 lb)	3.8 kg (8.38 lb)	4.4 kg (9.7 lb)
Approvals, according to	CE, cULus	CE, cULus	CE, cULus

SINUMERIK CNC
SINUMERIK 840D sl Type 1B

NCU 7x0.3 PN

2

▮ Selection and ordering data

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

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

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

[1] Example of specific software version of the CNC-SW 4.4 SP2: 6FC5851-1YG**40-2**YA0

[2] For available software releases, go to Industry Mall --> Configurator.

SINUMERIK CNC
SINUMERIK 840D sl Type 1B

Ordering examples

■ **Overview**

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Ordering as a bundle

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

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

Explanation for Item 1

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

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Ordering individually

Ordering via complete order numbers.
License key obtained over Internet

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

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2

2

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 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	Numeric Control Extension NX15.3
	6SL3040-1NC00-0AA0	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. [1]	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		
• Long-term storage in transport packaging	Class 1K4 according to DIN EN 60721-3-1 Temperature -25 … +55 °C (-13 … +131 °F) Relative/absolute humidity 10 … 100 %/≤ 26 g/m³	
• Transport	Class 2K4 according to DIN EN 60721-3-2 Temperature -40 … +70 °C (-40 … +158 °F) Relative/absolute humidity 5 … 95 %/≤ 60 g/m³	
• Operation	Class 3K3 according to DIN EN 60721-3-3 Temperature 0 … 55 °C (32 … 131 °F) Relative/absolute humidity 5 … 90 %/≤ 25 g/m³ Oil vapor, salt vapor, icing, condensation, water drops, spray, splash and jets are not permitted.	
Atmospheric pressure	700 ... 1060 hPa	
Ambient temperature		
• Storage	-25 ... +55 °C (-13 … +131 °F)	
• Transport	-40 ... +70 °C (-40 … +158 °F)	
• Operation	0 … 55 °C (32 … 131 °F)	
Dimensions		
• Width	25 mm (1 in)	
• Height	414 mm (16.30 in)	
• Depth	272 mm (10.7 in)	
Weight, approx.	2.58 kg (5.69 lb)	
Approvals, according to	cULus	

Selection and ordering data

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

[1] Ignoring digital inputs and DRIVE-CLiQ supply.

SINUMERIK CNC
SINUMERIK 840D sl Type 1B

SINUMERIK COM01.3 module

2

■ 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

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

■ Selection and ordering data

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

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

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

Selection and ordering data

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

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

SINUMERIK CNC
SINUMERIK I/O

SINUMERIK Analog Drive Interface
for 4 axes ADI 4

2

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 ±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° ± 30°
  - 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.

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

2

Integration (continued)

Connection overview for ADI 4

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

1) Included in scope of supply.
2) Not for NCU 720.2 PN/NCU 730.2 PN
3) The max. cable lengths depend on the current consumption, power supply and frequency of the encoders (see Manual ADI 4).
4) Only for SINUMERIK 840Di sl.

Technical specifications

Product name	SINUMERIK Analog Drive Interface for 4 Axes ADI 4
	6FC5211-0BA01-0AA4
Input voltage	24 V DC
Power consumption, max.	30.2 W
Degree of protection to EN 60529 (IEC 60529)	IP20
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F)
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 95 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-20 ... +55 °C (-4 ... +131 °F)
• Transport	-40 … +70 °C (-40 … +158 °F)
• Operation	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	48.5 mm (1.91 in)
• Height	325 mm (12.8 in)
• Depth	154.4 mm (6.08 in)
Weight, approx.	1.5 kg (3.31 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

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.

[1] With PP 72/48D 2/2A PN only.

G_NC01_EN_00409a

Technical specifications

Product name	SINUMERIK PP 72/48D PN I/O module	SINUMERIK PP 72/48D 2/2A PN I/O module
	6FC5311-0AA00-0AA0	6FC5311-0AA00-1AA0
Input voltage	DC 24 V + 20 %/- 15 %	DC 24 V + 20 %/- 15 %
Power consumption, max.	17 W	19 W
Digital I/Os	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
• Simultanety factor of outputs	100 % at I_{out} = 250 mA per output	100 % at I_{out} = 250 mA per output
Analog inputs	–	2
• Connection system	–	PHOENIX MINI COMBICON, spring cage connector, core cross-section 0.5 mm^2
• Type of analog inputs	–	± 10 V, 0 ... 10 V, ± 20 mA, 4 ... 20 mA, PT100
• Resolution	–	16 bit including sign
Analog outputs	–	2
• Connection system	–	PHOENIX MINI COMBICON, spring cage connector, core cross-section 0.5 mm^2
• Type of analog outputs	–	± 10 V, ± 20 mA (max. 600 Ω)
• Resolution	–	16 bit, including sign
Degree of protection to EN 60529 (IEC 60529)	IP00	IP00
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	10 … 80 % at 25 °C (77 °F)	10 … 80 % at 25 °C (77 °F)
Ambient temperature		
• 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)
Dimensions		
• 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)
Weight, approx.	0.9 kg (1.98 lb)	0.9 kg (1.98 lb)

Selection and ordering data

Description	Order No.
SINUMERIK PP 72/48D PN I/O module	**6FC5311-0AA00-0AA0**
72 digital inputs and 48 digital outputs	
SINUMERIK PP 72/48D 2/2A PN I/O module	**6FC5311-0AA00-1AA0**
72 digital inputs and 48 digital outputs 2 analog inputs and 2 analog outputs	

Description	Order No.
Accessories	
Terminal strip converter	**6EP5406-5AA00**
50-pin	
Cable set	**6EP5306-5BG00**
Ribbon cable 50-pin, length 6 m (236.22 in), 8 insulation displacement connectors 50-pin	
DRIVE-CLiQ signal cable, pre-assembled	
For PROFINET connection Connector with degree of protection IP20	
• In exact meter lengths[1]	**6FX2002-1DC00-1..0**
• In fixed lengths[1]	**6SL3060-4A..0-0AA0**

[1] For length code, see MOTION-CONNECT connection systems.

SINUMERIK CNC
SIMATIC I/O

SIMATIC ET 200 distributed I/O

2

Overview

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
- On the Internet at: www.siemens.com/simatic

■ 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
- On the Internet at: 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

2

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.
SINUMERIK Safety Integrated for SINUMERIK 840D sl	
• SINUMERIK SI Basic (incl. 1 axis/spindle; up to 4 inputs and up to 4 outputs can be used for safe programmable logic)	**6FC5800-0AM63-0YB0**
• SINUMERIK SI Comfort (including 1 axis/spindle; up to 64 inputs and up to 64 outputs can be used for safe programmable logic)	**6FC5800-0AM64-0YB0**
• SINUMERIK SI axis/spindle package (extra for each additional axis/spindle)	**6FC5800-0AC70-0YB0**
• SINUMERIK SI axis/spindle package (further additional 15 axes/spindles)	**6FC5800-0AC60-0YB0**

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 | SinuCom |

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.
SIMATIC STEP 7 for SINUMERIK	
• Single License, without data carrier	**6FC5252-0AY00-0AG1**
• Single License with CD-ROM, current software version	**6FC5252-0AY00-0AG0**
• Single License with CD-ROM, specific software version[1]	**6FC5252-■AY01-■AG0**

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 oscillograph 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

[1] Example of specific software version, e.g., 5.5:
6FC5252-**5**....-**5**...

2

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.

SinuCom Commissioning / service tools
• SinuCom NC, including
  - SinuCom NC Trace
  - SinuCom NC SI
• SinuCom FFS
• SinuCom CFS
• SinuCom ARC	

Languages: English, French, German, Italian, Spanish	
Documentation: English/German	
• Single License, without data carrier	**6FC5250-0AY00-0AG1**
• Single License on DVD-ROM, current software version	**6FC5250-0AY00-0AG0**
• Single License on DVD-ROM specific software version [1]	**6FC5250-7AY00-■AG0**
• Software Update Service	**6FC5250-0AY00-0AG2**
• Update on order on DVD-ROM, specific software version [1]	**6FC5250-7AY00-■AG3**

[1] Example of specific software version, e.g. 7.6:
6FC5250-**7**AY00-**6**...

SINUMERIK CNC
Functions

Control structure and configuration

■ **Overview table**

Description ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Control structure and configuration					
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 SINUMERIK NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN:					
• CNC software 31-3 with SINUMERIK Operate, export version, on CF card, with license		6FC5851-1YG..-.YA0		○	−
• CNC software 31-3 with SINUMERIK Operate, on CF card, with license		6FC5851-1XG..-.YA0		−	○
• CNC software 31-3 with SINUMERIK Operate, export version, on CF card, without license		6FC5851-1YG..-.YA8		○	−
• CNC software 31-3 with SINUMERIK Operate, on CF card, without license		6FC5851-1XG..-.YA8		−	○
• CNC software 31-3 with SINUMERIK Operate, export version, on DVD, without license		6FC5851-1YC..-.YA8		○	−
• CNC software 31-3 with SINUMERIK Operate, on DVD, without license		6FC5851-1XC..-.YA8		−	○
• CNC software 31-3 with SINUMERIK Operate, export version, license		6FC5851-1YF00-0YB0		○	−
• CNC software 31-3 with SINUMERIK Operate, license		6FC5851-1XF00-0YB0		−	○
• CNC software 31-3 with SINUMERIK Operate, export version, software update service, without license		6FC5851-1YP00-0YL8		○	−
• CNC software 31-3 with SINUMERIK Operate, software update service, without license		6FC5851-1XP00-0YL8		−	○

SINUMERIK CNC
Functions

Control structure and configuration

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK 840DE sl	840D sl
Control structure and configuration (continued)					
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

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Control structure and configuration (continued)					
• 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
Drives					
SINAMICS S120 Combi Power Modules	See SINAMICS S120.	6SL3111-3VE21-6FA0 6SL3111-3VE21-6EA0 6SL3111-3VE22-0HA0 6SL3111-4VE21-6FA0 6SL3111-4VE21-6EA0 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		○	○

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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: 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 booksize format Motor Modules; internal air cooling	See SINAMICS S120.	**6SL3120-1TE13-0A..** **6SL3120-1TE15-0A..** **6SL3120-1TE21-0A..** **6SL3120-1TE21-8A..** **6SL3120-1TE23-0A..** **6SL3120-1TE24-5A..** **6SL3120-1TE26-0A..** **6SL3120-1TE28-5A..** **6SL3120-1TE31-3A..** **6SL3120-1TE32-0A..** **6SL3120-2TE13-0A..** **6SL3120-2TE15-0A..** **6SL3120-2TE21-0A..** **6SL3120-2TE21-8A..**		○	○
• SINAMICS S120 booksize format Motor Modules; external air cooling		**6SL3121-1TE13-0A..** **6SL3121-1TE15-0A..** **6SL3121-1TE21-0A..** **6SL3121-1TE21-8A..** **6SL3121-1TE23-0A..** **6SL3121-1TE24-5A..** **6SL3121-1TE26-0A..** **6SL3121-1TE28-5A..** **6SL3121-1TE31-3A..** **6SL3121-1TE32-0A..** **6SL3121-2TE13-0A..** **6SL3121-2TE15-0A..** **6SL3121-2TE21-0A..** **6SL3121-2TE21-8A..**		○	○
• SINAMICS S120 booksize format Motor Modules; cold plate cooling		**6SL3126-1TE13-0A..** **6SL3126-1TE15-0A..** **6SL3126-1TE21-0A..** **6SL3126-1TE21-8A..** **6SL3126-1TE23-0A..** **6SL3126-1TE24-5A..** **6SL3126-1TE26-0A..** **6SL3126-1TE28-5A..** **6SL3126-1TE31-3A..** **6SL3126-1TE32-0A..** **6SL3126-2TE13-0A..** **6SL3126-2TE15-0A..** **6SL3126-2TE21-0A..** **6SL3126-2TE21-8A..**		○	○
• SINAMICS S120 booksize format Motor Modules; liquid cooling		**6SL3125-1TE32-0A..**		○	○
• SINAMICS S120 booksize format Active Line Modules; internal air cooling		**6SL3130-7TE21-6A..** **6SL3130-7TE23-6A..** **6SL3130-7TE25-5A..** **6SL3130-7TE28-0A..** **6SL3130-7TE31-2A..**		○	○

SINUMERIK CNC
Functions

Drives

2

Description	Instructions	Order No.	Order code	SINUMERIK	
● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	(footnotes are applicable line by line)	Type (for complete Order No., see notes)		840DE sl	840D sl
Drives (continued)					
SINAMICS S120 expansion modules (continued):					
● SINAMICS S120 booksize format Active Line Modules; external air cooling		6SL3131-7TE21-6A.. 6SL3131-7TE23-6A.. 6SL3131-7TE25-5A.. 6SL3131-7TE28-0A.. 6SL3131-7TE31-2A..		○	○
● SINAMICS S120 booksize format Active Line Modules; cold plate cooling		6SL3136-7TE21-6A.. 6SL3136-7TE23-6A.. 6SL3136-7TE25-5A.. 6SL3136-7TE28-0A.. 6SL3136-7TE31-2A..		○	○
● SINAMICS S120 booksize format Active Line Modules; liquid cooling		6SL3135-7TE31-2A..		○	○
● SINAMICS S120 booksize format Active Interface Modules	See SINAMICS S120.	6SL3100-0BE21-6A.. 6SL3100-0BE23-6A.. 6SL3100-0BE25-5A.. 6SL3100-0BE28-0A.. 6SL3100-0BE31-2A..		○	○
● SINAMICS S120 booksize format Smart Line Modules; internal air cooling		6SL3130-6AE15-0A.. 6SL3130-6AE21-0A.. 6SL3130-6TE21-6A.. 6SL3130-6TE23-6A.. 6SL3130-6TE25-5A..		○	○
● SINAMICS S120 booksize format Smart Line Modules; external air cooling		6SL3131-6AE15-0A.. 6SL3131-6AE21-0A.. 6SL3131-6TE21-6A.. 6SL3131-6TE23-6A.. 6SL3131-6TE25-5A..		○	○
● SINAMICS S120 booksize format Smart Line Modules; cold plate cooling		6SL3136-6AE15-0A.. 6SL3136-6AE21-0A..		○	○
● SINAMICS S120 booksize format Basic Line Modules; internal air cooling		6SL3130-1TE22-0A.. 6SL3130-1TE24-0A.. 6SL3130-1TE31-0A..		○	○
● SINAMICS S120 booksize format Basic Line Modules; cold plate cooling		6SL3136-1TE22-0A.. 6SL3136-1TE24-0A.. 6SL3136-1TE31-0A..		○	○
● SINAMICS S120 chassis format Motor Modules; internal air cooling (rated pulse frequency 2 kHz)		6SL3320-1TE32-1AA3 6SL3320-1TE32-6AA3 6SL3320-1TE33-1AA3 6SL3320-1TE33-8AA3 6SL3320-1TE35-0AA3		○	○
● SINAMICS S120 chassis format Motor Modules; internal air cooling (rated pulse frequency 1.25 kHz)		6SL3320-1TE36-1AA. 6SL3320-1TE37-5AA. 6SL3320-1TE38-4AA. 6SL3320-1TE41-0AA. 6SL3320-1TE41-2AA. 6SL3320-1TE41-4AA.		−	−
● SINAMICS S120 chassis format Active Line Modules; internal air cooling (up to 300 kW)		6SL3330-7TE32-1AA. 6SL3330-7TE32-6AA. 6SL3330-7TE33-8AA. 6SL3330-7TE35-0AA.		○	○
● SINAMICS S120 chassis format Active Line Modules; internal air cooling (from 500 kW)		6SL3330-7TE36-1AA. 6SL3330-7TE38-4AA. 6SL3330-7TE41-0AA. 6SL3330-7TE41-4AA.		−	−
● SINAMICS S120 chassis format Active Interface Modules		6SL3300-7TE32-6A.. 6SL3300-7TE33-8A.. 6SL3300-7TE35-0A..		○	○
● SINAMICS S120 blocksize format Power Modules 230 V 1 AC; internal air cooling	No SINUMERIK Safety Integrated.	6SL3210-1SB11-0... 6SL3210-1SB12-3... 6SL3210-1SB14-0...		○	○

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Drives (continued)					
SINAMICS S120 expansion modules (continued):					
• SINAMICS S120 blocksize format Power Modules 400 V 3 AC; internal air cooling	No SINUMERIK Safety Integrated.	6SL3210-1SE11-3UA0 6SL3210-1SE11-7UA0 6SL3210-1SE12-2UA0 6SL3210-1SE13-1UA0 6SL3210-1SE14-1UA0 6SL3210-1SE16-0... 6SL3210-1SE17-7... 6SL3210-1SE21-0... 6SL3210-1SE21-8... 6SL3210-1SE22-5... 6SL3210-1SE23-2... 6SL3210-1SE23-8... 6SL3210-1SE24-5... 6SL3210-1SE26-0... 6SL3210-1SE27-5... 6SL3210-1SE31-0... 6SL3210-1SE31-1... 6SL3210-1SE31-5... 6SL3210-1SE31-8...		○	○
• SINAMICS S120 chassis format Power Modules 400 V 3 AC; internal air cooling	See SINAMICS S120.	6SL3310-1TE32-1AA. 6SL3310-1TE32-6AA. 6SL3310-1TE33-1AA. 6SL3310-1TE33-8AA. 6SL3310-1TE35-0AA.		–	–
SINUMERIK Analog Drive Interface:					
• Analog Drive Interface for 4 axes ADI 4	No PROFIBUS certification.	6FC5211-0BA01-0AA4		○	○
External drive:					
• 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.	No SINUMERIK Safety Integrated.			○	○
Synchronous motors 1FT7/1FK7/1FE1/2SP1/1FW6/1FN3/1FN6	See Motors.			○	○
Induction motors 1PH8/1PH7/1PH2	See Motors.			○	○
SINAMICS S120 DRIVE-CLiQ on motor:					
• Resolver				○	○
• sin/cos 1 V_{pp} and EnDat 2.1				○	○
Connectable measuring systems:					
• Max. number	Two measuring systems per axis.			●	●
• Absolute/incremental encoder installed in 1FT7/1FK7/1PH7/1PH8	Integrated in motor via SINAMICS Sensor Modules.			●	●
• Resolver installed in 1FK7	Integrated in motor via SINAMICS Sensor Modules.			●	●
• Incremental rotary measuring systems with RS422 (TTL)	Via SINAMICS SMC30 Sensor Modules.			●	●
• Linear scale LMS with sin/cos 1 V_{pp}	Via SINAMICS SMC20/SME20 Sensor Modules.			●	●
• Rotary measuring systems with sin/cos 1 V_{pp}				●	●
• Linear scale LMS with distance-coded reference marks	Via SINAMICS SMC20/SME20 Sensor Modules.			●	●

SINUMERIK CNC
Functions

Drives
Drive functions

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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/SI/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				–	–

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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 (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 ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK 840DE sl	SINUMERIK 840D sl
Axis functions					
Traversing range ± 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 31 axes.			●	●
Link axes (axis container distributed among several NCUs):	Requirement: CBE 30-2 PROFINET module.			●	●
• Max. number of NCUs				3	3
Spindle functions					
Digital spindle speed				●	●
Spindle speed, max. programmable value range: 10^6 ... 0.0001 (display: ± 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 (positioning, oscillation)				●	●
Changeover to axis mode				●	●
Axis synchronization on-the-fly				●	●
Thread run-in and run-out, programmable				●	●
Thread cutting with constant or variable pitch				●	●
Tapping with compensating chuck/rigid tapping				●	●

Interpolations

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Interpolations					
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: Loadable compile cycle and cross-mode actions M43.	6FC5800-0AM24-0YB0	M24	○	○
Crankshaft interpolation CRIP	Requirement: Loadable compile cycle.	6FC5800-0AN04-0YB0	N04	–	○

SINUMERIK CNC
Functions

Couplings

2

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

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Transformations					
Cartesian Point-to-Point (PTP) travel				●	●
Concatenated transformations (inclined axis TRAANG after TRAORI/ cardanic milling head/TRANSMIT/TRACYL)				●	●
Generic transformation	Requirement: 5-axis machining package or Milling technology package: SINUMERIK MDynamics 5 axes.			–	●
TRANSMIT/cylinder surface transformation		**6FC5800-0AM27-0YB0**	**M27**	○	○
Inclined axis		**6FC5800-0AM28-0YB0**	**M28**	○	○
Transformation DOUBLETRANSMIT 2TRA	Requirement: Loadable compile cycle.	**6FC5800-0AM25-0YB0**	**M25**	–	○
Transformation Handling RCTRA	Requirement: Loadable compile cycle.	**6FC5800-0AM31-0YB0**	**M31**	–	○
PARACOP 3-axis transformation for parallel kinematics (1st channel)	Requirement: Loadable compile cycle.	**6FC5800-0AM44-0YB0**		–	○
Transformation Pantograph kinematics 2 axes SCIS	Requirement: Loadable compile cycle.	**6FC5800-0AM51-0YB0**	**M51**	–	○
Double generic transformation DGEN	Requirement: Loadable compile cycle.	**6FC5800-0AN34-0YB0**	**N34**	–	○
Transformation TRIPOD HYBRID basis, 5 axes THYK	Requirement: Loadable compile cycle.	**6FC5800-0AN36-0YB0**	**N36**	–	○
Transformation robotics extended ROBX	Requirement: Loadable compile cycle.	**6FC5800-0AN54-0YB0**	**N54**	–	○
Measuring functions/measuring cycles					
Measuring stage 1 Two probes (switching) with/without deletion of distance-to-go				●	●
Measuring stage 2 Axial measuring, measuring from synchronized actions, cyclic measurement		**6FC5800-0AM32-0YB0**	**M32**	○	○
Measuring cycles for drilling/milling and turning (calibrate workpiece probe, workpiece measurement, tool measurement)		**6FC5800-0AP28-0YB0**	**P28**	○	○
Measure kinematics (determine transformation data of rotary axes)		**6FC5800-0AP18-0YB0**	**P18**	○	○

SINUMERIK CNC
Functions

Technologies

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Technologies					
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 block-related, modal and asynchronous		6FC5800-0AM34-0YB0	M34	○	○
Electronic transfer CP Contains the option: CP Comfort	[1] With restricted functionality, see export control version.	6FC5800-0AM76-0YB0	M76	○ [1]	○
Milling technology package: SINUMERIK MDynamics 3 axes Contains the options: ShopTurn/ShopMill, residual material detection and machining for contour pockets and cutting, 3D simulation 1 (finished part), simultaneous recording, Advanced Surface, Spline interpolation, Transmit and peripheral surface transformation, measuring cycles, additional HMI user memory on CF card		6FC5800-0AS32-0YB0	S32	○	○
5-axis machining package • Contains the option Multi-axis interpolation (> 4 interpolating axes) • 5-axis functionality (TRAORI, RTCP)		6FC5800-0AM30-0YB0	M30	–	○
5-axis machining package, additional function 7th axis		6FC5800-0AS01-0YB0	S01	–	○
Milling technology package: SINUMERIK MDynamics 5 axes Contains the options: 5-axis machining package, ShopTurn/ShopMill, residual material detection and machining for contour pockets and cutting, 3D simulation 1 (finished part), simultaneous recording, Advanced Surface, Spline interpolation, Transmit and peripheral surface transformation, measuring cycles, additional HMI user memory on CF card, 3D tool radius compensation, measure kinematics		6FC5800-0AS33-0YB0	S33	–	○
Typical block cycle times (block processing times) in ms • NCU 710.3 PN • NCU 720.3 PN • NCU 730.3 PN	Requirement: With use of the compressor. [1] Under development.			1.5 0.6 [1] 0.4	1.5 0.6 [1] 0.4
Handling package Contains the options: 3 additional axes, 3 additional channels, Handling transformation, synchronized actions stage 2, no tool offsets or spindles possible	Requirement: Loadable compile cycle.	6FC5800-0AS31-0YB0	S31	–	○
SINUMERIK plastics package IME Contains the options: • Three additional axes • Travel to fixed stop • Pair of synchronous axes (gantry axes) • Master/slave for drives • Position switching signals/cam controller • Polynomial interpolation • Handling transformation • Synchronized actions stage 2 and no tool offsets or spindles possible		6FC5800-0AS40-0YB0	S40	–	○
Velocity adaptation VADA	Requirement: Loadable compile cycle.	6FC5800-0AN05-0YB0	N05	–	○

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Technologies (continued)					
Extrapolated switching signals (64) XOUT	Requirement: Loadable compile cycle.	**6FC5800-0AN51-0YB0**	**N51**	–	○
Path-related pulse output PRIG	Requirement: Loadable compile cycle.	**6FC5800-0AN76-0YB0**	**N76**	–	○
CCG compiler as DLL for SINUMERIK PCU 50.5 (CCG = Cam Contour Grinding)		**6FC5800-0AP10-0YB0**	**P10**	○	○
Motion-synchronous actions					
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 32 digital inputs/32 digital outputs 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)	[1] With restricted functionality, see export control version.			● 1)	●
Synchronized actions stage 2	[1] With restricted functionality, see export control version.	**6FC5800-0AM36-0YB0**	**M36**	○ 1)	○
Positioning axes and spindles via synchronized actions (command axes)				●	●
Analog value control in the interpolation cycle (Requirement: analog input)				●	●
Analog output, path velocity-dependent (laser power control)		**6FC5800-0AM37-0YB0**	**M37**	○	○
Laser switching signal, high-speed HSLC	Requirement: 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: Loadable compile cycle. [1] With restricted functionality, see export control version.	**6FC5800-0AM40-0YB0**	**M40**	○ 1)	○
• Clearance control 1D/3D in position control cycle, free direction	Requirement: Loadable compile cycle and M40.	**6FC5800-0AM65-0YB0**	**M65**	○	○
Evaluation of internal drive variables (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 ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Open Architecture					
Program screens, operating areas and user interfaces SINUMERIK Integrate Create MyHMI:	See SINUMERIK Integrate.				
Create MyHMI /3GL (programming package) Software for PC	OEM contract required.	**6FC5861-1YC00-0YA0**		○	○
		6FC5861-1YC..-.YA0			
		6FC5861-1YP00-0YB0 **6FC5861-1YP00-0YL8**			
Run MyHMI /3GL		**6FC5800-0AP60-0YB0**	**P60**	○	○
Run MyHMI /3GL (.net)		**6FC5800-0AP66-0YB0**	**P66**	○	○
Use SIMATIC OP 177B, TP 177B, OP 277, TP 277, MP 277, MP 377, OP 170B, TP 170B, OP 270/TP 270 with 6"/10" display and MP 170/MP 270B/MP 370 with keys/touch SINUMERIK Integrate Create MyHMI:	See SINUMERIK Integrate.				
Run MyHMI /SIMATIC OP for SIMATIC Basic /Comfort Panels		**6FC5800-0AP03-0YB0**	**P03**	○	○
Integrate screens with variable layout in SINUMERIK Operate with SINUMERIK Integrate Create MyHMI /PRO	See SINUMERIK Integrate.	**6FC5867-3YC00-0YA8**		○	○
		6FC5867-3YC2.-.YA8			
SINUMERIK Integrate Run MyHMI /PRO for SINUMERIK PCU 50.5/ NCU 710.3 PN/NCU 720.3 PN/ NCU 730.3 PN for machine operation		**6FC5800-0AP47-0YB0**	**P47**	○	○
Integrate screens in SINUMERIK Operate with SINUMERIK Integrate Run MyScreens	See SINUMERIK Integrate.	**6FC5800-0AP64-0YB0**	**P64**	○	○
• Free screens				5	5
Integrate OEM specific solutions in the NC kernel with SINUMERIK Integrate Create MyCC:	See SINUMERIK Integrate.				
• Create MyCC for openness in the NC kernel	OEM contract required.	On request		–	○
• Create MyCCI for openness in the NC kernel based on Customized Interface	COA contract required.	**6FC5863-1YP00-0YB8**		○	○
• Create MyCCI /Interpreter for openness in the NC kernel based on Interpreter Interface	COA contract required.	**6FC5863-0YP00-0YB8**		○	○
• Run MyCC	Requirement: Create MyCC.	**6FC5800-0AM04-0YB0**	**M04**	–	○
• Run MyCCI /IMD	Requirement: Create MyCC or Create MyCCI or Create MyCCI /Interpreter.	**6FC5800-0AN13-0YB0**	**N13**	○	○
• Run MyCCI /VCI	Requirement: Create MyCC or Create MyCCI or Create MyCCI /Interpreter.	**6FC5800-0AN74-0YB0**	**N74**	○	○
• Run MyCCI /COOC	Requirement: Create MyCC or Create MyCCI or Create MyCCI /Interpreter.	**6FC5800-0AM67-0YB0**	**M67**	○	○

CNC programming language

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
CNC programming language					
Programming language (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, changeover manually or via program				●	●
Inverse-time feedrate				●	●
Auxiliary function output:					
• Via M word, max. programmable value range: INT 2^{31} -1				●	●
• Via H word, max. programmable value range: REAL ± 3.4028 ex 38 (display: ± 999 999 999.9999) INT -2^{31} to 2^{31} -1				●	●
CNC high-level language with:					
• User variables, configurable				●	●
• Predefined user variables (arithmetic parameters)				●	●
• Predefined user variables (arithmetic parameters), 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				●	●

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SINUMERIK CNC
Functions

CNC programming language

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
CNC programming language (continued)					
Online ISO dialect interpreter				●	●
Program/workpiece management:					
• Part programs on NCU, max. number	In total max. 512 files per directory.			1000	1000
• Workpieces on NCU, max. number	In total max. 256 directories.			250	250
• Workpieces on SSD of PCU, max. number	In total max. 100000 user files.			10^5	10^5
• In additional HMI user memory on CF card of the NCU	In total max. 100000 user files 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, 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 (also via online configurable display) and log them				◇	◇

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Programming support					
Program editor:					
• Text editor with editing functions: Selecting, copying, deleting				●	●
• Dual editor				●	●
• Multi-editor, maximum 4	Requirement: SINUMERIK 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: Option P17.	6FC5800-0AP14-0YB0	P14	◇	◇
programSYNC (machining step programming)		6FC5800-0AP05-0YB0	P05	◇	◇
Programming support for geometry entries:					
• programGUIDE (programming support for cycles, dynamic programming graphics, animated elements)				●	●
Technology cycles:					
• Drilling				●	●
• Milling				●	●
• Turning				●	●
Pocket milling with free contour definition and islands				●	●
Residual material detection and machining for contour pockets and stock removal		6FC5800-0AP13-0YB0	P13	○	○
Programming support for cycles:					
• Dynamic programming graphic during programming				●	●
• Programming support is expandable (e.g. customer cycles)	SINUMERIK Integrate Run MyScreens.			●	●
Access protection for cycles SINUMERIK Integrate Lock MyCycles:	See SINUMERIK Integrate.				
• Lock MyCycles (cycle protection (OEM))		6FC5800-0AP54-0YB0	P54	○	○
CAD Reader for PC		6FC5260-0AY00-0AG0		○	○
		6FC5260-6AY00-2AG0			
		6FC5260-0AY00-0AG2			

SINUMERIK CNC
Functions

Simulation

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Description ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Simulation					
Up to n channels can be simulated	Requirement: programSYNC			4	4
Simulation of program X, while program Y is being executed	With NCU 720.3/ NCU 730.3			●	●
Quickview for mold-making programs				●	●
Turning/drilling/milling:					
• Turning				●	●
• Counterspindle				●	●
• Turn-milling				●	●
• Mill-turning with supported kinematics	Application-specific by machine manufacturer.			●	●
• Milling up to 5-axis machining with TRAORI				●	●
• Simultaneous recording (real-time simulation of current machining)		6FC5800-0AP22-0YB0	P22	○	○
• 2D simulation (finished part)				●	●
• 3D simulation 1 (finished part)		6FC5800-0AP25-0YB0	P25	○	○

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK 840DE sl	840D sl
Operating modes					
JOG:				●	●
• Handwheel selection				●	●
• Inch/metric changeover				●	●
• Manual measurement of zero work offset				●	●
• Manual measurement of tool offset				●	●
• Automatic tool/workpiece measurement				●	●
• Reference point approach 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 TCU/PCU e.g. card reader, memory stick				●	●
• Execution from HMI memory on CF card of NCU	Requirement: Additional HMI user memory on CF card of 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 ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Tools					
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: SINUMERIK MDynamics 5 axes or 5 axis machining package.			–	●
Online tool length compensation				●	●
Operation without 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/ 1500	600/ 1500

Tools

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Tools (continued)					
Operation with tool management up to 3 magazines (corresponding to one real magazine):				●	●
• Operation with 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/ 1500	600/ 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 Software for PC/Server		6FC6000-2XC02-4AA8			
		6FC6000-2XC0.-.AA8			
• Manage MyTools License for NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN		6FC5800-0AP37-0YB0	P37	○	○
• Manage MyTools (Node) 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 (TDI Ident Connection)		6FC5800-0AP52-0YB0	P52	○	○

SINUMERIK CNC
Functions

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Communication/data management

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Communication/data management					
HMI user memory, additional on CF card of NCU	See CNC. [1] Not in combination with PCU 50.5.	6FC5800-0AP12-0YB0	P12	○ [1]	○ [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.			● [1]	● [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.			● [1]	● [1]
Manage additional drives:					
• Via Ethernet, max. 4				●	●
• Via USB				●	●
• Via CF card of the PCU				●	●
COM (RS232C/V.24) serial interface	Requirement: COM01 RS232C (V.24) module for NCU or PCU 50.5.			●	●
I/O interfacing via PROFIBUS DP				●	●
Axis data output via PROFIBUS ADAS	Requirement: Loadable compile cycle.	6FC5800-0AN07-0YB0	N07	○	○
Reading of actual positions correlated with output signal COPA	Requirement: Loadable compile cycle.	6FC5800-0AN61-0YB0	N61	○	○
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 SINUMERIK Integrate Manage MyPrograms (MCIS DNC):	See SINUMERIK Integrate.				
• Manage MyPrograms Software for PC/Server		6FC6000-0XC02-4AA8			
		6FC6000-0XC0.-.AA8			
• Manage MyPrograms License for NCU 710.3 PN/NCU 720.3 PN/NCU 730.3 PN		6FC5800-0AP41-0YB0	P41	○	○
• Manage MyPrograms Node license for other ports		6FC6000-0NF00-0YB0			

Operation

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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: PCU 50.5.	**6FC5303-0AF13-0AA0**		○	○
Thin Client Unit for operator panel fronts:					
• SINUMERIK TCU	Not in combination with SINUMERIK 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 (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 P4505; 1.86 GHZ/1024 MB, Windows XP ProEmbSys		**6FC5210-0DF52-2AA0**		○	○
• SINUMERIK PCU 50.5-P i5-520E; 2.4 GHZ/2048 MB, 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 ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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 **6FC5860-1YP00-0YL8**			
• PC for machine operation with SINUMERIK Operate		**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: 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: 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				●	●

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Operation (continued)					
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 handwheel 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

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Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Operation (continued)					
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**		○	○

Operation

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK 840DE sl	840D sl
Operation (continued)					
Memory/storage devices:				○	○
• Card reader for CF/SD memory media, with USB connection		6FC5335-0AA00-0AA0		○	○
• Industrial USB hub 4	With SINUMERIK PCU 50.5.	6AV6671-3AH00-0AX0		○	○
• 1 GB CompactFlash card	Requirement: Card reader.	6FC5313-5AG00-0AA1		○	○
• 8 GB CompactFlash card	Requirement: Card reader.	6FC5313-6AG00-0AA0		○	○
• SIMATIC USB FlashDrive 8 GB		6ES7648-0DC50-0AA0		○	○
Plain text display of user variables				●	●
Multi-channel display	With OP 019 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 available on request.	6FC5800-0AN00-0YB0	N00	○	○
• Maximum configuration for installed languages	SINUMERIK PCU 50.5 unlimited.			8	8
Additional languages for operating software SINUMERIK Operate on DVD, without license Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Slovak, Slovene, Swedish, Turkish		6FC5860-0YC..-.YA8		○	○
• Other languages	On request.			○	○

SINUMERIK CNC
Functions

Monitoring functions

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Monitoring functions					
Working area limitation				●	●
Limit switch monitoring 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:					
• Axis collision protection PROT	Requirement: Loadable compile cycle.	6FC5800-0AN06-0YB0	N06	–	○
Extended stop and retract ESR (numerically controlled and drive-autonomous)		6FC5800-0AM61-0YB0	M61	○	○
PROFIBUS tool and process monitoring	Requirement: Loadable compile cycle.	6FC5800-0AM62-0YB0	M62	○	○
Integrated tool monitoring and diagnostics:					
• IMD light	Requirement: Loadable compile cycle.	6FC5800-0AN12-0YB0	N12	○	○
• IMD base	Requirement: Loadable compile cycle.	6FC5800-0AN13-0YB0	N13	○	○

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Compensation					
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	[1] With restricted functionality, see export control version.	6FC5800-0AM54-0YB0	M54	○ [1]	○
Sag compensation, multi-dimensional	[1] With restricted functionality, see export control version.	6FC5800-0AM55-0YB0	M55	○ [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 ● Basic version ○ Option ◇ Function is dependent on operating software − Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	**840D sl**
Programmable logic controller (PLC)					
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		6FC5800-0AD10-0YB0	D11…D18	○	○
SIMATIC STEP 7 programming language:					
• Ladder diagram LAD				○	○
• Function block diagram FBD				○	○
• Statement list STL				○	○
• Structured Control Language SCL (add-on package for STEP 7)				○	○
• Continuous Function Chart CFC (add-on package for STEP 7)				○	○
• GRAPH (add-on package for STEP 7)				○	○
PLC programming with HiGraph (add-on package for STEP 7)				○	○
Distributed I/O via PROFIBUS DP:	See Catalog ST 70 or Siemens Industry Mall.				
• Via integrated interface, data transfer rates up to 12 Mbit/s				●	●
• Distributed DP slaves, max. number	In total on DP1 and DP2.			124	124
Distributed I/O via PROFINET:	See Catalog ST 70 or Siemens Industry Mall.				
• Via integrated interface, 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 (can be adjusted between 0 and 4049 bytes)	Number = process image inputs.			1024	1024
Digital outputs, number in bytes (can be adjusted between 0 and 4049 bytes)	Number = process image outputs.			1024	1024
I/O inputs, number in bytes:	Logical address range inputs.			8192	8192
• Maximum usable				5700	5700
I/O outputs, number in bytes:	Logical address range inputs.			8192	8192
• Maximum usable				5700	5700

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				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 Safety functions for personnel and machine protection:					
Safety functions integrated in the system	Requirement: 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 ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Safety functions (continued)					
Safety Integrated with safe programmable logic (SPL)					
Safety Integrated SI-Basic incl. 1 axis/spindle 4 inputs/outputs for safe programmable logic		6FC5800-0AM63-0YB0	M63	○	○
Safety Integrated SI-Comfort incl. 1 axis/spindle 64 inputs/outputs for safe programmable logic		6FC5800-0AM64-0YB0	M64	○	○
Safety Integrated SI axis/spindle extra for each additional axis/spindle		6FC5800-0AC70-0YB0	C71…C78	○	○
Safety Integrated SI axis/spindle package additional 15 axes/spindles		6FC5800-0AC60-0YB0	C61, C62	○	○
Safety Integrated acceptance test Executed automatically with SinuCom NC SI	Requirement: SinuCom NC.			○	○
Drive-autonomous safety functions for personnel and machine protection:					
• SBC (Safe Brake Control)				●	●
• STO (Safe Torque Off)				●	●
• SS1 (Safe Stop 1)				●	●
Commissioning					
Commissioning functions for drive system are integrated:					
Auto Servo Tuning (AST) Fully automatic speed and position controller optimization:				●	●
• Optimization of single axis incl. gantry axes				●	●
• Speed controller optimization incl. setting of current setpoint filters				●	●
• Position controller optimization 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 menus: Re-optimization of speed controller				●	●
• Report generation: Single axis and path interpolation				●	●
• Optimization project can be loaded and optimized offline on the PC				●	●

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Commissioning (continued)					
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: 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		6FC5250-0AY00-0AG0 6FC5250-7AY00-.AG0 6FC5250-0AY00-0AG1 6FC5250-0AY00-0AG2 6FC5250-7AY00-.AG3		○	○
• Commissioning software for SINAMICS S120 (and SIMODRIVE 611 digital)	For commissioning.				
• SinuCom NC Dialog-based parameterization of machine data, management of series startup files, integrated online help for functions, machine data and alarms					
• SinuCom NC Trace Dynamic recording of variables and signals – optimization without additional oscilloscope					
• SinuCom CFS Creation of an image for the CF card in Ext3 format					
• SinuCom ARC Reading, deletion, insertion and editing of series startup files					
SINUMERIK Integrate Create MyConfig for series production and software upgrades		6FC5862-2YC41-0YA0		○	○
STARTER drive/commissioning software for SINAMICS and MICROMASTER	For topology and diagnostics.	6SL3072-0AA00-0AG0		–	–

SINUMERIK CNC
Functions

Diagnostic functions and maintenance

2

Description ● Basic version ○ Option ◇ Function is dependent on operating software – Not possible	Instructions (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code	SINUMERIK	
				840DE sl	840D sl
Diagnostic functions and maintenance					
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** **6FC5252-0AY00-0AG1** **6FC5252-.AY01-.AG0**		○	○
Remote diagnostics and file transfer SINUMERIK Integrate Access MyMachine:	See SINUMERIK Integrate.				
• Access MyMachine /P2P (RCS Commander for PC/PG). Principally permits file transfer between PC/PG and CNCs	Requirement: Access MyMachine /P2P for image transmission by modem.	**6FC5860-7YC00-0YA0** **6FC5860-7YC..-.YA0**		○	○
• Access MyMachine /P2P (RCS Host remote diagnostics software)	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** **6FC6001-0EE00-0DS1**		○	○
• ASP Account (ePS Company Account)		**6FC6001-0EE00-0CA1**		○	○
• ASP Machine Setup Fee (ePS Connect Machine)		**6FC6001-0EE00-0CE0** **6FC6001-0EE00-0CE1**		○	○
• Analyze MyCondition (ePS Condition Monitoring Basic) for state-oriented maintenance	Requirement: Access MyMachine /Ethernet company account, setup fee.	**6FC6001-0EE00-0MB0** **6FC6001-0EE00-0MB1**		○	○
• ASP Account (ePS Company Account)		**6FC6001-0EE00-0CA1**		○	○
• ASP Machine Setup Fee (ePS Connect Machine)		**6FC6001-0EE00-0CE0** **6FC6001-0EE00-0CE1**		○	○

SINUMERIK Operate

3

SINUMERIK Operate
The user interface for efficient machine operation

Overview

DIN & SINUMERIK High-level language & programGUIDE	ShopMill/ShopTurn Machining step programming	programSYNC
Developed to provide maximum flexibility and very short machining times	Developed to speed up programming	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.

3

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.

3

SINUMERIK Operate
Operation and programming

SINUMERIK Operate operating software

Overview

CNC user interface

The modern SINUMERIK Operate operating software is a technology-neutral, multi-channel operating software for:

- Machine operation
- Programming
- Diagnostics
- Startup

It permits user-friendly, practice-oriented operation of the machine, from production to the workshop.

Programming of the part programs is optimally supported by a modern text editor with integrated ProgramGUIDE featuring Animated Elements. The powerful integrated contour calculator enables programming and graphic display of complex workpiece contours. Processes such as drilling, centering, plunging or pocket milling are represented as machining steps in a simple and clear manner. Part programs can be rapidly checked using the 2D/3D simulation for turning and milling.

It is easy to modify or redesign the user interface.

Benefits

■ Clearly structured:
  - The user interface is clearly organized and intuitive to use
  - The integrated machine-step and high-level language programming enables the user to program parts and prepare work very quickly, rationally and intuitively.
■ Always helpful:
  - Cursor texts are shown for every text box of the screen forms
  - Convenient to use thanks to animated elements
  - Confident programming supported by simulation
  - Helpful functions for efficient production, e.g. Help key, tooltips, search shortcut CTRL+F, UNDO, etc.
■ Open for:
  - User-generated screens and user-defined operating philosophies and concepts

Function

- Modern text editor with many helpful functions
- ProgramGUIDE with Animated Elements – perfect support for integrating cycles in part programs
- Shopfloor-oriented technology cycles for drilling, milling, and turning
- Comprehensive measuring cycles (option)
- Residual material recognition and machining for contour pockets and cutting (option)
  - Automatic recognition of contour areas that cannot be machined using large tools
  - Targeted reworking of these areas using a suitable, smaller tool
- Powerful contour computer for entering any contours, from simple to very complex ones
- Comprehensive sequence programming with ShopMill/ShopTurn (option)
- Support of swivel heads and swivel tables
- Multiple clamping of identical workpieces (ShopMill/ShopTurn is required)
- Multiple clamping of different workpieces (option)
- Fast broken-line graphics (QuickView) for mold-making programs
- Quick checking of part programs
  - Integrated 2D simulation for turning and milling
  - 3D simulation (option)
- Simultaneous recording of current machining (option)
  - Real-time simulation of current machining
- Integrated tool management for one magazine (more than 3 magazine tables as option)
- Access to external programs via network drives, USB and COM interfaces
- Integrated configuration for user-defined screens with SINUMERIK Integrate Run MyScreens (option)
- Implementation of user-defined operating philosophies and concepts with SINUMERIK Integrate Create MyHMI (option)
- Support for the entire workflow: setting up tools and workpieces, programming, simulation, trial program runs and process monitoring
- Intelligent HMI functions provide simple and effective assistance with daily tasks such as generating screenshots with the shortcut CTRL+P
- Display and analysis of energy consumption

Integration

The SINUMERIK Operate operating software is a component of the CNC software with:

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

The SINUMERIK Operate can be used for:

- SINUMERIK PCU 50.5
- PC with Windows XP or Windows 7 operating system

3

Selection and ordering data

Description	Order No.
SINUMERIK Operate operating software	
For SINUMERIK PCU 50.5	
Languages: Chinese Simplified, English, German, French, Italian, Spanish	
• Single license without data storage medium	**6FC5860-1YF00-0YB0**
• Single license on DVD-ROM, current software version	**6FC5860-1YC00-0YA0**
• Single license on DVD-ROM, specific software version[1]	**6FC5860-1YC2■-■YA0**
• Without license on DVD-ROM, specific software version[1]	**6FC5860-1YC2■-■YA8**
• Software Update Service	**6FC5860-1YP00-0YL8**
SINUMERIK Operate operating software	
For PC with Windows XP or Windows 7	
Languages: Chinese Simplified, English, German, French, Italian, Spanish	
• Single license without data storage medium	**6FC5860-2YF00-0YB0**
• Single license on DVD-ROM, current software version	**6FC5860-2YC00-0YA0**
• Single license on DVD-ROM, specific software version[1]	**6FC5860-2YC2■-■YA0**
• Without license on DVD-ROM, specific software version[1]	**6FC5860-2YC2■-■YA8**
• Software Update Service	**6FC5860-2YP00-0YL8**
Accessories	
Additional languages[2]	**6FC5860-0YC20-1YA8**
On DVD-ROM	
Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Slovak, Slovene, Swedish, Turkish	
Without license.	
• For SINUMERIK 840D sl: CNC SW 2.4 SP1, 2.5 SP1, 2.6	
• For PCU 50.5: SINUMERIK Operate SW version 2.6	
Additional languages	**6FC5800-0AN00-0YB0**
Use of language extensions Software option • Single license without data storage medium	

Description	Order No.
Accessories (continued)	
HMI user memory	**6FC5800-0AP12-0YB0**
Additionally on CF card of NCU Software option	
• Single license without data storage medium	
Residual material detection and processing for contour pockets and stock removal	**6FC5800-0AP13-0YB0**
Software option	
• Single license without data storage medium	
ShopMill/ShopTurn	**6FC5800-0AP17-0YB0**
Machining step programming Software option	
• Single license without data storage medium	
Multiple clamping of different workpieces	**6FC5800-0AP14-0YB0**
Software option	
• Single license without data storage medium	
Simultaneous recording of current processing	**6FC5800-0AP22-0YB0**
Real-time simulation of current processing Software option	
• Single license without data storage medium	
3D simulation 1	**6FC5800-0AP25-0YB0**
Finished part simulation Software option	
• Single license without data storage medium	
Operator control without SINUMERIK operator panel	**6FC5800-0AP00-0YB0**
Software option	
• Single license without data storage medium	

[1] Example for specific software version 2.7 SP1:
6FC5860-1YC2**3-0**YA0

[2] 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.
CAD Reader for PC	
Including documentation	
Languages: English, German	
• Single License, without data storage medium	**6FC5260-0AY00-0AG1**
• Single license on CD ROM, current software version	**6FC5260-0AY00-0AG0**
• Single license on CD ROM, specific software version[1]	**6FC5260-■AY00-■AG0**
• Software Update Service	**6FC5260-0AY00-0AG2**
• Service Pack on order of specific software version[1]	**6FC5260-■AY00-■AG8**

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[1] Example for specific software version 6.2:
6FC5260-**6**AY00-**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.
SINUMERIK Integrate Run MyHMI /PRO For SINUMERIK 840D sl and SINUMERIK PCU 50.5 Runtime software including configuration software Languages: English, German	
• Single License, without data storage medium	**6FC5800-0AP47-0YB0**
• Without license on CD ROM, current software version	**6FC5867-3YC00-0YA8**
• Without license on CD ROM, specific software version[1]	**6FC5867-3YC2■-■YA8**
HMI Lite Runtime software Languages: English, German, French, Italian, Spanish, Chinese Simplified	
• Single License, without data storage medium	**6FC5263-0PY11-0AG0**
• Single License, specific software version[1]	**6FC5263-■PY11-■AG0**
• Single License, without data storage medium	**6FC5263-0PY11-0AG1**

[1] Examples for specific software versions:
e.g. HMI PRO sl RT 2.7: 6FC5867-3YC2**2**-**7**YA8
or for HMI Lite 5.1:   6FC5263-**5**PY11-**1**AG0

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

DEMMEL – 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

Product name	SINUMERIK OP 08T operator panel front
	6FC5203-0AF04-1BA0
Screen	7.5" TFT, 640 x 480 pixels
Input voltage	24 V DC
Power consumption, max.	15 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	310 mm (12.2 in)
• Height	330 mm (12.99 in)
• Depth	41 mm (1.61 in)
Panel cutout	
• Width	285 mm (11.22 in)
• Height	304 mm (11.97 in)
Weight, approx.	2.9 kg (6.39 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

3

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

Product name	SINUMERIK OP 010 operator panel front
	6FC5203-0AF00-0AA1
Screen	10.4" TFT, 640 x 480 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	310 mm (12.2 in)
• Depth	30 mm (1.18 in)
Depth	
• Without PCU	20 mm (0.79 in)
• With PCU 50.5	108.2 mm (4.26 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11.0 lb)
Approvals, according to	CE, cULus

Selection and ordering data

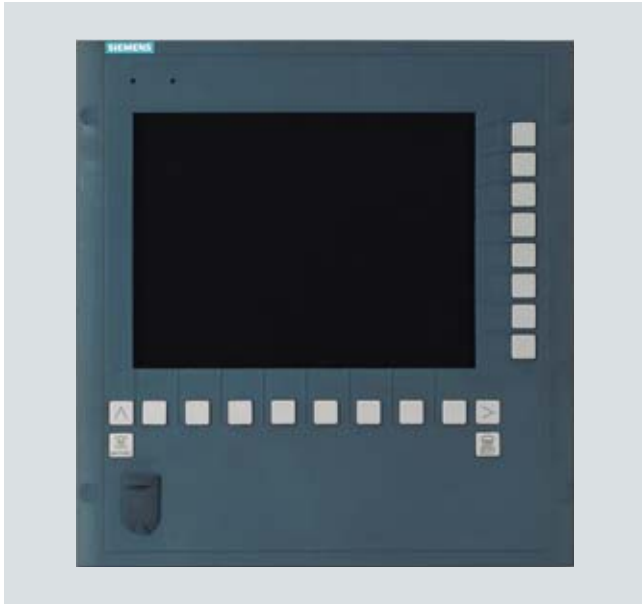| Description	Order No.
SINUMERIK OP 010 operator panel front 26.4 cm/10.4" TFT (640 x 480) with membrane keys	**6FC5203-0AF00-0AA1**
Accessories	
Slide-in labels for inscribing 3 DIN A4 sheets, for SINUMERIK OP 010	**6FC5248-0AF07-0AA0**
Sealing caps (10 units) For the USB port	**6FC5248-0AF05-0AA0**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

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

Product name	SINUMERIK OP 010S operator panel front
	6FC5203-0AF04-0AA0
Screen	10.4" TFT, 640 x 480 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	310 mm (12.2 in)
• Height	330 mm (12.99 in)
• Depth	45 mm (1.77 in)
Depth	
• Without PCU	35 mm (1.38 in)
• With PCU 50.5	123.2 mm (4.85 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5.5 kg (12.1 lb)
Approvals, according to	CE, cULus

■ Selection and ordering data

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

SINUMERIK Operate
Operator panels

3

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

Product name	SINUMERIK OP 010C operator panel front
	6FC5203-0AF01-0AA0
Screen	10.4" TFT, 640 x 480 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	483 mm (19.02 in)
• Height	310 mm (12.2 in)
• Depth	30 mm (1.18 in)
Depth	
• Without PCU	20 mm (0.79 in)
• With PCU 50.5	108.2 mm (4.26 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11.0 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

SINUMERIK Operate
Operator panels

SINUMERIK OP 012

3

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 x (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

Product name	SINUMERIK OP 012 operator panel front
	6FC5203-0AF02-0AA1
Screen	12.1" TFT, 800 x 600 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	21 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	310 mm (12.2 in)
• Depth	30 mm (1.18 in)
Depth	
• Without PCU	20 mm (0.79 in)
• With PCU 50.5	108.2 mm (4.26 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11.0 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

SINUMERIK Operate
Operator panels

■ 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

Product name	SINUMERIK OP 015 operator panel front
	6FC5203-0AF03-0AA0
Screen	15" TFT, 1024 x 768 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	24 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	310 mm (12.2 in)
• Depth	52 mm (2.05 in)
Depth	
• Without PCU	42 mm (1.65 in)
• With PCU 50.5	130.2 mm (5.13 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	7 kg (15.4 lb)
Approvals, according to	CE, cULus

■ Selection and ordering data

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

3

SINUMERIK Operate
Operator panels

SINUMERIK OP 015A

3

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

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

Technical specifications (continued)

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

Selection and ordering data

Description	Order No.
SINUMERIK OP 015A operator panel front 38 cm/15" TFT (1024 x 768) with membrane keys	**6FC5203-0AF05-0AB0**
SINUMERIK direct key module PROFIBUS DP With mounting kit for SINUMERIK OP 012	**6FC5247-0AF11-0AA0**
Direct key module mounting kit For SINUMERIK OP 015A/ OP 019/TP 015A	**6FC5247-0AF30-0AA0**
Accessories	
Slide-in labels for inscribing 3 DIN A4 sheets for SINUMERIK OP 015A/ OP 015AT/TP 015A/TP 015AT for vertical softkeys	**6FC5248-0AF24-0AA0**
USB mouse For operator panel front	**6FC5247-0AF01-0AA0**
Sealing caps (10 units) For the USB port	**6FC5248-0AF05-0AA0**
Set of clamps (9 units) For operator components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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

Technical specifications

Product name	SINUMERIK OP 015AT operator panel front
	6FC5203-0AF05-1AB0
Screen	15" TFT, 1024 x 768 pixels
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	355 mm (13.98 in)
• Depth	53 mm (2.09 in)
Weight, approx.	7.6 kg (16.8 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

3

SINUMERIK Operate
Operator panels

SINUMERIK OP 019

3

■ 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.
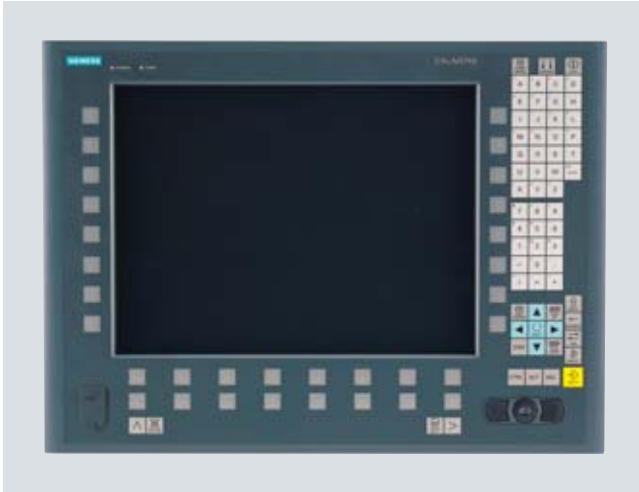
■ Technical specifications

Product name	SINUMERIK OP 019 operator panel front
	6FC5303-0AF13-0AA0
Screen	19" TFT, 1280 × 1024 Pixel
Input voltage	5 V DC via PCU
Power consumption, max.	24 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65/IP66
• Rear	IP20
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 … 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	399 mm (15.71 in)
• Depth	58.5 mm (3.37 in)
Depth	
• Without PCU	47.5 mm (1.87 in)
• With PCU 50.5	131.5 mm (5.18 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	11.5 kg (25.36 lb)
Approvals, according to	CE, UL

■ Selection and ordering data

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

■ 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

Product name	SINUMERIK TP 015A operator panel front
	6FC5203-0AF08-0AB2
Screen	15" TFT, 1024 x 768 pixels
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	25 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	355 mm (13.98 in)
• Depth	53 mm (2.09 in)
Depth	
• Without PCU	42 mm (1.65 in)
• With PCU 50.5	127 mm (5.00 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	8.4 kg (18.5 lb)
Approvals, according to	CE, cULus

■ Selection and ordering data

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

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

Product name	SINUMERIK TP 015AT operator panel front
	6FC5203-0AF08-1AB2
Screen	15" TFT, 1024 x 768 pixels
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• 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)
Dimensions	
• Width	483 mm (19.02 in)
• Height	355 mm (13.98 in)
• Depth	53 mm (2.09 in)
Weight, approx.	7.6 kg (16.8 lb)
Approvals, according to	CE, cULus

◾ Selection and ordering data

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

3

SINUMERIK direct key module

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

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

Selection and ordering data

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

3

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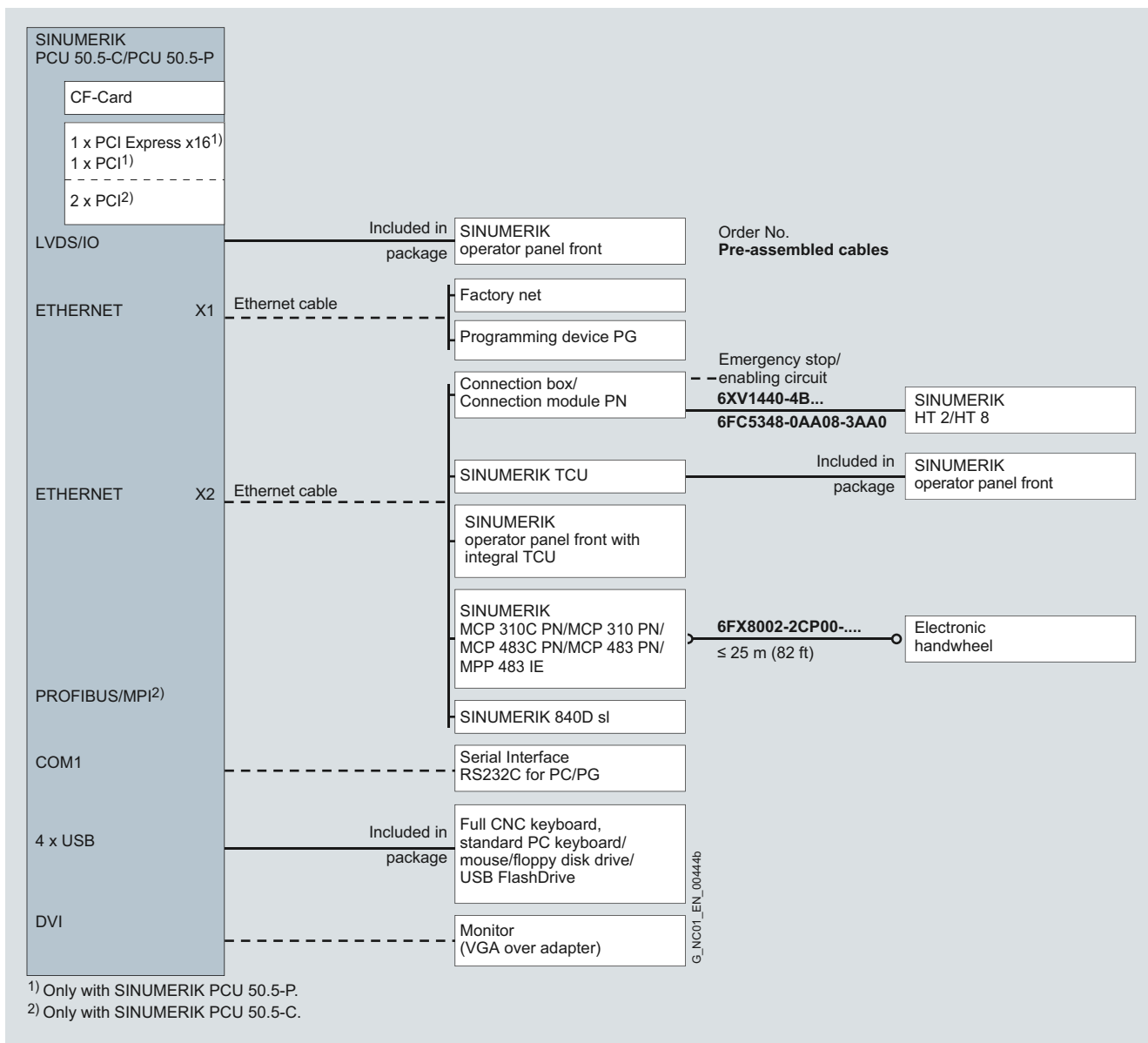- SINUMERIK 840D sl
  (software version 7.6 or higher of HMI-Advanced operating software and SINUMERIK Operate software version 2.6 SP1)

Integration

$^{1)}$ Only with SINUMERIK PCU 50.5-P.
$^{2)}$ Only with SINUMERIK PCU 50.5-C.

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

Product name	SINUMERIK PCU 50.5-C	SINUMERIK PCU 50.5-P
	6FC5210-0DF52-2AA0	6FC5210-0DF53-2AA0
Processor	Intel Celeron P4505 Dual Core/1.86 GHz	Intel Core i5-520E Dual Core/2.4 GHz
RAM	1 GB ECC RAM	2 GB ECC RAM
Input voltage	24 V DC	
Power consumption		
• Maximum	190 W	
• Typical	48 W	
Power loss ride-through time	20 ms	
Degree of protection to DIN EN 60529 (IEC 60529)	IP20	
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative atmospheric humidity		
• Storage	5 ... 95 % at 25 °C (77 °F)	
• Transport	5 ... 95 % at 25 °C (77 °F)	
• Operation	5 … 80 % at 25 °C (77 °F)	
Ambient temperature		
• Storage	-20 … +60 °C (-4 ... +140 °F)	
• Transport	-20 ... +60 °C (-4 ... +140 °F)	
• Operation		
- Max. 15 W for expansions	5 … 55 °C (41 ... 131 °F)	
- Max. 20 W for expansions	5 … 50 °C (41 ... 122 °F)	
- Max. 30 W for expansions	5 … 45 °C (41 ... 113 °F)	
Dimensions		
• Width	297 mm (11.7 in)	
• Height	267 mm (10.5 in)	
• Depth	82 mm (3.23 in)	
Weight, approx.	4.5 kg (9.92 lb)	
Approvals, according to	CE, UL	

▪ Selection and ordering data

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

▪ Selection and ordering data (continued)

Description	Order No.
SINUMERIK Operate operating software	
On hard disk of SINUMERIK PCU[1]	
Languages: Chinese Simplified, English, German, French, Italian, Spanish	
• Single License current software version	**6FC5860-1YF00-0YA0**
• Single License specific software version[2]	**6FC5860-1YF■■-■YA0**
Accessories	
Memory expansion	
For SINUMERIK PCU 50.5	
• 1 GB	**6ES7648-2AJ40-1KA0**
• 2 GB	**6ES7648-2AJ50-1KA0**
Mounting bracket	**6FC5248-0AF20-2AA0**
For SINUMERIK PCU, video link receiver or TCU behind operator panel front	
Upright mounting bracket	**6FC5248-0AF20-1AA1**
For SINUMERIK PCU 50.5	
8 GB CompactFlash card	**6FC5313-6AG00-0AA0**
Blank	
SIMATIC IPC USB FlashDrive	**6ES7648-0DC50-0AA0**
8 GB, USB 2.0, metal enclosure, boot capability, incl. SIMATIC IPC BIOS Manager	
SINUMERIK Service Pack	**6FC5253-1CX10-1XU8**
Recovery Media Windows XP ProEmbSys	
For SINUMERIK PCU 50.5 with Windows XP ProEmbSys on DVD-ROM	
Contents:	
• Windows XP ProEmbSys including SP3	
• Ghost of basic software emergency boot	
• Multilingual User Interface Pack Chinese Simplified, Chinese Traditional, Czech, Danish, Dutch, Finnish, French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese/ Brazilian, Rumanian, Russian, Slovak, Spanish, Swedish, Turkish	
• Documentation German/English	

[1] 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.

[2] Order No. for software version 2.7 SP1 for operating software SINUMERIK Operate: 6FC5860-1YF**23-0**YA0

3

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

Mounting bracket required:
PCU 50: 6FC5248-0AF20-0AA0 or
6FC5248-0AF20-1AA1
TCU: 6FC5248-0AF20-2AA0 (not requ. for OP 010S)

[1] Not requ. for operator panel fronts with integral TCU.

Connection overview for SINUMERIK TCU without central OP on PCU

Mounting bracket required
PCU 50/TCU:
6FC5248−0AF20−2AA0
(not requ. for OP 010S)

[1] Not requ. for operator panel fronts with integral TCU.

Connection overview for SINUMERIK TCU with central OP on PCU

SINUMERIK Operate
TCU for operator panels

SINUMERIK TCU

Integration (continued)

1) Not requ. for operator panel fronts with integral TCU.

Mounting bracket required:
PCU 50: 6FC5248-0AF20-2AA0 (not requ. for OP 010S)

Connection overview for SINUMERIK TCU on NCU

Mounting bracket required for mounting in control cabinet:
6FC5248-0AF20-0AA0 or 6FC5248-0AF20-1AA0

Mounting bracket required for mounting on operator panel front:
TCU/PCU 50: 6FC5248-0AF20-1AA1 (not requ. for OP 010S)

1) Not required for operator panel fronts with integral TCU.

Connection overview for SINUMERIK TCU with several TCUs on NCU

Technical specifications

Product name	SINUMERIK Thin Client Unit TCU
	6FC5312-0DA00-0AA1
Input voltage	24 V DC
Power consumption, max.	36 W
Degree of protection to DIN EN 60529 (IEC 60529)	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	260 mm (10.24 in)
• Height	265 mm (10.43 in)
• Depth	40 mm (1.57 in)
Weight, approx.	1.7 kg (3.75 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

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 Mall.

www.siemens.com/industrymall

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 handwheel 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:
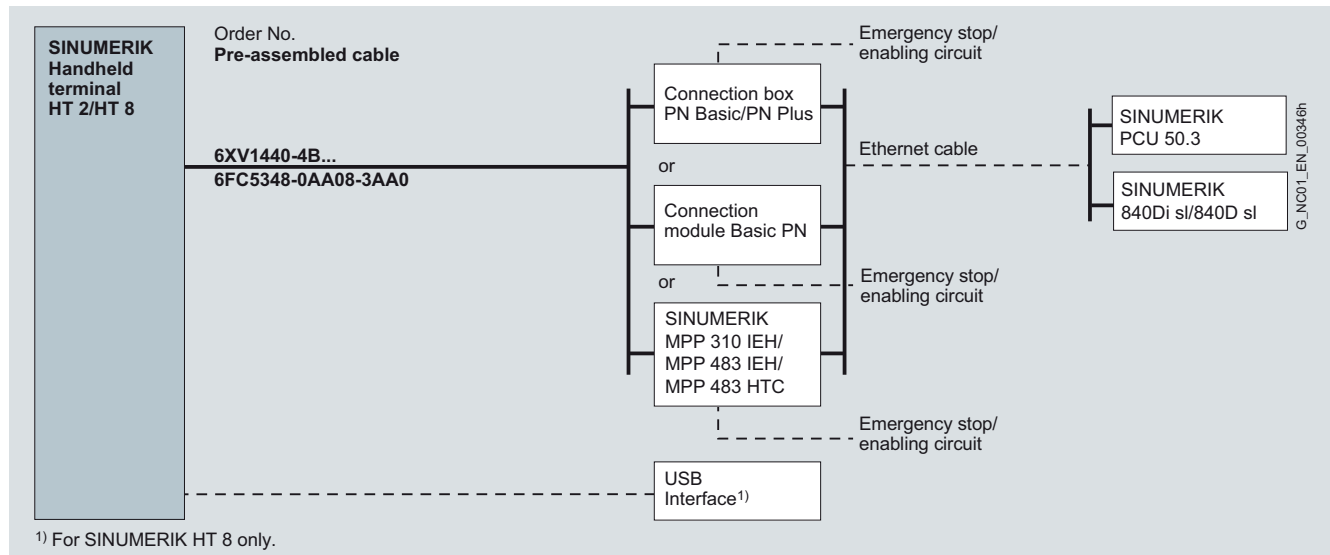 NCU 7x0.3 PN
  SINUMERIK PCU 50.5

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

SINUMERIK HT 2

Integration (continued)

Connection overview for SINUMERIK HT 2

Technical specifications

Product name	SINUMERIK HT 2 handheld terminal
	6FC5303-0AA00-2AA0
Input voltage	24 V DC
Power consumption, max.	2.5 W
Degree of protection to DIN EN 60529 (IEC 60529)	IP65
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 65 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +60 °C (-13 ... +140 °F)
• Transport	-25 … +60 °C (-13 ... +140 °F)
• Operation	0 … 50 °C (32 ... 122 °F)
Dimensions	
• 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)
Weight, approx.	0.69 kg (1.52 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

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

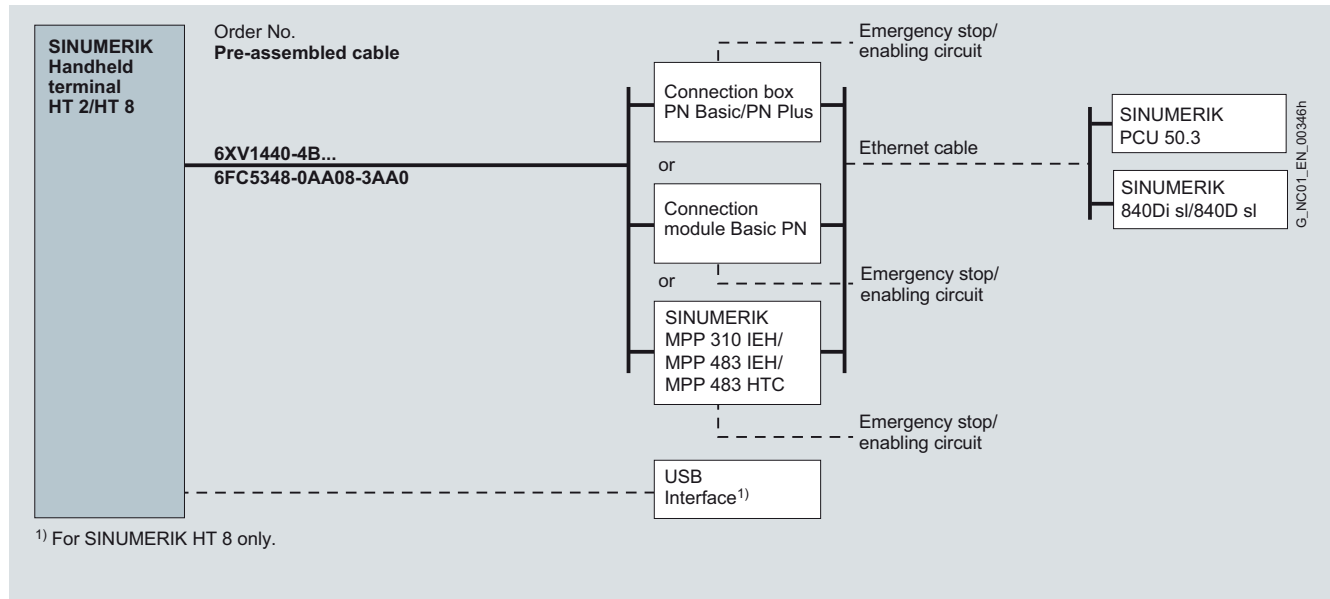| Product name	SINUMERIK HT 8 handheld terminal	SINUMERIK HT 8 handheld terminal with handwheel
	6FC5403-0AA20-0AA0	6FC5403-0AA20-1AA0
Input voltage	24 V DC	24 V DC
Power consumption, max.	15 W	15 W
Degree of protection to DIN EN 60529 (IEC 60529)	IP65	IP65
Humidity class based on DIN EN 60721-3-3	Class 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

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SINUMERIK Operate
Handheld units

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.
SINUMERIK HT 8 handheld terminal	**6FC5403-0AA20-0AA0**
Based on the Thin Client principle Operating software in the SINUMERIK NCU/PCU	
SINUMERIK HT 8 handheld terminal with handwheel	**6FC5403-0AA20-1AA0**
Based on the Thin Client principle Operating software in the SINUMERIK NCU/PCU	
Accessories	
PN Basic connection box	**6AV6671-5AE01-0AX0**
Protection class IP65	
<u>Without</u> automatic emergency stop override for mounting in the system	
PN Plus connection box	**6AV6671-5AE11-0AX0**
Protection class IP65	
<u>With</u> automatic emergency stop override for mounting in the system	
Connection module Basic PN	**6FC5303-0AA01-1AA0**
<u>Without</u> automatic emergency stop override for mounting in the control cabinet with terminating plug	

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

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

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

Selection and ordering data

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

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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 6FC9320-5DB01	Electronic handwheel 6FC9320-5DC01 6FC9320-5DF01 6FC9320-5DM00	Portable electronic handwheel 6FC9320-5DE02	Electronic handwheel 6FC9320-5DH01
Rated voltage	5 V DC ± 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)				
• Front	IP65			
• Rear	IP50			
Relative atmospheric humidity				
• Storage	10 ... 95 % at 25 °C (77 °F)			
• Transport	10 ... 95 % at 25 °C (77 °F)			
• Operation	5 ... 80 % at 25 °C (77 °F)			
Ambient temperature				
• Storage	-40 ... +85 °C (-40 ... +185 °F)			
• Transport	-40 ... +85 °C (-40 ... +185 °F)			
• Operation	0 ... 70 °C (32 ... 158 °F)			
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			

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■ **Selection and ordering data**

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

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

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[1] 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

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

■ Selection and ordering data

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

[1] For length code, see MOTION-CONNECT connection systems.

[2] 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 mm/0.63 in)
- 1 slot for emergency stop button or rotary override switch (up to d = 22 mm/0.87 in)

Integration

The SINUMERIK MCP 310C PN machine control panel can be used for:
- SINUMERIK 840D sl

Technical specifications

Product name	SINUMERIK MCP 310C PN machine control panel
	6FC5303-0AF23-0AA1
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 90 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-20 … +60 °C (-4 ... +140 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Max. distance	100 m (328 ft)
Dimensions	
• Width	310 mm (12.2 in)
• Height	175 mm (6.89 in)
• Depth	54 mm (2.13 in)
Panel cutout	
• Width	285 mm (11.22 in)
• Height	155 mm (6.1 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	1.2 kg (2.65 lb)
Approvals, according to	CE, cULus

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SINUMERIK Operate
Machine control panels

SINUMERIK MCP 310C PN

■ Selection and ordering data

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

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

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

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[1] 16G: Latching at position 16; T=24: 24 positions for 360°
23G: Latching at position 23; T=32: 32 positions for 360°

[2] 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 mm/0.63 in)
- 1 slot for emergency stop button or rotary override switch (up to d = 22 mm/0.87 in)

Integration

The SINUMERIK MCP 310 PN machine control panel can be used for:
- SINUMERIK 840D sl

Technical specifications

Product name	SINUMERIK MCP 310 PN machine control panel
	6FC5303-0AF23-1AA1
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-20 … +60 °C (-4 ... +140 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Max. distance	100 m (328 ft)
Dimensions	
• Width	310 mm (12.2 in)
• Height	175 mm (6.89 in)
• Depth	54 mm (2.13 in)
Panel cutout	
• Width	285 mm (11.22 in)
• Height	155 mm (6.1 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	1.2 kg (2.65 lb)
Approvals, according to	CE, cULus

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SINUMERIK Operate
Machine control panels

SINUMERIK MCP 310 PN

■ **Selection and ordering data**

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

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

[1] 16G: Latching at position 16; T=24: 24 positions for 360°
   23G: Latching at position 23; T=32: 32 positions for 360°

[2] 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 mm/0.63 in)

Integration

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

- SINUMERIK 840D sl

Technical specifications

Product name	SINUMERIK MCP 483C PN machine control panel
	6FC5303-0AF22-0AA1
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Max. distance	100 m (328 ft)
Dimensions	
• Width	483 mm (19.02 in)
• Height	155 mm (6.1 in)
• Depth	55 mm (2.17 in)
Panel cutout	
• Width	450 mm (17.72 in)
• Height	135 mm (5.31 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	2 kg (4.41 lb)
Approvals, according to	CE, UL

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SINUMERIK Operate
Machine control panels

SINUMERIK MCP 483C PN

■ Selection and ordering data

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

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

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[1] 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 mm/0.63 in)

Integration

The SINUMERIK MCP 483 PN machine control panel can be used for:
- SINUMERIK 840D sl

Technical specifications

Product name	SINUMERIK MCP 483 PN machine control panel
	6FC5303-0AF22-1AA1
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 65 % (annual mean) and max. 85 % over max. 2 months/year
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Max. distance	100 m (328 ft)
Dimensions	
• Width	483 mm (19.02 in)
• Height	155 mm (6.1 in)
• Depth	55 mm (2.17 in)
Panel cutout	
• Width	450 mm (17.72 in)
• Height	135 mm (5.31 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	1.6 kg (3.53 lb)
Approvals, according to	CE, cULus

SINUMERIK Operate
Machine control panels

SINUMERIK MCP 483 PN

■ **Selection and ordering data**

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

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

[1] 16G: Latching at position 16; T=24: 24 positions for 360°
   23G: Latching at position 23; T=32: 32 positions for 360°

[2] For length code, see MOTION-CONNECT connection systems.

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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

Product name	SINUMERIK MPP 310 IEH Machine Push Button Panel
	6FC5303-1AF20-8AA1
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	10 ... 95 % at 25 °C (77 °F)
• Transport	10 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-20 … +60 °C (-4 ... +140 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	310 mm (12.2 in)
• Height	295 mm (11.61 in)
• Depth	140 mm (5.51 in) (105 mm (4.13 in) without connector for handwheel connection)
Panel cutout	
• Width	278.5 mm (10.96 in)
• Height	276.5 mm (10.89 in)
Weight, approx.	3 kg (6.62 lb)
Approvals, according to	CE, cULus

Selection and ordering data

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

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 mm/0.89 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 mm/0.89 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**

Product name	SINUMERIK MPP 483 IE Machine Push Button Panel 6FC5303-1AF10-0AA0	SINUMERIK MPP 483 IEH Machine Push Button Panel 6FC5303-1AF10-8AA0
Input voltage	24 V DC	
Power consumption, max.	21 W	35 W
Degree of protection to DIN EN 60529 (IEC 60529)		
• Front	IP54	
• Rear	IP10A	
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative atmospheric humidity		
• Storage	10 ... 95 % at 25 °C (77 °F)	
• Transport	10 ... 95 % at 25 °C (77 °F)	
• Operation	5 ... 80 % at 25 °C (77 °F)	
Ambient temperature		
• 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)	
Dimensions		
• 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)	
Panel cutout		
• Width	451 mm (17.76 in)	
• Height	138 mm (5.43 in)	
Weight, approx.	3 kg (6.62 lb)	
Approvals, according to	CE, cULus	

■ **Selection and ordering data**

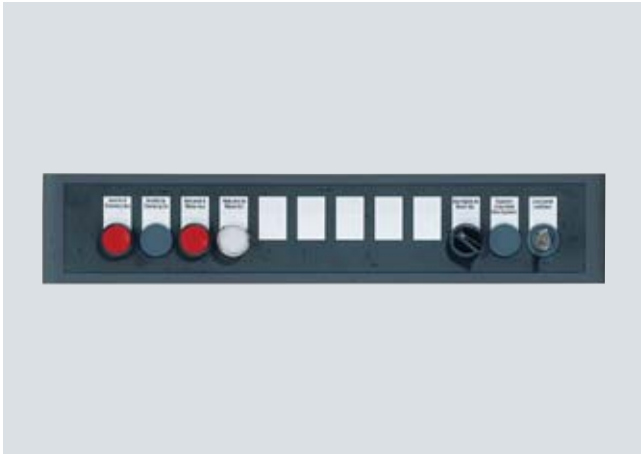| Description	Order No.
SINUMERIK MPP 483 IE Machine Push Button Panel	**6FC5303-1AF10-0AA0**
SINUMERIK MPP 483 IEH Machine Push Button Panel With port for SINUMERIK HT 2/HT 8	**6FC5303-1AF10-8AA0**

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

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

Selection and ordering data

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

SIRIUS 3SB3

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.
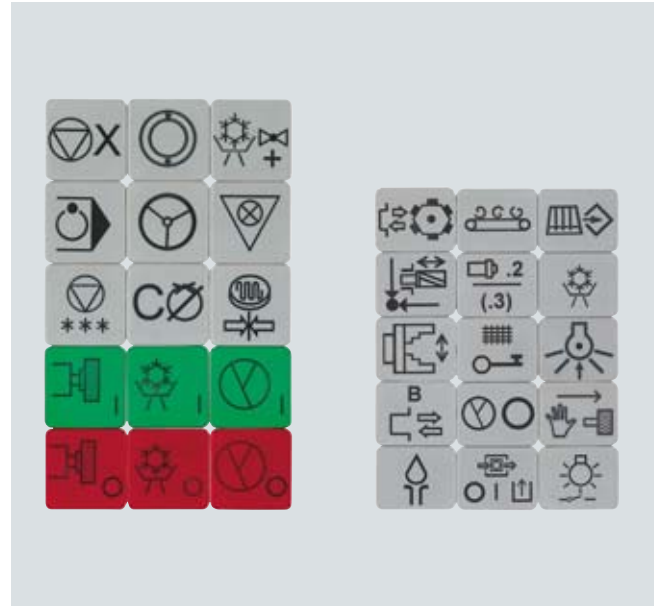
Benefits

- 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

Laser inscriptions

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

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CoReKu

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www.coreku.de

SINUMERIK Operate
Keyboards

3

| KBPC CG US standard PC keyboard | Keyboard tray |

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

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

Selection and ordering data

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

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

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

Selection and ordering data

Description	Order No.
Keyboard tray	**6FC5247-0AA40-0AA0**
For keyboard, incl. 2 collar screws	

SINUMERIK Operate
Keyboards

■ 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

Product name	SINUMERIK KB 310C full CNC keyboard
	6FC5203-0AF21-0AA1
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Distance to PCU	3 m (9.84 ft)
Dimensions	
• Width	310 mm (12.2 in)
• Height	175 mm (6.89 in)
• Depth	31 mm (1.22 in)
Panel cutout	
• Width	285 mm (11.22 in)
• Height	155 mm (6.1 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	0.9 kg (1.98 lb)
Approvals, according to	CE, UL

■ Selection and ordering data

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

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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

Product name	SINUMERIK KB 483C full CNC keyboard
	6FC5203-0AF20-0AA1
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative atmospheric humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	483 mm (19.02 in)
• Height	133 mm (5.24 in)
• Depth	31 mm (1.22 in)
Panel cutout	
• Width	450 mm (17.72 in)
• Height	112.5 mm (4.43 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	1.3 kg (2.87 lb)
Approvals, according to	CE, UL

◾ Selection and ordering data

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

DEMMEL – full CNC keyboard

Overview

The full CNC membrane keyboards supplied by DEMMEL 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

Product name	DEMMEL full CNC membrane keyboards
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection to DIN EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity class based on DIN EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Ambient temperature	
• Storage	-25 … +55 °C (-13 ... +131 °F)
• Transport	-25 … +55 °C (-13 ... +131 °F)
• Operation	
- Front	0 … 45 °C (32 ... 113 °F)
- Rear	0 … 55 °C (32 ... 131 °F)
Dimensions	
• Width	
- QWERTY 483	483 mm (19.02 in)
- QWERTY 310	310 mm (12.2 in)
• Height	
- QWERTY 483	133 mm (5.24 in)
- QWERTY 310	175 mm (6.89 in)
• Depth	31 mm (1.22 in)
Panel cutout	
• Width	
- QWERTY 483	451 mm (17.76 in)
- QWERTY 310	278.4 mm (10.96 in)
• Height	
- QWERTY 483	115.1 mm (4.53 in)
- QWERTY 310	157.6 mm (6.20 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	
• QWERTY 483	1.3 kg (2.87 lb)
• QWERTY 310	1.1 kg (2.43 lb)

More information

DEMMEL 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!

DEMMEL AG

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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 re-moved 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

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

Selection and ordering data

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

CompactFlash card

■ 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

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

■ Selection and ordering data

Description	Order No.
CompactFlash card Empty memory card	
• 1 GB	**6FC5313-5AG00-0AA1**
• 8 GB	**6FC5313-6AG00-0AA0**

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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

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

Selection and ordering data

Description	Order No.
Industrial USB hub 4 With 4 USB interfaces, degree of protection IP65	**6AV6671-3AH00-0AX0**

SIMATIC IPC USB FlashDrive

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

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

Selection and ordering data

Description	Order No.
SIMATIC IPC USB FlashDrive 8 GB, USB 2.0, metal enclosure, boot capability, incl. SIMATIC PC BIOS Manager	**6ES7648-0DC50-0AA0**

3

SINUMERIK Operate
Industrial switches

Industrial Ethernet Switches – SCALANCE

3

■ 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.
Industrial Ethernet Switch SCALANCE XB005 unmanaged With 5 x 10/100 Mbit/s RJ45 ports for configuring small star and line topologies IP20 degree of protection	**6GK5005-0BA00-1AB2**
Industrial Ethernet Switch SCALANCE X005 unmanaged With 5 x 10/100 Mbit/s RJ45 ports for configuring small star and line topologies IP30 degree of protection	**6GK5005-0BA00-1AA3**
Industrial Ethernet Switch SCALANCE X108 unmanaged With 8 x 10/100 Mbit/s RJ45 ports for configuring star and line topologies IP30 degree of protection	**6GK5108-0BA00-2AA3**
Industrial Ethernet Switch SCALANCE X208 managed With 8 × 10/100 Mbit/s RJ45 ports for configuring line, star and ring topologies IP30 degree of protection	**6GK5208-0BA10-2AA3**
Industrial Ethernet Switch SCALANCE X208PRO managed With 8 x 10/100 Mbit/s RJ45 ports for configuring linear, star and ring topologies IP65 degree of protection incl. 8 × RJ45 and 3 × M12 dust protection caps	**6GK5208-0HA00-2AA6**
Ethernet cables and connections	
IE FC RJ45 plug 180 RJ plug connector for Industrial Ethernet with robust metal casing and integrated cutting/clamping contacts; with 180° outgoing cable	**6GK1901-1BB10-2AA0**
IE FC Standard Cable GP 2 x 2 (Type A) 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)	**6XV1840-2AH10**
IE FC Trailing Cable GP 2 x 2 (Type C) 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)	**6XV1840-3AH10**

■ 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

Technical specifications

Product name	SCALANCE XB005 6GK5005-0BA00-1AB2	SCALANCE X005 6GK5005-0BA00-1AA3	SCALANCE X108 6GK5108-0BA00-2AA3	SCALANCE X208 6GK5208-0BA10-2AA3	SCALANCE X208PRO 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 (-40 ... +176 °F)			-40 … +70 °C (-40 … +158 °F)	-40 … +80 °C (-40 ... +176 °F)
• Transport	-40 … +80 °C (-40 ... +176 °F)			-40 … +70 °C (-40 … +158 °F)	-40 … +80 °C (-40 ... +176 °F)
• Operation	-10 °C … +60 °C (14 ... 140 °F)	0 °C … 65 °C (32 ... 149 °F)	-20 ... +70 °C (-4 ... +158 °F)	-40 °C … +60 °C (-40 ... +140 °C)	-20 ... +70 °C (-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				

3

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" × 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" × 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

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
www.rittal.de

3

ROSE Systemtechnik GmbH

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
www.rose-pw.de

Notes

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SINUMERIK Integrate

4

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

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
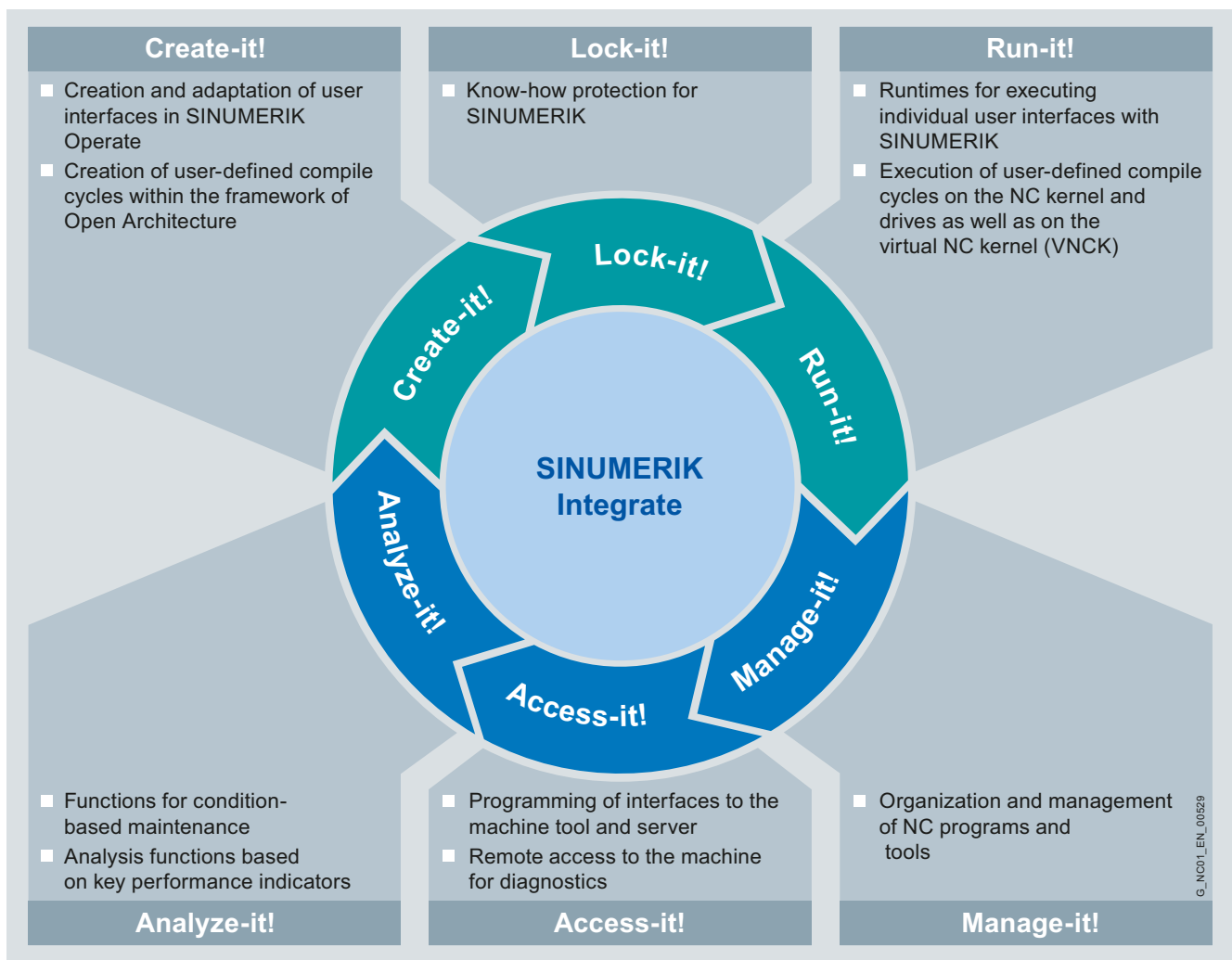
Manage-it!

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.

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Create-it!
- Creation and adaptation of user interfaces in SINUMERIK Operate
- Creation of user-defined compile cycles within the framework of Open Architecture

Lock-it!
- Know-how protection for SINUMERIK

Run-it!
- Runtimes for executing individual user interfaces with SINUMERIK
- Execution of user-defined compile cycles on the NC kernel and drives as well as on the virtual NC kernel (VNCK)

SINUMERIK Integrate

Analyze-it!
- Functions for condition-based maintenance
- Analysis functions based on key performance indicators

Access-it!
- Programming of interfaces to the machine tool and server
- Remote access to the machine for diagnostics

Manage-it!
- Organization and management of NC programs and tools
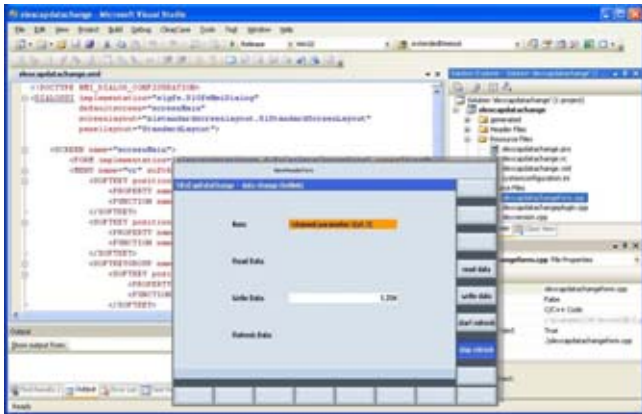
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SINUMERIK Integrate software modules

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
SINUMERIK Integrate Create MyHMI /3GL	SINUMERIK Operate NCU 710.3 PN, NCU 720.3 PN, NCU 730.3 PN PCU 50.5	SINUMERIK Integrate Run MyHMI /3GL Software option P60
Editor	SINUMERIK Operate NCU 710.3 PN, NCU 720.3 PN, NCU 730.3 PN PCU 50.5	SINUMERIK Integrate Run MyScreens Software option P64
	SIMATIC HMI	
SINUMERIK HMI configuring package WinCC flexible 2008	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	SINUMERIK Integrate Run MyHMI /SIMATIC OP 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.

4

Create MyHMI

■ Selection and ordering data

Description	Order No.
SINUMERIK Integrate Create MyHMI /3GL	
Including operating software SINUMERIK Operate for PC/PG for SINUMERIK 840D sl	
Engineering system languages: English, German	
Runtime system languages: Supports all languages of the HMI runtime system	
• Single license on DVD-ROM for current software version incl. Automation Value Card with 400 credits	**6FC5861-1YC00-0YA0**
• Single license on DVD-ROM for specific software version incl. Automation Value Card with 400 credits	**6FC5861-1YC■■-■YA0**
• Single license without data carrier	**6FC5861-1YP00-0YB0**
• Software update service	**6FC5861-1YP00-0YL8**
Qt license key	**Digia Ltd.**
For SINUMERIK Integrate Create MyHMI /3GL	
Accessories	
SINUMERIK HMI configuring package WinCC flexible 2008	
• Single license on DVD-ROM for current software version incl. Automation Value Card with 400 credits	**6FC5253-0CX25-0AG0**
• Single license on DVD-ROM for specific software version incl. Automation Value Card with 400 credits	**6FC5253-1CX25-3AG0**
• Single license without data carrier	**6FC5253-0CX25-0AG1**
• Software update service	**6FC5253-0CX25-0AG2**
SINUMERIK Integrate Run MyHMI /3GL	
For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP60-0YB0**

■ Selection and ordering data (continued)

Description	Order No.
Accessories (continued)	
SINUMERIK Integrate Run MyScreens	
For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP64-0YB0**
SINUMERIK Integrate Run MyHMI /SIMATIC OP	
For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP03-0YB0**

Example of a specific software version 2.7:
6FC5861-1YC**23-0**YA0

■ More information

• You will find further information in the "Updates" at:

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

• You can obtain the Qt license key directly from:

Digia Ltd.

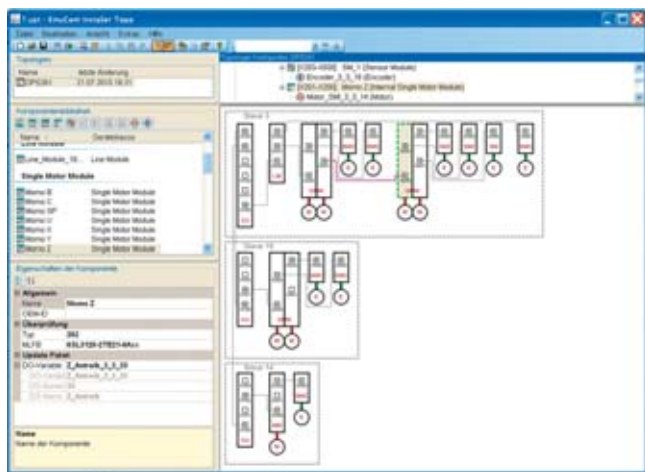Contact: Joachim Hagene

Tel.: +47 47 451220
Fax: +47 22 237040
E-mail: qt-sales@digia.com

4

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.
SINUMERIK Integrate Create MyConfig	
For series start-up and software upgrades	
• Single license on CD-ROM Software version 4.5	**6FC5862-2YC41-0YA0**

Create MyCC

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.
SINUMERIK Integrate Create MyCC	**On request**
For openness in the NCK	
OEM contract required.	
SINUMERIK Integrate Create MyCCI	**6FC5863-1YP00-0YB8**
For openness in the NCK based on customized interface	
OEM contract required.	
SINUMERIK Integrate Create MyCCI /Int	**6FC5863-0YP00-0YB8**
For openness in the NCK based on Interpreter interface	
OEM contract required.	

Accessories

SINUMERIK Integrate Run MyCC	
License for compile cycles developed by the OEM	
• Single license without data carrier	**6FC5800-0AM04-0YB0**

4

SINUMERIK Integrate
Create-it!

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 serivce 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)
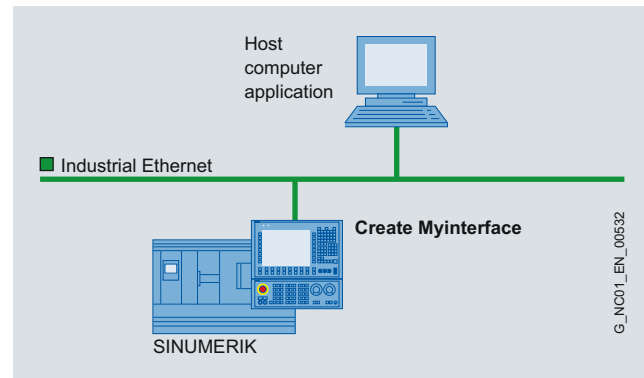- Familiarization
- Commissioning, maintenance

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.
SINUMERIK Integrate Create MyInterface	
Communication software for host computer interface	
Languages: English, German	
• CD-ROM without license for current software version	**6FC6000-7AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-7AC0■-■AA8**
• Single license without data carrier	**6FC5800-0AP50-0YB0**

Example of a specific software version 2.6:
6FC6000-7AC0**2-0**AA8

4

Lock MyCycles

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.
SINUMERIK Integrate LOCK MyCycles Cycle protection (OEM) for SINUMERIK 840D sl	
• Single license without data carrier	**6FC5800-0AP54-0YB0**

4

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.
SINUMERIK Integrate Run MyCC For SINUMERIK 840D sl License for compile cycles developed by the OEM	
• Single license without data carrier	**6FC5800-0AM04-0YB0**
Technological add-on functions in the form of loadable compile cycles as an option for SINUMERIK 840D sl	
SINUMERIK Integrate Run MyCC /RESU Continue machining at the contour (retrace support)	**6FC5800-0AM24-0YB0**
SINUMERIK Integrate Run MyCC /2TRA Transformation: DOUBLETRANSMIT	**6FC5800-0AM25-0YB0**
SINUMERIK Integrate Run MyCC /RCTRA Transformation: Handling	**6FC5800-0AM31-0YB0**
SINUMERIK Integrate Run MyCC /HSLC High-speed laser switching signal	**6FC5800-0AM38-0YB0**
SINUMERIK Integrate Run MyCC /CLC Clearance control 1D/3D in position control cycle	**6FC5800-0AM40-0YB0**
SINUMERIK Integrate Run MyCC /PACO Transformation: PARACOP 3 AXES	**6FC5800-0AM44-0YB0**
SINUMERIK Integrate Run MyCC /SCIS Transformation: Pantograph kinematics	**6FC5800-0AM51-0YB0**
SINUMERIK Integrate Run MyCC /SEC-KT Spatial compensation for kinematic transformations	**6FC5800-0AM57-0YB0**
SINUMERIK Integrate Run MyCC /TPM-PB PROFIBUS tool and process monitoring	**6FC5800-0AM62-0YB0**
SINUMERIK Integrate Run MyCC /SCRA Transformation: SCARA, 2/3 axes	**6FC5800-0AM68-0YB0**
SINUMERIK Integrate Run MyCC /SKID Transformation: Double slide	**6FC5800-0AM80-0YB0**
SINUMERIK Integrate Run MyCC /AXCO Compensation of a forced mechanical coupling	**6FC5800-0AM81-0YB0**
SINUMERIK Integrate Run MyCC /KPXT Drive current measurement	**6FC5800-0AM82-0YB0**
SINUMERIK Integrate Run MyCC /DSTT Transformation: Dynamic swivel tripod	**6FC5800-0AM84-0YB0**

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■ **Selection and ordering data** (continued)

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

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

SINUMERIK Integrate
Run-it!

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.
SINUMERIK Integrate Run MyHMI /3GL For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP60-0YB0**
SINUMERIK Integrate Run MyHMI /3GL (.NET) For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP66-0YB0**
SINUMERIK Integrate Run MyScreens For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP64-0YB0**
SINUMERIK Integrate Run MyHMI /PRO For SINUMERIK 840D sl Software option	
• Single license without data carrier	**6FC5800-0AP47-0YB0**
SINUMERIK Integrate Run MyHMI /SIMATIC OP For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license without data carrier	**6FC5800-0AP03-0YB0**

■ More information

- You will find further information in the "Updates" at:

  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

- You can obtain the Qt license key directly from:

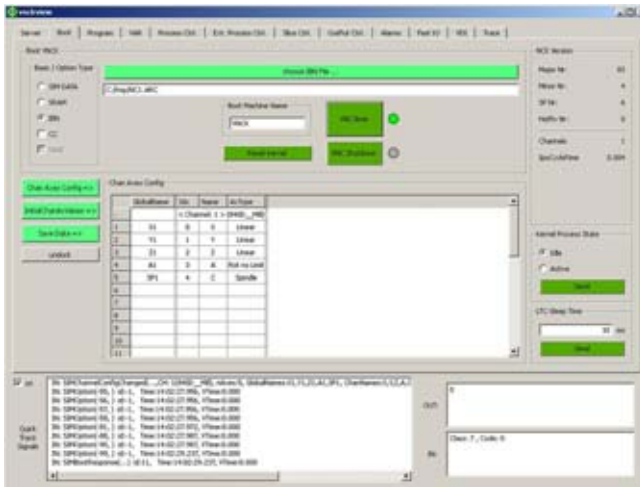 **Digia Ltd.**

  Contact: Joachim Hagene

  Tel.:   +47 47 451220
  Fax: +47 22 237040
  E-mail: qt-sales@digia.com

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SINUMERIK Integrate
Run-it!

Run MyVNCK

■ Overview

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.

■ Selection and ordering data

Description	Order No.
SINUMERIK Integrate Run MyVNCK VNCK basic package for PC	**6FC5868-0XC40-0YA8**
SINUMERIK 840D sl VNCK	
• Basic package up to 4 axes simultaneously for 1 machine configuration	**6FC5868-0XF00-0YB0**
• Basic package for 5 axes or more simultaneously for 1 machine configuration	**6FC5868-0XF01-0YB0**
• Expansion >1 machine configuration	**6FC5868-0XF03-0YB0**
SINUMERIK Option VNCK-Link for 1 machine configuration	**6FC5261-0AX30-0AB0**

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
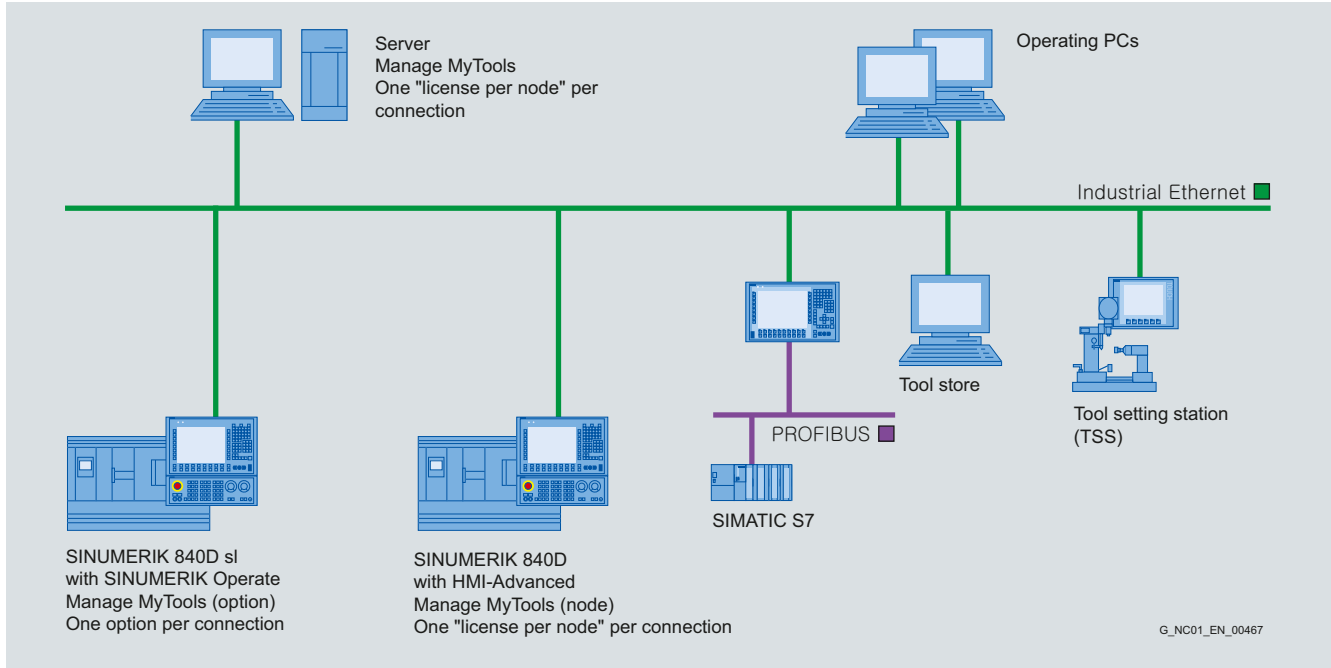
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SINUMERIK Integrate
Manage-it!

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

G_NC01_EN_00467

Selection and ordering data

Description	Order No.
SINUMERIK Integrate Manage MyTools	
Option for SINUMERIK Operate	
For SINUMERIK 840D sl	
Software option (in conjunction with SINUMERIK Operate operating software)	
• Single license, without data carrier	**6FC5800-0AP37-0YB0**
SINUMERIK Integrate Manage MyTools	
License per system participant (e.g. HMI-Advanced, server, operating stations), order data carrier separately	
• Single license per connection node without data carrier	**6FC6000-2NF00-0YB0**

Description	Order No.
SINUMERIK Integrate Manage MyTools	
Data carrier for installation of server, PC, PCU 50.5 and SINUMERIK 840D sl (in conjunction with SINUMERIK Operate operating software)	
• CD-ROM without license, specific version Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC6000-2XC0■-■AA8**
• CD-ROM without license, current version	**6FC6000-2XC02-4AA8**

Example of a specific software version 2.4:
6FC6000-2XC0**2-4**AA8

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

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SINUMERIK Integrate
Manage-it!

Manage MyPrograms

Selection and ordering data

Description	Order No.
SINUMERIK Integrate Manage MyPrograms For SINUMERIK 840D sl Software option • Single license, without data carrier	**6FC5800-0AP41-0YB0**
SINUMERIK Integrate Manage MyPrograms License per connection node, per system participant (e.g. HMI-Advanced, server, operating station), order data carrier separately • Single license per connection node without data carrier	**6FC6000-0NF00-0YB0**
SINUMERIK Integrate Manage MyPrograms Data carrier for installation of server, PC, PCU 50.5 and SINUMERIK 840D sl (in conjunction with SINUMERIK Operate operating software) • CD-ROM without license, specific version Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC6000-0XC0■-■AA8**
• CD-ROM without license, current version	**6FC6000-0XC02-4AA8**

Example of a specific software version 2.4:
6FC6000-0XC0**2-4**AA8

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.
SINUMERIK Integrate Access MyMachine /P2P For SINUMERIK 840D sl Software option Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC5800-0AP30-0YB0**
SINUMERIK Integrate Access MyMachine /P2P for PC/PG	
• Current software version single license with CD-ROM	**6FC5860-7YC00-0YA0**
• Specific software version single license with CD-ROM	**6FC5860-7YC■■-■YA0**
TS Adapter IE modem with integrated analog modem	**6ES7972-0EM00-0XA0**
TS Adapter IE ISDN with integrated ISDN terminal adapter	**6ES7972-0ED00-0XA0**
Teleservice software With floating license Languages: English, French, German, Italian, Spanish	**6ES7842-0CE00-0YE0**

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

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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.
SINUMERIK Integrate Access MyMachine /Ethernet Diagnostic Services (Network Services)	
• 1st year (term of contract 15 months)[1]	**6FC6001-0EE00-0DS0**
• 12 months extension[1]	**6FC6001-0EE00-0DS1**
Requirements for the use of Access MyMachine/Ethernet are	
SINUMERIK Integrate Access MyMachine /Ethernet Account (Company Account)	**6FC6001-0EE00-0CA1**
SINUMERIK Integrate Access MyMachine /Ethernet Setup Fee (Connect Machine)	
• Without EUNA	**6FC6001-0EE00-0CE0**
• With EUNA	**6FC6001-0EE00-0CE1**

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

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[1] 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.
SINUMERIK Integrate Access MyTool ID	
Option for SINUMERIK Operate	
For SINUMERIK 840D sl, the software is included in the SINUMERIK Operate package	
• Single license, without data carrier	**6FC5800-0AP52-0YB0**

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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.
SINUMERIK Integrate Analyze MyCondition	
(Condition Monitoring Basic) for condition-oriented maintenance	
• 1st year (term of contract 15 months)	**6FC6001-0EE00-0MB0**
• 12 months extension	**6FC6001-0EE00-0MB1**
Requirements for the use of Analyze MyCondition are	
SINUMERIK Integrate Access MyMachine/Ethernet	
Account (Company Account)	**6FC6001-0EE00-0CA1**
SINUMERIK Integrate Access MyMachine/Ethernet	
Setup Fee (Connect Machine)	
• Without EUNA	**6FC6001-0EE00-0CE0**
• With EUNA	**6FC6001-0EE00-0CE1**

EUNA: End User Notification Administration

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Overview

Complete designation	Abbreviation	Former designation	Order No.
SINUMERIK Integrate Create-it!			
SINUMERIK Integrate Create MyHMI /3GL	CMH/3	SINUMERIK Operate Programming Package	6FC5861-1YC00-0YA0 6FC5861-1YC..-.YA0 6FC5861-1YP00-0YB0 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 6FC6000-7AC0.-.AA8 6FC5800-0AP50-0YB0
SINUMERIK Integrate Lock-it!			
SINUMERIK Integrate Lock MyCycles	LMC	– (new product)	6FC5800-0AP54-0YB0
SINUMERIK Integrate Run-it!			
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 6FC5800-0AP66-0YB0
SINUMERIK Integrate Run MyScreens	RMS	SINUMERIK Operate Runtime OA Easy Screen + 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 6FC5868-0XF00-0YB0 6FC5868-0XF01-0YB0 6FC5868-0XF03-0YB0
SINUMERIK Integrate Manage-it!			
SINUMERIK Integrate Manage MyTools	MMT	MCIS TDI Machine (package incl. MCIS TDI Overview, MCIS TDI Toolhandling) under construction <GAPs> Operate: TDI Planning, TDI Statistic	6FC5800-0AP37-0YB0 6FC6000-2NF00-0YB0 6FC6000-2XC0.-.AA8 6FC6000-2XC02-4AA8
SINUMERIK Integrate Manage MyPrograms	MMP	MCIS DNC	6FC5800-0AP41-0YB0 6FC6000-0NF00-0YB0 6FC6000-0XC0.-.AA8 6FC6000-0XC02-4AA8
SINUMERIK Integrate Access-it!			
SINUMERIK Integrate Access MyMachine /P2P	AMM/P	MCIS RCS Host + RCS Commander	6FC5800-0AP30-0YB0 6FC5860-7YC00-0YA0 6FC5860-7YC..-.YA0
SINUMERIK Integrate Access MyMachine /Ethernet	AMM/E	ePS Remote Access	6FC6001-0EE00-0DS0 6FC6001-0EE00-0DS1 6FC6001-0EE00-0CA1 6FC6001-0EE00-0CE0 6FC6001-0EE00-0CE1
SINUMERIK Integrate Access MyTool ID	AMT	MCIS TDI Ident Connection	6FC5800-0AP52-0YB0
SINUMERIK Integrate Analyze-it!			
SINUMERIK Integrate Analyze MyCondition (ASP)	AMC	EPS COND. MON. BASIC	6FC6001-0EE00-0MB0 6FC6001-0EE00-0MB1 6FC6001-0EE00-0CA1 6FC6001-0EE00-0CE0 6FC6001-0EE00-0CE1

Comparison between current and former product designations.

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SINUMERIK Integrate

Notes

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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   TM120
DME20   TM15
TM41

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)

3 AC SINAMICS S120 Chassis
SINAMICS S120 Booksize
DRIVE-CLiQ
Control Unit

G_D211_EN_00097b

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.

5

■ **Overview** (continued)

SINUMERIK
HT 8

SINUMERIK operator panels with TCU

SINUMERIK
PCU 50.5

Industrial Ethernet ■

PROFIBUS I/O ■

DRIVE-CLiQ ■

SINUMERIK
840D sl with
SINAMICS S120

NX15.3

SINAMICS S120

Power supply

Servomotors

Servomotors

Main spindle motor

G_NC01_EN_00524

SINAMICS S120 drive system with SINUMERIK 840D sl

5

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.

SINAMICS S120 drive system
Introduction

■ **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.

internal air cooling   external air cooling   cold-plate cooling   liquid cooling

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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 SINMAICS 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

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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.

Drive system	SINAMICS S120
Electronic power supply	24 V DC, -15 %/+20 %
Vibratory load	
• Transport[1] acc. to EN 60721-3-2	
- All units and components except for chassis format	Class 2M3
- Chassis format units	Class 2M2
• Operation Test values acc. to EN 60068-2-6	Test Fc
	10 ... 58 Hz: Constant deflection 0.075 mm (0.003 in)
	58 ... 150 Hz: Constant acceleration 9.81 m/s^2 (3.2 ft/s^2) (1 × g)
Shock load	
• Transport[1] acc. to EN 60721-3-2	
- All units and components except for chassis format	Class 2M3
- Chassis format units	Class 2M2
• Operation Test values acc. to EN 60068-2-27	Test Ea
- Booksize and blocksize formats FSA to FSB	147 m/s^2 (482 ft/s^2) (15 × g)/11 ms
- Blocksize format FSC to FSF	49 m/s^2 (161 ft/s^2) (5 × g)/30 ms
- Chassis format	98 m/s^2 (321 ft/s^2) (10 × g)/20 ms
Ambient conditions	
• Protection class acc. to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
• Touch protection	DIN VDE 0106 Part 100 and BGV A 3 when used properly
• Cooling method	Internal/external air cooling, power units with increased air cooling by means of built-in fan
Permissible ambient/coolant temperature (air) during operation	
• For line-side components, Power Modules, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F), see derating characteristics
• For Control Units, supplementary system components, DC link components, and Sensor Modules	0 ... 55 °C (32 ... 131 °F) up to 2000 m (6562 ft) above sea level
Climatic ambient conditions	
• Storage[1] acc. to EN 60721-3-1	Class 1K4 Temperature -25 ... +70 °C (-13 ... +158 °F)
• Transport[1] acc. to EN 60721-3-2	Class 2K4 Temperature -40 … +70 °C (-40 ... +158 °F) Max. air humidity 95 % at 40 °C (104 °F)
• Operation acc. to EN 60721-3-3	Class 3K3 Temperature 0 ... 55 °C (32 ... 131 °F) Condensation, splashwater, and ice formation are not permitted (EN 60204, Part 1)

Drive system	SINAMICS S120
Environmental class/harmful chemical substances	
• Storage[1] acc. to EN 60721-3-1	Class 1C2
• Transport[1] acc. to EN 60721-3-2	Class 2C2
• Operation acc. to EN 60721-3-3	Class 3C2
Organic/biological influences	
• Storage[1] acc. to EN 60721-3-1	Class 1B1
• Transport[1] acc. to EN 60721-3-2	Class 2B1
• Operation acc. to EN 60721-3-3	Class 3B1
Degree of contamination acc. to EN 61800-5-1	2
European standards	
EN 954-1 Successor standard: ISO 13849-1	Safety of machinery – Safety-related parts of control systems Part 1: General principles for design
EN 61508-1	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements
EN 50370-1	Electromagnetic compatibility (EMC) – Product family standard for machine tools Part 1: 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 Part 1: General requirements
EN 61800-3	Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods
EN 61800-5-1	Adjustable speed electrical power drive systems Part 5: Safety requirements Main section 1: Electrical and thermal requirements
North American standards	
UL508C	Power conversion equipment
CSA C22.2 No. 14	Industrial control equipment
Approvals	
cULus	Testing by UL (Underwriters Laboratories) according to UL and CSA standards www.ul.com

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[1] In transport packaging.

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.

5

Overview

G_PM10_XX_00144

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.

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SINAMICS S120 drive system
Communication

■ **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 µs.

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.

5

■ **Overview**

G_D211_XX_00050

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
Industrial Wireless LAN	One cable for all purposes	Speed
Safety	Device/network diagnostics	High precision
Flexible topologies	Energy efficiency	Large quantity structures
Open standard	Easy cabling	High transmission rate
Web tools	Fast device replacement	Media redundancy
Expandability	Ruggedness/stability	Fast start-up

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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.

I/O controller: e. g. SIMATIC S7

■ PROFINET

IO devices

I/O

SINAMICS drives   SINAMICS drives

G_D211_EN_00052a

SINAMICS S120 drive system
Communication

PROFINET

■ Design

PROFINET IO with IRT for Motion Control[1]

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.

e.g. 1 ms position control cycle

G_D211_EN_00053a

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.

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[1] IRT interpolation with SINUMERIK NCK coming soon

SINAMICS S120 drive system
Engineering software

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.
SIZER for Siemens Drives engineering tool	**6SL3070-0AA00-0AG0**
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

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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.
STARTER commissioning tool for SINAMICS and MICROMASTER DVD-ROM English, French, German, Italian, Spanish	**6SL3072-0AA00-0AG0**

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SINAMICS S120 drive system
Engineering software

■ 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 for communication between the drive unit and the programming device or PC	Order No.
RS232	**SIMATIC S7 connecting cable** Null modem cable, 6 m (19.69 ft)	**6ES7901-1BF00-0XA0**
PROFIBUS	**CP 5512 communications module** PCMCIA type 2 card + adapter with 9-pin sub D socket, for Windows 2000/Windows XP Professional and PCMCIA 32	**6GK1551-2AA00**
	CP 5711 communications module USB adapter for connecting a PG or notebook to PROFIBUS or MPI USB cable (2 m) (6.56 ft) included in scope of delivery	**6GK1571-1AA00**
	SIMATIC DP plug-in cable 12 Mbaud, for PG connector, pre-assembled with 2 × 9-pin sub D connector, 3 m (9.84 ft)	**6ES7901-4BD00-0XA0**
PROFINET/Ethernet	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

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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
Infeed Control	• Booksize - Current control with/without mains sensor - V_{DC} control with/without mains sensor • Chassis - Current control with mains sensor - V_{DC} control with mains sensor	• Booksize - Smart Line mode can be selected • Chassis - None	• Mains identification • Controller optimization • Harmonics filter • Integral reactive current compensation can be activated for the drive components • Automatic restart	The mains sensor is the VSM10 Voltage Sensing Module; "current" is the line current; 3-phase with line frequency[1]
Servo Control	• Asynchronous motor - Torque control with encoder - Speed control with/without encoder • Synchronous motor, linear motor and torque motor - Torque control with encoder - Speed control with encoder • For all motor types - Position control with encoder	• Linear/parabolic characteristic • Fixed-frequency characteristic (textiles) • Independent voltage setpoint input	• Data set switchover • Setpoint input • Motor identification • Damping application • Reduced magnetic flux in the asynchronous motor for reducing the thermal load on the machine • Technology controller • Basic positioner	The position control can be selected as a function module (stand-alone drives)

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[1] 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[1])
- 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: ±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[2]

■ 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 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 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.

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[1] Only for use with SINAMICS S120 drive solutions without SINUMERIK.
[2] 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

■ Technical specifications

Product name	CU310-2 Control Unit
	PROFINET: 6SL3040-1LA01-0AA0
	PROFIBUS: 6SL3040-1LA00-0AA0
Current requirement, max. At 24 V DC, without taking account of digital outputs and DRIVE-CLiQ supply	0.35 A for CU310-2 + 0.5 A for PM340 Power Module
Conductor cross-section, max.	2.5 mm²
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1
	5 isolated digital inputs
	4 bidirectional non-isolated digital inputs/digital outputs
	3 parameterizable, fail-safe (available soon) digital inputs (isolated), or alternatively 6 parameterizable digital inputs (isolated)
	5 bidirectional isolated digital inputs/outputs
• 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, typ.	10 mA
• Delay time of digital inputs[1], approx.	
- L → H	50 µs
- H → L	100 µs
• Delay time of high-speed digital inputs[1], approx. (high-speed digital inputs can be used for position detection)	
- L → H	5 µs
- H → L	50 µs
• Conductor cross-section, max.	0.5 mm²
Digital outputs (resistant to sustained short circuits)	8 bidirectional non-isolated digital outputs/ digital inputs
• Voltage	24 V DC
• Load current per digital output[2], max.	500 mA
• Delay time[1], typ./max.	
- L → H	150 µs/400 µs
- H → L	75 µs/100 µs
• Conductor cross-section, max.	0.5 mm²

Product name	CU310-2 Control Unit
	PROFINET: 6SL3040-1LA01-0AA0
	PROFIBUS: 6SL3040-1LA00-0AA0
Encoder evaluation	Incremental encoder TTL/HTL
	SSI encoder without incremental signals
• Input impedance	
- TTL	570 Ω
- HTL, max.	16 mA
• 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
• Resolution absolute position SSI	30 bit
• Cable length, max.	
- TTL encoder	100 m (328 ft) (only bipolar signals permitted)[3]
- HTL encoder	100 m (328 ft) for unipolar signals 300 m (984 ft) for bipolar signals[3]
- SSI encoder	100 m (328 ft)
Power loss	< 20 W
PE connection	M5 screw
Dimensions	
• Width	73 mm (2.87 in)
• Height	191 mm (7.52 in)
• Depth	75 mm (2.95 in)
Weight, approx.	0.95 kg (2 lb)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
CU310-2 PN Control Unit Without CompactFlash card	**6SL3040-1LA01-0AA0**
CU310-2 DP Control Unit Without CompactFlash card	**6SL3040-1LA00-0AA0**
Accessories	
STARTER commissioning tool	**6SL3072-0AA00-0AG0**
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

For information on connectors and cables, please refer to Catalog IK PI and the Siemens Industry Mall:
www.siemens.com/industrymall

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[1] 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.

[2] In order to use the digital outputs, an external 24 V power supply must be connected to terminal X124.

[3] 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 Compact-Flash 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.
CompactFlash card for CU310-2 PN and CU310-2 DP Control Units **without** **Safety license**	
including Certificate of License	**6SL3054-0E■00-1BA0**
CompactFlash card for CU310-2 PN and CU310-2 DP Control Units **with** **Safety license**	
including Certificate of License and with Safety license	**6SL3054-0E■00-1BA0-Z F01**
Firmware **V4.4**	**E**
Firmware **V4.5** (available soon)	**F**
Subsequent licensing	
Safety Integrated Extended Functions option including Certificate of License for one axis for subsequent licensing of a CompactFlash card.	**6SL3074-0A A 10-0AA0**

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SINAMICS S120 drive system
Control Units

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[1]
- CU320-2 PN: 1 PROFINET interface with 2 ports (RJ45 sockets) with PROFIdrive V4 profile
- CU320-2 DP: 1 PROFIBUS interface with PROFIdrive 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[2]
- 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.

[1] Only for use with SINAMICS S120 drive solutions without SINUMERIK.
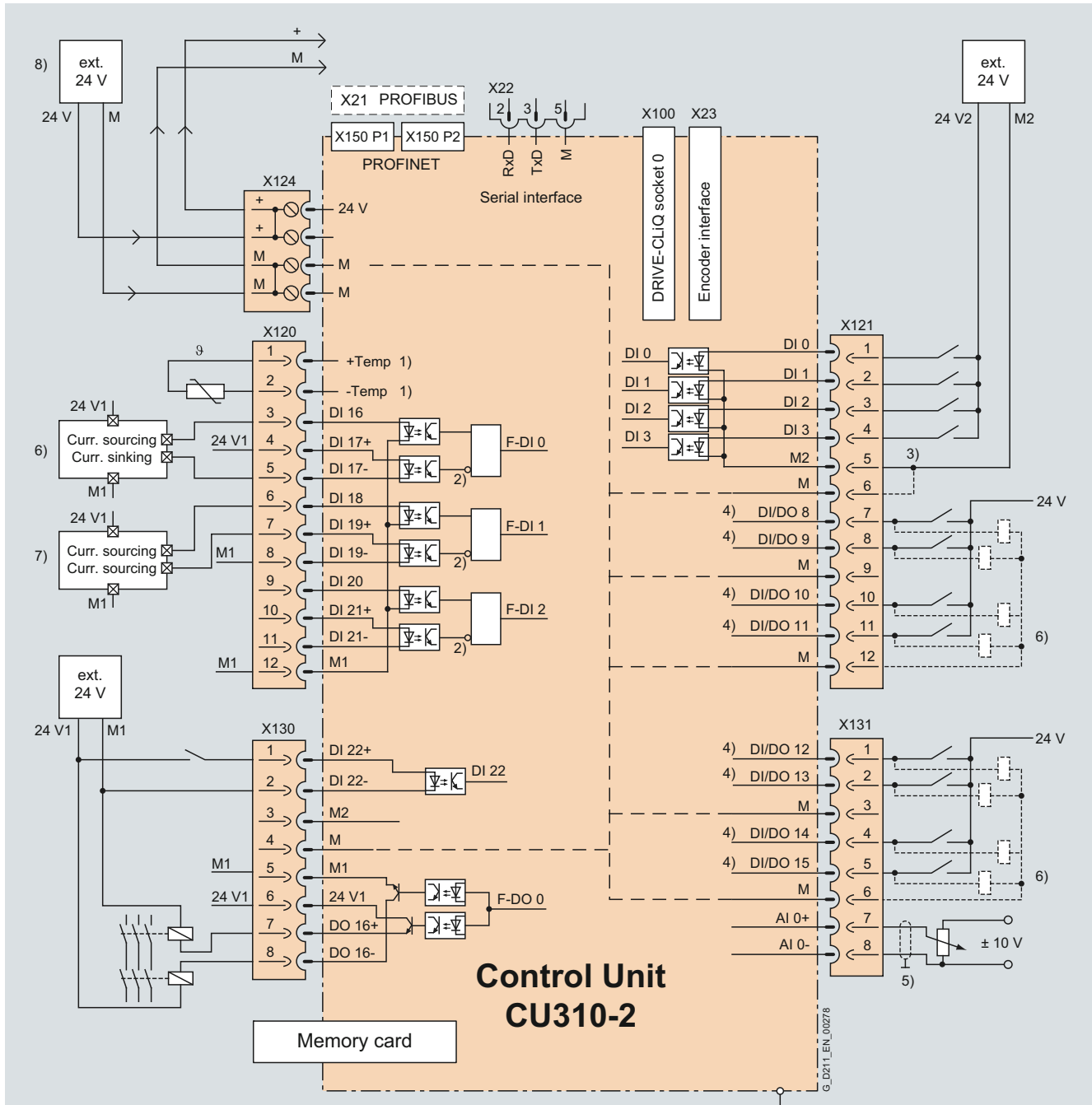[2] BOP20 is not used on machine tools.

SINAMICS S120 drive system
Control Units

CU320-2 Control Unit

■ **Integration** (continued)

1) Fast inputs (must be shielded).
2) Jumper open, isolation for digital inputs (DI).
3) Can be parameterized individually as input/output.

Connection example of a CU320-2 Control Unit

SINAMICS S120 drive system
Control Units

CU320-2 Control Unit

■ Technical specifications

Product name	CU320-2 Control Unit
	PROFINET: 6SL3040-1MA01-0AA0
	PROFIBUS: 6SL3040-1MA00-0AA0
Current requirement, max. At 24 V DC, without taking account of digital outputs, expansion option slot and DRIVE-CLiQ supply	1.0 A
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1
	12 isolated digital inputs
	8 bidirectional non-isolated digital inputs/digital outputs
• 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, typ.	9 mA
• Delay time of digital inputs[1], approx.	
- L → H	5 µs
- H → L	50 µs
• Conductor cross-section, max.	1.5 mm^2
Digital outputs (resistant to sustained short circuits)	8 bidirectional non-isolated digital outputs/digital inputs
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Delay time[1], typ./max.	
- L → H	150 µs/400 µs
- H → L	75 µs/100 µs
• Conductor cross-section, max.	1.5 mm^2
Power loss	24 W
PE connection	M5 screw
Ground connection	M5 screw
Dimensions	
• Width	50 mm (1.97 in)
• Height	300 mm (11.81 in)
• Depth	226 mm (8.90 in)
Weight, approx.	2.3 kg (5.07 lb)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
Control Unit CU320-2 PN	**6SL3040-1MA01-0AA0**
Control Unit CU320-2 DP	**6SL3040-1MA00-0AA0**
Accessories	
Spacers (2 units) For increasing the depth of the CU320-2 DP Control Unit to 270 mm (10.63 in) (if the integrated brackets are not used, but the depth still has to be 270 mm (10.63 in))	**6SL3064-1BB00-0AA0**
STARTER commissioning tool	**6SL3072-0AA00-0AG0**
Accessories for re-ordering	
SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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[1] 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 ordered for each axis via order codes (**F..**) in addition to the Order No.

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.
CompactFlash card for CU320-2 Control Unit <u>without</u> Safety license	
- Without performance expansion	**6SL3054-0E ■ 00-1BA0**
- With performance expansion firmware option	**6SL3054-0E ■ 01-1BA0**
CompactFlash card for CU320-2 Control Unit <u>with</u> Safety license	
• 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**
Subsequent licensing	
• 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. 6× for a CompactFlash card	**6SL3074-0A A 10-0AA0**

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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.

[1] 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 ±10 %.

[2] 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

Product name	Smart Line Modules in booksize format 6SL313.-6....-....
Line supply voltage Up to 2000 m (6562 ft) above sea level	380 ... 480 V 3 AC ± 10 % (-15 % < 1 min)[1]
Line frequency	47 … 63 Hz
Line power factor At rated power	
• Fundamental (cos φ_1)	> 0.96
• Total (λ)	0.65 … 0.90
Overvoltage category In accordance with EN 60664-1	Class III
DC link voltage, approx.	1.35 × line voltage[2]
Electronic power supply	24 V DC, -15 %/+20 %
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 according to EN 61800-3 up to 350 m (1148 ft) total cable length (shielded)
Cooling method	Internal air cooling
	External air cooling, power units with increased air cooling by built-in fans
	Cold-plate cooling (5 kW (6.71 HP) / 10 kW (13.4 HP))
Permissible ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	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	–	–	–
Infeed/regenerative feedback power						
• Rated power P_{rated}						
- at 380 V 3 AC	kW	5	10	16	36	55
- at 460 V 3 AC[3]	(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
DC link current						
• 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
Input current						
• 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
Current requirement 24 V DC electronic power supply, max.	A	0.8	0.9	0.95	1.5	1.9
Current carrying capacity						
• 24 V DC busbars	A	20	20	20	20	20
• DC link busbars	A	100	100	100	200	200
DC link capacitance						
• Smart Line Module	µF	220	330	710	1410	1880
• Drive line-up, max.	µF	6000	6000	20000	20000	20000
Internal/external air cooling						
• Power loss[1]						
- Internal air cooling	kW	0.08	0.14	0.19	0.405	0.665
- External air cooling int.[2]/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	m³/s (ft³/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
Cold plate cooling						
• Power loss[1] int.[2]/ext.	kW	0.035/0.04	0.055/0.08	–	–	–
• Thermal resistance R_{th}	K/W	0.175	0.175	–	–	–
Line connection U1, V1, W1		Screw-type terminals (X1)	Screw-type terminals (X1)	Screw-type terminals (X1)	M6 screw studs (X1)	M6 screw studs (X1)
• Conductor cross-section	mm²	2.5 … 6	2.5 … 6	2.5 … 10	2.5 … 50	2.5 … 95
Shield connection		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
PE connection		M5 screw	M5 screw	M5 screw	M6 screw	M6 screw
Cable length, max. 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20

[1] Power loss of Smart Line Module at rated power including losses of 24 V DC electronic power supply.

[2] Power loss of the power electronics + power loss of the 24 V electronics

[3] 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.

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	–	–	–
Dimensions						
• 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)	–	–	–
Weight, approx.						
• 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.
Smart Line Module in booksize format	
Internal air cooling Rated power:	
• 5 kW (5 HP)	**6SL3130-6AE15-0AB0**
• 10 kW (10 HP)	**6SL3130-6AE21-0AB0**
• 16 kW (18 HP)	**6SL3130-6TE21-6AA3**
• 36 kW (40 HP)	**6SL3130-6TE23-6AA3**
• 55 kW (60 HP)	**6SL3130-6TE25-5AA3**
External air cooling Rated power:	
• 5 kW (5 HP)	**6SL3131-6AE15-0AA0**
• 10 kW (10 HP)	**6SL3131-6AE21-0AA0**
• 16 kW (18 HP)	**6SL3131-6TE21-6AA3**
• 36 kW (40 HP)	**6SL3131-6TE23-6AA3**
• 55 kW (60 HP)	**6SL3131-6TE25-5AA3**
Cold plate cooling Rated power:	
• 5 kW (5 HP)	**6SL3136-6AE15-0AA0**
• 10 kW (10 HP)	**6SL3136-6AE21-0AA0**
Accessories	
Shield connection kit For Line/Motor Modules in booksize format with a width of 150 mm (5.91 in)	**6SL3162-1AF00-0AA1**
DC link rectifier adapter For direct infeed of DC link voltage	
• Screw-type terminals 0.5 ... 10 mm² For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	**6SL3162-2BD00-0AA0**
• Screw-type terminals 35 ... 95 mm² 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)	**6SL3162-2BM00-0AA0**
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 … 95 mm² For all Line Modules and Motor Modules in booksize format	**6SL3162-2BM01-0AA0**
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	**6SL3162-2AA00-0AA0**
24 V jumper For connection of the 24 V busbars (for booksize format)	**6SL3162-2AA01-0AA0**

Description	Order No.
Warning labels in 30 languages 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	**6SL3166-3AB00-0AA0**
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For modules with a width of 50 mm/100 mm (1.97 in/3.94 in)	**6SL3163-8KB00-0AA0**
• For modules with a width of 100 mm (3.94 in)	**6SL3163-8FD00-0AA0**
• For modules with a width of 150 mm (5.91 in)	**6SL3163-8GF00-0AA0**
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

■ 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	Suitable for Smart Line Module in booksize format	Line reactor
kW (HP)		Order No.
5 (5)	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	**6SL3000-0CE15-0AA0**
10 (10)	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	**6SL3000-0CE21-0AA0**
16 (18)	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	**6SL3000-0CE21-6AA0**
36 (40)	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	**6SL3000-0CE23-6AA0**
55 (60)	6SL3130-6TE25-5AA3 6SL3131-6TE25-5AA3	**6SL3000-0CE25-5AA0**

■ Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line reactors				
6SL3000-...		0CE15-0AA0	0CE21-0AA0	0CE21-6AA0	0CE23-6AA0	0CE25-5AA0
Rated current	A	14	28	35	69	103
Power loss	W	62	116	110	170	190
Line/load connection 1U1, 1V1, 1W1/ 1U2, 1V2, 1W2		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	4	10	10	16	70
PE connection		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	mm²	4	10	–	–	–
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Weight, approx.	kg (lb)	3.7 (8)	7.5 (17)	9.5 (21)	17 (37)	36 (79)
Approvals according to		cURus	cURus	cURus	cURus	cURus
Suitable for Smart Line Module in booksize format	Type	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	6SL3130-6TE25-5AA3 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	Suitable for Smart Line Module in booksize format	Line filter
kW (HP)		Order No.
5 (5)	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	**6SL3000-0HE15-0AA0**
10 (10)	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	**6SL3000-0HE21-0AA0**
16 (18)	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	**6SL3000-0BE21-6DA0**
36 (40)	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	**6SL3000-0BE23-6DA1**
55 (60)	6SL3130-6TE25-5AA3 6SL3131-6TE25-5AA3	**6SL3000-0BE25-5DA0**

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line filter				
6SL3000-...		0HE15-0AA0	0HE21-0AA0	0BE21-6DA0	0BE23-6DA1	0BE25-5DA0
Rated current	A	12	25	36	74	105
Power loss	W	20	20	16	26	43
Line/load connection L1, L2, L3 / U, V, W		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	10	10	10	35	50
PE connection		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
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Weight, approx.	kg (lb)	2.1 (5)	2.3 (5)	5.0 (11)	7.5 (17)	11.5 (25)
Approvals according to		cURus	cURus	cURus	cURus	cURus
Suitable for Smart Line Module in booksize format	Type	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	6SL3130-6TE25-5AA3 6SL3131-6TE25-5AA3
• Rated infeed power of the Smart Line Module	kW	5	10	16	36	55

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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 kW (HP)	Suitable for Smart Line Module in booksize format	Line contactor Type	Circuit breaker IEC 60947 Order No.	Circuit breaker UL489/CSA C22.2 No. 5-02 Type	Main circuit breaker Order No.
5 (5)	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	3RT1023-...	3RV1031-4BA10	3VL1102-2KM30-....	3LD2003-0TK51
10 (10)	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	3RT1026-...	3RV1031-4FA10	3VL1135-2KM30-....	3LD2203-0TK51
16 (18)	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	3RT1035-...	3RV1031-4FA10	3VL2105-2KN30-....	3LD2504-0TK51
36 (40)	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	3RT1045-...	3RV1041-4LA10	3VL2108-2KN30-....	3LD2704-0TK51
55 (60)	6SL3130-6TE25-5AA3	3RT1054-...	3VL2712-1DC33-....	3VL2112-2KW30-....	3KA5330-1GE01

Rated power kW (HP)	Suitable for Smart Line Module in booksize format	Fuse switch disconnector Order No.	Switch disconnector with fuse holders Order No.	NH fuse (gL/gG) Rated current	Size	Order No.	UL/CSA fuse, Class J Available from: Mersen www.ep.mersen.com Rated current	Size	Reference No.
5 (5)	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	3NP1123-1CA20	3KL5030-1GB01	16 A	000	3NA3805	17.5 A	21 × 57	AJT17-1/2
10 (10)	6SL3130-6AE21-0AB0 6SL3131-6AE21-0AA0 6SL3136-6AE21-0AA0	3NP1123-1CA20	3KL5030-1GB01	35 A	000	3NA3814	35 A	27 × 60	AJT35
16 (18)	6SL3130-6TE21-6AA3 6SL3131-6TE21-6AA3	3NP1123-1CA20	3KL5030-1GB01	35 A	000	3NA3814	35 A	27 × 60	AJT35
36 (40)	6SL3130-6TE23-6AA3 6SL3131-6TE23-6AA3	3NP1123-1CA20	3KL5230-1GB01	80 A	000	3NA3824	80 A	27 × 117	AJT80
55 (60)	6SL3130-6TE25-5AA3	3NP1143-1DA20	3KL5530-1GB01	125 A	000	3NA3132	125 A	41 × 146	AJT125

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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

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SINAMICS S120 drive system
Booksize format – Line Modules

Active Line Modules

■ **Technical specifications**

Product name	Active Line Modules in booksize format 6SL313 . -7TE...	Product name	Active Line Modules in booksize format 6SL313 . -7TE...
Line supply voltage Up to 2000 m (6562 ft) above sea level	380 ... 480 V 3 AC ± 10 % (-15 % < 1 min)[1]	**Radio interference suppression**	
Line frequency	47 … 63 Hz	• Standard combination, consisting of: Active Line Module + Active Interface Module	Category C3 to EN 61800-3 up to 350 m (1148 ft) total cable length
Line power factor		• Extended combination, consisting of: Active Line Module + Active Interface Module + Basic Line Filter	Category C2 according to EN 61800-3 up to 350 m (1148 ft) total cable length Category C3 according to EN 61800--3 from 350 m to 1000 m (1148 ... 3281 ft) total cable length
• Active Mode - Fundamental ($\cos \varphi_1$)	1.0 (factory setting) can be altered by entering a reactive current setpoint		
- Total (λ)	1.0 (factory setting)	• Alternative combination, consisting of: Active Line Module + HFD line reactor	No radio interference suppression
• Smart Mode - Fundamental	> 0.96		
- Total	0.65 … 0.90	• Extended alternative combination, consisting of: Active Line Module + HFD line filter package (including Wideband Line Filter)	Category C2 according to EN 61800-3
Efficiency in %	98		
Overvoltage category In accordance with EN 60664-1	Class III	**Cooling method**	Internal air cooling (power units with increased air cooling by built-in fans)
DC link voltage V_d	In Active Mode, the DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage. In Smart Mode, the DC link voltage is regulated in proportion to the line voltage to the mean rectified line voltage value. Factory setting for DC link voltage: 380 … 400 V 3 AC: 600 V (Active Mode) 400 … 415 V 3 AC: 625 V (Active Mode) 416 … 480 V 3 AC: 1.35 × line voltage (Smart Mode)		External air cooling (power units with increased air cooling by built-in fans)
			Cold plate cooling
			Liquid cooling
		Ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics
		Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Electronic power supply	24 V DC, -15 %/+20 %	**Declarations of conformity**	CE (Low Voltage and EMC Directives)
		Approvals according to	cULus

[1] 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 ±10 %.

■ **Technical specifications** (continued)

Line supply voltage 380 … 480 V 3 AC	Active Line Module in booksize format					
Internal air cooling	6SL3130-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
External air cooling	6SL3131-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
Cold plate cooling	6SL3136-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
Liquid cooling	6SL3135-...	–	–	–	–	7TE31-2AA3
Infeed/regenerative feedback power						
• Rated power P_{rated}						
- at 380 V 3 AC	kW	16	36	55	80 (64[1])	120 (84[1])
- at 460 V 3 AC[5]	(HP)	(18)	(40)	(60)	(100) (75[1])	(150) (100[1])
• For S6 duty P_{S6} (40 %)	kW	21	47	71	106	145
• P_{max}	kW	35	70	91 (110[2])	131	175
DC link current						
• 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[2])	218	292
Input current						
• 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[2])	200	267
Current requirement 24 V DC electronic power supply, max.	A	1.1	1.5	1.9	2.0	2.5 (2.1[3])
Current carrying capacity						
• 24 V DC busbars	A	20	20	20	20	20
• DC link busbars	A	100	200	200	200	200
DC link capacitance						
• Active Line Module	µF	710	1410	1880	2820	3995
• Drive line-up, max.	µF	20000	20000	20000	20000	20000
Internal/external air cooling						
• Power loss[4]						
- 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	m³/s (ft³/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
Cold plate cooling						
• Power loss, int./ext.[4]	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

[1] In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

[2] Higher peak output is possible in combination with the Active Interface Module 6SL3100-0BE25-5AB0 (for operating cycle constraints, see SINAMICS S120 Manual).

[3] For 6SL3135-7TE31-2AA3

[4] Power loss of Active Line Module at rated power including losses of 24 V DC electronic power supply.

[5] 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.

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SINAMICS S120 drive system
Booksize format – Line Modules

Active Line Modules

■ **Technical specifications** (continued)

Line supply voltage 380 … 480 V 3 AC	Active Line Module in booksize format				
Internal air cooling 6SL3130-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
External air cooling 6SL3131-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
Cold plate cooling 6SL3136-...	7TE21-6AA3	7TE23-6AA3	7TE25-5AA3	7TE28-0AA3	7TE31-2AA3
Liquid cooling 6SL3135-...	–	–	–	–	7TE31-2AA3
Infeed/regenerative feedback power					
• Rated power P_{rated}					
- at 380 V 3 AC kW	16	36	55	80 (64[1])	120 (84[1])
- at 460 V 3 AC[7] (HP)	(18)	(40)	(60)	(100) (75[1])	(150) (100[1])
Liquid cooling[2]					
• Power loss, int./ext.[3] kW	–	–	–	–	0.46/1.8
- Rated volumetric flow for water at 70 kPa pressure drop[4] l/min (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
Line connection 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. mm²	2.5 … 10	2.5 … 50	2.5 … 95, 2 × 35	2.5 … 120, 2 × 50	2.5 … 120, 2 × 50
Shield connection	Integrated in the connector	See Accessories	See Accessories	See Accessories	See Accessories
PE connection	M5 screw	M6 screw	M6 screw	M8 screw	M8 screw
Cable length, max. Total of all motor cables and DC link					
• Shielded m (ft)	630 (2067)[5]	630 (2067)[5]	1000 (3281)	1000 (3281)	1000 (3281)
Degree of protection	IP20	IP20	IP20	IP20	IP20
Dimensions					
• 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[6] mm (in)	–	–	–	629 (24.76)	629 (24.76)
- With screwed fitting mm (in)	–	–	–	629 (24.76)	553 (21.77)[2]
• 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)
Weight, approx.					
• 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)

[1] In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

[2] 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.

[3] Power loss of Active Line Module at rated power including losses of 24 V DC electronic power supply.

[4] This value applies to water as coolant; for other coolants, refer to the SINAMICS S120 Manual.

[5] Max. cable lengths in conjunction with Active Interface Module and Basic Line Filter (Category C3 in accordance with EN 61800-3).

[6] The fan is supplied with the Active Line Module and must be installed before the Active Line Module is commissioned.

[7] 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.

■ **Selection and ordering data**

Description	Order No.
Active Line Module in booksize format	
Internal air cooling Rated power:	
• 16 kW (18 HP)	**6SL3130-7TE21-6AA3**
• 36 kW (40 HP)	**6SL3130-7TE23-6AA3**
• 55 kW (60 HP)	**6SL3130-7TE25-5AA3**
• 80 kW (100 HP)	**6SL3130-7TE28-0AA3**
• 120 kW (150 HP)	**6SL3130-7TE31-2AA3**
External air cooling Rated power:	
• 16 kW (18 HP)	**6SL3131-7TE21-6AA3**
• 36 kW (40 HP)	**6SL3131-7TE23-6AA3**
• 55 kW (60 HP)	**6SL3131-7TE25-5AA3**
• 80 kW (100 HP)	**6SL3131-7TE28-0AA3**
• 120 kW (150 HP)	**6SL3131-7TE31-2AA3**
Cold plate cooling Rated power:	
• 16 kW (18 HP)	**6SL3136-7TE21-6AA3**
• 36 kW (40 HP)	**6SL3136-7TE23-6AA3**
• 55 kW (60 HP)	**6SL3136-7TE25-5AA3**
• 80 kW (100 HP)	**6SL3136-7TE28-0AA3**
• 120 kW (150 HP)	**6SL3136-7TE31-2AA3**
Liquid cooling Rated power:	
• 120 kW (150 HP)	**6SL3135-7TE31-2AA3**
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For Active Line Modules with a width of 100 mm (3.94 in), int./ext. air cooling	**6SL3163-8FD00-0AA0**
• For Active Line Modules with a width of 150 mm (5.91 in) wide, int./ext. air cooling	**6SL3163-8GF00-0AA0**
• For Active Line Modules with a width of 200 mm (7.87 in) wide, int./ext. air cooling	**6SL3163-8HH00-0AA0**
• For Active Line Modules with a width of 300 mm (11.81 in) wide, int./ext. air cooling	**6SL3163-8JM00-0AA0**
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

Description	Order No.
Accessories	
Shield connection plate For Line/Motor Modules in booksize format	
• 150 mm (5.91 in) wide for internal air cooling	**6SL3162-1AF00-0AA1**
• 150 mm (5.91 in) wide for external air cooling and cold plate cooling	**6SL3162-1AF00-0BA1**
• 200 mm (7.87 in) wide for internal air cooling	**6SL3162-1AH01-0AA0**
• 200 mm (7.87 in) wide for external air cooling and cold plate cooling	**6SL3162-1AH01-0BA0**
• 300 mm (11.81 in) wide for all cooling types	**6SL3162-1AH00-0AA0**
DC link rectifier adapter For direct infeed of DC link voltage	
• Screw-type terminals 0.5 ... 10 mm^2 For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	**6SL3162-2BD00-0AA0**
• Screw-type terminals 35 ... 95 mm^2 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)	**6SL3162-2BM00-0AA0**
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 … 95 mm^2 For all Line Modules and Motor Modules in booksize format	**6SL3162-2BM01-0AA0**
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	**6SL3162-2AA00-0AA0**
24 V jumper For connection of the 24 V busbars (for booksize format)	**6SL3162-2AA01-0AA0**
Warning labels in 30 languages This set of foreign language warning signs can be placed on top of the standard English or German signs. A set of signs is supplied with the units. 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	**6SL3166-3AB00-0AA0**

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SINAMICS S120 drive system
Booksize format – Line Modules

Active Line Modules

■ **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

■ 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 for 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	Suitable for Active Line Module in booksize format	Active Interface Module
kW (HP)		Order No.
16 (18)	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	**6SL3100-0BE21-6AB0**
36 (40)	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	**6SL3100-0BE23-6AB0**
55 (60)	6SL3130-7TE25-5AA3 6SL3131-7TE25-5AA3 6SL3136-7TE25-5AA3	**6SL3100-0BE25-5AB0**
80 (100)	6SL3130-7TE28-0AA3 6SL3131-7TE28-0AA3 6SL3136-7TE28-0AA3	**6SL3100-0BE28-0AB0**
120 (150)	6SL3130-7TE31-2AA3 6SL3131-7TE31-2AA3 6SL3136-7TE31-2AA3 6SL3135-7TE31-2AA3	**6SL3100-0BE31-2AB0**

■ Accessories

Description	Order No.
Shield connection plate[1]	
• For Active Interface Module 36 kW	**6SL3163-1AF00-0AA0**
• For Active Interface Module 55 kW	**6SL3163-1AH00-0AA0**
• For Active Interface Modules 80 kW	**6SL3163-1AM00-0AA0**
DRIVE-CLiQ cable, preassembled Degree of protection of connector IP20/IP20	
• For Active Interface Module 16 kW, 0.31 m (1.02 ft) in length	**6SL3060-4AK00-0AA0**
• For Active Interface Module 36 kW, 0.41 m (1.35 ft) in length	**6SL3060-4AP00-0AA0**
• For Active Interface Module 55 kW, 0.6 m (1.97 ft) in length	**6SL3060-4AU00-0AA0**
• For Active Interface Module 80 kW and 120 kW, 0.95 m (3.12 ft) in length	**6SL3060-4AA10-0AA0**
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper)	
• For Active Interface Module 16 kW	**6SL3160-8CD10-0AA0**
• For Active Interface Module 36 kW	**6SL3160-8DF10-0AA0**
• For Active Interface Module 55 kW	**6SL3160-8EH10-0AA0**
• For Active Interface Modules 80 kW and 120 kW	**6SL3160-8FM10-0AA0**

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[1] 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 re-quired (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 interfer-ence 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 con-nected 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

■ **Technical specifications**

Line connection voltage 380 … 480 V 3 AC		Active Interface Module				
Internal air cooling	6SL3100-...	0BE21-6AB0	0BE23-6AB0	0BE25-5AB0	0BE28-0AB0	0BE31-2AB0
Rated current	A	27	60	88	132	200
Current requirement 24 V DC electronic power supply, max.	A	0.25	0.5	0.6	1.2	1.2
Internal resistance Digital input "Fan off" (X21/Pin 4)	Ω	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %
Power loss	kW	0.3	0.39	0.45	0.575	0.8
Cooling air requirement	m^3/s (ft^3/s)	0.03 (1.1)	0.04 (1.4)	0.075 (2.6)	0.15 (5.3)	0.15 (5.3)
Sound pressure level L_{pA} (1 m)	dB	57	60	66	68	68
Line/load connection 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^2	16	50	2.5 … 95 or 2 × 35	2.5 … 120 or 2 × 50	2.5 … 120 or 2 × 50
Thermostatic switch (NC contact)						
• Switching capacity		250 V AC/1.6 A 60 V DC/0.75 A	250 V AC/1.6 A 60 V DC/0.75 A	250 V AC/1.6 A 60 V DC/0.75 A	250 V AC/1.6 A 60 V DC/0.75 A	250 V AC/1.6 A 60 V DC/0.75 A
PE connection		M5 screw	M5 screw	M6 screw	M8 screw	M8 screw
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Weight, approx.	kg (lb)	11 (24.3)	18.5 (40.8)	21 (46.3)	29 (63.9)	36 (79.4)
Approvals according to		cURus	cURus	cURus	cURus	cURus
Suitable for Active Line Module in booksize format	Type	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	6SL3130-7TE25-5AA3 6SL3131-7TE25-5AA3 6SL3136-7TE25-5AA3	6SL3130-7TE28-0AA3 6SL3131-7TE28-0AA3 6SL3136-7TE28-0AA3	6SL3130-7TE31-2AA3 6SL3131-7TE31-2AA3 6SL3136-7TE31-2AA3 6SL3135-7TE31-2AA3
Rated power of the Active Line Module	kW	16	36	55	80	120

■ **Characteristic curves**

SINAMICS S120 drive system
Booksize format – Line Modules

■ **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.

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 kW (HP)	Suitable for Active Line Module in booksize format	Basic Line Filter Order No.
16 (18)	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	**6SL3000-0BE21-6DA0**
36 (40)	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	**6SL3000-0BE23-6DA1**
55 (60)	6SL3130-7TE25-5AA3 6SL3131-7TE25-5AA3 6SL3136-7TE25-5AA3	**6SL3000-0BE25-5DA0**
80 (100)	6SL3130-7TE28-0AA3 6SL3131-7TE28-0AA3 6SL3136-7TE28-0AA3	**6SL3000-0BE28-0DA0**
120 (150)	6SL3130-7TE31-2AA3 6SL3131-7TE31-2AA3 6SL3136-7TE31-2AA3 6SL3135-7TE31-2AA3	**6SL3000-0BE31-2DA0**

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Technical specifications

Line supply voltage 380 … 480 V 3 AC		Basic Line Filters				
6SL3000-...		0BE21-6DA0	0BE23-6DA1	0BE25-5DA0	0BE28-0DA0	0BE31-2DA0
Rated current	A	36	74	105	132	192
Power loss	kW	0.016	0.028	0.041	0.048	0.086
Line/load connection 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^2	10	35	50	95	95
PE connection		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
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Weight, approx.	kg (lb)	5 (11.0)	7.5 (16.5)	11.5 (25.4)	18.2 (40.1)	18.8 (41.5)
Approvals according to		cURus	cURus	cURus	cURus	cURus
Suitable for Active Line Module in booksize format	Type	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	6SL3130-7TE25-5AA3 6SL3131-7TE25-5AA3 6SL3136-7TE25-5AA3	6SL3130-7TE28-0AA3 6SL3131-7TE28-0AA3 6SL3136-7TE28-0AA3	6SL3130-7TE31-2AA3 6SL3131-7TE31-2AA3 6SL3136-7TE31-2AA3 6SL3135-7TE31-2AA3
• **Rated power of the Active Line Module**	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 6SL3130- 6SL3131-	Type	Order No.	Order No.	Order No.
16 (18)	7TE21-6AA3	3RT1035-...	3TX7004-1LB00	3LD2504-0TK51	3LD9200-5B
36 (40)	7TE23-6AA3	3RT1045-...	3TX7004-1LB00	3LD2704-0TK51	3LD9200-5B
55 (60)	7TE25-5AA3	3RT1054-...	3TX7004-1LB00	3KA5330-1GE01	3KX3552-3EA01
80 (100)	7TE28-0AA3	3RT1056-...	3TX7004-1LB00	3KA5330-1GE01	3KX3552-3EA01
120 (150)	7TE31-2AA3	3RT1065-...	3TX7004-1LB00	3KA5730-1GE01	3KX3552-3EA01

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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 disconnector	Switch disconnector with fuse holders	Leading auxiliary switch for switch disconnector with fuse holders
kW (HP)	Type 6SL3130- 6SL3131- 6SL3136- 6SL3135-	Order No.	Order No.	Order No.	Order No.	Order No.
16 (18)	7TE21-6AA3	3RV1031-4FA10	3VL2105-2KN30-....	3NP1123-1CA20	3KL5030-1GB01	3KX3552-3EA01
36 (40)	7TE23-6AA3	3RV1041-4LA10	3VL2108-2KN30-....	3NP1123-1CA20	3KL5230-1GB01	3KX3552-3EA01
55 (60)	7TE25-5AA3	3VL2712-1DC33-....	3VL2112-2KN30-....	3NP1123-1DA20	3KL5530-1GB01	3KX3552-3EA01
80 (100)	7TE28-0AA3	3VL3720-1DC33-....	3VL3117-2KN30-....	3NP1123-1DA20	3KL5530-1GB01	3KX3552-3EA01
120 (150)	7TE31-2AA3	3VL3725-1DC36-....	3VL3125-2KN30-....	3NP1123-1DA20	3KL5730-1GB01	3KX3552-3EA01

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[1] Available from: Mersen www.ep.mersen.com		
kW (HP)	Type 6SL3130- 6SL3131- 6SL3136- 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	5SE2335	35 A	DIII	5SB411	35 A	000	3NA3814	35 A	27 × 60	AJT35
36 (40)	7TE23-6AA3	–	–	–	80 A	DIV	5SC211	80 A	000	3NA3824	80 A	29 × 117	AJT80
55 (60)	7TE25-5AA3	–	–	–	–	–	–	125 A	1	3NA3132	125 A	41 × 146	AJT125
80 (100)	7TE28-0AA3	–	–	–	–	–	–	160 A	1	3NA3136	175 A	41 × 146	AJT175
120 (150)	7TE31-2AA3	–	–	–	–	–	–	250 A	1	3NA3144	250 A	54 × 181	AJT250

[1] Not suitable for 3NP and 3KL switch disconnectors.

■ 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.

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SINAMICS S120 drive system
Booksize format – Line Modules

Basic Line Modules

■ **Technical specifications**

Product name	Basic Line Modules in booksize format 6SL313 . -1TE...	Product name	Basic Line Modules in booksize format 6SL313 . -1TE...
Line supply voltage Up to 2000 m (6562 ft) above sea level	380 ... 480 V 3 AC ±10 % (-15 % < 1 min)[1]	**Cooling method**	Internal ventilator, power units with increased air cooling by built-in fans Cold plate cooling
Line frequency	47 … 63 Hz	**Permissible ambient and coolant temperature (air)** In operation for line-side components, Line Modules, and Motor Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics
Line power factor At rated power			
• Fundamental (cos φ_1)[2]	> 0.96		
• Total (λ)	0.75 … 0.93	**Installation altitude**	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Overvoltage category In accordance with EN 60664-1	Class III		
DC link voltage, approx.	1.35 × line voltage[2]		
Electronic power supply	24 V DC, -15 %/+20 %		
Radio interference suppression		**Declarations of conformity**	CE (Low Voltage and EMC Directives)
• Standard - 20 kW and 40 kW Basic Line Modules	No radio interference suppression	**Approvals according to**	cULus
- 100 kW Basic Line Module	Category C3 according to EN 61800-3 up to 350 m (1148 ft) total cable length (shielded)		
• With line filter	Category C2 according to EN 61800-3 up to 350 m (1148 ft) total cable length (shielded)		

Line supply voltage 380 … 480 V 3 AC	Basic Line Module in booksize format		
Internal air cooling with varnished modules	6SL3130-... 1TE22-0AA0	1TE24-0AA0	1TE31-0AA0
Cold plate cooling	6SL3136-... 1TE22-0AA0	1TE24-0AA0	1TE31-0AA0
Power			
• Rated power P_{rated} - at 380 V 3 AC - at 460 V 3 AC[3]	kW (HP)	20 (25)	40 (50)	100 (125)
• For S6 duty P_{S6} (40 %)	kW	26	52	130
• P_{max}	kW	60	120	175
Braking power With external braking resistor			
• $P_{Bmax.}$ (=2 ×P_{rated})	kW	40	80	–
• Continuous braking power P_d (=0.25 × P_{rated})	kW	5	10	–
DC link current			
• At 600 V DC	A	34	67	167
• For S6 duty (40 %)	A	43	87	217
• Maximum	A	100	200	292
Input current			
• Rated current at 380 V 3 AC	A	35	69	172
• Maximum	A	113	208	301
Activation threshold Braking module	V	774	774	–

[1] Can also be operated on supply systems with 200 ... 240 V 3 AC ±10 % with appropriate parameter assignment and reduced output.

[2] The DC link voltage is unregulated and load-dependent

[3] 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.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC		Basic Line Module in booksize format		
Internal air cooling with varnished modules	6SL3130-...	1TE22-0AA0	1TE24-0AA0	1TE31-0AA0
Cold plate cooling	6SL3136-...	1TE22-0AA0	1TE24-0AA0	1TE31-0AA0
Resistance value External braking resistor	Ω	≥ 14.8	≥ 7.4	–
Cable length To braking resistor, max.	m (ft)	15 (50)	15 (50)	–
Connection for braking resistor (X2)		Screw-type terminals	Screw-type terminals	–
• Conductor cross-section, max.	mm^2	0.5 … 4	0.5 … 10	
Current requirement 24 V DC electronic power supply, max.	A	1	1.4	2
Current carrying capacity				
• 24 V DC busbars	A	20	20	20
• DC link busbars	A	100	200	200
DC link capacitance				
• Basic Line Module	µF	940	1880	4100
• Drive line-up, max.	µF	20000	20000	50000
Internal air cooling				
• Power loss[1]	kW	0.144	0.284	0.628
• Cooling air requirement	m^3/s (ft^3/s)	0.016 (0.6)	0.031 (1.1)	0.05 (1.8)
• Sound pressure level L_{pA} (1 m)	dB	< 60	< 65	< 65
Cold plate cooling				
• Power loss, int./ext.[1]	kW	0.047/0.095	0.071/0.205	0.168/0.450
• Thermal resistance R_{th}	K/W	0.075	0.05	0.045
Line connection U1, V1, W1		Screw-type terminals	Screw-type terminals	M8 screw stud
• Conductor cross-section, max.	mm^2	0.5 … 16	10 … 50	1 × 35 … 120 or 2 × 50
Shield connection		Integrated into the power plug	See Accessories	See Accessories
PE connection		M5 screw	M6 screw	M6 screw
Cable length, max. Total of all motor cables and DC link				
• Shielded	m (ft)	630 (2067)	630 (2067)	1000 (3281)
• Unshielded	m (ft)	850 (2788)	850 (2788)	1500 (4921)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	100 (3.94)	150 (5.91)	200 (7.87)
• Height	mm (in)	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)
- With cold plate cooling	mm (in)	226 (8.90)	226 (8.90)	226 (8.90)
Weight, approx.				
- With internal air cooling	kg (lb)	6.8 (15.0)	11.3 (24.9)	15.8 (34.8)
- With cold plate cooling	kg (lb)	6.4 (14.1)	10.9 (24.0)	16.4 (36.2)

[1] 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.
Basic Line Module in booksize format	
Internal air cooling Rated power:	
• 20 kW (25 HP)	**6SL3130-1TE22-0AA0**
• 40 kW (50 HP)	**6SL3130-1TE24-0AA0**
• 100 kW (125 HP)	**6SL3130-1TE31-0AA0**
Cold plate cooling Rated power:	
• 20 kW (25 HP)	**6SL3136-1TE22-0AA0**
• 40 kW (50 HP)	**6SL3136-1TE24-0AA0**
• 100 kW (125 HP)	**6SL3136-1TE31-0AA0**
Accessories	
Shield connection plate For Line/Motor Modules in booksize format	
• 150 mm (5.91 in) wide for internal air cooling	**6SL3162-1AF00-0AA1**
• 150 mm (5.91 in) wide for cold plate cooling	**6SL3162-1AF00-0BA1**
• 200 mm (7.87 in) wide for internal air cooling	**6SL3162-1AH01-0AA0**
• 200 mm (7.87 in) wide for cold plate cooling	**6SL3162-1AH01-0BA0**
DC link rectifier adapter For direct infeed of DC link voltage	
• Screw-type terminals 0.5 ... 10 mm^2 For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	**6SL3162-2BD00-0AA0**
• Screw-type terminals 35 ... 95 mm^2 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)	**6SL3162-2BM00-0AA0**
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 … 95 mm^2 For all Line Modules and Motor Modules in booksize format	**6SL3162-2BM01-0AA0**
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	**6SL3162-2AA00-0AA0**
24 V jumper For connection of the 24 V busbars (for booksize format)	**6SL3162-2AA01-0AA0**
Warning labels in 30 languages 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	**6SL3166-3AB00-0AA0**

Description	Order No.
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For Basic Line Modules with a width of 100 mm (3.94 in)	**6SL3163-8LD00-0AA0**
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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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} = 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	Suitable for Basic Line Module in booksize format	Line reactor
kW (HP)		Order No.
20 (25)	6SL3130-1TE22-0AA0 6SL3136-1TE22-0AA0	**6SL3000-0CE22-0AA0**
40 (50)	6SL3130-1TE24-0AA0 6SL3136-1TE24-0AA0	**6SL3000-0CE24-0AA0**
100 (125)	6SL3130-1TE31-0AA0 6SL3136-1TE31-0AA0	**6SL3000-0CE31-0AA0**

■ Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line reactors		
6SL3000-...		0CE22-0AA0	0CE24-0AA0	0CE31-0AA0
Rated current	A	37	74	185
Power loss At 50/60 Hz	kW	0.130/0.154	0.270/0.320	0.480/0.565
Line/load connection		Screw-type terminals	Screw-type terminals	Flat connector for M8 screw
• Conductor cross-section	mm²	0.5 … 16	2.5 … 35	–
Degree of protection		IP20	IP20	IP00
Dimensions				
• 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)
Weight, approx.	kg (lb)	5.2 (11.5)	11.2 (24.7)	21.7 (47.8)
Approvals according to		cURus	cURus	cURus
Suitable for Basic Line Module in booksize format	Type	6SL3130-1TE22-0AA0 6SL3136-1TE22-0AA0	6SL3130-1TE24-0AA0 6SL3136-1TE24-0AA0	6SL3130-1TE31-0AA0 6SL3136-1TE31-0AA0
• Rated power of the Basic Line Module	kW (HP)	20 (25)	40 (50)	100 (125)

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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	Suitable for Basic Line Module in booksize format	Line filter
kW (HP)		Order No.
20 (25)	6SL3130-1TE22-0AA0 6SL3136-1TE22-0AA0	**6SL3000-0BE21-6DA0**
40 (50)	6SL3130-1TE24-0AA0 6SL3136-1TE24-0AA0	**6SL3000-0BE23-6DA1**
100 (125)	6SL3130-1TE31-0AA0 6SL3136-1TE31-0AA0	**6SL3000-0BE31-2DA0**

■ Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line filter		
		6SL3000-... 0BE21-6DA0	0BE23-6DA1	0BE31-2DA0
Rated current	A	36	74	192
Power loss	kW	0.016	0.02	0.09
Line/load connection L1, L2, L3 / U, V, W		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	10	35	95
PE connection		M6 screw stud	M6 screw stud	M10 screw stud
Degree of protection		IP20	IP20	IP20
Dimensions				
• 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)
Weight, approx.	kg (lb)	5 (11.0)	7.5 (16.5)	18.8 (41.5)
Approvals according to		cURus	cURus	cURus
Suitable for Basic Line Module in booksize format	Type	6SL3130-1TE22-0AA0 6SL3136-1TE22-0AA0	6SL3130-1TE24-0AA0 6SL3136-1TE24-0AA0	6SL3130-1TE31-0AA0 6SL3136-1TE31-0AA0
• Rated power of the Basic Line Module	kW (HP)	20 (25)	40 (50)	100 (125)

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■ **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 kW (HP)	Assignment to Basic Line Module in booksize format Type 6SL3130- 6SL3136-	Line contactor Type	Output coupling device for line contactor Order No.	Main circuit breaker Order No.
20 (25)	1TE22-0AA0	3RT1035-…	3TX7004-1LB00	3LD2504-0TK51
40 (50)	1TE24-0AA0	3RT1045-…	3TX7004-1LB00	3LD2704-0TK51
100 (125)	1TE31-0AA0	3RT1056-…	3TX7004-1LB00	3KA5530-1GE01

Rated power kW (HP)	Assignment to Basic Line Module in booksize format Type 6SL3130- 6SL3136-	Circuit breaker IEC 60947 Order No.	Circuit breaker UL489/CSA C22.2 No. 5-02 Order No.	Fuse switch disconnector Order No.
20 (25)	1TE22-0AA0	3RV1041-4JA10	3VL2106-2KN30-….	3NP1123-1CA20
40 (50)	1TE24-0AA0	3VL2710-1DC33-….	3VL2110-2KN30-….	3NP1123-1CA20
100 (125)	1TE31-0AA0	3VL3725-1DC36-….	3VL3125-2KN30-….	3NP1123-1DA20

Rated power kW (HP)	Assignment to Basic Line Module in booksize format Type 6SL3130- 6SL3136-	Switch disconnector with fuse holders Order No.	NH fuse (gL/gG) Rated current	Size	Order No.	UL/CSA fuse, Class J[1] Mersen www.ep.mersen.com Rated current	Size	Reference No.
20 (25)	1TE22-0AA0	3KL5230-1GB01	63 A	000	3NA3822	60 A	29 × 117	AJT60
40 (50)	1TE24-0AA0	3KL5230-1GB01	100 A	000	3NA3830	100 A	29 × 117	AJT100
100 (125)	1TE31-0AA0	3KL5730-1GB01	250 A	1	3NA3144	250 A	54 × 181	AJT250

[1] 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 × 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

Technical specifications

Product name	Single Motor Module in booksize format 6SL312. -1TE...
DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line voltage 380 ... 480 V 3 AC)[1]
Output frequency	0 ... 650 Hz[2]
Electronic power supply	24 V DC -15 %/+20 %
Cooling method	Internal air cooling, external air cooling Power units with increased air cooling by built-in fans Cold plate cooling Liquid cooling
Permissible ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F) see derating characteristics

Product name	Single Motor Module in booksize format 6SL312. -1TE...
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1 Control category 3 acc. to ISO 13849-1

DC link voltage 510 ... 720 V DC	Single Motor Module in booksize format					
Internal air cooling	6SL3120-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
External air cooling	6SL3121-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
Cold plate cooling	6SL3126-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
Liquid cooling	6SL3125-...	–	–	–	–	–
Output current						
• Rated current I_{rated}	A	**3**	**5**	**9**	**18**	**30**
• 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
Type rating[3]						
• 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)
Rated pulse frequency	kHz	4	4	4	4	4
DC link current I_d[4]	A	3.6	6	11	22	36
Current carrying capacity						
• DC link busbars	A	100[5]	100[5]	100[5]	100[5]	100[5]
• 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 mm², max. fuse protection 20 A).					
DC link capacitance	µF	110	110	110	220	710
Current requirement At 24 V DC, max.	A	0.85	0.85	0.85	0.85	0.9

[1] 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.

[2] 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

[3] Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

[4] Rated DC link current for dimensioning an external DC connection.

[5] 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)

DC link voltage 510 … 720 V DC		Single Motor Module in booksize format				
Internal air cooling	6SL3120-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
External air cooling	6SL3121-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
Cold plate cooling	6SL3126-...	1TE13-0AA3	1TE15-0AA3	1TE21-0AA3	1TE21-8AA3	1TE23-0AA3
Liquid cooling	6SL3125-...	–	–	–	–	–
Internal/external air cooling						
• Power loss[1]						
- 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[2]	kW	0.03	0.04	0.06	0.14	0.26
- With external air cooling, int./ext.[1]	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^3/s (ft^3/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
Cold plate cooling						
• Power loss, int./ext.[1]	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
Motor connection U2, V2, W2		Connector (X1)[3], max. 30 A	Connector (X1)[3], max. 30 A	Connector (X1)[3], max. 30 A	Connector (X1)[3], max. 30 A	Connector (X1)[3], max. 30 A
Shield connection		Integrated in connector (X1)	Integrated in connector (X1)	Integrated in connector (X1)	Integrated in connector (X1)	Integrated in connector (X1)
PE connection		M5 screw	M5 screw	M5 screw	M5 screw	M5 screw
Motor brake connection		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
Motor cable length, max.						
• 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Weight, approx.						
• 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)

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[1] Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

[2] At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 … 600 V.

[3] Connector not included in scope of supply, see Accessories.

■ **Technical specifications** (continued)

DC link voltage 510 … 720 V DC		Single Motor Module in booksize format				
Internal air cooling	6SL3120-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
External air cooling	6SL3121-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
Cold plate cooling	6SL3126-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
Liquid cooling	6SL3125-...	–	–	–	–	1TE32-0AA4
Output current						
• Rated current I_{rated}	A	**45**	**60**	**85**	**132 (105**[1]**)**	**200 (140**[1]**)**
• 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_{max}	A	85	113	141	210	282
Rated pulse frequency	kHz	4	4	4	4	4
• **Power**[2] 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
DC link current I_d[3]	A	54	72	102	158	200
Current carrying capacity						
• 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 mm², max. fuse protection 20 A).				
DC link capacitance	µF	1175	1410	1880	2820	3995
Current requirement At 24 V DC, max.	A	1.2	1.2	1.5	1.5	1.5
Internal/external air cooling						
• Power loss[4]						
- 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[5]	kW	0.38	0.55	0.77	1.26	2.03
- With external air cooling, int./ext.[4]	kW	0.14/0.32	0.16/0.46	0.2/0.59	0.29/1.0	0.47/1.62
• Cooling air requirement	m³/s (ft³/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
Cold plate cooling						
• Power loss, int./ext.[4]	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

[1] In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink.

[2] Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

[3] Rated DC link current for dimensioning an external DC connection.

[4] Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

[5] At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 … 600 V.

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SINAMICS S120 drive system
Booksize format – Motor Modules

Single Motor Modules

■ Technical specifications (continued)

DC link voltage 510 … 720 V DC		Single Motor Module in booksize format				
Internal air cooling	6SL3120-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
External air cooling	6SL3121-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
Cold plate cooling	6SL3126-...	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
Liquid cooling	6SL3125-...	–	–	–	–	1TE32-0AA4
Liquid cooling[1]						
• Power loss, int./ext.	kW	–	–	–	–	0.39/1.7
- Rated volumetric flow for water at 70 kPa pressure drop[3]	l/min (US gal/min)	–	–	–	–	8 (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
Motor connection U2, V2, W2		M6 screw studs (X1)	M6 screw studs (X1)	M8 screw studs (X1)	M8 screw studs (X1)	M8 screw studs (X1)
• Conductor cross-section, max.	mm²	2.5 … 50	2.5 … 50	2.5 … 95, 2 × 35	2.5 … 120, 2 × 50	2.5 … 120, 2 × 50
Shield connection		See Accessories	See Accessories	See Accessories	See Accessories	See Accessories
PE connection		M6 screw	M6 screw	M6 screw	M8 screw	M8 screw
Motor brake connection		Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A
Motor cable length, max.						
• 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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[2]	mm (in)	–	–	–	629 (24.76)	629 (24.76)
- With screwed fitting	mm (in)	–	–	–	–	553 (21.77)[1]
• 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)
Weight, approx.						
• 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)

[1] 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.

[2] The fan is supplied with the Motor Module and must be installed before the Motor Module is commissioned.

[3] 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)[1]	Order No.	Order No.	Order No.	Order No.
DC link voltage 510 … 720 V DC					
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.
Accessories	
Power connector (X1) At Motor Module end, with screw-type terminals 1.5 ... 10 mm^2, For Motor Modules with rated output current of 3 … 30 A	6SL3162-2MA00-0AA0
Shield connection plate For Line/Motor Modules in booksize format	
• 150 mm (5.91 in) wide for internal air cooling	6SL3162-1AF00-0AA1
• 150 mm (5.91 in) wide for external air cooling and cold plate cooling	6SL3162-1AF00-0BA1
• 200 mm (7.87 in) wide for internal air cooling	6SL3162-1AH01-0AA0
• 200 mm (7.87 in) wide for external air cooling and cold plate cooling	6SL3162-1AH01-0BA0
• 300 mm (11.81 in) wide for all cooling types	6SL3162-1AH00-0AA0
DC link rectifier adapter For direct infeed of DC link voltage	
• Screw-type terminals 0.5 … 10 mm^2 for Line/Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	6SL3162-2BD00-0AA0
• Screw-type terminals 35 … 95 mm^2 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)	6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 … 95 mm^2 For all Line Modules/Motor Modules in booksize format	6SL3162-2BM01-0AA0
24 V terminal adapter For all Line Modules/Motor Modules in booksize format	6SL3162-2AA00-0AA0
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0

Description	Order No.
Reinforced DC link busbar set For replacement of DC link busbars for 5 modules in booksize format	
• 50 mm (1.97 in) wide	6SL3162-2DB00-0AA0
• 100 mm (3.94 in) wide	6SL3162-2DD00-0AA0
Warning labels in 30 languages 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	6SL3166-3AB00-0AA0
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For Motor Modules 50 mm (1.97 in) wide, int./ext. air cooling	6SL3162-8AB00-0AA0
• For Motor Modules 100 mm (3.94 in) wide, int./ext. air cooling	6SL3162-8BD00-0AA0
• For Motor Modules 150 mm (5.91 in) wide, int./ext. air cooling	6SL3162-8CF00-0AA0
• For Motor Modules 200 mm (7.87 in) wide, int./ext. air cooling	6SL3162-8DH00-0AA0
• For Motor Modules 300 mm (11.81 in) wide, int./ext. air cooling	6SL3162-8EM00-0AA0
SINAMICS/SINUMERIK/SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

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[1] 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

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■ **Characteristic curves** (continued)

Derating characteristics

G_D212_EN_00002c

Output current dependent on pulse frequency
(rated current up to 132 A for Single Motor Modules in booksize format)

G_D211_EN_00090a

Output current as a function of installation altitude

G_D211_EN_00272

Output current dependent on pulse frequency
(rated current up to 200 A for Single Motor Modules in booksize format)

G_D211_EN_00006b

Voltage derating dependent on installation altitude

G_D211_EN_00089a

Output current as a function of ambient temperature

G_D211_EN_00249a

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**

Product name	Double Motor Modules in booksize format 6SL312. -2TE...
DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line connection voltage 380 ... 480 V 3 AC)[1]
Output frequency	0 … 650 Hz[2]
Electronic power supply	24 V DC -15 %/+20 %
Cooling method	• Internal air cooling, external air cooling, power units with forced air cooling through built-in fan • Cold plate cooling
Permissible ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics

Product name	Double Motor Modules in booksize format 6SL312. -2TE...
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) acc. to IEC 61508, Performance Level d (PLd) acc. to ISO 13849-1 Control category 3 acc. to ISO 13849-1

[1] 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.

[2] 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.

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■ **Technical specifications** (continued)

DC link voltage 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
Output current					
• 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
Type rating[1]					
• 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)
DC link current I_d[2]	A	7.2	12	22	43
Current carrying capacity					
• 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 mm², max. fuse protection 20 A).			
DC link capacitance	µF	110	220	220	705
Current requirement At 24 V DC, max.	A	1.0	1.0	1.0	1.0
Internal/external air cooling					
• Power loss[3]					
- 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[4]		0.05	0.08	0.15	0.28
- With external air cooling, int./ext.[3]	kW	0.06/0.035	0.07/0.06	0.09/0.095	0.105/0.24
• Cooling air requirement	m³/s (ft³/s)	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
Cold plate cooling					
• Power loss, int./ext.[3]	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
Motor connection U2, V2, W2		2 × connectors (X1, X2)[5], max. 30 A (not included in scope of supply, see Accessories)			
Shield connection		Integrated in connector (X1, X2)	Integrated in connector (X1, X2)	Integrated in connector (X1, X2)	Integrated in connector (X1, X2)
PE connection		M5 screw	M5 screw	M5 screw	M5 screw
Motor brake connection		Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A			
Motor cable length, max.					
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	70 (230)
• Unshielded	m (ft)	75 (246)	75 (246)	75 (246)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• 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)
Weight, approx.					
• 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)

[1] Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

[2] Rated DC link current for dimensioning an external DC connection.

[3] Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

[4] At max. motor cable length 30 m (98 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

[5] Connector not included in scope of supply, see Accessories.

SINAMICS S120 drive system
Booksize format – Motor Modules

Double Motor Modules

■ **Selection and ordering data**

Rated output current	Type rating	Double Motor Module in booksize format		
		Internal air cooling	External air cooling	Cold plate cooling
A	kW (HP)[1]	Order No.	Order No.	Order No.
2 × 3	2 × 1.6 (2 × 1.5)	6SL3120-2TE13-0AA3	6SL3121-2TE13-0AA3	6SL3126-2TE13-0AA3
2 × 5	2 × 2.7 (2 × 3)	6SL3120-2TE15-0AA3	6SL3121-2TE15-0AA3	6SL3126-2TE15-0AA3
2 × 9	2 × 4.8 (2 × 5)	6SL3120-2TE21-0AA3	6SL3121-2TE21-0AA3	6SL3126-2TE21-0AA3
2 × 18	2 × 9.7 9.7 (2 × 10)	6SL3120-2TE21-8AA3	6SL3121-2TE21-8AA3	6SL3126-2TE21-8AA3

Description	Order No.
Accessories	
Power connector (X1/X2) At Motor Module end, with screw-type terminals 1.5 ... 10 mm², For Motor Modules with rated output current of 3 ... 30 A	6SL3162-2MA00-0AA0
DC link rectifier adapter For direct supply of the DC link voltage Screw-type terminals 0.5 ... 10 mm² For Line/Motor Modules in book-size format with a width of 50 mm (1.97 in) and 100 mm (3.94 in)	6SL3162-2BD00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 95 mm² For all Line Modules/Motor Modules in booksize format	6SL3162-2BM01-0AA0
24 V terminal adapter For all Line Modules/Motor Modules in booksize format	6SL3162-2AA00-0AA0
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Reinforced DC link busbar set For replacement of DC link bus-bars for 5 modules in booksize format	
• 50 mm (1.97 in) wide	6SL3162-2DB00-0AA0
• 100 mm (3.94 in) wide	6SL3162-2DD00-0AA0
Warning labels in 30 languages 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	6SL3166-3AB00-0AA0

Description	Order No.
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For Motor Modules 50 mm (1.97 in) wide, int./ext. air cooling	6SL3162-8AB00-0AA0
• For Motor Modules 100 mm (3.94 in) wide, int./ext. air cooling	6SL3162-8BD00-0AA0
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

■ **Characteristic curves**

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[1] Nominal HP based on asynchronous motors (induction motors).
Match the motor nameplate current for specific sizing.

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 A	Rated inductance mH	Series motor reactor Order No.
22.5	0.1	**4EU2452-0EG00-4BA0**
22.5	0.3	**4EU2552-0EF00-4BA0**
54	0.2	**4EU3052-0EB00-4BA0**
54	0.3	**4EU3652-0EC00-4BA0**
108	0.1	4EU3951-0AR00-4B
108	0.2	4EU4521-0BS00-4B
61	0.32	**6SE7026-0HS87-1FE0**
79	0.23	**6SE7028-2HS87-1FE0**

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■ Technical specifications

Input voltage 380 ... 480 V 3 AC (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 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-... 6SL3121-... 6SL3126-... 6SL3125-...	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...

SINAMICS S120 drive system
Booksize format – Motor Modules

Series motor reactors

■ **Technical specifications** (continued)

Input voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)		Series motor reactor			
		4EU3052-0EB00-4BA0	4EU3652-0EC00-4BA0	4EU3951-0AR00-4B	4EU4521-0BS00-4B
Rated current	A	54	54	108	108
Rated inductance	mH	0.2	0.3	0.1	0.2
Power loss	kW	0.27	0.319	0.454	0.629
Continuous current I_{thmax}, therm. perm.	A	60	60	120	120
Continuous frequency, therm. perm.	Hz	1400	1400	1400	1400
Pulse frequency, max.	kHz	8	8	8	8
Relative voltage drop at the series motor reactor At I_{thmax} and V_{rated}	%	38	66	38	76
Ambient temperature	°C (°F)	40 (104)	40 (104)	40 (104)	40 (104)
Connection to Motor Module/motor		Flat-type terminal	Flat-type terminal	Flat-type terminal	Flat-type terminal
PE connection		M6 screw	M8 screw	M8 screw	M8 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• 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)
Weight, approx.	kg (lb)	70 (154)	70 (154)	68 (150)	130 (287)
Approvals according to		cURus	cURus	cURus	cURus
Suitable for Motor Module in booksize format	Type	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...

Input voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)		Series motor reactor	
		6SE7028-2HS87-1FE0	6SE7026-0HS87-1FE0
Rated current	A	79	61
Rated inductance	mH	0.23	0.32
Power loss	kW	0.37	0.3
Connection to Motor Module/motor		Flat-type terminal	Flat-type terminal
PE connection		Screw studs	Screw studs
Degree of protection		IP00	IP00
Dimensions			
• 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)
Weight, approx.	kg (lb)	42.3 (93.3)	30 (66.2)
Approvals according to		cURus	cURus
Suitable for Motor Module in booksize format	Type	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...	6SL3120-... 6SL3121-... 6SL3126-... 6SL3125-...
Suitable for motors	Type	1FE1052-4HD.0 1FE1052-4HG.0	1FE1053-4HH.1

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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 × 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 – $I \times t$ monitoring)
- 2 PE/protective conductor connections

The status of the Braking Module is indicated via two 2-color LEDs.

■ Technical specifications

Product name	Braking Module in booksize format (Internal air cooling)
DC link voltage 510 … 720 V DC	6SL3100-1AE31-0AB0
Rated power P_{DB}	1.5 kW[1]
Peak power P_{max}	100 kW[1]
Activation threshold	770 V
Cable length to braking resistor, max.	10 m (32.8 ft)
DC link capacitance	110 µF
Current requirement at 24 V DC, max.	0.5 A
Digital inputs in accordance with IEC 61131-2 Type 1	
• Voltage	-3 V … +30 V
• Low level (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 mm²
Digital outputs (resistant to sustained short circuits)	
• Voltage	24 V DC
• Load current per digital output, max.	100 mA
• Conductor cross-section, max.	1.5 mm²
Current carrying capacity	
• 24 V DC busbars	20 A
• DC link busbars	100 A
PE connection	M5 screw
Dimensions	
• 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)
Weight, approx.	4.1 kg (9 lb)
Approvals according to	cURus

■ Selection and ordering data

Description	Order No.
Braking Module in booksize format	**6SL3100-1AE31-0AB0**
Accessories for re-ordering	
Warning labels in 30 languages	**6SL3166-3AB00-0AA0**
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	

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[1] 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 6SL3100-1AE31-0AB0	**6SN1113-1AA00-0DA0**
1.5 kW / 100 kW	Braking Module 6SL3100-1AE31-0AB0	**6SL3100-1BE31-0AA0**
5 kW / 30 kW	Basic Line Module 20 kW 6SL3130-1TE22-0AA0	**6SE7023-2ES87-2DC0**
12.5 kW / 75 kW	Basic Line Module 40 kW 6SL3130-1TE24-0AA0	**6SE7028-0ES87-2DC0**

■ Characteristic curves

Load diagram for Braking Module in booksize format and braking resistors for booksize format

■ **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 Braking resistor with connected 1.5 mm^2 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 42 V DC/0.2 A	250 V AC/max. 10 A 42 V DC/0.2 A
• Conductor cross-section	mm^2	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	–

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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**

Product name	Capacitor Module (Internal air cooling)
DC link voltage 510 … 720 V DC	6SL3100-1CE14-0AA0
Capacitance	4000 µF
Current carrying capacity	
• 24 V DC busbars	20 A
• DC link busbars	100 A
PE connection	M5 screw
Dimensions	
• Width	100 mm (3.94 in)
• Height	380 mm (14.96 in)
• Depth, with spacer (included in scope of supply)	270 mm (10.63 in)
Weight, approx.	7.2 kg (16 lb)
Approvals according to	cULus

■ **Selection and ordering data**

Description	Order No.
Capacitor Module	**6SL3100-1CE14-0AA0**
Accessories for re-ordering	
Warning labels in 30 languages	**6SL3166-3AB00-0AA0**

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

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■ 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 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 × 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^2, 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

Product name	Control Supply Module in booksize format (Internal air cooling)
DC link voltage 510 … 720 V DC **Line voltage 380 … 480 V 3 AC**	6SL3100-1DE22-0AA1
Rated input current	
• At 400 V 3 AC	≤ 2 A
• At 600 V DC	1.1 A
DC link voltage range	300 … 882 V DC (operation in 300 … 430 V DC range is permitted temporarily for < 1 min)
Radio interference suppression (standard)	Category C2 according to EN 61800-3
Rated output voltage	24 V ... 28.8 V DC (adjustable via potentiometer)
Rated output current	20 A
Current carrying capacity	
• 24 V DC busbars	20 A
• DC link busbars	100 A
Line connection L1, L2, L3 (X1)	Screw-type terminals
• Conductor cross-section	0.2 … 4.0 mm^2
PE connection	M5 screw
Dimensions	
• 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)
Weight, approx.	4.8 kg (10.6 lb)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
Control Supply Module in booksize format	**6SL3100-1DE22-0AA1**
Accessories for re-ordering	
Warning labels in 30 languages	**6SL3166-3AB00-0AA0**
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	

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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.
DC link rectifier adapter	
For direct infeed of DC link voltage For Line Modules and Motor Modules in booksize and booksize compact format	
• 50 mm (1.97 in), 75 mm (2.95 in) and 100 mm (3.94 in) wide	**6SL3162-2BD00-0AA0**
• 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.8 in) wide	**6SL3162-2BM00-0AA0**
DC link adapter set (2 units) For multi-tier configuration For all Line Modules and Motor Modules in booksize and booksize compact format	**6SL3162-2BM01-0AA0**

■ **Technical specifications**

		DC link rectifier adapter		DC link adapter
		6SL3162-2BD00-0AA0	6SL3162-2BM00-0AA0	6SL3162-2BM01-0AA0
Connection		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	0.5 … 10	35 … 95	35 … 95
Current carrying capacity	A	43	240	240
Weight, approx.	kg (lb)	0.06 (0.13)	0.48 (1.06)	0.76 (1.68)
Approvals according to		cURus	cURus	cURus
Suitable for Line Modules and Motor Modules	Formats	Booksize and booksize compact	Booksize and booksize compact	Booksize and booksize compact

■ 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.
Active Line Module in chassis format Rated power:	
• 132 kW (200 HP)	**6SL3330-7TE32-1AA3**
• 160 kW (225 HP)	**6SL3330-7TE32-6AA3**
• 235 kW (350 HP)	**6SL3330-7TE33-8AA3**
• 300 kW (450 HP)	**6SL3330-7TE35-0AA3**

■ Technical specifications

Product name	Active Line Modules in chassis format 6SL3330-7TE3...
Line supply voltage Up to 2000 m (6562 ft) above sea level	380 ... 480 V 3 AC ± 10 % (-15 % < 1 min)
Line frequency	47 … 63 Hz
Line power factor	
• Fundamental (cos φ_1)	1.0 (factory setting) can be altered by entering a reactive current setpoint
• Total (λ)	1.0 (factory setting)
Overvoltage category In accordance with EN 60664-1	Class III
DC link voltage V_d	The DC link voltage is regulated and can be adjusted as a voltage decoupled from the line voltage. Factory setting for DC link voltage: 1.5 x line voltage
Electronic power supply	24 V DC, -15 %/+20 %
Radio interference suppression	
• Standard With Active Interface Module	Category C3 according to EN 61800-3
Cooling method	Forced air cooling by means of built-in fan
Ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics
Installation altitude	Up to 2000 m (6562 ft) above sea level without derating, > 2000 ... 4000 m (6562 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cULus

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SINAMICS S120 drive system
Chassis format – Line Modules

Active Line Modules

■ **Technical specifications** (continued)

Line supply voltage 380 … 480 V 3 AC		Active Line Module in chassis format			
	6SL3330-...	7TE32-1AA3	7TE32-6AA3	7TE33-8AA3	7TE35-0AA3
Infeed/regenerative feedback power					
• Rated power P_{rated}					
- at 400 V 3 AC	kW	132	160	235	300
- at 460 V 3 AC[2]	(HP)	(200)	(225)	(350)	(450)
• P_{max}	kW	198	240	352.5	450
DC link current					
• 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
Input current					
• Rated current at 400 V 3 AC	A	210	260	380	490
• Maximum	A	315	390	570	735
Current requirement					
• 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
DC link capacitance	μF	4200	5200	7800	9600
Power loss, max.	kW	2.3	2.9	4.2	5.1
Cooling air requirement	m³/s (ft³/s)	0.17 (6.0)	0.23 (8.1)	0.36 (12.7)	0.36 (12.7)
Sound pressure level L_{pA} (1 m)[1] at 50/60 Hz	dB	74/76	75/77	76/78	76/78
Line connection 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.	mm²	2 × 185	2 × 185	2 × 185	2 × 185
DC link connection 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.	mm²	2 × 185	2 × 185	2 × 185	2 × 185
PE connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max.					
- PE1/GND	mm²	1 × 185	1 × 185	1 × 185	1 × 185
- PE2/GND	mm²	2 × 185	2 × 185	2 × 185	2 × 185
Cable length, max. 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)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• 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)
Frame size		FX	FX	GX	GX
Weight, approx.	kg (lb)	88 (194)	88 (194)	152 (335)	152 (335)

[1] Total sound pressure level of Active Interface Module and Active Line Module

[2] 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

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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 by-pass 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 kW (HP)	Suitable for Active Line Module in chassis format	Active Interface Module Order No.
132 (200) 160 (225)	6SL3330-7TE32-1AA3 6SL3330-7TE32-6AA3	**6SL3300-7TE32-6AA0**
235 (350)	6SL3330-7TE33-8AA3	**6SL3300-7TE33-8AA0**
300 (450)	6SL3330-7TE35-0AA3	**6SL3300-7TE35-0AA0**

■ Technical specifications

Line supply voltage 380 … 480 V 3 AC		Active Interface Module in chassis format			
		6SL3300-7TE32-6AA0		6SL3300-7TE33-8AA0	6SL3300-7TE35-0AA0
Rated current	A	210	260	380	490
Bypass contactor		Included	Included	Included	Included
DC link capacitance Of the drive line-up, max.	μF	41600	41600	76800	76800
Current requirement					
• 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
Power loss	kW	2.1	2.2	3.0	3.9
Cooling air requirement	m^3/s (ft^3/s)	0.24 (8.5)	0.24 (8.5)	0.47 (16.6)	0.47 (16.6)
Sound pressure level[1] L_{pA} (1 m) at 50/60 Hz	dB	74/76	75/77	76/78	76/78
Line/load connection 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^2	2 × 185	2 × 185	2 × 185	2 × 185
PE connection		M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max.	mm^2	2 × 185	2 × 185	2 × 185	2 × 185
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• 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)
Frame size		FI	FI	GI	GI
Weight, approx.	kg (lb)	135 (298)	135 (298)	190 (419)	190 (419)
Approvals according to		cURus	cURus	cURus	cURus
Suitable for Active Line Module in chassis format	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

[1] 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	**3KL5530-1AB01**	**3KL5530-1GB01**	250 A	**3NA3144**	315 A	**3NE1230-2**
160 (225)	260	7TE32-6AA0	**3KL5730-1AB01**	**3KL5730-1GB01**	315 A	**3NA3252**	350 A	**3NE1331-2**
235 (350)	380	7TE33-8AA0	**3KL5730-1AB01**	**3KL5730-1GB01**	500 A	**3NA3365**[*]	500 A	**3NE1334-2**
300 (450)	490	7TE35-0AA0	**3KL6130-1AB02**	**3KL6130-1GB02**	630 A	**3NA3372**	630 A	**3NE1436-2**

[*] Fuse suitable only for 3KL6130...

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SINAMICS S120 drive system
Chassis format – 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.
Single Motor Module in chassis format Rated output current:	
• 210 A	**6SL3320-1TE32-1AA3**
• 260 A	**6SL3320-1TE32-6AA3**
• 310 A	**6SL3320-1TE33-1AA3**
• 380 A	**6SL3320-1TE33-8AA3**
• 490 A	**6SL3320-1TE35-0AA3**

Technical specifications

Product name	Single Motor Modules in chassis format 6SL3320-...
DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line connection voltage 380 ... 480 V 3 AC)
Output frequency	0 ... 300 Hz[1]
Electronic power supply	24 V DC -15 %/+20 %
Cooling method	Internal air cooling, power units with forced air cooling using an integrated fan
Permissible ambient or coolant temperature (air) In operation for line-side components, Line Modules, and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F) see derating characteristics
Installation altitude	Up to 2000 m (6562 ft) above sea level without derating, > 2000 ... 4000 m (6562 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to 510 ... 720 V DC Motor Modules only	cULus
Safety Integrated	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

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[1] 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 510 ... 720 V DC		Single Motor Module in chassis format				
6SL3320-...		1TE32-1AA3	1TE32-6AA3	1TE33-1AA3	1TE33-8AA3	1TE35-0AA3
Output current						
• Rated current I_{rated}	A	**210**	**260**	**310**	**380**	**490**
• 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
Type rating[1]						
• 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)
Rated pulse frequency	kHz	2	2	2	2	2
Rated DC link current I_d[2] When supplied via						
• Active Line Module	A	227	281	335	411	530
DC link capacitance	µF	4200	5200	6300	7800	9600
Current requirement						
• 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
Power loss, max.	kW	1.94	2.6	3.1	3.8	4.5
Cooling air requirement	m^3/s (ft^3/s)	0.17 (6.0)	0.23 (8.1)	0.36 (12.7)	0.36 (12.7)	0.36 (12.7)
Sound pressure level L_{pA} (1 m)	dB	< 67	< 69	< 69	< 69	< 69
DC link connection DCP, DCN		Flat connector for M10 screw	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^2	2 × 185	2 × 185	2 × 185	2 × 185	2 × 185
Motor connection U2, V2, W2		Flat connector for M10 screw	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^2	2 × 185	2 × 185	2 × 185	2 × 185	2 × 185
PE connection		M10 screw	M10 screw	M10 screw	M10 screw	M10 screw
• Conductor cross-section, max.	mm^2	2 × 185	2 × 185	2 × 185	2 × 185	2 × 185
Motor brake connection		–	–	–	–	–
Motor cable length, max. 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Frame size		FX	FX	GX	GX	GX
Weight, approx.	kg (lb)	88 (194)	88 (194)	152 (335)	152 (335)	152 (335)

[1] Rated power of a typical standard asynchronous motor at 600 V DC link voltage.

[2] Rated DC link current for dimensioning an external DC connection.

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■ 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	Type rating	Output current for a pulse frequency of 2 kHz	Derating factor for a pulse frequency of 4 kHz
6SL3320-...	kW (HP)	A	
1TE32-1AA3	110 (150)	210	**0.82**
1TE32-6AA3	132 (200)	260	**0.83**
1TE33-1AA3	160 (250)	310	**0.88**
1TE33-8AA3	200 (300)	380	**0.87**
1TE33-0AA3	250 (400)	490	**0.78**

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.

■ **Technical specifications**

DC link voltage 510 … 720 V DC		Braking Module in chassis format	
		6SL3300-1AE31-3AA0	6SL3300-1AE32-5AA0
Power			
• 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
Activation thresholds (adjustable via DIP switch)	V	774 (factory setting) or 673	774 (factory setting) or 673
Cable length to braking resistor, max.	m (ft)	100 (328)	100 (328)
Digital inputs 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.	mm²	1.5	1.5
Digital outputs (resistant to sustained short circuits)			
• Voltage	V	DC 24	DC 24
• Load current per digital output, max.	mA	500	500
• Conductor cross-section, max.	mm²	1.5	1.5
Connection R1/R2		M8 screw	M8 screw
• Conductor cross-section, max.	mm²	35	50
Weight, approx.	kg (lb)	3.6 (8)	7.3 (16)
Approvals according to		cURus	cURus
Suitable for installation in an air-cooled Motor Module, Power Module, Active Line Module, Basic Line Module	Frame size	FX/FB	GX/GB[1]

■ **Selection and ordering data**

Description	Braking Module in chassis format Order No.
DC link voltage 510 … 720 V DC	
Frame size FX, 25 kW/125 kW	**6SL3300-1AE31-3AA0**
Frame size GX, 50 kW/250 kW	**6SL3300-1AE32-5AA0**

Description	Order No.
Accessories	
Cable harness set For mounting a Braking Module of frame size GX into a Basic Line Module of frame size GB	**6SL3366-2NG00-0AA0**
Accessories for re-ordering	
Warning labels in 30 languages 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	**6SL3166-3AB00-0AA0**

[1] 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	Ω	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.	mm²	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	**6SL3000-1BE31-3AA0**
50 kW/250 kW	6SL3300-1AE32-5 . A0	**6SL3000-1BE32-5AA0**

■ **Characteristic**

P_{DB} = Rated power
P_{15} = 5 x P_{DB} = Power which is permissible every 90 s for 15 s
P_{20} = 4 x P_{DB} = Power which is permissible every 90 s for 20 s
P_{40} = 2 x P_{DB} = Power which is permissible every 90 s for 40 s

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.

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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	✓	✓	✓	✓	✓	O
Braking resistor	✓	✓	O	O	O	O

✓ = suitable as base-type
O = 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.

■ **Technical specifications**

Product name	Power Modules in blocksize format 6SL3210-...
Line supply voltage Up to 2000 m (6562 ft) above sea level	200 V ... 240 V 1 AC ±10 % (-15 % < 1 min) or 380 ... 480 V 3 AC ± 10 % (-15 % < 1 min)
Line frequency	47 … 63 Hz
Line power factor At rated power	
• Fundamental (cos φ_1)	> 0.96
• Total (λ)	
- 200 … 240 V 1 AC	0.45 … 0.7
- 380 … 480 V 3 AC	0.65 … 0.95
Overvoltage category In accordance with EN 60664-1	Class III
Precharging frequency Of the DC link, max.	1× every 30 s
DC link voltage, approx.	1.35 x line voltage
Output frequency	0 … 650 Hz[1]
Electronic power supply	24 V DC -15 %/+20 %
Radio interference suppression	
• Standard	No radio interference suppression
• With integrated line filter	Category C2 according to EN 61800-3
Cooling method	Forced air cooling by means of built-in fan
Permissible ambient or coolant temperature (air) In operation for line-side components, Power Modules	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C (104 … 131 °F) see derating characteristics
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, see derating characteristics
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cULus
Safety Integrated	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

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[1] 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 200 … 240 V 1 AC		PM340 Power Module in blocksize format		
	6SL3210-...	1SB11-0...	1SB12-3...	1SB14-0...
Output current				
• Rated current I_{rated}	A	**0.9**	**2.3**	**3.9**
• 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
Type rating[1] Based on I_{rated}	kW (HP)	0.12 (0.2)	0.37 (0.5)	0.75 (0.75)
Rated pulse frequency	kHz	4	4	4
Power loss	kW	0.06	0.075	0.11
Cooling air requirement	m^3/s (ft^3/s)	0.005	0.005	0.005
Sound pressure level L_{pA} (1 m)	dB	< 45	< 45	< 45
24 V DC power supply For Control Unit	A	1.0	1.0	1.0
Rated input current[2] With/without line reactor	A	1.4/2.2	4/6	6.5/10
Resistance value External braking resistor	Ω	≥ 180	≥ 180	≥ 180
Cable length To braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)
Line connection L, N		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
Motor connection U2, V2, W2		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
PE connection		M4 screw	M4 screw	M4 screw
Motor cable length[3]**, max.** Without external options				
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	75 (246)	75 (246)	75 (246)
Degree of protection		IP20	IP20	IP20
Dimensions				
• 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)
Frame size		FSA	FSA	FSA
Weight, approx.	kg (lb)	1.2 (2.65)	1.3 (3)	1.3 (3)

[1] Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

[2] 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 %.

[3] 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.

Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC		PM340 Power Module in blocksize format				
6SL3210-...		1SE11-3UA0	1SE11-7UA0	1SE12-2UA0	1SE13-1UA0	1SE14-1UA0
Output current						
• Rated current I_{rated}	A	**1.3**	**1.7**	**2.2**	**3.1**	**4.1**
• 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
Type rating[1]						
• 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)
Rated pulse frequency	kHz	4	4	4	4	4
Power loss	kW	0.10	0.10	0.10	0.11	0.11
Cooling air requirement	m^3/s (ft^3/s)	0.005 (0.2)	0.005 (0.2)	0.005 (0.2)	0.005 (0.2)	0.005 (0.2)
Sound pressure level L_{pA} (1 m)	dB	< 45	< 45	< 45	< 45	< 45
24 V DC power supply For Control Unit	A	1.0	1.0	1.0	1.0	1.0
Rated input current[2] 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
Resistance value External braking resistor	Ω	≥ 390	≥ 390	≥ 390	≥ 390	≥ 390
Cable length To braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line connection 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^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
Motor connection U2, V2, W2		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
PE connection		M4 screw	M4 screw	M4 screw	M4 screw	M4 screw
Motor cable length[3], max.						
• 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• 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)
Frame size		FSA	FSA	FSA	FSA	FSA
Weight, approx.	kg (lb)	1.2 (3)	1.2 (3)	1.2 (3)	1.2 (3)	1.2 (3)

[1] Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

[2] 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 %.

[3] 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 380 … 480 V 3 AC		PM340 Power Module in blocksize format					
	6SL3210-...	1SE16-0...	1SE17-7...	1SE21-0...	1SE21-8...	1SE22-5...	1SE23-2...
Output current							
• Rated current I_{rated}	A	**5.9**	**7.7**	**10.2**	**18**	**25**	**32**
• 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
Type rating[1]							
• 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)
Rated pulse frequency	kHz	4	4	4	4	4	4
Power loss	kW	0.14	0.16	0.18	0.24	0.30	0.40
Cooling air requirement	m³/s (ft³/s)	0.009 (0.3)	0.009 (0.3)	0.009 (0.3)	0.038 (1.3)	0.038 (1.3)	0.038 (1.3)
Sound pressure level L_{pA} (1 m)	dB	< 50	< 50	< 50	< 60	< 60	< 60
24 V DC power supply For Control Unit	A	1.0	1.0	1.0	1.0	1.0	1.0
Rated input current[2] 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	33/39
Resistance value External braking resistor	Ω	≥ 160	≥ 160	≥ 160	≥ 56	≥ 56	≥ 56
Cable length To braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line connection U1/L1, V1/L2, W1/L3		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	1.0 … 6	1.0 … 6	1.0 … 6	2.5 … 10	2.5 … 10	2.5 … 10
Motor connection U2, V2, W2		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	1.0 … 6	1.0 … 6	1.0 … 6	2.5 … 10	2.5 … 10	2.5 … 10
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	1.0 … 6	1.0 … 6	1.0 … 6	2.5 … 10	2.5 … 10	2.5 … 10
PE connection		M5 screw	M5 screw	M5 screw	M5 screw	M5 screw	M5 screw
Motor cable length[3]**, max.**							
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	75 (246)	75 (246)	75 (246)	75 (246)	75 (246)	75 (246)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	153 (6.02)	153 (6.02)	153 (6.02)	188.4 (7.42)	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)	333.4 (13.13)
• Depth - PM340	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	185 (7.28)	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)	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)	215.3 (8.48)
Frame size		FSB	FSB	FSB	FSC	FSC	FSC
Weight, approx.	kg (lb)	4.0 (9)	4.0 (9)	4.0 (9)	6.5 (14.3)	6.5 (14.3)	6.5 (14.3)

[1] Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.
[2] 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 %.
[3] 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.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC		PM340 Power Module in blocksize format				
6SL3210-...		1SE23-8...	1SE24-5...	1SE26-0...	1SE27-5...	1SE31-0...
Output current						
• Rated current I_{rated}	A	**38**	**45**	**60**	**75**	**90**
• 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
Type rating[1]						
• 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)
Rated pulse frequency	kHz	4	4	4	4	4
Power loss	kW	0.38	0.51	0.69	0.99	1.21
Cooling air requirement	m³/s (ft³/s)	0.022 (0.8)	0.022 (0.8)	0.039 (1.4)	0.022 (0.8)	0.039 (1.4)
Sound pressure level L_{pA} (1 m)	dB	< 60	< 60	< 61	< 60	62
24 V DC power supply for Control Unit	A	1.0	1.0	1.0	1.0	1.0
Rated input current[2] With/without line reactor	A	40/46	47/53	63/72	78/88	94/105
Resistance value External braking resistor	Ω	≥ 27	≥ 27	≥ 27	≥ 15	≥ 15
Cable length To braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)	15 (49)
Line connection U1/L1, V1/L2, W1/L3		M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud
• Conductor cross-section	mm²	10 … 35	10 … 35	10 … 35	10 … 35	10 … 35
Motor connection U2, V2, W2		M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud
• Conductor cross-section	mm²	10 … 35	10 … 35	10 … 35	10 … 35	10 … 35
DC link connection, connection for braking resistor DCP/R1, DCN, R2		M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud
• Conductor cross-section	mm²	10 … 35	10 … 35	10 … 35	10 … 35	10 … 35
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Motor cable length[3], max.						
• 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	275 (10.83)	275 (10.83)	275 (10.83)	275 (10.83)	275 (10.83)
• Height PM340 without/with int. filter	mm (in)	418.3/511 (16.47/20.12)	418.3/511 (16.47/20.12)	418.3/511 (16.47/20.12)	498.3/633 (19.62/24.92)	498.3/633 (19.62/24.92)
• Depth - PM340 - PM340 with CU310 - PM340 with CUA31	mm (in) mm (in) mm (in)	203.5 (8.01) 293.1 (11.54) 233.8 (9.20)	203.5 (8.01) 293.1 (11.54) 233.8 (9.20)	203.5 (8.01) 293.1 (11.54) 233.8 (9.20)	203.5 (8.01) 293.1 (11.54) 233.8 (9.20)	203.5 (8.01) 293.1 (11.54) 233.8 (9.20)
Frame size		FSD	FSD	FSD	FSE	FSE
Weight, approx. PM340 without/with int. filter	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)

[1] Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

[2] 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 %.

[3] 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 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[1]				
• 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	m^3/s (ft^3/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 For Control Unit	A	1.0	1.0	1.0
Rated input current[2] with/without line reactor	A	115/129	151/168	186/204
Resistance value External braking resistor	Ω	≥ 8.2	≥ 8.2	≥ 8.2
Cable length To braking resistor, max.	m (ft)	15 (49)	15 (49)	15 (49)
Line connection U1/L1, V1/L2, W1/L3		M8 screw stud	M8 screw stud	M8 screw stud
• Conductor cross-section, max.	mm^2	120	120	120
Motor connection U2, V2, W2		M8 screw stud	M8 screw stud	M8 screw stud
• Conductor cross-section, max.	mm^2	120	120	120
DC link connection, connection for braking resistor DCP/R1, DCN, R2		M8 screw stud	M8 screw stud	M8 screw stud
• Conductor cross-section, max.	mm^2	120	120	120
PE connection		M8 screw	M8 screw	M8 screw
Motor cable length[3]**, 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 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. 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)

[1] Nominal HP based on asynchronous motors and 460 V AC. For specific sizing select drive based on motor nameplate current and overload.

[2] 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 %.

[3] 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.

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■ **Selection and ordering data**

Rated output current	Type rating	Frame size	PM340 Power Module in blocksize format without line filter	PM340 Power Module in blocksize format with integrated line filter
A	kW (HP)		Order No.	Order No.
Line supply voltage 200 … 240 V 1 AC				
0.9	0.12 (0.2)	FSA	6SL3210-1SB11-0UA0	6SL3210-1SB11-0AA0
2.3	0.37 (0.5)	FSA	6SL3210-1SB12-3UA0	6SL3210-1SB12-3AA0
3.9	0.75 (0.75)	FSA	6SL3210-1SB14-0UA0	6SL3210-1SB14-0AA0
Line supply voltage 380 … 480 V 3 AC				
1.3	0.37 (0.5)	FSA	6SL3210-1SE11-3UA0	–
1.7	0.55 (0.75)	FSA	6SL3210-1SE11-7UA0	–
2.2	0.75 (1)	FSA	6SL3210-1SE12-2UA0	–
3.1	1.1 (1.5)	FSA	6SL3210-1SE13-1UA0	–
4.1	1.5 (2)	FSA	6SL3210-1SE14-1UA0	–
5.9	2.2 (3)	FSB	6SL3210-1SE16-0UA0	6SL3210-1SE16-0AA0
7.7	3 (5)	FSB	6SL3210-1SE17-7UA0	6SL3210-1SE17-7AA0
10.2	4 (5)	FSB	6SL3210-1SE21-0UA0	6SL3210-1SE21-0AA0
18	7.5 (10)	FSC	6SL3210-1SE21-8UA0	6SL3210-1SE21-8AA0
25	11 (15)	FSC	6SL3210-1SE22-5UA0	6SL3210-1SE22-5AA0
32	15 (20)	FSC	6SL3210-1SE23-2UA0	6SL3210-1SE23-2AA0
38	18.5 (25)	FSD	6SL3210-1SE23-8UA0	6SL3210-1SE23-8AA0
45	22 (30)	FSD	6SL3210-1SE24-5UA0	6SL3210-1SE24-5AA0
60	30 (40)	FSD	6SL3210-1SE26-0UA0	6SL3210-1SE26-0AA0
75	37 (50)	FSE	6SL3210-1SE27-5UA0	6SL3210-1SE27-5AA0
90	45 (60)	FSE	6SL3210-1SE31-0UA0	6SL3210-1SE31-0AA0
110	55 (75)	FSF	6SL3210-1SE31-1UA0	6SL3210-1SE31-1AA0
145	75 (100)	FSF	6SL3210-1SE31-5UA0	6SL3210-1SE31-5AA0
178	90 (125)	FSF	6SL3210-1SE31-8UA0	6SL3210-1SE31-8AA0

■ **Accessories**

Example of shield connection kit for PM340 frame size FSB

Description	Order No.
Shield connection kit For PM340	
• Frame size FSA	6SL3262-1AA00-0BA0
• Frame size FSB	6SL3262-1AB00-0DA0
• Frame size FSC	6SL3262-1AC00-0DA0
• Frame sizes FSD and FSE	6SL3262-1AD00-0DA0
• Frame size FSF	6SL3262-1AF00-0DA0

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

■ **Technical specifications**

Line supply voltage 200 … 240 V 1 AC		Line reactor	
6SE6400-...		3CC00-4AB3	3CC01-0AB3
Rated current	A	3.4	8.1
Power loss, approx. At 50/60 Hz	W	12.5/15	11.5/14.5
Line connection U1, V1, W1		Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	6	6
Load connection		Cable	Cable
• Conductor cross-section		3 × AWG16 (1.5 mm²)	3 × AWG16 (1.5 mm²)
• Length, approx.	m (ft)	0.38 (1.25) m	0.38 (1.25) m
PE connection		M5 screw studs	M5 screw studs
Degree of protection[1]		IP20	IP20
Dimensions			
• 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)
Weight, approx.	kg (lb)	1.3 (3)	1.3 (3)
Approvals according to		cURus	cURus
Suitable for Power Module in blocksize format	Type (rated output current)	6SL3210-1SB11--0... (0.9 A) 6SL3210-1SB12--3... (2.3 A)	6SL3210-1SB14--0... (3.9 A)

Line supply voltage 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
Rated current	A	1.9	3.5	4.8	9	11.6	25
Power loss At 50/60 Hz	W	6/7	12.5/15	7.5/9	9/11	27/32	98/118
Line connection U1, V1, W1		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	6	6	6	6	6	6
Load connection		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		3 × AWG16 (1.5 mm²)	3 × AWG16 (1.5 mm²)	3 × AWG16 (1.5 mm²)	3 × AWG16 (1.5 mm²)	3 × AWG16 (1.5 mm²)	4 × AGW10 (2.5 mm²)
• 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)
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Degree of protection[1]		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• 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)
Weight, approx.	kg (lb)	1.2 (3)	1.3 (3)	1.3 (3)	3.4 (7.50)	3.4 (7.50)	6.3 (14)
Approvals according to		cURus	cURus	cURus	cURus	cURus	cURus
Suitable for Power Module in blocksize format	Type (rated output current)	6SL3210-1SE11-3... (1.3 A) 6SL3210-1SE11-7... (1.7 A)	6SL3210-1SE12-2... (2.2 A) 6SL3210-1SE13-1... (3.1 A)	6SL3210-1SE14-1... (4.1 A)	6SL3210-1SE16-0... (5.9 A) 6SL3210-1SE17-7... (7.7 A)	6SL3210-1SE21-0... (10 A)	6SL3210-1SE21-8... (18 A) 6SL3210-1SE22-5... (25 A)

[1] With correctly connected load connection cable.

SINAMICS S120 drive system
Blocksize format – Power Modules

Line reactors

■ **Technical specifications** (continued)

Line supply voltage 380 … 480 V 3 AC		Line reactor					
		6SL3203-0CD23-5AA0	6SL3203-0CJ24-5AA0	6SL3203-0CD25-3AA0	6SL3203-0CJ28-6AA0	6SE6400-3CC11-2FD0	6SE6400-3CC11-7FD0
Rated current	A	31.3	47	63	94	151	186
Power loss At 50/60 Hz	W	37/44	90/115	90/115	170/215	280/360	280/360
Line connection U1, V1, W1		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm²	16	16	16	50	–	–
Load connection		Cable	Cable	Cable	Cable	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section		4 × AWG10 (2.5 mm²)	4 × 16 mm²	4 × 16 mm²	4 × 35 mm²	–	–
• Length, approx.	m (ft)	0.49 (1.61)	0.7 (2.3)	0.7 (2.3)	0.7 (2.3)		
PE connection		M5 screw studs	M8 screw	M8 screw	M8 screw	M8 screw stud	M8 screw stud
Degree of protection[1]		IP20	IP20	IP20	IP20	IP00	IP00
Dimensions							
• 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)
Weight, approx.	kg (lb)	6.4 (14)	13 (29)	13 (29)	19 (42)	25 (55)	25 (55)
Approvals according to		cURus	cURus	cURus	cURus	cURus	cURus
Suitable for Power Module in blocksize format	Type (rated output current)	6SL3210-1SE23-2... (32 A)	6SL3210-1SE23-8... (38 A) 6SL3210-1SE24-5... (45 A)	6SL3210-1SE26-0... (60 A)	6SL3210-1SE27-5... (75 A) 6SL3210-1SE31-0... (90 A)	6SL3210-1SE31-1... (110 A) 6SL3210-1SE31-5... (145 A)	6SL3210-1SE31-8... (178 A)

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[1] With correctly connected load connection cable.

Selection and ordering data

Rated output current	Type rating	Suitable for Power Module in blocksize format		Line reactor
A	kW (HP)	Type	Frame size	Order No.
Line supply voltage 200 … 240 V 1 AC				
0.9	0.12 (0.2)	6SL3210-1SB11-0...	FSA	**6SE6400-3CC00-4AB3**
2.3	0.37 (0.5)	6SL3210-1SB12-3...		
3.9	0.75 (0.75)	6SL3210-1SB14-0...	FSA	**6SE6400-3CC01-0AB3**
Line supply voltage 380 … 480 V 3 AC				
1.3	0.37 (0.5)	6SL3210-1SE11-3UA0	FSA	**6SE6400-3CC00-2AD3**
1.7	0.55 (0.75)	6SL3210-1SE11-7UA0		
2.2	0.75 (1)	6SL3210-1SE12-2UA0	FSA	**6SE6400-3CC00-4AD3**
3.1	1.1 (1.5)	6SL3210-1SE13-1UA0		
4.1	1.5 (2)	6SL3210-1SE14-1UA0	FSA	**6SE6400-3CC00-6AD3**
5.9	2.2 (3)	6SL3210-1SE16-0...	FSB	**6SL3203-0CD21-0AA0**
7.7	3 (5)	6SL3210-1SE17-7...		
10	4 (5)	6SL3210-1SE21-0...	FSB	**6SL3203-0CD21-4AA0**
18	7.5 (10)	6SL3210-1SE21-8...	FSC	**6SL3203-0CD22-2AA0**
25	11 (15)	6SL3210-1SE22-5...		
32	15 (20)	6SL3210-1SE23-2...	FSC	**6SL3203-0CD23-5AA0**
38	18.5 (25)	6SL3210-1SE23-8...	FSD	**6SL3203-0CJ24-5AA0**
45	22 (30)	6SL3210-1SE24-5...		
60	30 (40)	6SL3210-1SE26-0...	FSD	**6SL3203-0CD25-3AA0**
75	37 (50)	6SL3210-1SE27-5...	FSE	**6SL3203-0CJ28-6AA0**
90	45 (60)	6SL3210-1SE31-0...		
110	55 (75)	6SL3210-1SE31-1...	FSF	**6SE6400-3CC11-2FD0**
145	75 (100)	6SL3210-1SE31-5...		
178	90 (125)	6SL3210-1SE31-8...	FSF	**6SE6400-3CC11-7FD0**

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SINAMICS S120 drive system
Blocksize format – Power Modules

Line filters

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■ 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

Product name	Line filter
Line supply voltage 380 … 480 V 3 AC	6SE6400-2FA00-6AD0
Rated current	6 A
Power loss	< 5 W
Line connection L1, L2, L3	Screw-type terminals
• Conductor cross-section	1 ... 2.5 mm²
PE connection	M4 screw stud
Load connection U, V, W	Shielded cable
• Conductor cross-section	4 × 1.5 mm²
• Length, approx.	0.24 m (0.79 ft)
Degree of protection	IP20 (with correctly connected load connection cable)
Dimensions	
• Width	73.5 mm (2.89 in)
• Height	200 mm (7.87 in)
• Depth	44 mm (1.73 in)
Weight, approx.	0.5 kg (1 lb)
Approvals according to	cURus
Suitable for Power Module in blocksize format Type (rated output current)	6SL3210-1SE11-... (1.3 A and 1.7 A) 6SL3210-1SE12-... (2.2 A) 6SL3210-1SE13-... (3.1 A) 6SL3210-1SE14-... (4.1 A)

■ Selection and ordering data

Suitable for Power Modules in blocksize format Frame size FSA	Line filter
Type	Order No.
6SL3210-1SE11-... 6SL3210-1SE12-... 6SL3210-1SE13-... 6SL3210-1SE14-...	**6SE6400-2FA00-6AD0**

■ **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 Available from: Mersen www.ep.mersen.com		
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**

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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 disconnector	Switch disconnector with fuse holders	Fuse	UL/CSA fuse, Class J[1] Available from: Mersen www.ep.mersen.com		
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

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[1] 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.
DC link voltage 240 ... 360 V DC (line voltage 200 ... 240 V 1 AC)		
Braking resistor		
• 180 Ω	Frame size FSA	**6SE6400-4BC05-0AA0**
DC link voltage 510 ... 720 V DC (line voltage 380 ... 480 V 3 AC)		
Braking resistor		
• 390 Ω	Frame size FSA	**6SE6400-4BD11-0AA0**
• 160 Ω	Frame size FSB	**6SL3201-0BE12-0AA0**
• 56 Ω	Frame size FSC	**6SE6400-4BD16-5CA0**
• 27 Ω	Frame size FSD	**6SE6400-4BD21-2DA0**
• 15 Ω	Frame size FSE	**6SE6400-4BD22-2EA1**
• 8.2 Ω	Frame size FSF	**6SE6400-4BD24-0FA0**

■ Characteristic curves

Load diagram for braking resistors in blocksize format

t_a = 12 s

t = 240 s

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SINAMICS S120 drive system
Blocksize format – DC link components

Braking resistors

■ **Technical specifications**

Product name	Braking resistor
DC link voltage 240 ... 360 V DC	6SE6400-4BC05-0AA0
Resistance	180 Ω
Rated power P_{DB}	0.05 kW
Peak power P_{max}	1 kW
Degree of protection[1]	IP20
Power connections	3 × 1.5 mm² (shielded)
• Length	0.5 m (1.64 ft)
Thermostatic switch (NC contact)	
• Switching capacity	250 V AC/max. 2.5 A
• Conductor cross-section	0.5 ... 2.5 mm²
Dimensions	
• Width	72 mm (2.83 in)
• Height	230 mm (9.06 in)
• Depth	43.5 mm (1.71 in)
Weight, approx.	1.0 kg (2.21 lb)
Approvals according to	cURus
Suitable for Power Modules in blocksize format	FSA

DC link voltage 510 V ... 720 V DC		Braking resistor					
		6SE6400-4BD11-0AA0	6SL3201-0BE12-0AA0	6SE6400-4BD16-5CA0	6SE6400-4BD21-2DA0	6SE6400-4BD22-2EA1	6SE6400-4BD24-0FA0
Resistance	Ω	390	160	56	27	15	8.2
Rated power P_{DB}	kW	0.1	0.2	0.65	1.2	2.2	4.0
Peak power P_{max}	kW	1.7	4.1	12	24	44	80
Degree of protection[1]		IP20	IP20	IP20	IP20	IP20	IP20
Power connections		3 × 1.5 mm² (shielded)	3 × 1.5 mm² (shielded)	3 × 1.5 mm² (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)	–	–	–
Thermostatic switch (NC contact)							
• 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	mm²	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5	0.5 ... 2.5
Dimensions							
• 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)
Weight, approx.	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)
Approvals according to		cURus	cURus	cURus	cURus	cURus	cURus
Suitable for Power Modules in blocksize format		FSA	FSB	FSC	FSD	FSE	FSF

[1] With correctly connected load connection cable.

SINAMICS S120 drive system
SINAMICS S120 Combi

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[1]
- 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

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SINAMICS S120 drive system
SINAMICS S120 Combi

■ **Integration** (continued)

G_NC01_EN_00525

■ **Selection and ordering data**

Rated power Infeed	Rated output current Spindle	Rated output current Feedrate 1	Rated output current Feedrate 2	Rated output current Feedrate 3	
kW	A	A	A	A	Order No.
SINAMICS S120 Combi Power Modules (3 power units)					
16	18	5	5	–	**6SL3111-3VE21-6FA0**
16	24	9	9	–	**6SL3111-3VE21-6EA0**
20	30	9	9	–	**6SL3111-3VE22-0HA0**
SINAMICS S120 Combi Power Modules (4 power units)					
16	18	9	5	5	**6SL3111-4VE21-6FA0**
16	24	9	9	9	**6SL3111-4VE21-6EA0**
20	30	12	9	9	**6SL3111-4VE22-0HA0**

■ **Accessories**

Description	Order No.
SINAMICS S120 Combi accessories pack	**6SL3161-8AP00-0AA0**
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	

SINAMICS S120 drive system
SINAMICS S120 Combi

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■ **Technical specifications**

Product name	SINAMICS S120 Combi Power Modules
	6SL3111-...
DC link voltage	$1.35 \times$ line voltage [1]
Output voltage	$0 \dots 0.7 \times$ DC link voltage [1]
Line power factor at rated power	
• Fundamental (cos φ_1)	> 0.96
• Total (λ)	0.65 … 0.90
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 according to EN 61800-3
Degree of protection	IP20
Site altitude (installation altitude)	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) with derating
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cURus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to ISO 13849-1 or EN 954-1

Product name		3-axis Power Module		
External air cooling		6SL3111-3VE21-6FA0	6SL3111-3VE21-6EA0	6SL3111-3VE22-0HA0
Infeed	kW	**16**	**16**	**20**
• 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
Regenerative feedback				
• Rated power P_{rated} (S1)	kW	16	16	20
• Peak regenerative feedback power P_{max}	kW	35	35	40
Supply voltages				
• Line voltage	V	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) above sea level	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) above sea level	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) 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)
Rated input current				
• 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
Pulse frequency	kHz	4	4	4
Output voltage AC	V	$0 \dots 0.7 \times$ DC link voltage	$0 \dots 0.7 \times$ DC link voltage	$0 \dots 0.7 \times$ DC link voltage
Spindle	A	**18**	**24**	**30**
• 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
Rated power				
• At 540 V DC link voltage	kW	8.7	11.7	14.4
• At 600 V DC link voltage	kW	9.7	13	16
Feedrate 1/Feedrate 2	A	**5**	**9**	**9**
• 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

[1] 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
Rated power				
• 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
Output for expansion axis				
• 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
Electronics current consumption at 24 V DC				
• Without external fan module	A	1.5	1.5	1.5
• With external fan module	A	2.3	2.3	2.3
Total power loss (incl. electronics losses)	kW	0.425	0.535	0.635
• Internal	kW	0.08	0.09	0.1
• External	kW	0.345	0.445	0.53
Ambient temperature, max.				
• Without derating	°C (°F)	45 (104)	45 (104)	45 (104)
• With derating	°C (°F)	55 (131)	55 (131)	55 (131)
DC link voltage	V	460 ... 720	460 ... 720	460 ... 720
• Overvoltage trip DC	V	820 ± 2 %	820 ± 2 %	820 ± 2 %
• Undervoltage trip DC	V	380 ± 2 %	380 ± 2 %	380 ± 2 %
DC link capacitance	µF	1645	1880	2115
Circuit breaker (UL)				
• 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
Safety fuses (UL)				
• 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
Cooling air requirement	m³/h (ft³/s)	160 (5650)	160 (5650)	160 (5650)
Dimensions				
• 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)
Weight, approx.	kg (lb)	18.35 (40.45)	18.4 (40.56)	18.5 (40.78)

■ **Technical specifications** (continued)

External air cooling		4-axis Power Module		
		6SL3111-4VE21-6FA0	6SL3111-4VE21-6EA0	6SL3111-4VE22-0HA0
Infeed	kW	**16**	**16**	**20**
• 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
Regenerative feedback				
• Rated power P_{rated} (S1)	kW	16	16	20
• Peak regenerative feedback power P_{max}	kW	35	35	40
Supply voltages				
• Line voltage	V	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) above sea level	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) above sea level	380 V 3 AC - 10 % ... 480 V + 10 % up to 2000 m (6562 ft) 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)
Rated input current				
• 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
Pulse frequency	kHz	4	4	4
Output voltage AC	V	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage
Spindle	A	**18**	**24**	**30**
• 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
Rated power				
• At 540 V DC link voltage	kW	8.7	11.7	14.4
• At 600 V DC link voltage	kW	9.7	13	16
Feedrate 1	A	**9**	**9**	**12**
• 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
Rated power				
• 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
Feedrate 2/Feedrate 3	A	**5**	**9**	**9**
• 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
Rated power				
• 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
Output for expansion axis				
• 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)

External air cooling		4-axis Power Module (continued)		
		6SL3111-4VE21-6FA0	6SL3111-4VE21-6EA0	6SL3111-4VE22-0HA0
Electronics current consumption at 24 V DC				
• Without external fan module	A	1.6	1.6	1.6
• With external fan module	A	2.4	2.4	2.4
Total power loss (incl. electronics losses)	kW	0.49	0.605	0.735
• Internal	kW	0.085	0.1	0.115
• External	kW	0.405	0.505	0.62
Ambient temperature, max.				
• Without derating	°C (°F)	45 (104)	45 (104)	45 (104)
• With derating	°C (°F)	55 (131)	55 (131)	55 (131)
DC link voltage	V	460 ... 720	460 ... 720	460 ... 720
• Overvoltage trip DC	V	820 ± 2 %	820 ± 2 %	820 ± 2 %
• Undervoltage trip DC	V	380 ± 2 %	380 ± 2 %	380 ± 2 %
DC link capacitance	µF	1645	2115	2520
Circuit breaker (UL)				
• 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
Safety fuses (UL)				
• 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
Cooling air requirement	m³/h (ft³/s)	160 (5650)	160 (5650)	160 (5650)
Dimensions				
• 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)
Weight, approx.	kg (lb)	18.9 (41.66)	18.95 (41.79)	19.05 (42.00)

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■ 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 m³/h is required.

The external fan module supplies a maximum volumetric flow of 290 m³/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.

■ 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

Product name	External fan module
	6SL3161-0EP00-0AA0
Rated voltage	24 V DC
Voltage range	20.4 … 28.8 V DC
Volumetric flow, max.	290 m³/h (10241 ft³/h)
Current consumption	0.8 A
Power consumption	18 W
Ambient temperature, permissible	-20 ... +70 °C (-4 ... +58 °F)
Service life	
• At 55 °C (131 °F)	50000 h
• At 70 °C (158 °F)	20000 h
Degree of protection	IP54
Dimensions	
• Height	258 mm (10.16 in)
• Width	104 mm (4.09 in)
• Depth	86 mm (3.38 in)
Weight, approx.	1.5 kg (3.3 lb)
Approvals according to	VDE, CSA, UL

■ Technical specifications

Product name	Reinforcement plates
	6SL3161-1LP00-0AA0
Dimensions	
• Height	575 mm (22.63 in)
• Width	15 mm (0.59 in)
• Depth	75 mm (2.95 in)
Weight, approx.	0.75 kg (1.65 lb)

■ Selection and ordering data

Description	Order No.
SINAMICS S120 Combi External fan module	**6SL3161-0EP00-0AA0**
Accessories	
SINAMICS S120 Combi Reinforcement plates (2 units)	**6SL3161-1LP00-0AA0**

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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 Infeed	Suitable for SINAMICS S120 Combi Power Module	Line reactor
kW	Type	Order No.
16	6SL3111-3VE21-6FA0 6SL3111-3VE21-6EA0 6SL3111-4VE21-6FA0 6SL3111-4VE21-6EA0	**6SL3100-0EE21-6AA0**
20	6SL3111-3VE22-0HA0 6SL3111-4VE22-0HA0	**6SL3100-0EE22-0AA0**

■ **Technical specifications**

		Line reactor	
		6SL3100-0EE21-6AA0	6SL3100-0EE22-0AA0
Rated power	kW	16	20
Rated current	A	28	33
Power loss	W	75	98
Line/load connection 1U1, 1V1, 1W1/1U2, 1V2, 1W2		Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	4	10
PE connection		Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm²	4	10
Degree of protection		IP20	IP20
Dimensions			
• 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)
Weight, approx.	kg (lb)	10.7 (23.6)	10.9 (24.0)
Approvals according to		cURus	cURus

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■ 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

Product name	Line filter
	6SL3000-0BE21-6DA0
Rated current	36 A
Power loss	6 W
Line/load connection L1, L2, L3 / U, V, W	Screw-type terminals
• Conductor cross-section	10 mm^2
PE connection	M6 screw stud
Degree of protection	IP20
Dimensions	
• Width	50 mm (1.97 in)
• Height	429 mm (16.89 in)
• Depth	226 mm (8.90 in)
Weight, approx.	5 kg (11 lb)
Approvals according to	cURus

■ Selection and ordering data

Rated power Infeed	Suitable for SINAMICS S120 Combi Power Module	Line filter
kW	Type	Order No.
16	6SL3111-3VE21-6FA0 6SL3111-3VE21-6EA0 6SL3111-3VE22-0HA0	**6SL3000-0BE21-6DA0**
20	6SL3111-4VE21-6FA0 6SL3111-4VE21-6EA0 6SL3111-4VE22-0HA0	

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SINAMICS S120 drive system
SINAMICS S120 Combi

■ 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[1]

■ Technical specifications

Product name	SINAMICS S120 Single Motor Module in booksize compact format 6SL3420-1TE.. SINAMICS S120 Double Motor Module in booksize compact format 6SL3420-2TE..
DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line voltage 380 ... 480 V 3 AC)
Electronic power supply	24 V DC -15 %/+20 %
Cooling method	Internal air cooling (power units with increased air cooling by built-in fans)
Ambient and coolant temperature (air), perm. In operation for line-side components, Line Modules, and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F) with derating
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level with derating
Degree of protection	IP20
Declarations of conformity	CE (Low Voltage and EMC Directives)
Approvals according to	cURus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to ISO 13849-1 or EN 954-1

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[1] 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

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 × 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
		Internal air cooling
A	kW (HP)[3]	Order No.
DC link voltage 510 ... 720 V DC		
3	1.6 (1.5)	**6SL3420-1TE13-0AA0**
5	2.7 (3)	**6SL3420-1TE15-0AA0**
9	4.8 (5)	**6SL3420-1TE21-0AA0**
18	9.7 (10)	**6SL3420-1TE21-8AA0**

Technical specifications

DC link voltage 510 ... 720 V DC		Single Motor Module in booksize compact format			
Internal air cooling		6SL3420-1TE13-0AA0	6SL3420-1TE15-0AA0	6SL3420-1TE21-0AA0	6SL3420-1TE21-8AA0
Output current					
• Rated current I_{rated}	A	3	5	9	18
• I_{max}	A	9	15	27	54
Rated power[3]	kW (HP)	1.6 (1.5)	2.7 (3)	4.8 (5)	9.7 (10)
DC link current I_d[1]	A	3.6	6	11	22
Current requirement At 24 V DC, max.	A	0.85	0.85	0.85	0.85
Power loss[2]					
• With internal air cooling in control cabinet	kW	0.07	0.1	0.1	0.18
Dimensions					
• 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)
Weight, approx.	kg (lb)	2.7 (5.9)	2.7 (5.9)	2.7 (5.9)	3.4 (7.50)

[1] Rated DC link current for dimensioning an external DC connection.

[2] Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

[3] 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 × 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 KLBÜ 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
		Internal air cooling
A	kW (HP)[3]	Order No.
DC link voltage 510 … 720 V DC		
2 × 1.7	2 × 0.9 (2 × 0.75)	**6SL3420-2TE11-7AA0**
2 × 3	2 × 1.6 (2 × 1.5)	**6SL3420-2TE13-0AA0**
2 × 5	2 × 2.7 (2 × 3)	**6SL3420-2TE15-0AA0**

■ Technical specifications

DC link voltage 510 … 720 V DC		Double Motor Module in booksize compact format		
Internal air cooling		6SL3420-2TE11-7AA0	6SL3420-2TE13-0AA0	6SL3420-2TE15-0AA0
Output current				
• Rated current I_{rated}	A	2 × 1.7	2 × 3	2 × 5
• I_{max}	A	2 × 5.1	2 × 9	2 × 15
Rated power[3]	kW (HP)	2 × 0.9 (2 × 0.75)	2 × 1.6 (2 × 1.5)	2 × 2.7 (2 × 3)
DC link current I_d[1]	A	4.1	7.2	12
Power loss[2]				
• With internal air cooling in control cabinet	kW	0.11	0.13	0.19
Dimensions				
• 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)
Weight, approx.	kg (lb)	3.4 (7.50)	3.4 (7.50)	3.4 (7.50)

[1] Rated DC link current for dimensioning an external DC connection.

[2] Power loss of Motor Module at rated power including losses of 24 V DC electronic power supply.

[3] 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

Product name	CBE20 Communication Board
	6SL3055-0AA00-2EB0
Current requirement At 24 V DC	0.16 A
Ambient temperature, permissible	
• Storage and transport	-40 … +70 °C (-40 ... +158 °F)
• Operation	0 … 55 °C (32 ... 131 °F)
Dimensions	130 mm × 78 mm (5.12 in × 3.07 in)
Weight, approx.	76 g (2.68 oz)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
CBE20 Communication Board	**6SL3055-0AA00-2EB0**
Accessories	
Industrial Ethernet FC	
• RJ45 Plug 180 (1 unit)	**6GK1901-1BB30-0AA0**
• RJ45 Plug 180 (10 units)	**6GK1901-1BB30-0AB0**
• Stripping tool	**6GK1901-1GA00**
• Standard cable GP 2x2	**6XV1840-2AH10**
• Flexible cable GP 2x2	**6XV1870-2B**
• Trailing cable GP 2x2	**6XV1870-2D**
• Trailing cable 2x2	**6XV1840-3AH10**
• Marine cable 2x2	**6XV1840-4AH10**

For more information on connectors and cables,
please refer to Catalog IK PI or the Siemens Industry Mall:
www.siemens.com/industrymall

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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

Product name	CUA31 Control Unit Adapter
	6SL3040-0PA00-0AA1
Current requirement, max. At 24 V DC without DRIVE-CLiQ supply	0.15 A for CUA31 + max. 0.5 A for PM340 Power Module
Conductor cross-section, max.	2.5 mm^2
Power loss	< 4 W
PE connection	M5 screw
Dimensions	
• Width	73 mm (2.87 in)
• Height	165.8 mm (6.53 in)
• Depth	37.3 mm (1.47 in)
Weight, approx.	0.31 kg (0.68 lb)
Approvals according to	cULus

Selection and ordering data

Description	Order No.
CUA31 Control Unit Adapter Without DRIVE-CLiQ cable	**6SL3040-0PA00-0AA1**
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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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**

Product name	DMC20 DRIVE-CLiQ Hub Module
	6SL3055-0AA00-6AA0
Current requirement, max. At 24 V DC without DRIVE-CLiQ supply	0.15 A
• Conductor cross-section, max.	2.5 mm^2
Degree of protection	IP20
Dimensions	
• Width	50 mm (1.97 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.8 kg (1.76 lb)
Approvals according to	cULus

■ **Selection and ordering data**

Description	Order No.
DMC20 DRIVE-CLiQ Hub Module Without DRIVE-CLiQ cable	**6SL3055-0AA00-6AA0**
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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SINAMICS S120 drive system
Supplementary system components

■ 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).
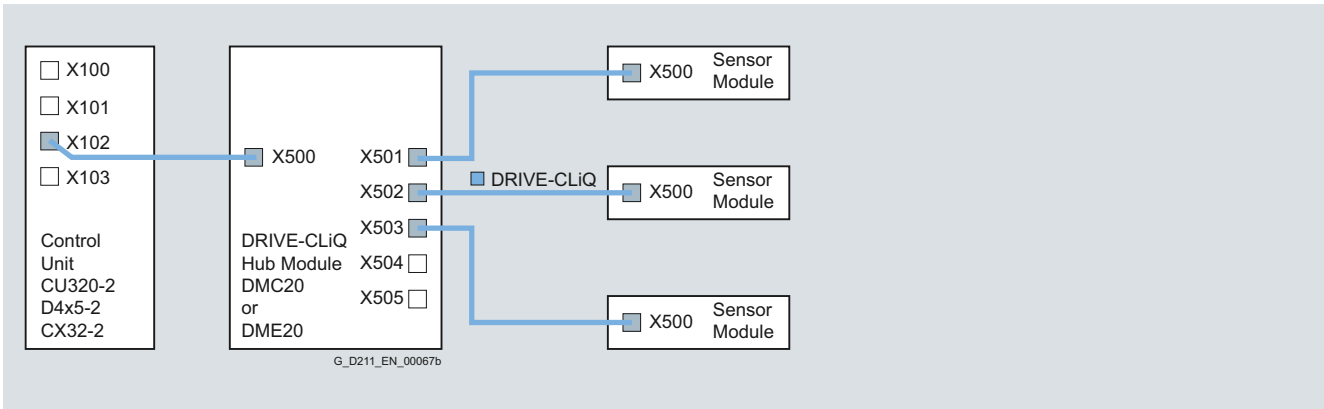
■ Design

The following are located on the DME20 DRIVE-CLiQ Hub Module:

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ nodes
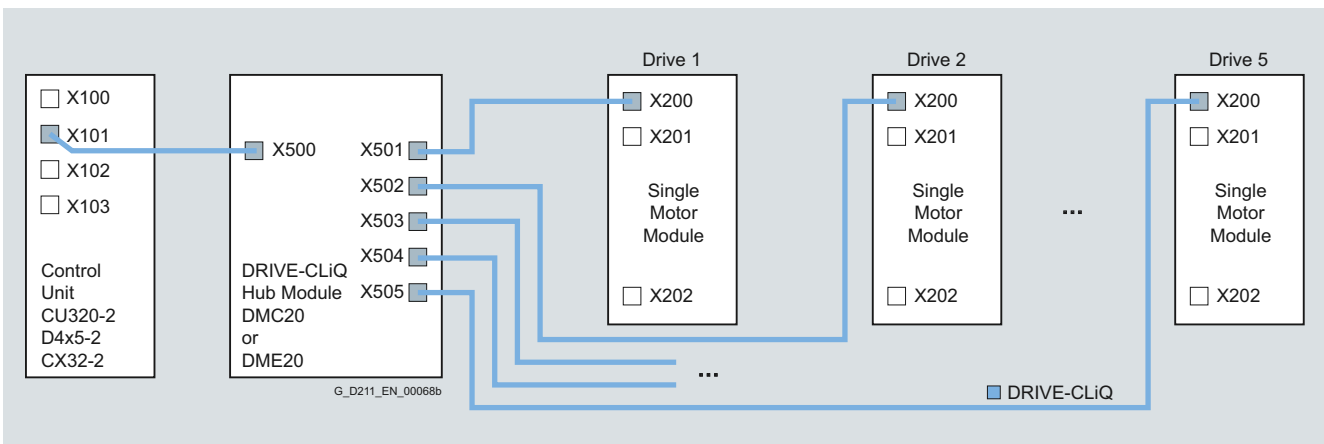- 1 connection for the electronic power supply via the 24 V DC circular power supply connector with conductor cross-section 4×0.75 mm^2 (pins 1+2 internally bridged; pins 3+4 internally bridged)

■ Integration

■ Technical specifications

Product name	DME20 DRIVE-CLiQ Hub Module
	6SL3055-0AA00-6AB0
Current requirement, max.	0.15 A
At 24 V DC without DRIVE-CLiQ supply	
• Conductor cross-section, max.	4×0.75 mm^2
Degree of protection	IP67
Dimensions	
• Width	99 mm (3.9 in)
• Height	149 mm (5.87 in)
• Depth	55.7 mm (2.19 in; without connector)
Weight, approx.	0.8 kg (1.76 lb)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
DME20 DRIVE-CLiQ Hub Module Without DRIVE CLiQ cable; without electronic power supply cable and circular connector for 24 V DC	**6SL3055-0AA00-6AB0**
Accessories	
24 V DC power supply cable	Order and delivery Phoenix Contact www.phoenixcontact.com
• Shielded connector, 5-pole, user-assembled	Part No. 1508365
• 4-pole non-shielded connector, user-assembled, Speedcon quick-lock	Part No. 1521601
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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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.
TM15 Terminal Module Without DRIVE-CLiQ cable	**6SL3055-0AA00-3FA0**
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

Technical specifications

Product name	TM15 Terminal Module
	6SL3055-0AA00-3FA0
Current requirement, max. With 24 V DC without load	0.15 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Number of DRIVE-CLiQ sockets	2
I/Os	
• 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^2
Digital inputs	
• 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.[1]	
- L → H	50µs
- H → L	100µs
Digital outputs Resistant to sustained short circuits	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (resistive load)[1]	
- L → H, typ. L → H, max.	50 µs 100 µs
- H → L, typ. H → L, max.	150 µs 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
Power loss	< 3 W
PE connection	M4 screw
Dimensions	
• Width	50 mm (1.97 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.86 kg (1.90 lb)
Approvals according to	cULus

[1] 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.

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■ 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.
TM41 Terminal Module Without DRIVE-CLiQ cable	**6SL3055-0AA00-3PA1**
Accessories for re-ordering	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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SINAMICS S120 drive system
Supplementary system components

TM41 Terminal Module

■ **Technical specifications**

Product name	TM41 Terminal Module 6SL3055-0AA00-3PA1
Current requirement (X524 at 24 V DC) without DRIVE-CLiQ supply or digital outputs (X514)	0.5 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
I/Os	
• Digital inputs/outputs	Individually parameterizable as DI or DO
• Number of digital inputs/ outputs	4
• Number of digital inputs/ outputs (with electrical isolation)	4
• Connection method	Plug-in screw-type terminals
• Conductor cross-section, max.	1.5 mm^2
Digital inputs	
• Voltage	-3 V ... +30 V (digital inputs without isolation) -30 V ... +30 V (digital inputs with isolation)
• Low level (an open digital input is interpreted as low)	-3 V ... +5 V (digital inputs without isolation) -30 V ... +5 V (digital inputs with isolation)
• High level	15 … 30 V
• Current consumption at 24 V DC, typ.	< 9 mA
• Delay times of digital inputs, max.[1]	
- L → H	3 ms
- H → L	3 ms
Digital outputs Resistant to sustained short circuits	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (resistive load)[1]	
- L → H, typ. L → H, max.	50 µs 100 µs
- H → L, typ. H → L, max.	75 µs 150 µs
Analog input (Difference)	
• Voltage range	-10 … +10 V
• Internal resistance	≥ 100 kΩ
• Resolution[2]	12 bit + sign

Product name	TM41 Terminal Module 6SL3055-0AA00-3PA1
Pulse encoder emulation	
• Level	TTL (RS422), A+, A-, B+, B-, zero track N+, N-
• Limit frequency $f_{max.}$	512 kHz
• Ratio Encoder pulses: Encoder emulation	1 : 1 with incremental encoder sin/cos and TTL/HTL
PE connection	M4 screw
Dimensions	
• Width	50 mm (1.97 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.85 kg (1.87 lb)
Approvals according to	cULus

[1] 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.

[2] 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}.

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

Product name	TM120 Terminal Module
	6SL3055-0AA00-3KA0
Current requirement, max. at 24 V DC	0.5 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Temperature sensor inputs The inputs can be parameterized separately for the evaluation of KTY84-130 or PTC sensors or temperature switches.	
• Conductor cross-section	0.2 ... 6 mm^2
• Constant current per sensor, approx.	2 mA
• Safe electrical separation up to the line voltage, max.	480 V AC
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.41 kg (0.90 lb)

Selection and ordering data

Description	Order No.
TM120 Terminal Module Without DRIVE-CLiQ cable	**6SL3055-0AA00-3KA0**
Accessories	
SINAMICS/SINUMERIK/ SIMOTION dust-proof blanking plugs (50 units) For DRIVE-CLiQ ports	**6SL3066-4CA00-0AA0**

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

Product name	Safe Brake Relay
	6SL3252-0BB01-0AA0
Switching capacity of the NO contact	–
Supply voltage	20.4 … 28.8 V DC
	Recommended rated supply voltage 26 V DC
	(To compensate for voltage drop in feeder cable to 24 V DC motor brake solenoid)
Current requirement, max.	
• Motor brake	2 A
• 24 V DC	0.05 A + the current requirement of the motor brake
• Conductor cross-section, max.	2.5 mm^2
Dimensions	
• Width	69 mm (2.71 in)
• Height	63 mm (2.48 in)
• Depth	33 mm (1.3 in)
Weight, approx.	0.17 kg (0.37 lb)

■ Selection and ordering data

Description	Order No.
Safe Brake Relay Including cable harness for connection to Power Module	**6SL3252-0BB01-0AA0**

■ 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	100 m (328 ft)
• When using MOTION-CONNECT 800 DRIVE-CLiQ cables	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.

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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

Product name	SMC10 Sensor Module Cabinet-Mounted
	6SL3055-0AA00-5AA3
Current requirement, max. At 24 V DC, without taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss	< 10 W
Encoders which can be evaluated	• 2-pole resolver
	• Multi-pole resolver
• 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)
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.4 kg (0.88 lb)
Approvals according to	cULus

Selection and ordering data

Description	Order No.
SMC10 Sensor Module Cabinet-Mounted Without DRIVE-CLiQ cable	**6SL3055-0AA00-5AA3**

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SINAMICS S120 drive system
Encoder system connection

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_{pp}
- Absolute encoder EnDat
- SSI encoder with incremental signals sin/cos 1 V_{pp} (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

Product name	SMC20 Sensor Module Cabinet-Mounted
	6SL3055-0AA00-5BA3
Current requirement, max.	0.2 A
At 24 V DC, without taking encoder into account	
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss	< 10 W
Encoders which can be evaluated	• Incremental encoder sin/cos 1 V_{pp}
	• Absolute encoder EnDat
	• SSI encoder with incremental signals sin/cos 1 V_{pp} (firmware V2.4 and later)
• 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)
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.45 kg (1 lb)
Approvals according to	cULus

Selection and ordering data

Description	Order No.
SMC20 Sensor Module Cabinet-Mounted Without DRIVE-CLiQ cable	**6SL3055-0AA00-5BA3**

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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^2.

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

Product name	SMC30 Sensor Module Cabinet-Mounted 6SL3055-0AA00-5CA2
Current requirement, max. At 24 V DC, without taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss	< 10 W
Encoders which can be evaluated	• Incremental encoder TTL/HTL • SSI encoder with TTL/HTL incremental signals • SSI encoder without incremental signals
• Input impedance	
- TTL	570 Ω
- HTL, max.	16 mA
• 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)[1]
- HTL encoder	100 m (328 ft) for unipolar signals 300 m (984 ft) for bipolar signals[1]
- SSI encoder	100 m (328 ft)
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.45 kg (1 lb)
Approvals according to	cULus

■ Selection and ordering data

Description	Order No.
SMC30 Sensor Module Cabinet-Mounted Without DRIVE-CLiQ cable	**6SL3055-0AA00-5CA2**

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[1] Signal cables twisted in pairs and shielded.

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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_{pp} without rotor position track (C and D tracks)
- Absolute encoder EnDat 2.1
- SSI absolute encoder[1] with incremental signals sin/cos 1 V_{pp} (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.
SME20 Sensor Module External For incremental measuring systems Without DRIVE-CLiQ cable	**6SL3055-0AA00-5EA3**
SME25 Sensor Module External For absolute measuring systems Without DRIVE-CLiQ cable	**6SL3055-0AA00-5HA3**
Accessories	
Adapter cable[2] For SME20, to connect motors with 17-pole encoder connector, with encoders, without C and D tracks.	**6FX8002-2CA88-....**

■ Integration

SME20/SME25 Sensor Modules External communicate with a Control Unit via DRIVE-CLiQ.

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[1] For SME25, only encoders with 5 V supply voltage.

[2] 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 6SL3055-0AA00-5EA3	Sensor Module External SME25 6SL3055-0AA00-5HA3
Encoder		• Incremental encoder sin/cos 1 V_{pp} with 5 V power supply 0.35 A	• Absolute encoder EnDat with 5 V power supply 0.35 A • Absolute encoder SSI with incremental signals sin/cos 1 V_{pp} with 5 V voltage supply 0.35 A
Signal subdivision (Interpolation)		≤ 16384 times (14 bit)	≤ 16384 times (14 bit)
Max. encoder frequency that can be evaluated	kHz	≤ 500	≤ 500
SSI/EnDat 2.1 baud rate	kHz	–	100
Measuring system interface		12-pin M23 circular connector	17-pin M23 circular connector
Output		IP67 DRIVE-CLiQ connector	IP67 DRIVE-CLiQ connector
Current requirement, max. At 24 V DC, without taking encoder into account	A	0.11	0.11
• Conductor cross-section		Acc. to connector contacts	Acc. to connector contacts
• Protection		Via DRIVE-CLiQ power supply source	Via DRIVE-CLiQ power supply source
Power loss	W	< 4	< 4
PE connection		M4 screw/1.8 Nm	M4 screw/1.8 Nm
Cable length, max.			
• To measuring system[1]	m (ft)	3 (9.84)	3 (9.84)
• To automatic speed control	m (ft)	100 (328)	100 (328)
Degree of protection		IP67	IP67
Dimensions			
• Width	mm (in)	58 (2.28)	58 (2.28)
• Height	mm (in)	44 (1.73)	44 (1.73)
• Depth	mm (in)	112 (4.41)	112 (4.41)
Weight, approx.	kg (lb)	0.31 (0.68)	0.31 (0.68)
Approvals according to		cULus	cULus

[1] 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.)

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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[1] 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.
SME120 Sensor Module External For incremental measuring systems Without DRIVE-CLiQ cable	**6SL3055-0AA00-5JA3**
SME125 Sensor Module External For absolute measuring systems Without DRIVE-CLiQ cable	**6SL3055-0AA00-5KA3**
Accessories	
Connector for temperature sensor input (connector kits, 6+1-pole)	**6FX2003-0SU07**
Connector for hall sensor input (connector kits, 9-pole)	**6FX2003-0SU01**
Connector for encoder system interface SME120 (connector kits, 12-pole)	**6FX2003-0SA12**
Connector for encoder system interface SME125 (connector kits, 17-pole)	**6FX2003-0SA17**

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[1] 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 6SL3055-0AA00-5JA3	Sensor Module External SME125 6SL3055-0AA00-5KA3
Encoder		• Incremental encoder sin/cos 1 V_{pp} with 5 V power supply	• Absolute encoder EnDat with 5 V power supply • SSI with incremental encoder sin/cos 1 V_{pp} with 5 V power supply
Signal subdivision (Interpolation)		≤ 16384 times (14 bit)	≤ 16384 times (14 bit)
Max. encoder frequency that can be evaluated	kHz	≤ 500	≤ 500
SSI/EnDat 2.1 baud rate	kHz	–	100
Measuring system interface		12-pin M23 circular connector	17-pin M23 circular connector
Temperature sensor input		6-pin M17 circular connector	6-pin M17 circular connector
Hall effect sensor input		9-pin M23 circular connector	–
Output		IP67 DRIVE-CLiQ connector	IP67 DRIVE-CLiQ connector
Current requirement, max. At 24 V DC, without taking encoder into account	A	0.16	0.16
• Current carrying capacity of the encoder supply for measuring system (at 5 V DC) and, where applicable, including hall effect sensor box	A	0.35	0.35
• Conductor cross-section		Acc. to connector contacts	Acc. to connector contacts
• Protection		Via DRIVE-CLiQ power supply source	Via DRIVE-CLiQ power supply source
Power loss	W	≤ 4.5	≤ 4.5
PE connection		M4 screw/1.8 Nm	M4 screw/1.8 Nm
Cable length, max.			
• To measuring system[1]/ temperature sensor	m (ft)	3 (9.84)	3 (9.84)
• To automatic speed control	m (ft)	100 (328)	100 (328)
Degree of protection		IP67	IP67
Dimensions			
• Width	mm (in)	117.6 (4.63)	117.6 (4.63)
• Height	mm (in)	44 (1.73)	44 (1.73)
• Depth	mm (in)	127 (5.00)	127 (5.00)
Weight, approx.	kg (lb)	0.7 (1.54)	0.7 (1.54)
Approvals according to		cULus	cULus

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[1] 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 [1]	Accuracy in angular seconds	Resolution	Degree of protection without/with shaft input
Incremental encoders	sin/cos 1 V_{pp}	Yes	± 18 mech. × 3600/ PPR count z	2500 S/R	IP67/IP64
	RS422 (TTL)	[2]	± 18 mech. × 3600/ PPR count z	5000 S/R	IP67/IP64
	HTL	[2]	± 18 mech. × 3600/ PPR count z	2500 S/R	IP67/IP64
	RS422 (TTL) double track	[2]	Track 1: ± 63 Track 2: ± 12	Track 1: 1024 S/R Track 2: 9000 S/R	IP67/IP64
Absolute encoders	DRIVE-CLiQ	[2]	± 36	Single-turn 22 bit / Multi-turn 34 bit (22 bit single-turn + 12 bit multi-turn)	IP67/IP64
	SSI	[2]	± 79 (with 8192 steps)	Single-turn 13 bit (8192 steps) / Multi-turn 25 bits (8192 steps × 4096 revolutions)	IP67/IP64
	EnDat	Yes	± 60 (incremental track)	Single-turn 13 bit (8192 steps) / Multi-turn 25 bits (8192 steps × 4096 revolutions)	IP67/IP64
	PROFIBUS DP	[2]	± 79 (with 8192 steps)	Single-turn 13 bit (8192 steps) / Multi-turn 27 bit (8192 steps × 16384 revolutions)	IP67/IP64
	PROFINET IO	[2]	± 79 (with 8192 steps)	Single-turn 13 bit (8192 steps) / Multi-turn 27 bit (8192 steps × 16384 revolutions)	IP67/IP64

S/R = signals/revolution

[1] Built-on rotary encoders can be used for Safety Integrated.
[2] 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: ≥ 20 mm (0.79 in)
• Continuous bending: ≥ 75 mm (2.95 in)

SINAMICS S120 drive system
Measuring systems

■ Function

Incremental encoder (sin/cos 1 V_{pp}/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_{pp} 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_{pp}	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_p on encoder	V	5 ± 10 %	5 ± 10 % or 10 ... 30	10 ... 30	5 ± 5 %
Limit frequency, typ.	kHz	≥ 180 (-3 dB) ≥ 450 (-6 dB)	–	–	–
Scanning frequency, max.	kHz	–	300	300	Track 1: 160 Track 2: 1000
No-load current consumption, max.	mA	150	150	150	Track 1: 150 Track 2: 150
Signal level		Sinusoidal 1 V_{pp}	RS422 (TTL)	V_H ≥ 21 V at I_H = 20 mA at 24 V V_L ≤ 2.8 V at I_L = 20 mA at 24 V	RS422 (TTL)
Outputs protected against short circuit to 0 V		Yes	Yes	Yes	Yes
Switching time (10 ... 90 %) rise/fall time t_r/t_f (for 1 m (3.28 ft) cable and recommended input circuit)	ns	–	≤ 50	≤ 200	≤ 100
Phase angle, signal A to B 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_{pp} 6FX2001-3....	Incremental encoder with RS422 (TTL) 6FX2001-2....	Incremental encoder with HTL 6FX2001-4...0	Double-track incremental encoder with RS422 (TTL) 6FX2001-2UK00
Cable length to downstream electronics, max.[1]	m (ft)	150 (492)	100 (328)	300 (984)	Up to 500 kHz: 100 (328) Up to 1 MHz: 50 (164)
LED failure monitoring		–	High-resistance driver	High-resistance driver	–
Resolution, max.	S/R	2500	5000	2500	Track 1: 1024 Track 2: 9000
Accuracy	arcsec	± 18 mech. × 3600/ PPR count z	± 18 mech. × 3600/ PPR count z	± 18 mech. × 3600/ PPR count z	Track 1: ± 63 Track 2: ± 12
Speed, max.					
• Electrical	rpm	$(27 \times 10^6$ rpm)/ PPR count (at -6 dB)	$(18 \times 10^6$ rpm)/ PPR count	$(18 \times 10^6$ rpm)/ PPR count	Track 1: 9000 Track 2: 6500
• Mechanical	rpm	12000	12000	12000	12000
Friction torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Starting torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Shaft load capability					
• $n \le 6000$ rpm					
- Axial	N (lb_f)	40 (8.99)	40 (8.99)	40 (8.99)	10 (2.25)
- Radial at shaft extension	N (lb_f)	60 (13.5)	60 (13.5)	60 (13.5)	20 (4.50)
• $n > 6000$ rpm					
- Axial	N (lb_f)	10 (2.25)	10 (2.25)	10 (2.25)	–
- Radial at shaft extension	N (lb_f)	20 (4.50)	20 (4.50)	20 (4.50)	–
Shaft diameter					
• 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)	–
Shaft length					
• 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)	–
Angular acceleration, max.	rad/s²	10^5	10^5	10^5	10^5
Moment of inertia of rotor	kgm² (lb_f-in-s²)	1.45×10^{-6} (12.8×10^{-6})	1.45×10^{-6} (12.8×10^{-6})	1.45×10^{-6} (12.8×10^{-6})	20×10^{-6} (177×10^{-6})
Vibration (55 … 2000 Hz) acc. to EN 60068-2-6	m/s² (ft/s²)	≤ 300 (984)	≤ 300 (984)	≤ 300 (984)	≤ 100 (328)
Shock acc. to EN 60068-2-27					
• 2 ms	m/s² (ft/s²)	≤ 2000 (6562)	≤ 2000 (6562)	≤ 2000 (6562)	–
• 6 ms	m/s² (ft/s²)	≤ 1000 (3281)	≤ 1000 (3281)	≤ 1000 (3281)	≤ 1000 (3281)
Degree of protection acc. to DIN EN 60529 (IEC 60529)					
• Without shaft input		IP67	IP67	IP67	IP67
• With shaft input		IP64	IP64	IP64	IP64
Ambient temperature					
Operation					
• Flange outlet or fixed cable					
- At V_p = 5 V ± 10 %	°C (°F)	-40 … +100 (-40 … +212)	-40 … +100 (-40 … +212)	-40 … +100 (-40 … +212)	-10 … +70 (+14 … +158)
- At V_p = 10 … 30 V	°C (°F)	–	-40 … +70 (-40 … +158)	–	–
• Flexible cable					
- At V_p = 5 V ± 10 %	°C (°F)	-10 … +100 (+14 … +212)	-10 … +100 (+14 … +212)	-10 … +100 (+14 … +212)	-10 … +70 (+14 … +158)
- At V_p = 10 … 30 V	°C (°F)	–	-10 … +70 (+14 … +158)	–	–
Weight, approx.	kg (lb)	0.3 (0.66)	0.3 (0.66)	0.3 (0.66)	0.7 (1.54)
EMC		Tested in accordance with the guidelines for electromagnetic compatibility 89/336/EEC and the regulations of the EMC guidelines (generic standards)			
Approvals according to		CE, cULus	CE, cULus	CE, cULus	CE, cULus

S/R = signals/revolution

[1] 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.
Incremental encoders with sin/cos 1 V$_{pp}$	
5 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-3G ■■■
• Radial flange outlet	6FX2001-3E ■■■
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-3C ■■■
Resolution	
1000 S/R	B 0 0
1024 S/R	B 0 2
2500 S/R	C 5 0
Incremental encoders with RS422 (TTL)	
5 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-2G ■■■
• Radial flange outlet	6FX2001-2E ■■■
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-2C ■■■
Clamp flange and connection via	
• Axial flange outlet	6FX2001-2R ■■■
• Radial flange outlet	6FX2001-2P ■■■
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-2M ■■■
10 ... 30 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-2H ■■■
• Radial flange outlet	6FX2001-2F ■■■
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-2D ■■■
Clamp flange and connection via	
• Axial flange outlet	6FX2001-2S ■■■
• Radial flange outlet	6FX2001-2Q ■■■
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-2N ■■■
Resolution	
500 S/R	A 5 0
1000 S/R	B 0 0
1024 S/R	B 0 2
1250 S/R	B 2 5
1500 S/R	B 5 0
2000 S/R	C 0 0
2048 S/R	C 0 4
2500 S/R	C 5 0
3600 S/R	D 6 0
5000 S/R	F 0 0

Description	Order No.
Incremental encoders with HTL	
10 ... 30 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-4H ■■ 0
• Radial flange outlet	6FX2001-4F ■■ 0
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-4D ■■ 0
Clamp flange and connection via	
• Axial flange outlet	6FX2001-4S ■■ 0
• Radial flange outlet	6FX2001-4Q ■■ 0
• Cable 1 m (3.28 ft) with connector[1]	6FX2001-4N ■■ 0
Resolution	
100 S/R	A 1
500 S/R	A 5
1000 S/R	B 0
2500 S/R	C 5
Double-track incremental encoder with RS422 (TTL)	
5 V DC supply voltage	
Synchro flange and connection via	
• Cable 1 m (3.28 ft) with axial connector 2 types of resolution: 9000/1024 S/R	6FX2001-2UK00

S/R = signals/revolution

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[1] 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 6FX2001-5.D..-0AA1	Absolute encoder with SSI 6FX2001-5.S..	Absolute encoder with EnDat 6FX2001-5.E..
Operating voltage DC V_p **on encoder**	V	24 - 15 % + 20 %	10 ... 30	5 ± 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	100	–	–
	kHz	–	100 ... 1000	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.[1]	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

[1] 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 6FX2001-5.D..-0AA1	Absolute encoder with SSI 6FX2001-5.S..	Absolute encoder with EnDat 6FX2001-5.E..
Resolution				
• Single-turn	bit	22	13 (8192 steps)	13 (8192 steps)
• Multi-turn	bit	34 (22 bit single-turn+12 bit multi-turn)	25 (8192 steps × 4096 revolutions)	25 (8192 steps × 4096 revolutions)
Frame				
• Single-turn	bit	–	13 without parity	According to EnDat specification
• Multi-turn	bit	–	25 without parity	According to EnDat specification
Incremental track	S/R	2048, 1 V_{pp} (internal only)	–	512, 1 V_{pp}
Code type				
• Sampling		Gray	Gray	Gray
• Transfer		DRIVE-CLiQ	Gray, fir tree format	Binary
Parameterization capability				
• Preset		–	Set to zero	–
• Counting direction		Yes	Yes	–
Accuracy	arcsec	± 36	± 79 (with 8192 steps)	± 60 (incremental track)
Friction torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Starting torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Shaft load capability				
• $n \leq 6000$ rpm				
- Axial	N (lb_f)	40 (8.99)	40 (8.99)	40 (8.99)
- Radial at shaft extension	N (lb_f)	60 (13.5)	60 (13.5)	60 (13.5)
• $n > 6000$ rpm				
- Axial	N (lb_f)	10 (2.25)	10 (2.25)	10 (2.25)
- Radial at shaft extension	N (lb_f)	20 (4.50)	20 (4.50)	20 (4.50)
Shaft diameter				
• 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 Hollow shaft	mm (in)	10/12 (0.39/0.47)	–	–
Angular acceleration, max.	rad/s^2	10^5	10^5	10^5
Moment of inertia of rotor				
• Solid shaft	kgm^2 (lb_f-in-s^2)	1.90×10^{-6} (16.8×10^{-6})	1.45×10^{-6} (12.8×10^{-6})	1.45×10^{-6} (12.8×10^{-6})
• Hollow shaft	kgm^2 (lb_f-in-s^2)	2.80×10^{-6} (24.8×10^{-6})	–	–
Vibration (55 ... 2000 Hz) acc. to EN 60068-2-6	m/s^2 (ft/s^2)	≤ 100 (328)	≤ 300 (984)	≤ 300 (984)
Shock acc. to EN 60068-2-27				
• 2 ms	m/s^2 (ft/s^2)	≤ 2000 (6562)	≤ 2000 (6562)	≤ 2000 (6562)
• 6 ms	m/s^2 (ft/s^2)	≤ 1000 (3281)	≤ 1000 (3281)	≤ 1000 (3281)
Degree of protection acc. to DIN EN 60529 (IEC 60529)				
• Without shaft input		IP67	IP67	IP67
• With shaft input		IP64	IP64	IP64
Ambient temperature				
• Operation	°C (°F)	-20 ... +100 (-4 ... +212)	-40 ... +85 (-40 ... +185)	-40 ... +100 (-40 ... +212)
Weight, approx.				
• 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)
EMC		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
Approvals according to		CE, cULus	CE, cULus	CE, cULus

S/R = signals/revolution

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SINAMICS S120 drive system
Measuring systems

Built-on optoelectronic rotary encoders
Absolute encoders

■ **Technical specifications** (continued)

Product name		Absolute encoder with PROFIBUS DP 6FX2001-5.P..	Absolute encoder with PROFINET IO 6FX2001-5.N..
Operating voltage DC V_p **on encoder**	V	10 ... 30	10 ... 30
Current consumption, **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 acc. to EIA standard RS 485	2 ports IRT
Data output		Differential cable driver 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 ± 1 bit accuracy	rpm	5800	5800
• Mechanical			
- Single-turn	rpm	12000	12000
- Multi-turn	rpm	6000	6000
Cable length to down- **stream electronics, max.**[1]			
• 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 bus terminating resistor in removable cover with radial cable glands (3 units)	2 × M12 plug connectors, 4-pole for PROFINET ports 1 × M12 plug connector, 4-pole for operating voltage
• Cable diameter	mm (in)	6.5 ... 9 (0.26 ... 0.35) Removal of cover possible without interrupting bus	–
Resolution			
• Single-turn	bit	13 (8192 steps)	13 (8192 steps)
• Multi-turn	bit	27 (8192 steps × 16384 revolutions)	27 (8192 steps × 16384 revolutions)
Frame		According to PNO encoder profile V4.1 Class 1, Class 2, Class 3 Standard frame 81	According to PNO encoder profile V4.1 Class 1, Class 2, Class 3, Class 4 Standard frames 81/82/83/84 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

[1] 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 6FX2001-5.P..	Absolute encoder with PROFINET IO 6FX2001-5.N..
Parameterization capability			
• 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
Online parameterization		Yes	Yes
PNO certificate		Yes	Yes
Supported profiles		PNO encoder profile V4.1	PNO encoder profile V4.1
Accuracy with 8192 steps	arcsec	± 79 (± ½ LSB)	± 79 (± ½ LSB)
Friction torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Starting torque (at 20 °C) (68 °F)	Nm (lb_f-in)	≤ 0.01 (0.09)	≤ 0.01 (0.09)
Shaft load capability			
• $n \le 6000$ rpm			
- Axial	N (lb_f)	40 (8.99)	40 (8.99)
- Radial at shaft extension	N (lb_f)	110 (24.73)	110 (24.73)
• $n > 6000$ rpm			
- Axial	N (lb_f)	10 (2.25)	10 (2.25)
- Radial at shaft extension	N (lb_f)	20 (4.50)	20 (4.50)
Shaft diameter			
• Synchro flange	mm (in)	6 (0.24)	6 (0.24)
• Clamp flange	mm (in)	10 (0.39)	10 (0.39)
• Torque arm Hollow shaft	mm (in)	15 (0.59)[1]	15 (0.59)[1]
Angular acceleration, max.	rad/s^2	10^5	10^5
Moment of inertia of rotor			
• Solid shaft	kgm^2 (lb_f-in-s^2)	1.90×10^{-6} (16.8×10^{-6})	1.90×10^{-6} (16.8×10^{-6})
• Hollow shaft	kgm^2 (lb_f-in-s^2)	2.80×10^{-6} (24.8×10^{-6})	2.80×10^{-6} (24.8×10^{-6})
Vibration (55 ... 2000 Hz) **acc. to EN 60068-2-6**	m/s^2 (ft/s^2)	≤ 100 (328)	≤ 100 (328)
Shock **acc. to EN 60068-2-27**			
• 2 ms	m/s^2 (ft/s^2)	≤ 2000 (6562)	≤ 2000 (6562)
• 6 ms	m/s^2 (ft/s^2)	≤ 1000 (3281)	≤ 1000 (3281)
Degree of protection **acc. to DIN EN 60529** **(IEC 60529)**			
• Without shaft input		IP67	IP67
• With shaft input		IP64	IP64
Ambient temperature			
• Operation	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
Weight, approx.			
• Single-turn	kg (lb)	0.4 (0.88)	0.4 (0.88)
• Multi-turn	kg (lb)	0.5 (1.10)	0.5 (1.10)
EMC		Tested in accordance with DIN EN 50081 and EN 50082	Tested in accordance with DIN EN 50081 and EN 50082
Approvals according to		CE, cULus	CE, cULus

[1] 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.

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SINAMICS S120 drive system
Measuring systems

Built-on optoelectronic rotary encoders
Absolute encoders

■ Selection and ordering data

Description	Order No.
Absolute encoders with DRIVE-CLiQ	
24 V DC supply voltage	
Radial connection	
• Synchro flange Solid shaft	6FX2001-5FD ■■-0AA1
• Clamp flange Solid shaft	6FX2001-5QD ■■-0AA1
• Torque arm Hollow shaft diameter 10 mm (0.39 in)	6FX2001-5VD ■■-0AA1
• Torque arm Hollow shaft diameter 12 mm (0.47 in)	6FX2001-5WD ■■-0AA1
Resolution	
• Single-turn 22 bit	1 3
• Multi-turn 34 bit	2 5
Absolute encoders with SSI	
10 ... 30 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-5HS ■■
• Radial flange outlet	6FX2001-5FS ■■
Clamp flange and connection via	
• Axial flange outlet	6FX2001-5SS ■■
• Radial flange outlet	6FX2001-5QS ■■
Resolution	
• Single-turn 8192 steps/revolution (13 bit)	1 2
• Multi-turn 8192 steps/revolution, 4096 revolutions (25 bit)	2 4
Absolute encoders with EnDat	
5 V DC supply voltage	
Synchro flange and connection via	
• Axial flange outlet	6FX2001-5HE ■■
• Radial flange outlet	6FX2001-5FE ■■
Clamp flange and connection via	
• Axial flange outlet	6FX2001-5SE ■■
• Radial flange outlet	6FX2001-5QE ■■
Resolution	
• Single-turn 8192 steps/revolution (13 bit)	1 3
• Multi-turn 8192 steps/revolution, 4096 revolutions (25 bit)	2 5

Description	Order No.
Absolute encoders with PROFIBUS DP	
10 ... 30 V DC supply voltage	
Radial connection	
• Synchro flange Solid shaft	6FX2001-5FP ■■
• Clamp flange Solid shaft	6FX2001-5QP ■■
• Torque arm Hollow shaft diameter 15 mm (0.59 in)[1]	6FX2001-5WP ■■
Resolution	
• Single-turn 8192 steps/revolution (13 bit)	1 2
• Multi-turn 8192 steps/revolution, 16384 revolutions (27 bit)	2 4
Absolute encoders with PROFINET IO	
10 ... 30 V DC supply voltage	
Radial connection	
• Synchro flange Solid shaft	6FX2001-5FN ■■
• Clamp flange Solid shaft	6FX2001-5QN ■■
• Torque arm Hollow shaft diameter 15 mm (0.59 in)[1]	6FX2001-5WN ■■
Resolution	
• Single-turn 8192 steps/revolution (13 bit)	1 3
• Multi-turn 8192 steps/revolution, 16384 revolutions (27 bit)	2 5

■ More information

Description	Order No.
Decentralization with PROFIBUS DP/DPV1	**Via book trade ISBN: 978-3-89578-218-3**

[1] 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.

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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 6FX2001-7KF..	Plug-in coupling 6FX2001-7KS..
Transmission torque, max.	Nm (oz$_f$)	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$_f$/rad)	150 (539.51)	31 (111.5)
Lateral spring stiffness	N/mm (lb$_f$)	6 (1.35)	10 (2.25)
Moment of inertia	gcm^2 (lb$_f$-in-s^2)	19 (168 × 10^{-7})	20 (177 × 10^{-7})
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.
Spring disk coupling Shaft diameter:	
• 6 mm/6 mm (0.24 in/0.24 in)	**6FX2001-7KF10**
• 6 mm/5 mm (0.24 in/0.20 in)	**6FX2001-7KF06**
Plug-in coupling Shaft diameter:	
• 6 mm/6 mm (0.24 in/0.24 in)	**6FX2001-7KS06**
• 10 mm/10 mm (0.39 in/0.39 in)	**6FX2001-7KS10**
Clamp (1 unit) For double-track encoders and encoders with Synchro flange (3 units are required)	**6FX2001-7KP01**
Signal connector with cap nut (1 unit) Mating connector for incremental encoder with TTL, sin/cos 1 V$_{pp}$, HTL and absolute encoder with SSI 12-pin, insulator each with 12 socket contacts 0.08 ... 0.22 mm^2 and 0.20 ... 0.56 mm^2, 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm	**6FX2003-0SU12**
Signal connector with cap nut (1 unit) Mating connector for absolute encoder with EnDat 17-pin, insulator with 17 socket contacts 0.20 ... 0.56 mm^2, 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm	**6FX2003-0SU17**
Signal connector with external thread for encoders with cable (1 unit) Replacement connector for incremental encoder with RS422, sin/cos 1 V$_{pp}$ and HTL 12-pin, insulator with 12 pin contacts 0.20 ... 0.56 mm^2, 2 × cable clamping 6.5 ... 10 mm and 10.1 ... 13 mm	**6FX2003-0SA12**
Power connecting cable 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	
• Length 2 m (6.56 ft)	**6XV1801-5DH20**
• Length 3 m (9.84 ft)	**6XV1801-5DH30**
• Length 5 m (16.4 ft)	**6XV1801-5DH50**
• Length 10 m (32.8 ft)	**6XV1801-5DN10**
• Length 15 m (49.21 ft)	**6XV1801-5DN15**
IE connecting cable Pre-assembled signal cable for absolute encoders PROFINET IO with M12 plug connector and RJ45, D-coded, 4-pole	
• Length 2 m (6.56 ft)	**6XV1871-5TH20**
• Length 3 m (9.84 ft)	**6XV1871-5TH30**
• Length 5 m (16.4 ft)	**6XV1871-5TH50**
• Length 10 m (32.8 ft)	**6XV1871-5TN10**
• Length 15 m (49.21 ft)	**6XV1871-5TN15**
IE FC RJ45 Plug 145 (1 unit) 2 × 2 RJ45 connector with rugged metal enclosure and FC connection technology, 145° cable outlet	**6GK1901-1BB30-0AA0**
IE FC M12 Plug PRO (1 unit) M12 connector with metal enclosure and FC connection technology, axial cable outlet, D-coded	**6GK1901-0DB20-6AA0**
IE FC TP Trailing Cable 2 × 2 (PROFINET Type C) 4-wire, shielded, PROFINET-compliant, TP installation cable for use in cable carriers, sold by the meter Max. length 2000 m (6562 ft) Minimum order 20 m (65.6 ft)	**6XV1840-3AH10**

5

SINAMICS S120 drive system

Notes

5

CAD CREATOR

Dimension drawing and
2D/3D CAD generator

www.siemens.com/cadcreator

Introduction
Type overview and rated data

Motor type		Designation	Degree of protection	Type of cooling
SIMOTICS S Servomotors – Synchronous motors, permanent-magnet				
	SIMOTICS S-1FT7 Compact	Feed motor – Compact Very high power density	IP64[1)] (optional IP65, IP67)	Natural cooling Forced ventilation Water cooling
	SIMOTICS S-1FT7 High Dynamic	Feed motor – High Dynamic Very low rotor moment of inertia	IP64 (optional IP65, IP67)	Forced ventilation Water cooling
	SIMOTICS S-1FK7 Compact Compact for Power Modules 230 V 1 AC	Feed motor – Compact High power density	IP64 (optional IP65)	Natural cooling
	SIMOTICS S-1FK7 High Dynamic High Dynamic for Power Modules 230 V 1 AC	Feed motor – High Dynamic Very low rotor moment of inertia	IP64 (optional IP65)	Natural cooling
	SIMOTICS S-1FK7 High Inertia	Feed motor – High Inertia High or variable load moment of inertia	IP64 (optional IP65)	Natural cooling
Motor type		**Designation**	**Degree of protection**	**Type of cooling**
SIMOTICS L Linear motors – Synchronous motors, permanent-magnet				
	SIMOTICS L-1FN3	Direct drive	IP65	Water cooling
	SIMOTICS L-1FN6	Direct drive	Primary section: IP65[2)]	Natural cooling 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.

[1)] Core type: IP65.

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.

[2)] Degree of protection of the motor is determined by the design of the motor's installation in the machine. Minimum requirement: IP23.

Shaft height	Rated power P_{rated} for S1 duty kW (HP)							Rated torque M_{rated}	Selection and ordering data
	0.01	0.1	1	10	100	1000	10000		Page
SH 36/SH 48/SH 63/ SH 80/SH 100			0.88 (1.2)	10.5 (14.8)				1.4 ... 61 Nm (12.4 ... 540 lb$_f$-in)	6/18 ... 6/23
SH 80/SH 100			5 (6.71)	18.8 (25.2)				21 ... 73 Nm (186 ... 646 lb$_f$-in)	6/24 ... 6/25
SH 63/SH 80/SH 100			3.1 (4.16)	34.2 (45.9)				9.2 ... 125 Nm (81.4 ... 1106 lb$_f$-in)	6/26 ... 6/29
SH 63/SH 80			3.8 (5.10)	10.8 (14.5)				11 ... 33 Nm (97.4 ... 292 lb$_f$-in)	6/30 ... 6/31
SH 63/SH 80			5.7 (7.64)	21.7 (29.1)				16.5 ... 51 Nm (146 ... 451 lb$_f$-in)	6/30 ... 6/31
SH 20/SH 28/SH 36/ SH 48/SH 63/SH 80/ SH 100		0.05 (0.07)		8.2 (11)				0.08 ... 37 Nm (0.71 ... 327 lb$_f$-in)	6/36 ... 6/41
SH 20/SH 28/SH 36/ SH 48		0.05 (0.07)	0.8 (1.07)					0.08 ... 2.6 Nm (0.71 ... 23 lb$_f$-in)	6/46 ... 6/49
SH 36/SH 48/SH 63/ SH 80			0.6 (0.8)	3.8 (5.10)				0.9 ... 18 Nm (8.0 ... 159 lb$_f$-in)	6/42 ... 6/43
SH 36/SH 48			0.4 (0.54)	0.9 (1.21)				1.2 ... 3 Nm (10.6 ... 26.6 lb$_f$-in)	6/50 ... 6/51
SH 48/SH 63/SH 80			0.9 (1.21)	3.1 (4.16)				1.5 ... 15 Nm (13.3 ... 133 lb$_f$-in)	6/44 ... 6/45

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Primary section width mm	Feedrate force F_{rated} N (lb$_f$)							Velocity v_{max} at F_{rated}	Selection and ordering data
	0.01	0.1	1	10	100	1000	10000		Page
Precision cooling without with 67/96 76/105 126/141 135/150 188/248 197/257 342 351					**Peak load** 200 (45)		8100 (1821)	105 ... 836 m/min (345 ... 2743 ft/min)	6/68 ... 6/71
					Continuous load 150 (33.7)		10375 (2332)	129 ... 435 m/min (423 ... 1427 ft/min)	6/72 ... 6/73
80/115/130/ 209/289					66.3 (14.9)	3000 (674)		93.9 ... 1280 m/min (308 ... 4200 ft/min)	6/80 ... 6/83
80/115					119 (26.8)	1430 (321)		57.5 ... 852 m/min (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
SIMOTICS T Torque motors			
SIMOTICS T-1FW6	Synchronous motor, permanent-magnet Built-in torque motor direct drive	IP23[4]	Water cooling

Motor type	Designation	Degree of protection	Type of cooling
SIMOTICS M Main spindle motors			
SIMOTICS M-1PH8	Asynchronous motor Three-phase squirrel-cage motor without housing Main spindle motor Solid or hollow shaft	IP55[1] IP55/IP65[2]	Forced ventilation Water cooling
	Synchronous motor, permanent-magnet Main spindle/feed motor	IP55[1] IP55/IP65[2]	Forced ventilation Water cooling
SIMOTICS M-1FE1	Synchronous motor, permanent-magnet Built-in spindle motor Main spindle motor for direct drives	IP00	Water cooling
SIMOTICS M-1PH2	Asynchronous motor Three-phase squirrel-cage motor Main spindle motor for direct drives	IP00[5]	Water cooling

Motor spindles			
2SP1	Motor spindle, synchronous and asynchronous versions Main spindle motor	Operating range: IP64 Behind the spindle flange: IP53	Water cooling

[1] See Options for additional versions.
[2] From SH 180: IP55.

[3] The final degree of protection (minimum degree of protection is IP54) for the installed motor is determined by the machine manufacturer.
[4] According to spindle manufacturer specifications.

Diameter mm	Rated torque M_{rated} Nm (lb$_f$-in)	Max. speed n_{max} at M_{rated}	Selection and ordering data
	0.1　1　10　100　1000　10000		Page
External diameter 159/184/230/310/ 385/440/502/576/ 730	22 (194.7) — 5760 (50982)	38 ... 940 rpm	6/88 ... 6/99

Diameter mm	Rated power P_{rated} for S1 duty kW (HP)	Rated torque M_{rated}	Selection and ordering data
	0.1　1　10　100　1000　10000		Page
SH 80/SH 100/ SH 132/SH 160/ SH 180/SH 225/ SH 280	2.8 (3.75) — 250 (335)	10 ... 2459 Nm (88.5 ... 21765 lb$_f$-in)	6/104 ... 6/109
SH 80/SH 100/ SH 132/SH 160/ SH 180/SH 225/ SH 280	3.5 (4.69) — 227 (304)	14 ... 2602 Nm (124 ... 23030 lb$_f$-in)	6/110 ... 6/113
SH 132/SH 160/ SH 180/SH 225	15.7 (21.05) — 168 (225)	96 ... 1091 Nm (850 ... 9656 lb$_f$-in)	6/122 ... 6/127
SH 132/SH 160/ SH 180/SH 225	17.6 (23.6) — 228 (306)	109 ... 1651 Nm (146 ... 2214 lb$_f$-in)	6/122 ... 6/129
Outer diameter (cooling jacket) High-Torque series 95/115/130/190/ 205/250/310	4 (5.36) — 104 (139)	4.5 ... 820 Nm (39.8 ... 7258 lb$_f$-in)	6/136 ... 6/139
High-Speed series 120/155/180/205/ 230/270	6.5 (8.72) — 94 (126)	5 ... 300 Nm (44.3 ... 2655 lb$_f$-in)	6/140 ... 6/143
Outer diameter mm 205/250	7.5 (10.06) — 23.6 (31.65)	48 ... 146 Nm (425 ... 1292 lb$_f$-in)	6/146 ... 6/147

			Page
	0.1　1　10　100　1000　10000		
Spindle diameter 200/250	12 (16.1) — 53.4 (71.6)	42 ... 170 Nm (372 ... 1505 lb$_f$-in)	6/152 ... 6/153

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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	**IP23**	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	**IP54**	Complete protection against accidental contact	Protection against harmful dust deposits	Splash water from any direction
	IP55			Jet water from any direction
	IP64	Complete protection against accidental contact	Protection against dust ingress	Splash water from any direction
	IP65[1]			Jet water from any direction
	IP67[1]			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.

Effect / Liquids	General workshop environment	Water; gen. cooling lubricant (95 % water, 5 % oil)
Dry	IP64	–
Water-enriched environment/ increased humidity	–	IP64
Mist	–	IP65
Spray	–	IP65
Jet	–	IP67
Splash/brief immersion/constant imundation	–	IP67

[1] 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
IM B3	**IM B6**
IM B7	**IM B8**
IM V6	**IM V5**
IM V35[1]	**IM V15**[1]
IM B35[1]	**IM B5, IM B 14**
IM V3, IM V19	**IM V1, IM V18**

[1] 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 SH	Tolerance N mm (in)	Tolerance R mm (in)	Tolerance SPECIAL 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)/ –/–
280	0.07 (0.00276)	0.035 (0.00138)	–
355	0.08 (0.00315)	0.04 (0.00157)	–

Test: radial eccentricity

G_DA65_EN_00063b

dial gauge
motor shaft
L/2
L
motor

Concentricity and axial eccentricity tolerance of the flange surface to the shaft axis
referred to the centering diameter of the mounting flange

Shaft height SH	Tolerance N mm (in)	Tolerance R mm (in)	Tolerance SPECIAL 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)/ 0.04 (0.00157)
132/160/180/225	0.125 (0.00492)	0.063 (0.00248)	0.04 (0.00157)/ 0.04 (0.00157)/–
280/355	0.16 (0.00630)	0.08 (0.00315)	–

Test: concentricity

motor shaft
10 mm (0.39 in)
dial gauge
motor

Test: axial eccentricity

motor shaft
10 mm (0.39 in)
dial gauge
motor

G_DA65_EN_00064b

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.

G_PM21_EN_00185

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.

G_PM21_EN_00186

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	≤ 0.16 mm (0.006 in)
6.3 ... 250 Hz	Vibration velocity V_{rms}	≤ 4.5 mm/s (0.18 in/s)
> 250 Hz	Vibration acceleration a	≤ 10 m/s^2 (32.8 ft/s^2)

Vibration frequency	Vibration values for 1PH818/1PH822/1PH828/1PH835	
< 6.3 Hz	Vibration displacement s	≤ 0.25 mm (0.099 in)
6.3 ... 63 Hz	Vibration velocity V_{rms}	≤ 7.1 mm/s (0.28 in/s)
> 63 Hz	Vibration acceleration a	≤ 4.0 m/s^2 (13.12 ft/s^2)

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

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■ **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).

$$t_r = \frac{t_B}{t_B + t_L}$$

$t_s = 10$ min

G_DA65_EN_00068

Characteristic curves

Torque characteristic of a synchronous motor operating on a converter with field weakening (example)

	Explanations
n_{rated}	Rated speed
$n_{max\ Inv}$	Maximum permissible electric speed limit
$n_{max\ mech}$	Maximum permissible mechanical speed limit
M_0	Static torque
M_{rated}	Rated torque at rated speed
$M_{max\ Inv}$	Achievable maximum torque with recommended motor module
M_{max}	Maximum permissible torque

Rated torque

The torque supplied on the shaft is indicated in Nm (lb_f-ft) in the selection and ordering data.

$$M_{rated} = 9.55 \times P_{rated} \times \frac{1000}{n_{rated}}$$

P_{rated} Rated power in kW
n_{rated} Rated speed in rpm
M_{rated} Rated torque in Nm

$$M_{rated} = P_{rated} \times \frac{5250}{n_{rated}}$$

P_{rated} Rated power in HP
n_{rated} Rated speed in rpm
M_{rated} Rated torque in lb_f-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.

■ **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

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	**Moderate** (expanded) for indoor and outdoor installation with roof protection	
	Briefly	Up to 150 °C (302 °F)
	Continuously	Up to 120 °C (248 °F)
Special paint finish	**Worldwide** (expanded) for outdoor installation	
	Briefly	Up to 150 °C (302 °F)
	Continuously	Up to 120 °C (248 °F)
	Also	for aggressive atmospheres up to 1 % acid and alkali concentration or permanent dampness in sheltered rooms

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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 AS IC IN HTL	xxxxSR	Encoder _without_ DRIVE-CLiQ interface Resolution = xxxx signals per revolution
AM AS IC IN R	xxDQ or xxDQI	Encoder _with_ DRIVE-CLiQ interface 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	

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 [1]	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

[1] 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[2]	Absolute encoder, single-turn, 24 bit
AS20DQI[2]	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)[1]	4096 revolutions
Incremental signals (sinusoidal, 1 V_{pp})	
• 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	$2^{22}/2^{20}/2^{16}/2^{15}$ bit
• Traversing range (multi-turn)[1]	4096 revolutions

[1] Not for absolute encoder, single-turn AS

[2] 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_{pp} 2048 S/R with C and D tracks
IN2048S/R	Incremental encoder sin/cos 1 V_{pp} 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[1]	
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^{22} 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

[1] Instead of the incremental encoder IC22DQ, the single-turn absolute encoder AS24DQI 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[1]	
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	± 840"[2]
• Resolver p = 3 and R15DQ	± 420"
• Resolver p = 4 and R15DQ	± 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

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[1] 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

[2] For the 1FK701/1FK702 motors: 1200"

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

SIMOTICS S-1FT7 Compact/1FT7 High Dynamic motor

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 $\Delta T = 100$ K at an ambient temperature of 40 °C (104 °F). For water cooling, max. inlet temperature 30 °C (86 °F). 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) [1]	Tolerance N/Tolerance R
Vibration severity in accordance with EN 60034-14 (IEC 60034-14)	Grade A is maintained up to rated speed/ Grade R
Sound pressure level L_{pA} (1 m) in accordance with DIN EN ISO 1680, max. Tolerance + 3 dB	
• 1FT703	60 dB
• 1FT704 ... 1FT706	65 dB
• 1FT708 ... 1FT710	70 dB
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

Incremental encoder	
IC2048S/R encoder	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks

Absolute encoder	
AM2048S/R encoder	Absolute encoder 2048 S/R, 4096 revolutions, multi-turn

Built-in encoder systems with DRIVE-CLiQ interface

Absolute encoders, single-turn [2]	
AS24DQI encoder	Absolute encoder, single-turn, 24 bit (resolution 16777216, internal 2048 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)

S/R = signals/revolution

[1] Shaft extension run-out, concentricity of centering ring and shaft and perpendicularity of flange to shaft.

[2] The single-turn absolute encoder is applied for the previously used incremental encoders.

■ Options

Order code	Description
N05	Non-standard shaft extension (dimensions as for 1FT5 motors)
X01	Paint finish: Jet black, matt RAL 9005
X02	Paint finish: Cream white RAL 9001
X03	Paint finish: Reseda green RAL 6011
X04	Paint finish: Pebble gray RAL 7032
X05	Paint finish: Sky blue RAL 5015
X06	Paint finish: Light ivory RAL 1015
X09	Paint finish: Anthracite RAL 7016
K23	Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite RAL 7016
K23+X..	Special paint finish for "Worldwide" climate group: Primer and paint finish selectable from X01 to X09
K24	Primed (unpainted)
Q12	Sealing air connection (Only in conjunction with IP67 degree of protection. Not in combination with terminal box.)
J..	Mounting of SP+ planetary gearbox (see Gearboxes for SIMOTICS S servomotors)
X08	Paint finish: White aluminum
Y84	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)

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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 Compact synchronous motors **Core type**	Num-ber of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	kg (lb)
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)[1]	20 (14.8)	11.5 (8.48)[1]	10.1[1]	**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)[2]	6.0 (4.4)	3.7 (2.73)[2]	5.9[2]	**1FT7062-1AK7■-1 ■ ■ 1**	5	7.36 (6.51)	7.1 (15.7)
		2.59 (3.47)[3]	9.0 (6.6)	5.5 (4.06)[3]	6.1[3]	**1FT7064-1AK7■-1 ■ ■ 1**	5	11.9 (10.5)	9.7 (21.4)

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Type of construction:	IM B5	Flange 0			**0**
		Flange 1 (compatible with 1FT6)			**1**
Encoder systems for motors <u>without</u> **DRIVE-CLiQ interface:**	IC2048S/R encoder			**N**	
	AM2048S/R encoder			**M**	
Encoder systems for motors <u>with</u> **DRIVE-CLiQ interface:**	AS24DQI encoder			**B**	
	AM24DQI encoder			**C**	
Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**			
Plain shaft	Tolerance N	Without		**G**	
Plain shaft	Tolerance N	With		**H**	
Vibration severity:	**Degree of protection:**				
Grade A	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.

Motor type (repeated)	Effi-ciency [4]	Stall current	Calculated power P_{calc} [7]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [5]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [6]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT7102-1AC7...	93	12.5	6.28 (8.42)	18	6SL312■-■TE21-8AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7105-1AC7...	93	18	10.47 (14)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7044-1AF7...	92	2.8	1.57 (2.11)	3	6SL312■-■TE13-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7062-1AF7...	91	3.9	1.88 (2.52)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7064-1AF7...	93	5.7	2.83 (3.8)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7082-1AF7...	93	7.6	4.08 (5.47)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7084-1AF7...	93	11	6.28 (8.42)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7086-1AF7...	93	15.5	8.8 (11.8)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7084-1AH7...	93	15.6	9.42 (12.6)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7086-1AH7...	91	22.4	13.19 (17.7)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7034-1AK7...	90	2.7	1.26 (1.69)	3	6SL312■-■TE13-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7062-1AK7...	90	8.4	3.77 (5.06)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7064-1AK7...	91	9	5.65 (7.58)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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.

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[1] These values refer to n = 4000 rpm.

[2] These values refer to n = 5500 rpm.

[3] These values refer to n = 4500 rpm.

[4] Optimum efficiency in continuous duty.

[5] With default setting of the pulse frequency.

[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).

[7] $P_{calc} [kW] = \dfrac{M_0 [Nm] \times n_{rated}}{9550}$ $P_{calc} [hp] = \dfrac{M_0 [lb_f\text{-}ft] \times n_{rated}}{5250}$

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 Compact synchronous motors	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at $\Delta T=100$ K	M_0 at $\Delta T=100$ K	M_{rated} at $\Delta T=100$ K	I_{rated} at $\Delta T=100$ K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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	**0**		
		Flange 1 (compatible with 1FT6)	**1**		

Encoder systems for motors <u>without</u> DRIVE-CLiQ interface:	IC2048S/R encoder			**N**
	AM2048S/R encoder			**M**

Encoder systems for motors <u>with</u> 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.

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [2]	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT7102-5AB7...	93	9	4.71 (6.32)	9	6SL312■-■TE21-0AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7105-5AB7...	93	15	7.85 (10.5)	18	6SL312■-■TE21-8AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7108-5AB7...	93	18	10.99 (14.7)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7082-5AC7...	93	5	2.72 (3.65)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7084-5AC7...	93	9	4.19 (5.62)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7086-5AC7...	93	10.6	5.86 (7.86)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7102-5AC7...	93	12.5	6.28 (8.42)	18	6SL312■-■TE21-8AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7105-5AC7...	93	18	10.47 (14)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7108-5AC7...	93	25	14.66 (19.7)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7042-5AF7...	92	2.1	0.94 (1.26)	3	6SL312■-■TE13-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7044-5AF7...	92	2.8	1.57 (2.11)	3	6SL312■-■TE13-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7046-5AF7...	92	4	2.20 (2.95)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7062-5AF7...	91	3.9	1.88 (2.52)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7064-5AF7...	93	5.7	2.83 (3.8)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7066-5AF7...	92	8.4	3.77 (5.06)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7068-5AF7...	92	8.3	4.71 (6.32)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7082-5AF7...	93	7.6	4.08 (5.47)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7084-5AF7...	93	11	6.28 (8.42)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7086-5AF7...	93	15.5	8.8 (11.8)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7102-5AF7...	93	18	9.42 (12.6)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7105-5AF7...	94	26	15.71 (21)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7108-5AF7...	93	36	21.99 (29.5)	45	6SL312■-1 TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Power cable:	
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.

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[1] Optimum efficiency in continuous duty.

[2] With default setting of the pulse frequency.

[3] 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).

[4] P_{calc} [kW] $= \dfrac{M_0 \text{[Nm]} \times n_{rated}}{9550}$ P_{calc} [hp] $= \dfrac{M_0 \text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

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 Compact synchronous motors	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	kg (lb)
1FT7 Compact for DC link voltage 510 ... 720 V DC									
4500	48	1.32 (1.77)[1]	7 (5.2)	3.6 (2.66)[1]	4.7[1]	**1FT7046-5AH7■-1■■■**	3	7.52 (6.66)	9.3 (20.5)
	63	2.55 (3.42)[2]	12 (8.9)	6.1 (4.50)[2]	7.5[2]	**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)[2]	20 (14.8)	11.5 (8.48)[2]	10.1[2]	**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)[3]	5 (3.7)	3 (2.21)[3]	3.6[3]	**1FT7044-5AK7■-1■■■**	3	5.43 (4.81)	7.2 (15.9)
	63	2.13 (2.86)[4]	6 (4.4)	3.7 (2.73)[4]	5.9[4]	**1FT7062-5AK7■-1■■■**	5	7.36 (6.51)	7.1 (15.7)
		2.59 (3.47)[3]	9 (6.6)	5.5 (4.06)[3]	6.1[3]	**1FT7064-5AK7■-1■■■**	5	11.9 (10.5)	9.7 (21.4)

| **Type of construction:** | IM B5 | Flange 0 | | **0** |
| | | Flange 1 (compatible with 1FT6) | | **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:**	
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.

Motor type (repeated)	Efficiency [5] η %	Stall current I_0 at M_0 ΔT=100 K A	Calculated power P_{calc} [8] P_{calc} at M_0 ΔT=100 K kW (HP)	SINAMICS S120 Motor Module Rated output current [6] I_{rated} A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Power cable with complete shield Motor connection (and brake connection) via power connector Power connector Size	Cable cross-section [7] mm²	Pre-assembled cable Order No.
1FT7046-5AH7…	90	8.1	3.3 (4.43)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7066-5AH7…	90	13.6	5.65 (7.58)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7082-5AH7…	93	12.3	6.13 (8.22)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7084-5AH7…	93	15.6	9.42 (12.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■N31-….**
1FT7086-5AH7…	91	22.4	13.19 (17.7)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■N41-….**
1FT7034-5AK7…	90	2.7	1.26 (1.69)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7036-5AK7…	90	4.0	1.88 (2.52)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7042-5AK7…	91	3.9	1.88 (2.52)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7044-5AK7…	91	5.7	3.14 (4.21)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7062-5AK7…	90	8.4	3.77 (5.06)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**
1FT7064-5AK7…	91	9	5.65 (7.59)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-….**

Cooling:
Internal air cooling	**0**
External air cooling	**1**

Motor Module:
Single Motor Module	**1**
Double Motor Module	**2**

Power cable:
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.

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[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] $P_{calc}\,[\text{kW}] = \dfrac{M_0\,[\text{Nm}] \times n_{rated}}{9550}$ $\qquad P_{calc}\,[\text{hp}] = \dfrac{M_0\,[\text{lb}_f\text{-ft}] \times n_{rated}}{5250}$

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_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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■-■ ■ ■ ■**	5	178 (158)	50 (110)
		18.8 (25.2)	91 (67)	60 (44)	38	**1FT7108-5SF7■-■ ■ ■ ■**	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		**0**	
	Flange 1 (compatible with 1FT6)		**1**	

Connector outlet direction:	Connector sizes 1 and 1.5	Rotatable connector	**1**
	Connector size 3[1]	Transverse right	**1**
		Transverse left	**2**
		Axial NDE	**3**
		Axial DE	**4**

Terminal box/ cable entry:[1]	Top/transverse from right	**5**
	Top/transverse from left	**6**
	Top/axial from NDE	**7**
	Top/axial from DE	**8**

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:**	
Feather key	Tolerance N	Without	**A**
Feather key	Tolerance N	With	**B**
Feather key	Tolerance R	Without	**D**
Feather key	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:**[2]	
Grade A	IP64	**0**
Grade A	IP65	**1**
Grade R	IP64	**3**
Grade R	IP65	**4**

To select the type of construction and degree of protection, see Technical definitions.

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Motor type (repeated)	Effi-ciency [3]	Stall current	Calculated power P_{calc} [6]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [4]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT7084-5SC7...	93	15	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■N21-....**
1FT7086-5SC7...	93	19.5	7.5 (10.1)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 2.5	**6FX■002-5■N31-....**
1FT7105-5SC7...	93	31	13.6 (18.2)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 6	**6FX■002-5■N54-....**
1FT7108-5SC7...	93	39	19.1 (25.6)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■N64-....**
1FT7084-5SF7...	94	21	8.5 (11.4)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 2.5	**6FX■002-5■N31-....**
1FT7086-5SF7...	93	29	11.3 (15.2)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 6	**6FX■002-5■N51-....**
1FT7105-5SF7...	94	45	20.4 (27.4)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT7108-5SF7...	94	57	28.6 (38.4)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT7084-5SH7...	94	30.5	12.7 (17.0)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 6	**6FX■002-5■N51-....**
1FT7086-5SH7...	93	34	17.0 (22.8)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 6	**6FX■002-5■N54-....**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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.

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[1] Connector size 3 not rotatable. An alternative terminal box can be selected with connector size 3 only.

[2] The degree of protection refers to the motor. The built-in fan meets the requirements of degree of protection IP54.

[3] Optimum efficiency in continuous duty.

[4] With default setting of the pulse frequency.

[5] 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).

[6] $P_{calc}\,[kW] = \dfrac{M_0\,[Nm] \times n_{rated}}{9550}$ $P_{calc}\,[hp] = \dfrac{M_0\,[lb_f\text{-}ft] \times n_{rated}}{5250}$

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_{rated}	SH	P_{rated} at $\Delta T=100$ K	M_0 at $\Delta T=100$ K	M_{rated} at $\Delta T=100$ K	I_{rated} at $\Delta T=100$ K		p	J	m
rpm		kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)	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 | | **0** | | | |
| | | Flange 1 (compatible with 1FT6) | | **1** | | | |

Connector outlet direction:	Connector sizes 1 and 1.5	Rotatable connector		**1**		
	Connector size 3[1)]	Transverse right		**1**		
		Transverse left		**2**		
		Axial NDE		**3**		
		Axial DE		**4**		

Terminal box/ cable entry:[1)]	Top/transverse from right	**5**
	Top/transverse from left	**6**
	Top/axial from NDE	**7**
	Top/axial from DE	**8**

| **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:**	
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.

6

Motor type (repeated)	Effi-ciency [2]	Stall current	Calculated power P_{calc} [5]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [3]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system			
	η	I_0 at M_0 $\Delta T=100$ K	P_{calc} at M_0 $\Delta T=100$ K	I_{rated}	Order No.	Power connector Size	Cable cross-section [4] mm^2	Pre-assembled cable Order No.
	%	A	kW (HP)	A				
1FT7102-5WB7...	93	17.8	7.9 (10.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■N31-....**
1FT7105-5WB7...	94	28	14.1 (18.9)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■N41-....**
1FT7108-5WB7...	94	39	19.6 (26.3)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■N64-....**
1FT7082-5WC7...	93	10.7	4.4 (5.90)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■N21-....**
1FT7084-5WC7...	94	16.5	7.3 (9.79)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■N31-....**
1FT7086-5WC7...	94	23	10.5 (14.1)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■N41-....**
1FT7102-5WC7...	94	25.5	10.5 (14.1)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■N41-....**
1FT7105-5WC7...	94	39	18.8 (25.2)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■N64-....**
1FT7108-5WC7...	95	45.3	26.2 (35.1)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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.

6

[1] Connector size 3 not rotatable. An alternative terminal box can be selected with connector size 3 only.

[2] Optimum efficiency in continuous duty.

[3] With default setting of the pulse frequency.

[4] 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).

[5] P_{calc} [kW] $= \dfrac{M_0\,[Nm] \times n_{rated}}{9550}$ P_{calc} [hp] $= \dfrac{M_0\,[lb_f\text{-}ft] \times n_{rated}}{5250}$

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_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K	Order No.	p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A			10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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 | **0** |
| | | Flange 1 (compatible with 1FT6) | **1** |

Connector outlet direction:	Connector sizes 1 and 1.5 Rotatable connector		**1**
	Connector size 3[1]	Transverse right	**1**
		Transverse left	**2**
		Axial NDE	**3**
		Axial DE	**4**

Terminal box/ cable entry:[1]	Top/transverse from right	**5**
	Top/transverse from left	**6**
	Top/axial from NDE	**7**
	Top/axial from DE	**8**

| 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:	
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.

6

Motor type (repeated)	Effi-ciency [2]	Stall current	Calculated power P_{calc} [6]	SINAMICS S120 Motor Module		Power cable with complete shield		
				Rated output current [3]	Booksize format	Motor connection (and brake connection) via power connector		
					For additional versions and components, see chapter SINAMICS S120 drive system			
	η	I_0 at M_0 $\Delta T = 100$ K	P_{calc} at M_0 $\Delta T = 100$ K	I_{rated}		Power connector	Cable cross-section [4]	Pre-assembled cable
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT7062-5WF7...	91	7.4	3.1 (4.16)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7064-5WF7...	91	11.9	5.0 (6.71)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7066-5WF7...	91	14	6.3 (8.45)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7068-5WF7...	93	19	9.4 (12.6)	18 [5]	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX■002-5■N11-....
1FT7082-5WF7...	94	16	6.6 (8.85)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7084-5WF7...	94	23	11.0 (14.8)	30	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7086-5WF7...	94	34	15.7 (21.1)	45	6SL312■-1TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....
1FT7102-5WF7...	95	40	15.7 (21.1)	45	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX■002-5■N64-....
1FT7105-5WF7...	94	53.2	28.3 (38.0)	60	6SL312■-1TE26-0AA3	3	4 × 16	6FX■002-5■S23-....
1FT7108-5WF7...	95	65	39.3 (52.7)	85	6SL312■-1TE28-5AA3	3	4 × 16	6FX■002-5■G23-....
1FT7066-5WH7...	91	19.7	9.4 (12.6)	30	6SL312■-1TE23-0AA3	1	4 × 2.5	6FX■002-5■N11-....
1FT7082-5WH7...	94	24	9.9 (13.3)	30	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7084-5WH7...	94	34.3	16.5 (22.1)	45	6SL312■-1TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....
1FT7086-5WH7...	94	40.5	23.6 (31.6)	45	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX■002-5■N64-....
1FT7062-5WK7...	92	12.5	6.3 (8.5)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-....
1FT7064-5WK7...	92	20.2	10.1 (13.5)	30	6SL312■-1TE23-0AA3	1	4 × 2.5	6FX■002-5■N11-....

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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.

6

[1] Connector size 3 is not rotatable. An alternative terminal box can be selected with connector size 3 only.

[2] Optimum efficiency in continuous duty.

[3] With default setting of the pulse frequency.

[4] 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).

[5] 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.

[6] P_{calc} [kW] = $\dfrac{M_0 \text{[Nm]} \times n_{rated}}{9550}$ P_{calc} [hp] = $\dfrac{M_0 \text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

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 High Dynamic synchronous motors	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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	**1FT7065-7SH7■-1 ■ ■ ■**	5	6.4 (5.66)	19 (41.9)
		6.1 (8.18)	17 (12.5)	13 (9.59)	15	**1FT7067-7SH7■-1 ■ ■ ■**	5	8.3 (7.35)	23 (50.7)
	80	8.2 (11)	34 (25.1)	17.5 (12.9)	22.5	**1FT7085-7SH7■-1 ■ ■ ■**	5	20.7 (18.3)	34 (75.0)
		10.8 (14.5)	48 (35.4)	23 (17.0)	24	**1FT7087-7SH7■-■ ■ ■ ■**	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	**1FT7065-7W F 7■-1 ■ ■ ■**	5	6.4 (5.66)	16 (35.3)
		7.4 (9.92)	25 (18.4)	23.5 (17.3)	21	**1FT7067-7W F 7■-1 ■ ■ ■**	5	8.3 (7.35)	22 (48.5)
	80	11.9 (16.0)	43 (31.7)	38 (28.0)	32	**1FT7085-7W F 7■-1 ■ ■ ■**	5	20.7 (18.3)	32 (70.6)
		16.0 (21.5)	61 (45.0)	51 (37.6)	43	**1FT7087-7W F 7■-■ ■ ■ ■**	5	27.4 (24.3)	41 (90.4)
4500	63	7.8 (10.5)	19 (14.0)	16.5 (12.2)	20	**1FT7065-7WH7■-1 ■ ■ ■**	5	6.4 (5.66)	16 (35.3)
		10.4 (13.9)	25 (18.4)	22 (16.2)	25	**1FT7067-7WH7■-1 ■ ■ ■**	5	8.3 (7.35)	22 (48.5)
	80	15.6 (20.9)	43 (31.7)	33 (24.3)	48	**1FT7085-7WH7■-■ ■ ■ ■**	5	20.7 (18.3)	32 (70.6)
		21.7 (29.1)	61 (45.0)	46 (33.9)	53	**1FT7087-7WH7■-■ ■ ■ ■**	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[1]	Transverse right	**1**
		Transverse left	**2**
		Axial NDE	**3**
		Axial DE	**4**

Terminal box/cable entry:[1]	Top/transverse from right	**5**
	Top/transverse from left	**6**
	Top/axial from NDE	**7**
	Top/axial from DE	**8**

| 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:	
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.

6

Motor type (repeated)	Effi-ciency [2]	Stall current	Calculated power P_{calc} [5]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [3]	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Conductor cross-section [4]	Pre-assembled cable
	η	I_0 at M_0 $\Delta T=100$ K	P_{calc} at M_0 $\Delta T=100$ K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT7065-7SF7...	92	12	4.4 (5.90)	18	6SL312■-■TE21-8AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7067-7SF7...	94	15	5.3 (7.11)	18	6SL312■-■TE21-8AA3	1.5	4 × 1.5	6FX■002-5■N21-....
1FT7085-7SF7...	92	28	10.7 (14.3)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7087-7SF7...	93	40	15.1 (20.2)	45	6SL312■-1 TE24-5AA3	1.5	4 × 10	6FX■002-5■N64-....
1FT7065-7SH7...	92	16	6.6 (8.85)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7067-7SH7...	94	19	8.0 (10.7)	30	6SL312■-1 TE23-0AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7085-7SH7...	92	40	16.0 (21.5)	45	6SL312■-1 TE24-5AA3	1.5	4 × 10	6FX■002-5■N64-....
1FT7087-7SH7...	93	45	22.6 (30.3)	45	6SL312■-1 TE24-5AA3	3	4 × 10	6FX■002-5■S14-....
1FT7065-7WF7...	92	16	6.0 (8.05)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7067-7WF7...	94	22	7.9 (10.6)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7085-7WF7...	93	36	13.5 (18.1)	45	6SL312■-1 TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....
1FT7087-7WF7...	94	51	19.2 (25.7)	60	6SL312■-1 TE26-0AA3	3	4 × 16	6FX■002-5■S23-....
1FT7065-7WH7...	92	22	9.0 (12.1)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7067-7WH7...	94	28	11.8 (15.8)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7085-7WH7...	94	58	20.3 (27.2)	60	6SL312■-1 TE26-0AA3	3	4 × 16	6FX■002-5■S23-....
1FT7087-7WH7...	94	67	28.7 (38.5)	85	6SL312■-1 TE28-5AA3	3	4 × 25	6FX■002-5 D G33-....

Cooling:
Internal air cooling	0
External air cooling	1

Motor Module:
Single Motor Module	1
Double Motor Module	2

Power cable:
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.

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[1] Connector size 3 is not rotatable. An alternative terminal box can be selected with connector size 3 only.

[2] Optimum efficiency in continuous duty.

[3] With default setting of the pulse frequency.

[4] 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).
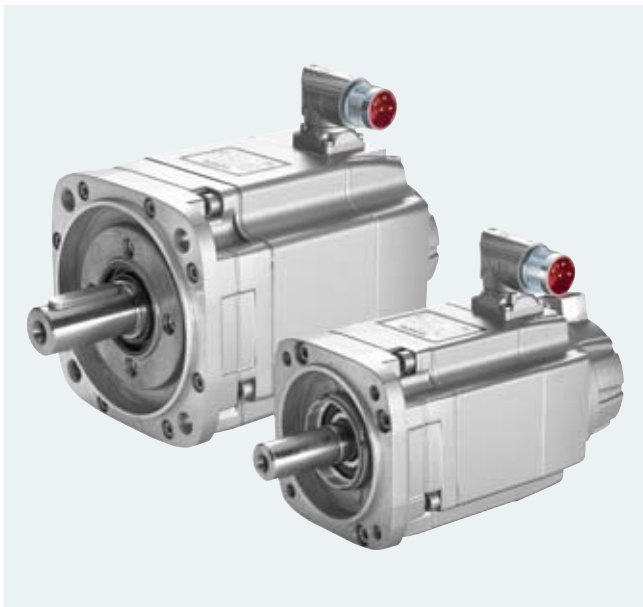
[5] $P_{calc}\,[\text{kW}] = \dfrac{M_0\,[\text{Nm}] \times n_{rated}}{9550}$ $P_{calc}\,[\text{hp}] = \dfrac{M_0\,[\text{lb}_\text{f}\text{-ft}] \times n_{rated}}{5250}$

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

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■ **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)[1]	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)[2]	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[3]	Anthracite (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_{pp} 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[4]	
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

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[1] 1FK701 can be supplied only with IP54 degree of protection.

[2] Shaft extension run-out, concentricity of centering ring and shaft and perpendicularity of flange to shaft.

[3] 1FK702 without a paint finish as standard.

[4] 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
M03	Version for Zone 2 hazardous areas according to EN 50021/IEC 60079-15 (only for 1FK7 Compact/1FK7 High Dynamic)
M39	Version for Zone 22 hazardous areas according to EN 50281/IEC 61241-1 (only for 1FK7 Compact/1FK7 High Dynamic)
N05	Non-standard shaft extension (dimensions as for 1FT5 motors)
N16	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).
Q31	Metal rating plate instead of adhesive label
X01	Paint finish: Jet black, matt RAL 9005[1]
X02	Paint finish: Cream white RAL 9001[1]
X03	Paint finish: Reseda green RAL 6011[1]
X04	Paint finish: Pebble grey RAL 7032[1]
X05	Paint finish: Sky blue RAL 5015[1]
X06	Paint finish: Pale ivory RAL 1015[1]
X08	Paint finish: Suitable for food grade applications White aluminum RAL 9006[1]
X27	Paint finish: Dark pearl grey RAL 9023[1]
K23	Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite RAL 7016[1]
K23+X..	Special paint finish for "Worldwide" climate group: Primer and paint finish selectable from X01 to X27[2]
K24	Primed (unpainted)
J..	Mounting of SP+ planetary gearbox (see Gearboxes for SIMOTICS S servomotors)
V..	Mounting of LP+ planetary gearbox (see Gearboxes for SIMOTICS S servomotors)

When ordering a motor with options, **-Z** should be added to the order number.

[1] For the paint finish, 1FK702 motors must be ordered with 3 or 5 in the 16th data position.

[2] 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 ar-
eas, 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 protec-
tion 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 per-
acetic 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 mate-
rial resistance test performed by ECOLAB Deutschland GmbH.

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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 Compact synchronous motors Natural cooling	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No. **Standard type**		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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 AM2048S/R encoder Multi-pole resolver 2-pole resolver	A E S T
Encoder systems for motors **with** DRIVE-CLiQ interface:	AS24DQI encoder AM24DQI encoder AS20DQI encoder AM20DQI encoder R15DQ resolver R14DQ resolver	B C Q R U 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

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Motor type (repeated)	Effi- ciency [1]	Stall current	Calculated power P_{calc} [5]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [2]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	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	**6FX■002-5■N01-...**
1FK7060-2AC71-...	90	3.15	1.3 (1.74)	3 [4]	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7062-2AC71-...	91	3.0	1.8 (2.41)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7063-2AC71-...	91	5.3	2.3 (3.08)	5 [4]	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7081-2AC71-...	93	5.0	2.5 (3.35)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7083-2AC71-...	93	7.5	3.4 (4.56)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7084-2AC71-...	93	8.5	4.2 (5.63)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7100-2AC71-...	92	8.4	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7101-2AC71-...	93	12.3	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■N21-...**
1FK7103-2AC71-...	93	14.4	7.5 (10.1)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■N21-...**
1FK7105-2AC71-...	93	20.0	10.1 (13.54)	30	**6SL312■-■TE23-0AA3**	1.5	4 × 2.5	**6FX■002-5■N31-...**
1FK7042-2AF71-...	89	2.2	0.9 (1.21)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7060-2AF71-...	90	4.45	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7062-2AF71-...	91	5.3	2.7 (3.62)	9 [4]	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7063-2AF71-...	91	8.0	3.5 (4.69)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7080-2AF71-...	92	4.9	2.5 (3.35)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7081-2AF71-...	93	8.7	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7083-2AF71-...	93	10.1	5 (6.71)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7084-2AF71-...	93	12.1	6.3 (8.45)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7100-2AF71-...	92	11.1	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7101-2AF71-...	93	18.8	8.5 (11.4)	18 [4]	**6SL312■-■TE23-8AA3**	1.5	4 × 2.5	**6FX■002-5■N31-...**
1FK7103-2AF71-...	93	26.0	11.3 (15.2)	30	**6SL312■-■TE23-0AA3**	1.5	4 × 4	**6FX■002-5■N41-...**
1FK7105-2AF71-...	94	31.0	15.1 (20.25)	30 [4]	**6SL312■-■TE24-0AA3**	1.5	4 × 6	**6FX■002-5■N51-...**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Power cable:	
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.

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[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 x 1.5 mm^2.

[4] With the specified Motor Module, the motor cannot be fully utilized with M_0 at ΔT = 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] = $\dfrac{M_0 \text{[Nm]} \times n_{rated}}{9550}$ P_{calc} [hp] = $\dfrac{M_0 \text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

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 Compact synchronous motors Natural cooling	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No. **Standard type**		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	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		A
	AM2048S/R encoder		E
	Multi-pole resolver		S
	2-pole resolver		T
Encoder systems for motors with DRIVE-CLiQ interface:	AS24DQI encoder		B
	AM24DQI encoder		C
	AS20DQI encoder		Q
	AM20DQI encoder		R
	R15DQ resolver		U
	R14DQ resolver		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

6

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S120 Motor Module		Power cable with complete shield		
				Rated output current [2]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Motor connection (and brake connection) via power connector		
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}		Power connector	Cable cross-section [3]	Pre-assembled cable
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
				Line voltage 380 ... 480 V 3 AC				
1FK7060-2AH71-...	90	6.3	2.8 (3.75)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7062-2AH71-...	91	8.0	4 (5.36)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7063-2AH71-...	90	12.0	5.2 (6.97)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7080-2AH71-...	92	7.4	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7081-2AH71-...	93	13.1	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7083-2AH71-...	93	15.0	7.5 (10.06)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7032-2AK71-...	88	1.7	0.7 (0.94)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7034-2AK71-...	88	1.9	1 (1.34)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7040-2AK71-...	88	2.35	1 (1.34)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7042-2AK71-...	89	4.4	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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.

6

[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 x 1.5 mm².

[4] $P_{calc}\ [kW] = \dfrac{M_0\ [Nm] \times n_{rated}}{9550}$ $P_{calc}\ [hp] = \dfrac{M_0\ [lb_f\text{-}ft] \times n_{rated}}{5250}$

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 Compact synchronous motors Natural cooling	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-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 AM512S/R encoder (only for 1FK702) AM16S/R encoder multi-pole resolver 2-pole resolver		**A** **H** **J** **S** **T**
Encoder systems for motors with DRIVE-CLiQ interface: (Only for 1FK702)[1]	IC22DQ encoder AM20DQ encoder AM15DQ encoder R15DQ resolver R14DQ resolver		**D** **L** **V** **U** **P**
Shaft extension: Feather key Feather key Plain shaft Plain shaft	**Shaft and flange accuracy:** Tolerance N Tolerance N Tolerance N Tolerance N	**Holding brake:** Without With Without With	**A** **B** **G** **H**
Degree of protection: IP64 (only for 1FK702) IP65 and DE flange IP67 (only for 1FK702) IP54 (only for 1FK701), IP64 (only for 1FK702) IP65 and DE flange IP67 (only for 1FK702)	**Paint finish:** Without Without With With		**0** **2** **3** **5**

6

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[1] 1FK701 motors are not available with a DRIVE-CLiQ interface. The encoder systems are connected via the SMC (Sensor Module Cabinet-Mounted).

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[2]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section[3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
Line voltage 380 ... 480 V 3 AC								
1FK7011-5AK71-...	62	1.5	0.1 (0.13)	3	**6SL312■-■TE13-0AA3**	0.5	4 × 1.5	**6FX5002-5DN20-...**
1FK7015-5AK71-...	68	1.5	0.2 (0.27)	3	**6SL312■-■TE13-0AA3**	0.5	4 × 1.5	**6FX5002-5DN20-...**
1FK7022-5AK71-...	86	1.8	0.5 (0.67)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Power cable:
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 x 1.5 mm².

[4] P_{calc} [kW] = $\dfrac{M_0\text{[Nm]} \times n_{rated}}{9550}$ P_{calc} [hp] = $\dfrac{M_0\text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

6

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 High Dynamic synchronous motors Natural cooling	Num-ber of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)	kg (lb)
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)

6

Encoder systems for motors without DRIVE-CLiQ interface:	IC2048S/R encoder AM2048S/R encoder Multi-pole resolver 2-pole resolver	A E S T
Encoder systems for motors with DRIVE-CLiQ interface:	AS24DQI encoder AM24DQI encoder AS20DQI encoder AM20DQI encoder R15DQ resolver R14DQ resolver	B C Q R U 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

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[2]	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system			
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}		Power connector	Cable cross-section[3]	Pre-assembled cable
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
Line voltage 380 ... 480 V 3 AC								
1FK7064-4CC71-...	93	8.1	2.5 (3.35)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7085-4CC71-...	92	13.5	4.6 (6.17)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7086-4CC71-...	93	13.2	5.9 (7.91)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7044-4CF71-...	91	4.0	1.4 (1.88)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7061-4CF71-...	93	6.1	2 (2.68)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7064-4CF71-...	93	10.8	3.8 (5.10)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7085-4CF71-...	92	22.0	6.9 (9.25)	30	6SL312■-■TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-...
1FK7086-4CF71-...	93	21.5	8.8 (11.8)	30	6SL312■-■TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-...
1FK7043-4CH71-...	90	4.1	1.6 (2.15)	5	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7044-4CH71-...	91	5.4	2.1 (2.8)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7061-4CH71-...	93	8.7	3 (4.02)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7064-4CH71-...	93	15.0	5.7 (7.64)	18	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7033-4CK71-...	88	2.1	0.8 (1.07)	3	6SL312■-■TE13-0AA3	1	4 × 1.5	6FX■002-5■N01-...
1FK7043-4CK71-...	90	5.6	2.2 (2.95)	9	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX■002-5■N01-...

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Power cable:	
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.

6

[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 x 1.5 mm².

[4] $P_{calc} \text{[kW]} = \dfrac{M_0 \text{[Nm]} \times n_{rated}}{9550}$ $\qquad P_{calc} \text{[hp]} = \dfrac{M_0 \text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

Feed motors
SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FK7 synchronous motors
High Inertia – Natural cooling

■ **Selection and ordering data**

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	SIMOTICS S-1FK7 High Inertia synchronous motors Natural cooling	Num-ber of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No. **Standard type**		10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	kg (lb)
1FK7 High Inertia for DC link voltage 510 ... 720 V DC									
2000	80	3.1 (4.16)	20.0 (14.75)	15.0 (11.06)	6.7	**1FK7084-3BC71-1**■■■■	4	99 (87.62)	23.0 (50.72)
3000	63	1.5 (2.01)	6.0 (4.43)	4.7 (3.5)	3.7	**1FK7060-3BF71-1**■■■■	4	12.5 (11.06)	7.9 (17.42)
		1.9 (2.55)	8.5 (6.27)	6.0 (4.43)	4.0	**1FK7062-3BF71-1**■■■■	4	23.5 (20.80)	10.7 (23.59)
	80	2.7 (3.62)	12.0 (8.85)	8.7 (6.4)	6.8	**1FK7081-3BF71-1**■■■■	4	49 (43.37)	15.2 (33.52)
		3.1 (4.16)	20.0 (14.75)	10.0 (7.4)	6.5	**1FK7084-3BF71-1**■■■■	4	99 (87.62)	23.0 (50.72)
6000	48	0.9 (1.21)	3.0 (2.21)	1.5 (1.1)	2.5	**1FK7042-3BK71-1**■■■■	4	5.1 (4.51)	5.1 (11.25)

Encoder systems for motors without DRIVE-CLiQ interface:	IC2048S/R encoder AM2048S/R encoder	A E
Encoder systems for motors with DRIVE-CLiQ interface:	AS24DQI encoder AM24DQI encoder AS20DQI encoder AM20DQI encoder	B C Q R

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

6

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [5]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [2]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
Line voltage 380 ... 480 V 3 AC								
1FK7084-3BC71-...	93	8.5	4.2 (5.63)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7060-3BF71-...	90	4.45	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7062-3BF71-...	91	5.3	2.7 (3.62)	5 [4]	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7081-3BF71-...	93	8.7	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7084-3BF71-...	93	12.1	6.3 (8.45)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-...**
1FK7042-3BK71-...	89	4.4	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-...**

Cooling:
Internal air cooling	**0**
External air cooling	**1**

Motor Module:
Single Motor Module	**1**
Double Motor Module	**2**

Power cable:
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.

6

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[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 x 1.5 mm².

[4] With the specified Motor Module, the motor cannot be fully utilized with M_0 at ΔT = 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] = $\dfrac{M_0\,[\text{Nm}] \times n_{rated}}{9550}$ P_{calc} [hp] = $\dfrac{M_0\,[\text{lb}_f\text{-ft}] \times n_{rated}}{5250}$

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 Compact synchronous motors Natural cooling	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-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 AM2048S/R encoder Multi-pole resolver 2-pole resolver	A E S T
Encoder systems for motors with DRIVE-CLiQ interface:	AS24DQI encoder AM24DQI encoder AS20DQI encoder AM20DQI encoder R15DQ resolver R14DQ resolver	B C Q R U 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

Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [5]	SINAMICS S110/S120 blocksize format		Power cable with complete shield — Motor connection (and brake connection) via power connector		
				Rated output current [2]	PM340 Power Module Air cooling	Power connector	Cable cross-section [3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
				Line voltage 200 ... 240 V 1 AC				
1FK7032-2AF21-...	85	1.7	0.4 (0.54)	2.3	**6SL3210-1SB12-3■A0**	1	4 × 1.5	**6FX■002-5■G10-...**
1FK7034-2AF21-...	85	1.9	0.5 (0.67)	2.3	**6SL3210-1SB12-3■A0**	1	4 × 1.5	**6FX■002-5■G10-...**
1FK7042-2AF21-...	88	3.95	0.9 (1.21)	3.9[4]	**6SL3210-1SB14-0■A0**	1	4 × 1.5	**6FX■002-5■G10-...**

Line filter:	
Without	**U**
Integrated	**A**

Power cable:	
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.

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[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 x 1.5 mm^2.

[4] With the specified Motor Module, the motor cannot be fully utilized with M_0 at ΔT = 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] $= \dfrac{M_0 \,[\text{Nm}] \times n_{rated}}{9550}$ $\quad P_{calc}$ [hp] $= \dfrac{M_0 \,[\text{lb}_f\text{-ft}] \times n_{rated}}{5250}$

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 Compact synchronous motors Natural cooling	Number of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb$_f$-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 AM512S/R encoder AM16S/R encoder (only for 1FK702) Multi-pole resolver 2-pole resolver	A H J S T
Encoder systems for motors with DRIVE-CLiQ interface: (Only for 1FK702)	IC22DQ encoder AM20DQ encoder AM15DQ encoder R15DQ resolver R14DQ resolver	D L V U 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:	Paint finish:	
IP64 (only for 1FK702)	Without	0
IP65 and DE flange IP67 (only for 1FK702)	Without	2
IP54 (only for 1FK701), IP64 (only for 1FK702)	With	3
IP65 and DE flange IP67 (only for 1FK702)	With	5

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Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S110/S120 blocksize format		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[2]	PM340 Power Module Air cooling	Power connector	Cable cross-section[3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	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	**6FX■002-5■G10-...**

Line filter:	
Without	**U**
Integrated	**A**

Power cable:	
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.

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[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 x 1.5 mm².

[4] P_{calc} [kW] = $\dfrac{M_0 \, [\text{Nm}] \times n_{rated}}{9550}$ P_{calc} [hp] = $\dfrac{M_0 \, [\text{lb}_f\text{-ft}] \times n_{rated}}{5250}$

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 High Dynamic synchronous motors Natural cooling	Num-ber of pole pairs	Moment of inertia of rotor (without brake)	Weight (without brake)
n_{rated}	SH	P_{rated} at ΔT=100 K	M_0 at ΔT=100 K	M_{rated} at ΔT=100 K	I_{rated} at ΔT=100 K		p	J	m
rpm		kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-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 AM2048S/R encoder Multi-pole resolver 2-pole resolver		A E S T		
Encoder systems for motors with DRIVE-CLiQ interface:	AS24DQI encoder AM24DQI encoder AS20DQI encoder AM20DQI encoder R15DQ resolver R14DQ resolver		B C Q R U P		
Shaft extension: Feather key Feather key Plain shaft Plain shaft	**Shaft and flange accuracy:** Tolerance N Tolerance N Tolerance N Tolerance N	**Holding brake:** Without With Without With		A B G H	
Degree of protection:	IP64 IP65 IP65 and DE flange IP67				0 1 2

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Motor type (repeated)	Effi-ciency [1]	Stall current	Calculated power P_{calc} [4]	SINAMICS S120 blocksize format		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current [2]	**PM340 Power Module Air cooling**	Power connector	Cable cross-section [3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} at M_0 ΔT=100 K	I_{rated}		Size	mm^2	
	%	A	kW (HP)	A	Order No.			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	**6FX■002-5■G10-....**
1FK7043-4CF21-...	88	3.9	1 (1.34)	3.9	**6SL3210-1SB14-0■A0**	1	4 × 1.5	**6FX■002-5■G10-....**

Line filter:			Power cable:		
Without		**U**	MOTION-CONNECT 800 PLUS	**8**	
Integrated		**A**	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 x 1.5 mm^2.

[4] P_{calc} [kW] $= \dfrac{M_0 \text{[Nm]} \times n_{rated}}{9550}$ P_{calc} [hp] $= \dfrac{M_0 \text{[lb}_f\text{-ft]} \times n_{rated}}{5250}$

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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 ± 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 <u>not</u> 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		Built-in holding brake					
Shaft height SH	Type	Holding torque [1] Nm (lb$_f$-ft)	Direct current A	Opening time with varistor ms	Closing time with varistor ms	Moment of inertia J 10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)	Maximum switched energy per brake operation from n = 3000 rpm
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 1FK7103 1FK7105	43 (31.72)	1.0	300	70	13.5 (11.95)	3380

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[1] 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.

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Feed motors
Gearboxes for SIMOTICS S servomotors

Planetary gearboxes series SP+
for SIMOTICS S-1FT7 synchronous motors

■ **Selection and ordering data**

Motor	Planetary gearbox Single-stage			Available gear ratio i =				Motor speed, max. S3-60 %	Output torque, max. S3-60 %	Radial output shaft loading, max.[1]	Axial output shaft loading, max.[1]
Type	Type	Torsional backlash	Gearbox weight, approx.	4	5	7	10	n_{G1}	M_{G2}	F_r	F_a
								(n_1)	(T_{2B})	(F_{2Rmax})	(F_{2Amax})
		arcmin	kg (lb)					rpm	Nm (lb$_f$-ft)	N (lb$_f$)	N (lb$_f$)
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)	4000 (899)	3350 (753)
1FT7036				✔	✔	✔	✔		(90 for i = 10)		
1FT7042				✔	✔	✔	✔				
1FT7044				✔	✔	✔	✔				
1FT7046				✔	✔	✔	–				
1FT7046	SP 100S-MF1	≤ 3	7.7 (17.0)	–	–	–	✔	4500	300 (221)	6300 (1416)	5650 (1270)
1FT7062				✔	✔	✔	✔		(225 for i = 10)		
1FT7064				✔	✔	✔	✔				
1FT7065				✔	✔	✔	–				
1FT7066				✔	✔	✔	✔				
1FT7067				✔	✔	✔	–				
1FT7068				✔	✔	✔	–				
1FT7065	SP 140S-MF1	≤ 3	17.2 (37.9)	–	–	–	✔	4000	600 (442)	9450 (2124)	9870 (2218)
1FT7067				–	–	–	✔		(480 for i = 10)		
1FT7068				–	–	–	✔				
1FT7082				✔	✔	✔	✔				
1FT7084				✔	✔	✔	✔				
1FT7085				✔	✔	✔	–				
1FT7086				✔	✔	✔	–				
1FT7087				✔	✔	–	–				
1FT7085	SP 180S-MF1	≤ 3	34 (75.0)	–	–	–	✔	3500	1100 (810)	14700 (3304)	14150 (3181)
1FT7086				–	–	–	✔		(880 for i = 10)		
1FT7087				–	–	✔	✔				
1FT7102				✔	✔	✔	✔				
1FT7105				✔	✔	✔	–				
1FT7108				✔	✔	✔	–				
1FT7105	SP 210S-MF1	≤ 3	56 (123)	–	–	–	✔	2500	2500 (1844)	21000 (4721)	30000 (6744)
1FT7108				–	–	–	✔		(2400 for i = 7 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:

• 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

[1] In relation to the output shaft center.

■ Technical specifications

SIMOTICS S-1FT7 motor with SP+ planetary gearbox

Single-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of the gearboxes (relating to the drive)				
		Continuous duty S1[1]		1FT703.	1FT704.	1FT706.	1FT708.	1FT710.
	i	n_{N1}	M_{N2} (T_{2N})	J_1	J_1	J_1	J_1	J_1
		rpm	Nm (lb$_f$-ft)	kgcm^2 (lb$_f$-in^2)	kgcm^2 (lb$_f$-in^2)	kgcm^2 (lb$_f$-in^2)	kgcm^2 (lb$_f$-in^2)	kgcm^2 (lb$_f$-in^2)
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)

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[1] 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 Two-stage			Available gear ratio i =					Motor speed, max. S3-60 %	Output torque, max. S3-60 %	Radial output shaft loading, max.[1]	Axial output shaft loading, max.[1]
Type	Type	Torsional backlash	Gearbox weight, approx.	**16**	**20**	**28**	**40**	**50**	n_{G1}	M_{G2}	F_r	F_a
		arcmin	kg (lb)						(n_1) rpm	(T_{2B}) Nm (lb$_f$-ft)	(F_{2Rmax}) N (lb$_f$)	(F_{2Amax}) N (lb$_f$)
1FT7034	SP 075S-MF2	≤ 6	3.6 (7.9)	✔	✔	✔	–	–	6000	110 (81.1)	4000 (899)	3350 (753)
1FT7036				✔	–	–	–	–				
1FT7042				✔	–	–	–	–				
1FT7034	SP 100S-MF2	≤ 5	7.9 (17.4)	–	–	–	✔	✔	4500	300 (221)	6300 (1416)	5650 (1270)
1FT7036				–	✔	✔	✔	✔				
1FT7042				–	✔	✔	✔	✔				
1FT7044				✔	✔	✔	–	–				
1FT7046				✔	✔	–	–	–				
1FT7062				✔	✔	–	–	–				
1FT7064				✔	–	–	–	–				
1FT7044	SP 140S-MF2	≤ 5	17 (37.5)	–	–	–	✔	✔	4000	600 (442)	9450 (2124)	9870 (2218)
1FT7046				–	–	✔	✔	✔				
1FT7062				–	–	✔	✔	✔				
1FT7064				–	✔	✔	–	–				
1FT7065				✔	✔	–	–	–				
1FT7066				✔	✔	–	–	–				
1FT7067				✔	–	–	–	–				
1FT7068				✔	✔	–	–	–				
1FT7082				✔	✔	–	–	–				
1FT7084				✔	–	–	–	–				
1FT7064	SP 180S-MF2	≤ 5	36.4 (80.3)	–	–	–	✔	✔	4000	1100 (811)	14700 (3305)	14150 (3181)
1FT7065				–	–	✔	✔	–				
1FT7066				–	–	✔	✔	✔				
1FT7067				–	✔	✔	–	–				
1FT7068				–	–	✔	✔	✔				
1FT7082				–	–	✔	✔	✔				
1FT7084				–	✔	✔	–	–				
1FT7085				✔	–	–	–	–				
1FT7086				✔	✔	–	–	–				
1FT7102				✔	✔	–	–	–				
1FT7084	SP 210S-MF2	≤ 5	55.0 (121)	–	–	–	✔	✔	3500	2400 (1770) (2500 for i = 20)	21000 (4721)	30000 (6744)
1FT7085				–	✔	✔	–	–				
1FT7086				–	–	✔	✔	–				
1FT7087				✔	✔	✔	–	–				
1FT7102				–	–	✔	–	–				
1FT7105				✔	✔	–	–	–				
1FT7108				✔	–	–	–	–				
1FT7085	SP 240S-MF2	≤ 5	80.6 (178)	–	–	–	✔	✔	3500	4500 (3319) (4000 for i = 40 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**				

✔ Possible
– Not possible
[1] In relation to the output shaft center.

■ **Technical specifications**

SIMOTICS S-1FT7 motor with SP+ planetary gearbox

Two-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of the gearboxes (relating to the drive)				
		Continuous duty S1[1]		1FT703.	1FT704.	1FT706.	1FT708.	1FT710.
	i	n_{N1} rpm	M_{N2} (T_{2N}) Nm (lb$_f$-ft)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)
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)

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[1] 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.

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■ **Selection and ordering data**

Motor	Planetary gearbox Single-stage			Available gear ratio i =				Motor speed, max. S3-60 %	Output torque, max. S3-60 %	Radial output shaft loading, max.[1]	Axial output shaft loading, max.[1]
Type	Type	Torsional backlash	Gearbox weight, approx.	4	5	7	10	n_{G1}	M_{G2}	F_r	F_a
								(n_1)	(T_{2B})	(F_{2Rmax})	(F_{2Amax})
		arcmin	kg (lb)					rpm	Nm (lb$_f$-ft)	N (lb$_f$)	N (lb$_f$)
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) (2400 for i = 7 1900 for i = 10)	21000 (4721)	30000 (6744)
	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**
  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 single-stage SP+ planetary gearbox
with i = 7 and gear shaft without feather key.
1FK7042-2AF71-1AG1**-Z**
J25

✔ Possible

– Not possible

[1] In relation to the output shaft center.

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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 | Motor speed | Output torque | Moments of inertia of the gearboxes (relating to the drive) | | | | | |
| | | Continuous duty S1[1] | | 1FK702. | 1FK703. | 1FK704. | 1FK706. | 1FK708. | 1FK710. |
	i	n_{N1} rpm	M_{N2} (T_{2N}) Nm (lb$_f$-ft)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)	J_1 kgcm^2 (lb$_f$-in^2)
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)

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[1] 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 Two-stage			Available gear ratio i =					Motor speed, max. S3-60 %	Output torque, max. S3-60 %	Radial output shaft loading, max.[1]	Axial output shaft loading, max.[1]
Type	Type	Torsional backlash arcmin	Gearbox weight, approx. kg (lb)	**16**	**20**	**28**	**40**	**50**	n_{G1} (n_1) rpm	M_{G2} (T_{2B}) Nm (lb$_f$-ft)	F_r (F_{2Rmax}) N (lb$_f$)	F_a (F_{2Amax}) N (lb$_f$)
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**
  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 = 28 and gear shaft without feather key.
1FK7042-2AF71-1AG1**-Z**
J35

✔ Possible

– Not possible

[1] In relation to the center of the output shaft at 100 rpm.

Feed motors
Gearboxes for SIMOTICS S servomotors

**Planetary gearboxes series SP+
for SIMOTICS S-1FK7 synchronous motors**

■ Selection and ordering data

Motor Type	Planetary gearbox Two-stage Type	Torsional backlash arcmin	Gearbox weight, approx. kg (lb)	16	20	28	40	50	Motor speed, max. S3-60 % n_{G1} (n_1) rpm	Output torque, max. S3-60 % M_{G2} (T_{2B}) Nm (lb$_f$-ft)	Radial output shaft loading, max.[1] F_r (F_{2Rmax}) N (lb$_f$)	Axial output shaft loading, max.[1] F_a (F_{2Amax}) N (lb$_f$)
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) (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) (4000 for i = 40 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

[1] In relation to the output shaft center.

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■ **Technical specifications**

SIMOTICS S-1FK7 motor with SP+ planetary gearbox

Two-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of the gearboxes (relating to the drive)					
		Continuous duty S1[1]		1FK702.	1FK703.	1FK704.	1FK706.	1FK708.	1FK710.
	i	n_{N1} rpm	M_{N2} (T_{2N}) Nm (lb_f-ft)	J_1 kgcm^2 (lb_f-in^2)	J_1 kgcm^2 (lb_f-in^2)	J_1 kgcm^2 (lb_f-in^2)	J_1 kgcm^2 (lb_f-in^2)	J_1 kgcm^2 (lb_f-in^2)	J_1 kgcm^2 (lb_f-in^2)
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)

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[1] 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.

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Selection and ordering data

Motor	Planetary gearbox LP+ Single-stage Torsional backlash ≤ 12 arcmin		Available gear ratio i =		Input speed, max. S3-60 %	Output torque, max. S3-60 %		Output shaft radial force, max.[1]	Gearbox moment of inertia
Type	Type	Gearbox weight, approx. kg (lb)	**5**	**10**	n_{G1} rpm	M_{G2} at $i = 5$ Nm (lb$_f$-ft)	M_{G2} at $i = 10$ Nm (lb$_f$-ft)	F_r N (lb$_f$)	J_G at $i = 5/10$ 10^{-4} kgm^2 (10^{-3} lb$_f$-in-s^2)
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 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
- **2 A** Compact   **G** without brake
- **3 B** High   **H** with brake
- Inertia
- **4 C** High Dynamic

or

1FK7 0 2■-5 A . 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+ Single-stage Torsional backlash ≤ 12 arcmin	Rated input speed	Rated output torque	
Type	n_{G1} rpm	M_{G2} at $i = 5$ Nm (lb$_f$-ft)	M_{G2} at $i = 10$ Nm (lb$_f$-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

[1] In relation to the center of the output shaft at 100 rpm.

6

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 ± 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

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■ **Technical specifications**

Product name	SIMOTICS L-1FN3 linear motors	
	Peak load	Continuous load
Type of motor	Permanent-magnet synchronous linear motor	
Magnet material	Rare-earth permanent magnets	
Overload ratio (F_{MAX}:F_{rated}) up to max.	2.75	1.7
Cooling	Water cooling	
Water cooler connections	G 1/8" internal thread on all primary and secondary section coolers	
Temperature influence on surrounding construction with precision cooling, max.	+4 K	
Coolant inlet temperature, permissible	35 °C (95 °F) (avoid condensation) > 35 °C (95 °F) on reduction of rated motor power	
Temperature monitoring integrated in the primary section winding	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).	
Insulation of stator winding according to EN (IEC) 60034-1	Temperature class 155 (F) for a winding temperature of 120 °C (248 °F)	
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65	
Available configurations	Different graduations due to modular construction	
Secondary section cover	Exchangeable through all segments or segment by segment	
2nd rating plate	Enclosed separately	
Encoder system (Not included in scope of delivery)	Select according to basic conditions specific to the application and the drive. Refer to Overview of measuring systems.	
Connection	Prepared for separate connection of the power and signal cable	
Approvals, according to	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[3]		SIMOTICS L-1FN3 synchronous linear motors – Version for peak load Standard type		Weight, approx.	
				Primary section	Secondary section	Primary section without/with precision cooling	Secondary section without/with heatsink profiles
F_{rated}[1)2)]	F_{MAX}	v_{MAX} at F_{MAX}	v_{MAX} at F_{rated}				
N (lb$_f$)	N (lb$_f$)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Water cooling							
200 (45)	550 (124)	146 (479)	373 (1224)	**1FN3050-2WC00-0EA1**	1FN3050-4SA00-0AA0	2.4/2.9 (5.3/6.4)	0.4/0.5 (0.9/1.1)
		146 (479)	373 (1224)	**1FN3050-2WC00-0FA1**			
200 (45)	490 (110)	138 (453)	322 (1056)	**1FN3100-1WC00-0BA1**	1FN3100-4SA00-0AA0	2.2/– (4.9/–)[4]	0.7/0.8 (1.5/1.8)
450 (101)	1100 (247)	131 (430)	297 (974)	**1FN3100-2WC00-0BA1**		3.8/4.4 (8.4/9.7)	
		237 (778)	497 (1631)	**1FN3100-2WE00-0BA1**			
675 (152)	1650 (371)	120 (394)	277 (909)	**1FN3100-3WC00-0BA1**		5.4/6.2 (11.9/13.7)	
		237 (778)	497 (1631)	**1FN3100-3WE00-0BA1**			
900 (202)	2200 (495)	131 (430)	297 (974)	**1FN3100-4WC00-0BA1**		7.4/8.5 (16.3/18.7)	
		237 (778)	497 (1631)	**1FN3100-4WE00-0BA1**			
1125 (253)	2750 (618)	109 (358)	255 (837)	**1FN3100-5WC00-0BA1**		9.1/10.4 (20.1/22.9)	
340 (76)	820 (184)	126 (413)	282 (925)	**1FN3150-1WC00-0BA1**	1FN3150-4SA00-0AA0	3.0/– (6.6/–)[4]	1.2/1.3 (2.7/2.9)
675 (152)	1650 (371)	126 (413)	282 (925)	**1FN3150-2WC00-0BA1**		5.3/6 (11.7/13.2)	
1010 (227)	2470 (555)	126 (413)	282 (925)	**1FN3150-3WC00-0BA1**		7.8/8.7 (17.2/19.2)	
1350 (304)	3300 (742)	126 (413)	282 (925)	**1FN3150-4WC00-0BA1**		10.2/11.4 (22.5/25.1)	
1690 (380)	4120 (926)	126 (413)	282 (925)	**1FN3150-5WC00-0BA1**		12.8/14.2 (28.2/31.3)	
610 (137)	1720 (387)	128 (420)	309 (1014)	**1FN3300-1WC00-0BA1**	1FN3300-4SA00-0AA0	6.2/ – (13.7/–)[4]	2.4/2.6 (5.3/5.7)
1225 (275)	3450 (776)	63 (207)	176 (577)	**1FN3300-2WB00-0BA1**		11.4/12.4 (25.1/27.3)	
		125 (410)	297 (974)	**1FN3300-2WC00-0BA1**			
		369 (1211)	805 (2641)	**1FN3300-2WG00-0BA1**			
1840 (414)	5170 (1162)	125 (410)	297 (974)	**1FN3300-3WC00-0BA1**		17.0/18.4 (37.5/40.6)	
		383 (1257)	836 (2743)	**1FN3300-3WG00-0BA1**			
2450 (551)	6900 (1551)	63 (207)	176 (577)	**1FN3300-4WB00-0BA1**		22.2/24 (48.9/52.9)	
		125 (410)	297 (974)	**1FN3300-4WC00-0BA1**			

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[8]	
• 1FN3100/1FN3150 motors	**6FX7002-2SL01-....**
• 1FN3300 to 1FN3900 motors	**6FX7002-2SL02-....**

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Motor type Primary section (repeated)	Rated current	Maxi-mum cur-rent	Calcu-lated power	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via adapter cable with power connector for increased velocity/acceleration			
				Required rated current	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Pre-assembled adapter cable for motor	Power con-nector	Cable cross-section[5]	Pre-assembled basic cable to the drive system
	I_{rated}[1]	I_{MAX}	$P_{el, max.}$	I_{rated}/I_{MAX}					
	A	A	kW (HP)	A	Order No.	Order No.	Size	mm²	Order No.
1FN3050-2WC00-...	2.7	8.2	4.1 (5.5)	5/10	6SL312■-■TE15-0AA3	[6]	1	4 × 2.5	6FX8002-5CS11-....
1FN3050-2WC00-...	2.7	8.2	4.1 (5.5)	5/10	6SL312■-■TE15-0AA3	[7]	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-1WC00-...	2.4	6.5	3.1 (4.2)	5/10	6SL312■-■TE15-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-2WC00-...	5.1	13.5	6.3 (8.5)	9/18	6SL312■-■TE21-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-2WE00-...	8.1	21.5	8.3 (11.1)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-3WC00-...	7.2	19.1	9.2 (12.3)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-3WE00-...	12.1	32.2	12.4 (16.6)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-4WC00-...	10.1	27.0	12.6 (16.9)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-4WE00-...	16.1	43.0	16.6 (22.3)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3100-5WC00-...	11.0	29.5	14.4 (19.3)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3150-1WC00-...	3.6	9.5	4.3 (5.8)	5/10	6SL312■-■TE15-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3150-2WC00-...	7.2	19.1	8.7 (11.7)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3150-3WC00-...	10.7	28.6	13.0 (17.4)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3150-4WC00-...	14.3	38.2	17.4 (23.3)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3150-5WC00-...	17.9	47.7	21.7 (29.1)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM42-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-1WC00-...	6.5	20.0	8.7 (11.7)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM62-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-2WB00-...	8.0	24.7	13.2 (17.7)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM62-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-2WC00-...	12.6	39.2	16.7 (22.4)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM62-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-2WG00-...	32.2	99.7	30.1 (40.4)	60/113	6SL312■-1TE26-0AA3	6FX7002-5LM82-....	1.5	4 × 6	6FX8002-5CS54-....
1FN3300-3WC00-...	19.0	58.7	25.1 (33.7)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM62-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-3WG00-...	50.0	154.9	46.2 (61.9)	132/210	6SL312■-1TE31-3AA3	6FX7002-5LM02-....	1.5	4 × 16	6FX8002-5CS24-....
1FN3300-4WB00-...	16.0	49.4	26.3 (35.3)	30/56	6SL312■-1TE23-0AA3	6FX7002-5LM62-....	1	4 × 2.5	6FX8002-5CS11-....
1FN3300-4WC00-...	25.3	78.3	33.5 (44.9)	45/85	6SL312■-1TE24-5AA3	6FX7002-5LM72-....	1.5	4 × 4	6FX8002-5CS54-....

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

.... Length code[8] **....**

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

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[1] For water cooling with inlet temperature 35 °C (95 °F).

[2] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[3] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[4] No precision cooler available.

[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).

[6] Permanently connected power and signal cables, length 2 m (6.56 ft), with exposed core ends:

[7] Permanently connected power and signal cables, length 0.5 m (1.64 ft), with power connector size 1 and M17 signal connector.

[8] 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[3]		SIMOTICS L-1FN3 synchronous linear motors – Version for peak load Standard type		Weight, approx.	
				Primary section	Secondary section	Primary section without/with precision cooling	Secondary section without/with heatsink profiles
F_{rated}[1)2)]	F_{MAX}	v_{MAX} at F_{MAX}	V_{MAX} at F_{rated}				
N (lb$_f$)	N (lb$_f$)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Water cooling							
1930 (434)	5180 (1165)	30 (98)	112 (368)	**1FN3450-2WA50-0BA1**	**1FN3450-4SA00-0AA0**	15.9/17.1 (35.1/37.7)	3.8/4 (8.4/8.8)
		120 (394)	275 (902)	**1FN3450-2WC00-0BA1**			
		240 (787)	519 (1703)	**1FN3450-2WE00-0BA1**			
2895 (651)	7760 (1745)	62 (203)	164 (538)	**1FN3450-3WB00-0BA1**		22.6/24.3 (49.8/53.6)	
		90 (295)	217 (712)	**1FN3450-3WB50-0BA1**			
		120 (394)	275 (902)	**1FN3450-3WC00-0BA1**			
		240 (787)	519 (1703)	**1FN3450-3WE00-0BA1**			
3860 (868)	10350 (2327)	62 (203)	164 (538)	**1FN3450-4WB00-0BA1**		30.9/33.1 (68.1/73)	
		90 (295)	217 (712)	**1FN3450-4WB50-0BA1**			
		120 (394)	275 (902)	**1FN3450-4WC00-0BA1**			
		240 (787)	519 (1703)	**1FN3450-4WE00-0BA1**			
2610 (587)	6900 (1551)	36 (118)	120 (394)	**1FN3600-2WA50-0BA1**	**1FN3600-4SA00-0AA0**	22.2/24.7 (49/54.5)	4.6/5 (10.1/11)
3915 (880)	10350 (2327)	58 (190)	155 (509)	**1FN3600-3WB00-0BA1**		31.5/33.4 (69.5/73.7)	
		127 (417)	279 (915)	**1FN3600-3WC00-0BA1**			
5220 (1174)	13800 (3102)	26 (85)	105 (345)	**1FN3600-4WA30-0BA1**		40.8/43.3 (90/95.5)	
		58 (190)	155 (509)	**1FN3600-4WB00-0BA1**			
		91 (299)	215 (705)	**1FN3600-4WB50-0BA1**			
		112 (367)	254 (833)	**1FN3600-4WC00-0BA1**			
4050 (910)	10350 (2327)	65 (213)	160 (525)	**1FN3900-2WB00-0BA1**	**1FN3900-4SA00-0AA0**	28.2/29.7 (62.2/65.4)	7.5/7.9 (16.5/17.4)
		115 (377)	253 (830)	**1FN3900-2WC00-0BA1**			
6075 (1366)	15530 (3491)	75 (246)	181 (594)	**1FN3900-3WB00-0BA1**		42.2/44.3 (93.1/97.6)	
8100 (1821)	20700 (4653)	65 (213)	160 (525)	**1FN3900-4WB00-0BA1**		56.2/58.9 (124/130)	
		88 (290)	203 (666)	**1FN3900-4WB50-0BA1**			
		115 (377)	253 (830)	**1FN3900-4WC00-0BA1**			

Type of connection:	
1FN3100 to 1FN3900 motors	
Connection cover prepared for separate power and signal cables	**B**

Description	Order No.
Signal cable, pre-assembled with M17 connector[7]	
• 1FN3100/1FN3150 motors	**6FX7002-2SL01-....**
• 1FN3300 to 1FN3900 motors	**6FX7002-2SL02-....**

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Motor type Primary section (repeated)	Rated current I_{rated}[1]	Maxi- mum current I_{MAX}	Calculated power $P_{el, max.}$	SINAMICS S120 Motor Module Required rated current I_{rated}/I_{MAX}	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Power cable with complete shield Motor connection via adapter cable with power connector for increased velocity/acceleration Pre-assembled adapter cable for motor Order No.	Power con- nector Size	Cable cross- section[4] mm²	Pre-assembled basic cable to the drive system Order No.
	A	A	kW (HP)	A					
1FN3450-2WA50-...	8.6	25.3	15.9 (21.3)	18/36	6SL312■-■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-....[5]	–	4 × 25	6FX7008-1BB25-....[6]
1FN3600-2WA50-...	12.4	36.0	21.9 (29.4)	18/36	6SL312■-■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-....[5]	–	4 × 25	6FX7008-1BB25-....[6]

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

.... Length code[7] ....

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

6

[1] For water cooling with inlet temperature 35 °C (95 °F).

[2] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[3] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[4] 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).

[5] Sold by the meter only (4 × 16 mm²). Connected to primary section with 16 mm² (< 1.5 m (4.92 ft)) then routed onwards through terminal box with 25 mm².

[6] Sold by the meter only (4 × 25 mm²).

[7] 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[3]		SIMOTICS L-1FN3 synchronous linear motors – Version for continuous load Standard type		Weight, approx.	
				Primary section	Secondary section	Primary section without/with precision cooling	Secondary section without/with heatsink profiles
F_{rated}[1)2)]	F_{MAX}	v_{MAX} at F_{MAX}	v_{MAX} at F_{rated}				
N (lb$_f$)	N (lb$_f$)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Water cooling							
150 (34)	260 (58)	242 (794)	435 (1427)	**1FN3050-1ND00-0EA1**	1FN3050-4SA00-0AA0	1.9/2.4 (4.2/5.3)	0.4/0.5 (0.9/1.1)
		242 (794)	435 (1427)	**1FN3050-1ND00-0FA1**			
300 (67)	510 (115)	106 (348)	202 (663)	**1FN3050-2NB80-0EA1**		3.2/4.0 (7.1/8.8)	
		106 (348)	202 (663)	**1FN3050-2NB80-0FA1**			
300 (67)	510 (115)	117 (384)	214 (702)	**1FN3100-1NC00-0BA1**	1FN3100-4SA00-0AA0	3/3.5 (6.6/7.7)	0.7/0.8 (1.5/1.8)
605 (136)	1020 (229)	170 (558)	307 (1007)	**1FN3100-2NC80-0BA1**		5.1/5.9 (11.3/13.1)	
905 (203)	1530 (344)	115 (337)	211 (692)	**1FN3100-3NC00-0BA1**		7.3/8.3 (16.1/18.03)	
1205 (271)	2040 (459)	169 (555)	305 (1001)	**1FN3100-4NC80-0BA1**		10/11.3 (22.1/24.9)	
455 (102)	770 (173)	129 (423)	234 (768)	**1FN3150-1NC20-0BA1**	1FN3150-4SA00-0AA0	4.1/4.6 (9.0/10.1)	1.2/1.3 (2.7/2.9)
905 (203)	1530 (344)	110 (361)	201 (660)	**1FN3150-2NB80-0BA1**		7.2/8.1 (15.9/17.9)	
1360 (306)	2300 (517)	163 (535)	292 (958)	**1FN3150-3NC70-0BA1**		10.5/11.7 (23.2/25.8)	
1810 (407)	3060 (688)	109 (358)	200 (656)	**1FN3150-4NB80-0BA1**		13.8/15.2 (30.4/33.5)	
865 (195)	1470 (331)	129 (423)	230 (755)	**1FN3300-1NC10-0BA1**	1FN3300-4SA00-0AA0	8.8/9.5 (19.4/20.9)	2.4/2.6 (5.3/5.7)
1730 (389)	2940 (661)	127 (417)	228 (748)	**1FN3300-2NC10-0BA1**		16.1/17.2 (35.5/37.9)	
2595 (583)	4400 (989)	144 (473)	257 (843)	**1FN3300-3NC40-0BA1**		22.8/24.3 (50.3/53.6)	
3460 (778)	5870 (1320)	109 (358)	196 (643)	**1FN3300-4NB80-0BA1**		30.4/32.3 (67.0/71.2)	
2595 (583)	4400 (989)	153 (502)	271 (889)	**1FN3450-2NC50-0BA1**	1FN3450-4SA00-0AA0	22/23.2 (48.5/51.2)	3.8/4 (8.4/8.8)
3890 (875)	6600 (1484)	152 (499)	270 (886)	**1FN3450-3NC50-0BA1**		32/33.6 (70.6/74.1)	
5185 (1166)	8810 (1981)	106 (348)	190 (623)	**1FN3450-4NB80-0BA1**		42.3/44.3 (93.3/97.9)	
3460 (778)	5870 (1320)	112 (368)	200 (656)	**1FN3600-2NB80-0BA1**	1FN3600-4SA00-0AA0	28.9/30.4 (63.7/67.0)	4.6/5 (10.1/11)
5185 (1166)	8810 (1981)	111 (364)	199 (653)	**1FN3600-3NB80-0BA1**		42.9/45.0 (94.6/99.2)	
6915 (1555)	11740 (2639)	111 (364)	199 (653)	**1FN3600-4NB80-0BA1**		56.6/59.2 (124.8/130.54)	
5185 (1166)	8810 (1981)	71 (233)	130 (427)	**1FN3900-2NB20-0BA1**	1FN3900-4SA00-0AA0	42.4/44.2 (93.5/97.5)	7.5/7.9 (16.5/17.4)
7780 (1749)	13210 (2970)	71 (233)	129 (423)	**1FN3900-3NB20-0BA1**		62/64.5 (136.7/142.2)	
10375 (2332)	17610 (3959)	70 (230)	129 (423)	**1FN3900-4NB20-0BA1**		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
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[7]	
• 1FN3100/1FN3150 motors	**6FX7002-2SL01-....**
• 1FN3300 to 1FN3900 motors	**6FX7002-2SL02-....**

6

Direct drives
SIMOTICS L linear motors for SINAMICS S120

Standard-type SIMOTICS L-1FN3 synchronous linear motors
Version for continuous load – Water cooling

Motor type Primary section (repeated)	Rated current	Maximum current	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via adapter cable with power connector for increased velocity/acceleration			
				Required rated current	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Pre-assembled adapter cable for motor	Power connector	Cable cross-section[5]	Pre-assembled basic cable to the drive system
	I_{rated}[1]	I_{MAX}	$P_{el, max.}$	I_{rated}/I_{MAX}					
	A	A	kW (HP)	A	Order No.	Order No.	Size	mm²	Order No.
1FN3050-1ND...	2.8	5.9	1.7 (2.28)	3/6	6SL312■-■TE13-0AA3	[6]	1	4 × 2.5	6FX8002-5CS11- ....
1FN3050-1ND...	2.8	5.9	1.7 (2.28)	3/6	6SL312■-■TE13-0AA3	[6]	1	4 × 2.5	6FX8002-5CS11- ....
1FN3050-2NB...	2.8	5.9	2.3 (3.08)	3/6	6SL312■-■TE13-0AA3	[6]	1	4 × 2.5	6FX8002-5CS11- ....
1FN3050-2NB...	2.8	5.9	2.3 (3.08)	3/6	6SL312■-■TE13-0AA3	[6]	1	4 × 2.5	6FX8002-5CS11- ....
1FN3100-1NC...	2.8	5.9	2.1 (2.8)	3/6	6SL312■-■TE13-0AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3100-2NC...	8	16.5	5.1 (6.84)	9/18	6SL312■-■TE21-0AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3100-3NC...	8.5	17.6	6.3 (8.5)	9/18	6SL312■-■TE21-0AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3100-4NC...	15.9	33.1	10.2 (13.9)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3150-1NC...	4.5	9.4	3.2 (4.3)	5/10	6SL312■-■TE15-0AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3150-2NB...	8	16.5	5.8 (7.78)	9/18	6SL312■-■TE21-0AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3150-3NC...	16.9	35.2	10.8 (14.5)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3150-4NB...	15.9	33.1	11.6 (15.6)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM42-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3300-1NC...	8.1	17.1	5.4 (7.2)	9/18	6SL312■-■TE21-0AA3	6FX7002-5LM62-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3300-2NC...	16.2	34.1	10.7 (14.3)	18/36	6SL312■-■TE21-8AA3	6FX7002-5LM62-	1	4 × 2.5	6FX8002-5CS11- ....
1FN3300-3NC...	27.3	57.4	17.3 (23.2)	30/56[4]	6SL312■-1 TE23-0AA3	6FX7002-5LM72-	1.5	4 × 4	6FX8002-5CS41- ....
1FN3300-4NB...	28.4	59.6	19.6 (26.3)	30/56[4]	6SL312■-1 TE23-0AA3	6FX7002-5LM72-	1.5	4 × 4	6FX8002-5CS41- ....
1FN3450-2NC...	28.4	59.6	17.4 (23.3)	30/56[4]	6SL312■-1 TE23-0AA3	6FX7002-5LM72-	1.5	4 × 4	6FX8002-5CS41- ....
1FN3450-3NC...	42.5	89.5	26.1 (35.0)	45/85[4]	6SL312■-1 TE24-5AA3	6FX7002-5LM32-	1.5	4 × 10	6FX8002-5CS64- ....
1FN3450-4NB...	40.8	85.8	27.9 (37.4)	45/85[4]	6SL312■-1 TE24-5AA3	6FX7002-5LM32-	1.5	4 × 10	6FX8002-5CS64- ....
1FN3600-2NB...	28.4	59.6	19.3 (25.9)	30/56[4]	6SL312■-1 TE23-0AA3	6FX7002-5LM72-	1.5	4 × 4	6FX8002-5CS41- ....
1FN3600-3NB...	42.5	89.5	28.9 (38.8)	45/85[4]	6SL312■-1 TE24-5AA3	6FX7002-5LM32-	1.5	4 × 10	6FX8002-5CS64- ....
1FN3600-4NB...	56.7	119.3	38.5 (51.6)	60/113[4]	6SL312■-1 TE26-0AA3	6FX7002-5LM02-	1.5	4 × 16	6FX8002-5CS24- ....
1FN3900-2NB...	28.4	59.6	22.3 (29.9)	30/56[4]	6SL312■-1 TE23-0AA3	6FX7002-5LM72-	1.5	4 × 4	6FX8002-5CS41- ....
1FN3900-3NB...	42.5	89.5	33.4 (44.8)	45/85[4]	6SL312■-1 TE24-5AA3	6FX7002-5LM32-	1.5	4 × 10	6FX8002-5CS64- ....
1FN3900-4NB...	56.7	119.3	44.5 (59.7)	60/113[4]	6SL312■-1 TE26-0AA3	6FX7002-5LM02-	1.5	4 × 16	6FX8002-5CS24- ....

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

.... Length code[7] ....

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

6

[1] For water cooling with inlet temperature 35 °C (95 °F).

[2] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[3] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[4] Power modules are designed for feed rate force F_{rated}. If feed rate force F_{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.

[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).

[6] Permanently connected power and signal cables.

[7] 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		Cover end pieces for secondary section cover[2]
	Secondary section cover		
Type	Continuous[1]	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			Number of secondary sections for all motors		
0	A		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				
			Number of secondary sections for motors 1FN3600/1FN3900		
0	A		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 Precision cooler	SIMOTICS L-1FN3 synchronous linear motors – Version for continuous load	Optional components Precision cooler
Type	Order No.	Type	Order No.
1FN3050-2W...	**1FN3050-2PK00-0AA0**	1FN3050-1N...	**1FN3050-1PK10-0AA0**
		1FN3050-2N...	**1FN3050-2PK10-0AA0**
1FN3100-2W...	**1FN3100-2PK00-0AA0**	1FN3100-1N...	**1FN3100-1PK10-0AA0**
1FN3100-3W...	**1FN3100-3PK00-0AA0**	1FN3100-2N...	**1FN3100-2PK10-0AA0**
1FN3100-4W...	**1FN3100-4PK00-0AA0**	1FN3100-3N...	**1FN3100-3PK10-0AA0**
1FN3100-5W...	**1FN3100-5PK00-0AA0**	1FN3100-4N...	**1FN3100-4PK10-0AA0**
1FN3150-2W...	**1FN3150-2PK00-0AA0**	1FN3150-1N...	**1FN3150-1PK10-0AA0**
1FN3150-3W...	**1FN3150-3PK00-0AA0**	1FN3150-2N...	**1FN3150-2PK10-0AA0**
1FN3150-4W...	**1FN3150-4PK00-0AA0**	1FN3150-3N...	**1FN3150-3PK10-0AA0**
1FN3150-5W...	**1FN3150-5PK00-0AA0**	1FN3150-4N...	**1FN3150-4PK10-0AA0**
1FN3300-2W...	**1FN3300-2PK00-0AA0**	1FN3300-1N...	**1FN3300-1PK10-0AA0**
1FN3300-3W...	**1FN3300-3PK00-0AA0**	1FN3300-2N...	**1FN3300-2PK10-0AA0**
1FN3300-4W...	**1FN3300-4PK00-0AA0**	1FN3300-3N...	**1FN3300-3PK10-0AA0**
		1FN3300-4N...	**1FN3300-4PK10-0AA0**
1FN3450-2W...	**1FN3450-2PK00-0AA0**	1FN3450-2N...	**1FN3450-2PK10-0AA0**
1FN3450-3W...	**1FN3450-3PK00-0AA0**	1FN3450-3N...	**1FN3450-3PK10-0AA0**
1FN3450-4W...	**1FN3450-4PK00-0AA0**	1FN3450-4N...	**1FN3450-4PK10-0AA0**
1FN3600-2W...	**1FN3600-2PK00-0AA0**	1FN3600-2N...	**1FN3600-2PK10-0AA0**
1FN3600-3W...	**1FN3600-3PK00-0AA0**	1FN3600-3N...	**1FN3600-3PK10-0AA0**
1FN3600-4W...	**1FN3600-4PK00-0AA0**	1FN3600-4N...	**1FN3600-4PK10-0AA0**
1FN3900-2W...	**1FN3900-2PK00-0AA0**	1FN3900-2N...	**1FN3900-2PK10-0AA0**
1FN3900-3W...	**1FN3900-3PK00-0AA0**	1FN3900-3N...	**1FN3900-3PK10-0AA0**
1FN3900-4W...	**1FN3900-4PK00-0AA0**	1FN3900-4N...	**1FN3900-4PK10-0AA0**

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[1] 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).

[2] The secondary section end pieces are designed to allow clamping of the integrated secondary section cover.

Precision cooler

Primary section

Secondary section cover

Secondary section

Power cooler

Connection cover

Heatsink profiles

Combi distributor

G_NC01_XX_00299a

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■ **Selection and ordering data**

SIMOTICS L-1FN3 linear motors	Optional components			
Type	Heatsink profile[3]	Secondary section end pieces[2]		
		Combi distributor	Combi adapter	Combi end piece
		Parallel water connection for all heatsink profiles	Combi adapter and end piece can only be implemented together.	
			Single-sided water connection	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 heatsink profile with cable grommet nipple	**4**		**Number of secondary sections**	
		A	0	
		B	10	
		C	20	
1FN3050 to 1FN3450 motors[4]: **Grommet nipple only on right end** of secondary section track	**6**	**A**	0	
		B	1	
		C	2	
1FN3600/1FN3900 motors: **Grommet nipple on both ends** of secondary section track	**6**	**D**	3	
		E	4	
		F	5	
1FN3050 to 1FN3450 motors[4]: **Grommet nipple only on left end** of secondary section track	**7**	**G**	6	
		H	7	
		J	8	
		K	9	

[3] 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).

[4] 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.

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■ **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.
Mounted opposite primary section terminal end		
1FN3050-2... 1FN3100-2... 1FN3100-4... 1FN3150-2... 1FN3150-4...	**1FN3002-0PH00-0AA0**	1FN3002-0PH01-0AA0
1FN3100-1... 1FN3100-3... 1FN3100-5... 1FN3150-1... 1FN3150-3... 1FN3150-5...	**1FN3005-0PH00-0AA0**	1FN3005-0PH01-0AA0
1FN3300-2... 1FN3300-4... 1FN3450-2... 1FN3450-4... 1FN3600-2... 1FN3600-4... 1FN3900-2... 1FN3900-4...	**1FN3003-0PH00-0AA0**	1FN3003-0PH01-0AA0
1FN3300-1... 1FN3300-3... 1FN3450-3... 1FN3600-3... 1FN3900-3...	**1FN3006-0PH00-0AA0**	1FN3006-0PH01-0AA0
Mounted on primary section terminal end		
1FN3050-... 1FN3100-... 1FN3150-...	**1FN3002-0PH00-0AA0**	1FN3002-0PH01-0AA0
1FN3300-... 1FN3450-... 1FN3600-... 1FN3900-...	**1FN3003-0PH00-0AA0**	1FN3003-0PH01-0AA0

Direct drives
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

	Absolute encoder EnDat enclosed	
Type	**LC 183**	**LC 483**
Signal cycle	20 µm	20 µm
Acceleration in measuring direction, max.	100 m/s^2 (328 ft/s^2)	100 m/s^2 (328 ft/s^2)
Traversing velocity, max.	180 m/min (591 ft/min)	180 m/min (591 ft/min)
Measuring length, max.	3040 mm (120 in)	2040 mm (80.3 in)
Output signal	1 V$_{pp}$	1 V$_{pp}$

	Incremental encoder sin/cos 1 V$_{pp}$ enclosed	
Type	**LS 187 (C)**	**LS 487 (C)**
Signal cycle	20 µm	20 µm
Acceleration in measuring direction, max.	100 m/s^2 (328 ft/s^2)	100 m/s^2 (328 ft/s^2)
Traversing velocity, max.	120 m/min (394 ft/min)	120 m/min (394 ft/min)
Measuring length, max.	3040 mm (120 in)	2040 mm (80.3 in)
Output signal	1 V$_{pp}$	1 V$_{pp}$

	Incremental encoder sin/cos 1 V$_{pp}$ open		
Type	**LIDA 185**	**LIDA 485**	**Renishaw RG2**
Signal cycle	40 µm	20 µm	20 µm
Acceleration in measuring direction, max.	200 m/s^2 (656 ft/s^2) [1]	200 m/s^2 (656 ft/s^2) [1]	300 m/s^2 (984 ft/s^2) [1]
Traversing velocity, max.	480 m/min (1575 ft/min)	480 m/min (1575 ft/min)	300 m/min (984 ft/min)
Measuring length, max.	30040 mm (1183 in)	30040 mm (1183 in)	50000 mm (1968 in)
Output signal	1 V$_{pp}$	1 V$_{pp}$	1 V$_{pp}$

■ 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 WOLFSCHLUGEN, Germany
Telephone: +49 70 22 50 03 - 0
Fax: +49 70 22 50 03 - 30
E-mail: info@bkw-kuema.de
www.bkw-kuema.de

Helmut Schimpke and Team Industriekühlanlagen GmbH + Co. KG

Contact: Ginsterweg 25-27
Mr. Gerkens   42781 HAAN, Germany
Telephone: +49 21 29 94 38 - 0
Fax: +49 21 29 94 38 - 99
E-mail: info@schimpke.de
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
www.hydac.com

Pfannenberg 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@pfannenberg.com
www.pfannenberg.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
www.rittal.com

For design of the coolers, see Configuration Manual (see documentation for Order No.).

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[1] 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 ± 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

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■ **Technical specifications**

Product name	SIMOTICS L-1FN6 linear motor
Type of motor	Permanent-magnet synchronous linear motor
Magnet material	Rare-earth permanent magnets
Cooling	
• 1FN6003 ... 1FN6024	Natural cooling
• 1FN6003 ... 1FN6007	Water cooling
Temperature monitoring in primary section[1]	
• In accordance with DIN 44081/DIN 44082	PTC thermistor in triple connection
• In accordance with EN 60034-11 (IEC 60034-11)	KTY84 thermistor Evaluation via Sensor Module: SME120/SME125/TM120 (see SINAMICS S120 drive system).
Insulation in accordance with EN (IEC) 60034-1	Temperature class 155 (F)
Type of construction	Individual components
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	Primary section: IP65 Degree of protection of the motor is determined by the construction of the motor's installation in the machine. Minimum requirement: IP23.
Encoder system (not included in scope of supply)	Select according to basic conditions specific to the application and the drive. Refer to overview of measuring systems.
Connection	
• 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
Approvals, according to	cURus

■ **Characteristic curves**

The SIMOTICS L-1FN6 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 (see footnotes for selection and ordering data).

[1] 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[1)3)]	Rated feedrate force, typ.[2)3)]	Feedrate-force, max.	Maximum velocity[4)]		SIMOTICS L-1FN6 linear motors 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 200 mm (7.87 in)/ 500 mm (19.69 in)
N (lb_f)	N (lb_f)	N (lb_f)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Natural cooling								
49 ... 119 (11 ... 27)	66.3 (14.9)	157 (35.3)	345 (1132)	748 (2454)	1FN6003-1LC57-0FA1	1FN6003-1S■00-0AA0	3.19 (7.03)	0.76/1.89 (1.68/4.17)
			503 (1650)	1080 (3543)	1FN6003-1LC84-0FA1			
98 ... 239 (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 (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 (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 (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 (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 (22 ... 54)	133 (29.9)	315 (70.8)	187 (614)	386 (1266)	1FN6007-1LC31-0KA1	1FN6007-1S■00-0AA0	5.08 (11.2)	1.61/4.03 (3.55/8.89)
			276 (906)	562 (1844)	1FN6007-1LC46-0KA1			
196 ... 477 (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 (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 (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 (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 (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) — **C**
Length: 500 mm (19.69 in) — **F**

Description	Order No.
Signal cable, pre-assembled[7)] For SIMOTICS L-1FN6 linear motors	6FX7002-2SL10-....

Motor type Primary section (repeated)	Continuous thermal current range[1][3] $I_{rated, th}$	Rated current, typ.[2][3] I_{rated}	Maximum current I_{MAX}	Calculated power $P_{el, max}$	SINAMICS S120 Motor Module		Power cable with complete shield		
					Required rated current[5] I_{rated}/I_{MAX}	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Pre-assembled cable to the drive system Power connector Size	Cable cross-section[6] mm²	Order No.
		A	A	kW (HP)	A				
1FN6003-1LC57-....	1.17 ... 3.2	1.61	5.18	1.29 (1.73)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LC84-....	1.69 ... 4.6	2.31	7.45	1.71 (2.29)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LE38-....	1.69 ... 4.6	2.31	7.45	1.97 (2.64)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LE88-....	4.11 ... 11.2	5.63	18.2	3.86 (5.18)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LG24-....	1.69 ... 4.6	2.31	7.45	2.28 (3.06)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LG61-....	4.11 ... 11.2	5.63	18.2	4.16 (5.58)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LJ17-....	1.69 ... 4.6	2.31	7.45	2.61 (3.50)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LJ44-....	4.11 ... 11.2	5.63	18.2	4.49 (6.02)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LL12-....	1.69 ... 4.6	2.31	7.45	2.93 (3.93)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LL35-....	4.11 ... 11.2	5.63	18.2	4.84 (6.49)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LN10-....	1.69 ... 4.6	2.31	7.45	3.25 (4.36)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1LN28-....	4.11 ... 11.2	5.63	18.2	5.2 (6.97)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LC31-....	1.17 ... 3.2	1.61	5.18	1.59 (2.13)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LC46-....	1.69 ... 4.6	2.31	7.45	2.07 (2.78)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LE20-....	1.69 ... 4.6	2.31	7.45	2.5 (3.35)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LE53-....	4.11 ... 11.2	5.63	18.2	4.65 (6.24)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LG12-....	1.69 ... 4.6	2.31	7.45	2.98 (4.00)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LG33-....	4.11 ... 11.2	5.63	18.2	5.14 (6.89)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LJ08-....	1.69 ... 4.6	2.31	7.45	3.46 (4.64)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LJ24-....	4.11 ... 11.2	5.63	18.2	5.67 (7.60)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LL05-....	1.69 ... 4.6	2.31	7.45	3.93 (5.27)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LL18-....	4.11 ... 11.2	5.63	18.2	6.21 (8.33)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LN15-....	4.11 ... 11.2	5.63	18.2	6.74 (9.04)	9/18	6SL312■-■TE21-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1LN32-....	8.22 ... 21	11.3	36.3	10.1 (13.5)	18/36	6SL312■-■TE21-8AA3	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[7] ....

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

6

[1] 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.

[2] 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.

[3] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[4] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[5] 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.

[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).
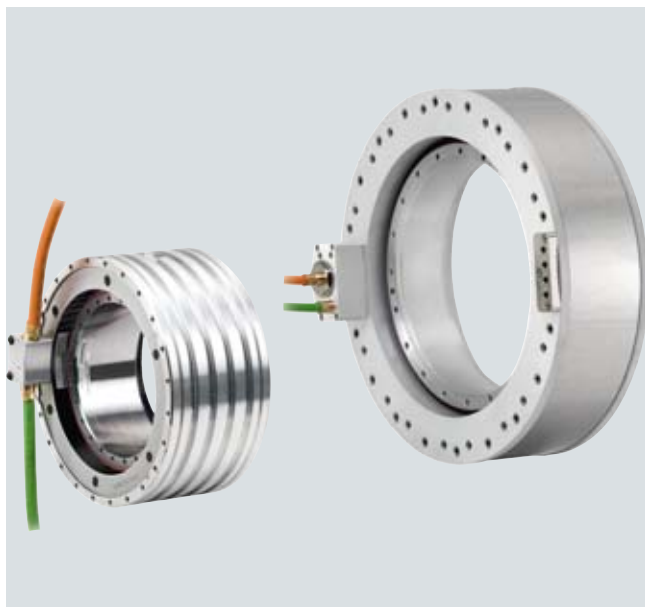
[7] For length code, refer to section MOTION-CONNECT connection systems.

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[1)3)]	Rated feedrate force, typ.[2)3)]	Feedrate-force, max.	Maximum velocity[4)]		SIMOTICS L-1FN6 linear motors 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 200 mm
N (lb$_f$)	N (lb$_f$)	N (lb$_f$)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Natural cooling								
309 ... 572 (69 ... 129)	374 (84.1)	898 (202)	98.5 (323)	218 (715)	**1FN6008-1LC17-0KA1**	1FN6008-1SC00-0AA0	16.3 (35.9)	2.81 (6.20)
			224 (735)	473 (1552)	**1FN6008-1LC37-0KA1**			
617 ... 1140 (139 ... 256)	749 (168)	1800 (405)	96.8 (318)	221 (725)	**1FN6008-1LE16-0KA1**		27.9 (61.5)	
			207 (679)	456 (1496)	**1FN6008-1LE34-0KA1**			
926 ... 1720 (208 ... 387)	1120 (252)	2690 (605)	96.7 (317)	224 (735)	**1FN6008-1LG16-0KA1**		39.6 (87.3)	
			200 (656)	449 (1473)	**1FN6008-1LG33-0KA1**			
543 ... 1140 (122 ... 256)	692 (156)	1800(405)	110 (361)	241 (791)	**1FN6016-1LC18-0KA1**	1FN6016-1SC00-0AA0	27.6 (60.9)	5.42 (11.9)
			176 (577)	377 (1237)	**1FN6016-1LC30-0KA1**			
1090 ... 2290 (245 ... 515)	1380 (310)	3590 (807)	101 (331)	233 (764)	**1FN6016-1LE17-0KA1**		48.2 (106)	
			162 (532)	365 (1198)	**1FN6016-1LE27-0KA1**			
1630 ... 3430 (366 ... 771)	2070 (465)	5390 (1212)	98.2 (322)	230 (755)	**1FN6016-1LG16-0KA1**		68.5 (151)	
			156 (512)	360 (1181)	**1FN6016-1LG26-0KA1**			
758 ... 1720 (170 ... 387)	1000 (225)	2690 (605)	70.1 (230)	160 (525)	**1FN6024-1LC12-0KA1**	1FN6024-1SC00-0AA0	39.9 (88.0)	7.96 (17.6)
			115 (377)	252 (827)	**1FN6024-1LC20-0KA1**			
1520 ... 3430 (342 ... 771)	2000 (450)	5390 (1212)	64.8 (213)	155 (509)	**1FN6024-1LE11-0KA1**		69.5 (153)	
			106 (348)	244 (801)	**1FN6024-1LE18-0KA1**			
2270 ... 5140 (510 ... 1156)	3000 (674)	8080 (1816)	62.8 (206)	153 (502)	**1FN6024-1LG10-0KA1**		99.2 (219)	
			102 (335)	241 (791)	**1FN6024-1LG17-0KA1**			

Type of connection:
1FN6008 to 1FN6024 motors

Two separate integrated sockets, for power and signal cable   **K**

Description	Order No.
Signal cable, pre-assembled[7)] For SIMOTICS L-1FN6 linear motors	**6FX7002-2SL10-....**

Motor type Primary section (repeated)	Continuous thermal current range[1)3]	Rated current, typ.[2)3]	Maximum current	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield		
					Required rated current[5]	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Pre-assembled cable to the drive system		
	$I_{rated, th}$	I_{rated}	I_{MAX}	$P_{el, max}$	I_{rated}/I_{MAX}		Power connector	Cable cross-section[6]	
	A	A	kW (HP)		A	Order No.	Size	mm^2	Order No.
1FN6008-1LC17-...	2.22 ... 4.32	2.71	8.64	3.09 (4.14)	5/10	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6008-1LC37-...	4.62 ... 9	5.65	18	4.88 (6.54)	9/18	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6008-1LE16-...	4.62 ... 9	5.65	18	5.93 (7.95)	9/18	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6008-1LE34-...	9.24 ... 18	11.3	36	9.28 (12.4)	18/36	**6SL312■-■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■-■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■-■TE21-0AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6016-1LC30-...	6.23 ... 13.8	8	27.7	7.75 (10.4)	18/36	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6016-1LE17-...	8.11 ... 18	10.4	36	11.1 (14.9)	18/36	**6SL312■-■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■-■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■-■TE21-8AA3**	1	4 × 1.5	**6FX8002-5CN01-....**
1FN6024-1LE11-...	7.53 ... 18	10	36	12.8 (17.2)	18/36	**6SL312■-■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:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Length code[7] ....

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

6

[1] 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.

[2] 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.

[3] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[4] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[5] 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.

[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).

[7] 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**

Feedrateforce[1][2]		Maximum velocity[3]		SIMOTICS L-1FN6 linear motors 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 200 mm/ 500 mm
N (lb$_f$)	N (lb$_f$)	m/min (ft/min)	m/min (ft/min)	Order No.	Order No.	kg (lb)	kg (lb)
Water cooling							
119 (27)	157 (35.3)	345 (1132)	509 (1670)	**1FN6003-1WC57-0FA1**	1FN6003-1S■00-0AA0	3.19 (7.03)	0.76/1.89 (1.68/4.17)
		503 (1650)	740 (2428)	**1FN6003-1WC84-0FA1**			
239 (54)	315 (70.8)	226 (742)	339 (1112)	**1FN6003-1WE38-0FA1**		4.99 (11.0)	
		572 (1877)	852 (2795)	**1FN6003-1WE88-0FA1**			
358 (80)	472 (106)	141 (463)	215 (705)	**1FN6003-1WG24-0FA1**		6.79 (15.0)	
		366 (1201)	549 (1801)	**1FN6003-1WG61-0FA1**			
477 (107)	630 (142)	99.6 (327)	155 (509)	**1FN6003-1WJ17-0FA1**		8.59 (18.9)	
		267 (876)	402 (1319)	**1FN6003-1WJ44-0FA1**			
597 (134)	787 (177)	74.7 (245)	119 (390)	**1FN6003-1WL12-0FA1**		10.4 (22.9)	
		208 (682)	316 (1037)	**1FN6003-1WL35-0FA1**			
716 (161)	945 (212)	57.9 (190)	95.1 (312)	**1FN6003-1WN10-0FA1**		12.2 (26.9)	
		169 (554)	258 (846)	**1FN6003-1WN28-0FA1**			
239 (54)	315 (70.8)	187 (614)	272 (892)	**1FN6007-1WC31-0KA1**	1FN6007-1S■00-0AA0	5.08 (11.2)	1.61/4.03 (3.55/8.89)
		276 (906)	399 (1309)	**1FN6007-1WC46-0KA1**			
477 (107)	630 (142)	120 (394)	180 (591)	**1FN6007-1WE20-0KA1**		8.39 (18.5)	
		315 (1034)	462 (1516)	**1FN6007-1WE53-0KA1**			
716 (161)	945 (212)	71.7 (235)	111 (364)	**1FN6007-1WG12-0KA1**		11.7 (25.8)	
		200 (656)	296 (971)	**1FN6007-1WG33-0KA1**			
955 (215)	1260 (283)	47.4 (156)	77.6 (255)	**1FN6007-1WJ08-0KA1**		15 (33.1)	
		143 (469)	215 (705)	**1FN6007-1WJ24-0KA1**			
1190 (268)	1570 (353)	32.4 (106)	57.5 (189)	**1FN6007-1WL05-0KA1**		18.3 (40.4)	
		110 (361)	167 (548)	**1FN6007-1WL18-0KA1**			
1430 (321)	1890 (425)	87.9 (288)	135 (443)	**1FN6007-1WN15-0KA1**		21.6 (47.6)	
		194 (637)	288 (879)	**1FN6007-1WN32-0KA1**			

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)	**C**
Length: 500 mm (19.69 in)	**F**

Description	Order No.
Signal cable, pre-assembled[5] For SIMOTICS L-1FN6 linear motors	**6FX7002-2SL10-....**

6

Motor type Primary section (repeated)	Rated current, typ.[1] I_{rated} A	Maximum current I_{MAX} A	Calculated power $P_{el, max}$ kW (HP)	SINAMICS S120 Motor Module Required rated current I_{rated}/I_{MAX} A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Power cable with complete shield Pre-assembled cable to the drive system Power connector Size	Cable cross-section[4] mm²	Order No.
1FN6003-1WC57-...	3.2	5.18	1.29 (1.73)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WC84-...	4.6	7.45	1.71 (2.29)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WE38-...	4.6	7.45	1.97 (2.64)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WE88-...	11.2	18.2	3.86 (5.18)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WG24-...	4.6	7.45	2.28 (3.06)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WG61-...	11.2	18.2	4.16 (5.58)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WJ17-...	4.6	7.45	2.61 (3.5)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WJ44-...	11.2	18.2	4.49 (6.02)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WL12-...	4.6	7.45	2.93 (3.93)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WL35-...	11.2	18.2	4.84 (6.49)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WN10-...	4.6	7.45	3.25 (4.36)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6003-1WN28-...	11.2	18.2	5.2 (6.97)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WC31-...	3.2	5.18	1.59 (2.13)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WC46-...	4.6	7.45	2.07 (2.78)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WE20-...	4.6	7.45	2.5 (3.35)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WE53-...	11.2	18.2	4.65 (6.24)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WG12-...	4.6	7.45	2.98 (4.0)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WG33-...	11.2	18.2	5.14 (6.89)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WJ08-...	4.6	7.45	3.46 (4.64)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WJ24-...	11.2	18.2	5.67 (7.6)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WL05-...	4.6	7.45	3.93 (5.27)	5/10	6SL312■-■TE15-0AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WL18-...	11.2	18.2	6.21 (8.33)	18/36	6SL312■-■TE21-8AA3	1	4 × 1.5	6FX8002-5CN01-....
1FN6007-1WN15-...	11.2	18.2	6.74 (9.04)	18/36	6SL312■-■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-....

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Cooling:
Internal air cooling	**0**
External air cooling	**1**

Motor Module:
Single Motor Module	**1**
Double Motor Module	**2**

Length code[5] ....

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

[1] For water cooling with inlet temperature 35 °C (95 °F).

[2] A reduction of up to 30 % must be expected in case of motor standstill, at very low velocities, or with very short traverse paths.

[3] Velocity values refer to a DC link voltage of the drive system of 600 V DC.

[4] 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).

[5] 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)

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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

Product name	SIMOTICS T-1FW6 built-in torque motors
Type of motor	Synchronous motor with permanent magnet rotor multi-pole (number of rotor poles 22 ... 98)
Torque ripple	≤ 1.5 % M_0
Coolant inlet temperature, max.	35 °C (95 °F)
Pressure in cooling circuit, max.	10 bar (static)
Temperature monitoring	1FW6050 and 1FW6060: 1 × PTC thermistor triplet with response threshold +130 °C (266 °F) (according to DIN 44081/44082) 1FW6090 to 1FW629: 2 × PTC thermistor triplet with response threshold +130/150 °C (266/302 °F) (according to DIN 44081/44082) All motors: 1 × KTY84 thermistor (according to DIN EN 60034-11) in the stator Evaluation via Sensor Module: SME120/SME125/TM120 (see SINAMICS S120 drive system)
Insulation of stator winding according to DIN EN 60034-1	Temperature class 155 (F)
Type of construction	Individual components: Stator, rotor
Degree of protection to DIN EN 60034-5	IP23 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.
Encoder system (not included in scope of supply)	Select according to basic conditions specific to the application and the drive
Connection, electrical	Permanently connected power and signal cables
Paint finish	Unpainted
Rating plate	1 unit enclosed separately
Approvals, according to	cURus

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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 M_{max} Nm (lb$_f$-ft)	Static torque[1)3)] M_0 Nm (lb$_f$-ft)	Rated torque [2)3)] M_{rated} Nm (lb$_f$-ft)	Max. speed at maximum torque[2)] n_{max} at M_{max} rpm	Max. speed at rated torque[2)] n_{max} at M_{rated} rpm	SIMOTICS T-1FW6 built-in torque motors Standard type Order No.	Moment of inertia of rotor J 10^{-2}kgm^2 (lb$_f$-in-s^2)	Weight, approx. stator + rotor m kg (lb)
1FW6, standard type, water cooling							
34.4 (25.4)	24.2 (17.8)	22.3 (16.4)	670	940	1FW6050-0■B03-0F■1	0.139 (0.012)	3.1 (6.84)
57.5 (54.4)	40.4 (29.8)	38.6 (28.5)	360	520	1FW6050-0■B05-0F■1	0.267 (0.024)	5.9 (13.01)
80.6 (59.5)	56.6 (41.7)	54.9 (40.5)	220	340	1FW6050-0■B07-0F■1	0.39 (0.035)	7.9 (17.42)
81.2 (59.9)	53 (39.1)	48.8 (36)	660	880	1FW6050-0■B07-0K■1		
116 (85.6)	75.8 (55.9)	71.8 (53)	420	570	1FW6050-0■B10-0K■1	0.488 (0.043)	11.4 (25.14)
174 (128.3)	114 (84.1)	110 (81.1)	220	340	1FW6050-0■B15-0K■1	0.691 (0.061)	19.2 (42.34)
		105 (77.4)	640	840	1FW6050-0■B15-1J■1		
64.5 (47.6)	33.3 (24.6)	30.7 (22.6)	340	660	1FW6060-0■B03-0F■1	0.347 (0.031)	7.1 (15.66)
123 (90.7)	63.1 (46.5)	60.7 (44.8)	130	320	1FW6060-0■B05-0F■1	0.665 (0.059)	9.9 (21.83)
		57.9 (42.7)	410	690	1FW6060-0■B05-0K■1		
166 (122.4)	85.4 (63)	83.2 (61.4)	46	210	1FW6060-0■B07-0F■1	0.904 (0.080)	12.5 (27.56)
		80.5 (59.4)	260	480	1FW6060-0■B07-0K■1		
231 (170.4)	119 (87.8)	114 (84.1)	140	310	1FW6060-0■B10-0K■1	1.21 (0.107)	16.2 (35.72)
226 (166.7)	116 (85.6)	106 (78.2)	500	740	1FW6060-0■B10-1J■1		
339 (250)	174 (128.3)	171 (126.1)	31	180	1FW6060-0■B15-0K■1	1.72 (0.152)	22.4 (49.39)
332 (244.9)	171 (126.1)	161 (118.8)	270	460	1FW6060-0■B15-1J■1		

Cable outlet only for 1FW6050 and 1FW6060:
Axial — **W**
Tangential — **T**

Type of connection:
Permanently connected power and signal cables with exposed core ends[5)]
Length: 2 m (6.56 ft) — **C**
Permanently connected power and signal cables pre-assembled with connectors
Length: 0.5 m (1.64 ft) — **D**

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Direct drives
SIMOTICS T torque motors for SINAMICS S120
SIMOTICS T-1FW6 synchronous built-in torque motors
Water cooling

Motor type (repeated)	Stall current [1][3] I_0 A	Rated current [2][3] I_{rated} A	Maxi-mum current[2] I_{max} A	Calculated power $P_{el, max}$ kW (HP)	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via power connector[5]		
					Required rated current I_{rated}/I_{max} A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Power connec-tor Size	Cable cross-section[6] mm²	Pre-assembled basic cable to the drive system Order No.
1FW6050-0.B03-0F..	5	4.6	7.6	4.18 (5.61)	5/10	6SL312■-■TE15-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6050-0.B05-0F..	5	4.8	7.6	4.54 (6.09)	5/10	6SL312■-■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■-■TE15-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6050-0.B07-0K..	9.3	8.6	14	8.68 (11.64)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6050-0.B10-0K..	9.3	8.8	14	9.06 (12.15)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6050-0.B15-0K..	9.3	9	14	9.58 (12.85)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6050-0.B15-1J..	18	17	29	17.2 (22.8)	18/36	6SL312■-■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■-■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■-■TE15-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B05-0K..	8.1	7.4	17	10.2 (13.68)	9/18	6SL312■-■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■-■TE15-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B07-0K..	8.1	7.6	17	10.8 (14.48)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B10-0K..	8.1	7.8	17	11.7 (15.69)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B10-1J..	15	13	31	19.4 (26.02)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B15-0K..	8.1	7.9	17	12.9 (17.3)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6060-0.B15-1J..	15	14	31	20.6 (27.62)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....

Cooling:
Internal air cooling	0
External air cooling	1

Motor Module:
Single Motor Module	1
Double Motor Module	2

Length code ....

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

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[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[1][3]	Rated torque[2][3]	Max. speed at maximum torque[2]	Max. speed at rated torque[2]	SIMOTICS T-1FW6 built-in torque motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor
M_{max}	M_0	M_{rated}	n_{max} at M_{max}	n_{max} at M_{rated}		J	m
Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	10^{-2}kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FW6, standard type, water cooling							
179 (132)	119 (87.8)	113 (83.3)	46	140	**1FW6090-0■B05-0F■2**	1.52 (0.13)	9.2 (20.3)
		109 (80.4)	140	250	**1FW6090-0■B05-0K■2**		
251 (185)	166 (122)	154 (114)	120	220	**1FW6090-0■B07-0K■2**	2.2 (0.19)	12.2 (27)
		142 (105)	270	430	**1FW6090-0■B07-1J■2**		
358 (264)	238 (176)	231 (170)	8.7	82	**1FW6090-0■B10-0K■2**	3.09 (0.27)	17.2 (37.9)
		216 (159)	170	270	**1FW6090-0■B10-1J■2**		
537 (396)	357 (263)	338 (249)	78	150	**1FW6090-0■B15-1J■2**	4.65 (0.41)	27.2 (60)
		319 (235)	200	310	**1FW6090-0■B15-2J■2**		
439 (324)	258 (190)	241 (178)	47	130	**1FW6130-0■B05-0K■2**	6.37 (0.56)	13.2 (29.1)
		217 (160)	180	310	**1FW6130-0■B05-1J■2**		
614 (453)	361 (266)	344 (254)	21	96	**1FW6130-0■B07-0K■2**	8.92 (0.79)	18.2 (40.1)
		324 (239)	110	200	**1FW6130-0■B07-1J■2**		
878 (648)	516 (381)	484 (357)	50	120	**1FW6130-0■B10-1J■2**	12.7 (1.12)	25.2 (55.6)
		450 (332)	150	250	**1FW6130-0■B10-2J■2**		
1320 (974)	775 (572)	744 (549)	14	78	**1FW6130-0■B15-1J■2**	19.1 (1.69)	38.2 (84.2)
		714 (527)	77	150	**1FW6130-0■B15-2J■2**		
710 (524)	360 (266)	338 (249)	110	230	**1FW6150-0■B05-1J■2**	10.1 (0.8939)	21.7 (47.8)
		298 (220)	330	650	**1FW6150-0■B05-4F■2**		
994 (733)	504 (372)	470 (347)	130	260	**1FW6150-0■B07-2J■2**	14.2 (1.2568)	33.5 (73.9)
		445 (327)	230	450	**1FW6150-0■B07-4F■2**		
1420 (1047)	720 (531)	688 (507)	76	170	**1FW6150-0■B10-2J■2**	20.9 (1.8498)	47.5 (104.7)
		664 (489)	150	300	**1FW6150-0■B10-4F■2**		
2130 (1571)	1080 (797)	1050 (774)	32	100	**1FW6150-0■B15-2J■2**	31.3 (2.7703)	70.8 (156)
		1030 (760)	89	190	**1FW6150-0■B15-4F■2**		

Cable outlet <u>only</u> for 1FW6090/1FW6130/1FW6150:
Axial **P**
Radially outwards **Q**
Tangential **N**

Type of connection:
Permanently connected power and signal cables with exposed core ends[5] **C**
Length: 2 m (6.56 ft)
Permanently connected power and signal cables pre-assembled with connectors **D**
Length: 0.5 m (1.64 ft)

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Motor type (repeated)	Stall current [1][3] I_0 A	Rated current [2][3] I_{rated} A	Maxi-mum current [2] I_{max} A	Calculated power $P_{el, max}$ kW (HP)	SINAMICS S120 Motor Module Required rated current I_{rated}/I_{max} A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.	Power cable with complete shield Motor connection via power connector [5] Power connector Size	Cable cross-section [6] mm²	Pre-assembled basic cable to the drive system Order No.
1FW6090-0.B05-0F..	5.9	5.6	9.5	6.55 (8.78)	5/10[4]	6SL312■-■TE15-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B05-0K..	8.2	7.4	13	8.12 (10.88)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B07-0K..	10	9.5	16	10.3 (13.8)	9/18[4]	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B07-1J..	16	13	26	14.1 (18.9)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B10-0K..	8.2	7.9	13	9.43 (12.6)	9/18	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B10-1J..	16	14	26	15.3 (20.5)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B15-1J..	16	15	26	17.1 (22.9)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6090-0.B15-2J..	26	23	43	24.1 (32.3)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6130-0.B05-0K..	9.7	9	18	12.2 (16.4)	9/18[4]	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B05-1J..	17	14	32	18.3 (24.5)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B07-0K..	10	10	20	14.2 (19)	9/18[4]	6SL312■-■TE21-0AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B07-1J..	17	15	32	19.7 (26.4)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B10-1J..	17	16	32	21.4 (28.7)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B10-2J..	28	24	53	30.6 (41)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6130-0.B15-1J..	19	18	36	25.4 (34.1)	18/36[4]	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6130-0.B15-2J..	28	26	54	34.1 (45.7)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6150-0.B05-1J..	18	17	44	22.8 (30.6)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6150-0.B05-4F..	44	36	100	39.4 (52.8)	45/85	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX8002-5CS64-....
1FW6150-0.B07-2J..	27	25	66	32.0 (42.9)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6150-0.B07-4F..	44	38	100	42.7 (57.3)	45/85	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX8002-5CS64-....
1FW6150-0.B10-2J..	27	26	66	36.2 (48.5)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6150-0.B10-4F..	44	40	100	47.3 (63.4)	45/85	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX8002-5CS64-....
1FW6150-0.B15-2J..	27	26	66	42.4 (56.9)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6150-0.B15-4F..	44	41	100	54.5 (73.1)	45/85	6SL312■-1TE24-5AA3	1.5	4 × 10	6FX8002-5CS64-....

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Length code   ....

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).
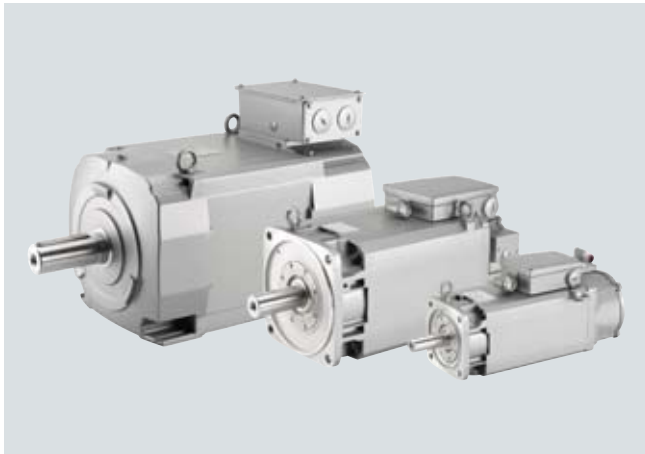
[6] The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

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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[1)3)]	Rated torque[2)3)]	Max. speed at maximum torque[2)]	Max. speed at rated torque[2)]	SIMOTICS T-1FW6 built-in torque motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor
M_{max}	M_0	M_{rated}	n_{max} at M_{max}	n_{max} at M_{rated}		J	m
Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	10^{-2}kgm^2 (lb$_f$-in-s^2)	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■B07-8FB2		
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■B10-8FB2		
		622 (459)	330	600	1FW6160-0■B10-2PB2		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■B15-8FB2		
		1120 (826)	220	360	1FW6160-0■B15-2PB2		96.4 (213)
		961 (709)	320	560	1FW6160-0■B15-0WB2		
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■B20-8FB2		
		1600 (1180)	160	260	1FW6160-0■B20-2PB2		125.4 (277)
		1460 (1077)	240	400	1FW6160-0■B20-0WB2		

6

Cable outlet only for 1FW6160 to 1FW6290:	
Axial	**W**
Radially outwards	**V**
Tangential (only for types of connection C and D)	**T**
Type of connection:	
Permanently connected power and signal cables with exposed core ends[4)] Length: 2 m (6.56 ft)	**C**
Permanently connected power and signal cables pre-assembled with connectors Length: 0.5 m (1.64 ft)	**D**
Type of connection only for specific motors (Not configurable):	
Permanently connected power and signal cables with exposed core ends[4)] Length: 1 m (3.28 ft)	**B**

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Direct drives
SIMOTICS T torque motors for SINAMICS S120
SIMOTICS T-1FW6 synchronous built-in torque motors
Water cooling

Motor type (repeated)	Stall current [1][3]	Rated current [2][3]	Maxi-mum current[2]	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via power connector[4]		
					Required rated current	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Power connec-tor	Cable cross-section[5]	Pre-assembled basic cable to the drive system
	I_0	I_{rated}	I_{max}	$P_{el, max}$	I_{rated}/I_{max}				
	A	A	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FW6160-0.B05-1J..	17	16	31	15.1 (20.2)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6160-0.B05-2J..	28	24	49	20 (26.8)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6160-0.B05-5G..	56	36	98	33.1 (44.4)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6160-0.B07-1J..	17	16	31	16.7 (22.4)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6160-0.B07-2J..	28	25	49	21.8 (29.2)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6160-0.B07-5G..	56	43	98	35.2 (47.2)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6160-0.B07-8FB.	80	51	140	46.7 (62.6)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6160-0.B10-1J..	17	17	31	19 (25.5)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6160-0.B10-2J..	28	26	49	24.4 (32.7)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6160-0.B10-5G..	56	47	98	38.1 (51.1)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6160-0.B10-8FB.	80	61	140	49.8 (66.8)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6160-0.B10-2PB.	110	73	190	64.6 (86.6)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6160-0.B15-2J..	28	26	49	28.2 (37.8)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6160-0.B15-5G..	56	50	98	42.6 (57.1)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6160-0.B15-8FB.	80	68	140	54.6 (73.2)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6160-0.B15-2PB.	110	88	190	69.5 (93.2)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6160-0.B15-0WB.	160	100	280	92.8 (124)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6160-0.B20-5G..	56	52	98	46.9 (62.9)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6160-0.B20-8FB.	80	72	140	59.2 (79.4)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6160-0.B20-2PB.	110	95	190	74.2 (99.5)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6160-0.B20-0WB.	160	120	280	97.7 (131)	200/282	6SL312■-1TE32-0AA3	–	–	–

6

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Length code	**....**

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 M_{max} Nm (lb$_f$-ft)	Static torque[1][3] M_0 Nm (lb$_f$-ft)	Rated torque[2][3] M_{rated} Nm (lb$_f$-ft)	Max. speed at maximum torque[2] n_{max} at M_{max} rpm	Max. speed at rated torque[2] n_{max} at M_{rated} rpm	SIMOTICS T-1FW6 built-in torque motors Standard type Order No.	Moment of inertia of rotor J 10^{-2}kgm^2 (lb$_f$-in-s^2)	Weight, approx. stator + rotor m kg (lb)
1FW6, standard type, water cooling							
990 (730)	672 (496)	633 (467)	54	97	1FW6190-0■B05-1J■2	35.8 (3.17)	42.8 (94.4)
		605 (446)	96	160	1FW6190-0■B05-2J■2		
		509 (375)	210	380	1FW6190-0■B05-5G■2		
1390 (1025)	941 (694)	905 (668)	33	63	1FW6190-0■B07-1J■2	48.6 (4.30)	55.8 (123)
		879 (648)	64	110	1FW6190-0■B07-2J■2		
		791 (583)	150	250	1FW6190-0■B07-5G■2		
		704 (519)	220	390	1FW6190-0■B07-8F B2		
1980 (1460)	1340 (988)	1310 (966)	14	38	1FW6190-0■B10-1J■2	67.8 (6.0)	75.8 (167)
		1290 (952)	39	70	1FW6190-0■B10-2J■2		
		1210 (892)	100	170	1FW6190-0■B10-5G■2		
		1130 (833)	150	260	1FW6190-0■B10-8F B2		
		955 (704)	250	450	1FW6190-0■B10-2PB2		77.1 (170)
2970 (2191)	2020 (1490)	1970 (1453)	17	40	1FW6190-0■B15-2J■2	99.8 (8.83)	107.8 (238)
		1890 (1394)	62	100	1FW6190-0■B15-5G■2		
		1820 (1342)	97	160	1FW6190-0■B15-8F B2		
		1670 (1232)	160	270	1FW6190-0■B15-2PB2		109.1 (241)
		1540 (1136)	210	370	1FW6190-0■B15-0WB2		
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■B20-8F B2		
		2360 (1741)	120	200	1FW6190-0■B20-2PB2		137.5 (303)
		2250 (1660)	160	260	1FW6190-0■B20-0WB2		

Cable outlet only for 1FW6160 to 1FW6290:
Axial — **W**
Radially outwards — **V**
Tangential (only for types of connection C and D) — **T**

Type of connection:
Permanently connected power and signal cables with exposed core ends[4]
Length: 2 m (6.56 ft) — **C**
Permanently connected power and signal cables pre-assembled with connectors
Length: 0.5 m (1.64 ft) — **D**

Type of connection only for specific motors (Not configurable):
Permanently connected power and signal cables with exposed core ends[4]
Length: 1 m (3.28 ft) — **B**

Motor type (repeated)	Stall current [1][3]	Rated current [2][3]	Maxi-mum current [2]	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via power connector [4]		
					Required rated current	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section [5]	Pre-assembled basic cable to the drive system
	I_0	I_{rated}	I_{max}	$P_{el, max}$	I_{rated}/I_{max}	Order No.	Size	mm^2	Order No.
	A	A	A	kW (HP)	A				
1FW6190-0.B05-1J..	18	17	31	16.3 (21.9)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6190-0.B05-2J..	27	24	47	20.6 (27.6)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6190-0.B05-5G..	54	40	95	32.9 (44.1)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6190-0.B07-1J..	18	17	31	18.2 (24.4)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6190-0.B07-2J..	27	25	47	22.7 (30.4)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6190-0.B07-5G..	54	44	95	35.4 (47.5)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6190-0.B07-8FB.	78	56	130	46.3 (62.1)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6190-0.B10-1J..	18	17	31	20.7 (27.8)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6190-0.B10-2J..	27	26	47	25.7 (34.5)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6190-0.B10-5G..	54	48	95	38.7 (51.9)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6190-0.B10-8FB.	78	64	130	49.9 (66.9)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6190-0.B10-2PB.	120	84	210	69.9 (93.7)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6190-0.B15-2J..	27	26	47	30.1 (40.4)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6190-0.B15-5G..	54	50	95	44.1 (59.1)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6190-0.B15-8FB.	78	69	130	55.6 (74.6)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6190-0.B15-2PB.	120	99	210	75.8 (102)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6190-0.B15-0WB.	150	110	270	91.5 (123)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6190-0.B20-5G..	54	51	95	49 (54.7)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6190-0.B20-8FB.	78	71	130	61.1 (81.9)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6190-0.B20-2PB.	120	100	210	81.5 (109)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6190-0.B20-0WB.	150	120	270	97.4 (131)	200/282	6SL312■-1TE32-0AA3	–	–	–

Cooling:
Internal air cooling	0
External air cooling	1

Motor Module:
Single Motor Module	1
Double Motor Module	2

Length code ....

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

6

[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 tor 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[1][3]	Rated torque[2][3]	Max. speed at maximum torque[2]	Max. speed at rated torque[2]	SIMOTICS T-1FW6 built-in torque motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor
M_{max}	M_0	M_{rated}	n_{max} at M_{max}	n_{max} at M_{rated}		J	m
Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	10^{-2}kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FW6, standard type, water cooling							
1320 (974)	841 (620)	799 (589)	34	69	1FW6230-0■B05-1J■2	62.2 (5.51)	44.8 (98.8)
		774 (571)	59	110	1FW6230-0■B05-2J■2		
		660 (487)	160	290	1FW6230-0■B05-5G■2		
1840 (1357)	1180 (870)	1140 (841)	19	45	1FW6230-0■B07-1J■2	84.3 (7.46)	58.8 (130)
		1120 (826)	38	73	1FW6230-0■B07-2J■2		
		1010 (745)	110	190	1FW6230-0■B07-5G■2		
		923 (681)	160	290	1FW6230-0■B07-8FB2		
2630 (1940)	1680 (1239)	1630 (1202)	21	46	1FW6230-0■B10-2J■2	118.0 (10.4)	81.8 (180)
		1520 (1121)	74	130	1FW6230-0■B10-5G■2		
		1450 (1070)	110	190	1FW6230-0■B10-8FB2		
		1320 (974)	160	290	1FW6230-0■B10-2PB2		
3950 (2914)	2520 (1859)	2440 (1800)	19	43	1FW6230-0■B15-4C■2	173.0 (15.3)	117.8 (260)
		2380 (1755)	44	80	1FW6230-0■B15-5G■2		
		2310 (1704)	67	120	1FW6230-0■B15-8FB2		
		2190 (1615)	100	180	1FW6230-0■B15-2PB2		
		2020 (1490)	150	270	1FW6230-0■B15-0WB2		119.4 (263)
5260 (3880)	3360 (2478)	3230 (2382)	29	56	1FW6230-0■B20-5G■2	228.0 (20.2)	153.8 (339)
		3160 (2331)	47	84	1FW6230-0■B20-8FB2		
		3050 (2250)	74	130	1FW6230-0■B20-2PB2		
		2890 (2132)	110	190	1FW6230-0■B20-0WB2		155.4 (343)

Cable outlet only for 1FW6160 to 1FW6290:		
Axial	**W**	
Radially outwards	**V**	
Tangential (only for types of connection C and D)	**T**	
Type of connection:		
Permanently connected power and signal cables with exposed core ends[4] Length: 2 m (6.56 ft)		**C**
Permanently connected power and signal cables pre-assembled with connectors Length: 0.5 m (1.64 ft)		**D**
Type of connection only for specific motors (Not configurable):		
Permanently connected power and signal cables with exposed core ends[4] Length: 1 m (3.28 ft)		**B**

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Direct drives
SIMOTICS T torque motors for SINAMICS S120
SIMOTICS T-1FW6 synchronous built-in torque motors
Water cooling

Motor type (repeated)	Stall current I_0 [1)3)] A	Rated current I_{rated} [2)3)] A	Maximum current[2)] I_{max} A	Calculated power $P_{el,max}$ kW (HP)	SINAMICS S120 Motor Module — Required rated current I_{rated}/I_{max} A	Booksize format — For additional versions and components, see chapter SINAMICS S120 drive system — Order No.	Power connector Size	Cable cross-section[5)] mm²	Pre-assembled basic cable to the drive system Order No.
1FW6230-0.B05-1J..	16	15	31	17.3 (23.2)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6230-0.B05-2J..	24	22	45	21 (28.2)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6230-0.B05-5G..	53	40	100	34.1 (45.7)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6230-0.B07-1J..	16	16	31	19.4 (26.0)	18/36	6SL312■-■TE21-8AA3	1	4 × 2.5	6FX8002-5CS11-....
1FW6230-0.B07-2J..	24	22	45	23.6 (31.6)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6230-0.B07-5G..	53	44	100	36.9 (49.5)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6230-0.B07-8FB.	74	56	130	46.3 (62.1)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6230-0.B10-2J..	24	23	45	27.1 (36.3)	30/56	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX8002-5CS41-....
1FW6230-0.B10-5G..	54	48	100	42 (56.3)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6230-0.B10-8FB.	74	62	130	50.6 (67.9)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6230-0.B10-2PB.	100	80	190	65.4 (87.7)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6230-0.B15-4C..	33	32	63	38 (50.9)	45/85	6SL312■-1TE24-5AA3	1.5	4 × 6	6FX8002-5CS54-....
1FW6230-0.B15-5G..	53	49	100	47.4 (63.5)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6230-0.B15-8FB.	74	66	130	57.3 (76.8)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6230-0.B15-2PB.	100	90	190	72.5 (97.2)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6230-0.B15-0WB.	140	110	270	91.2 (122)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6230-0.B20-5G..	53	51	100	53.5 (71.7)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6230-0.B20-8FB.	74	69	130	63.7 (85.4)	85/141	6SL312■-1TE28-5AA3	–	–	–
1FW6230-0.B20-2PB.	100	94	190	79.4 (106)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6230-0.B20-0WB.	140	120	270	98.1 (132)	200/282	6SL312■-1TE32-0AA3	–	–	–

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**
Double Motor Module **2**

Length code ....

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[1)3)]	Rated torque[2)3)]	Max. speed at maximum torque[2)]	Max. speed at rated torque[2)]	SIMOTICS T-1FW6 built-in torque motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor
M_{max}	M_0	M_{rated}	n_{max} at M_{max}	n_{max} at M_{rated}		J	m
Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	10^{-2}kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FW6, standard type, water cooling							
4000 (2950)	2220 (1637)	2060 (1519)	59	110	**1FW6290-0■B07-5G■2**	228 (20.2)	103.6 (228)
		1910 (1409)	110	210	**1FW6290-0■B07-0L B2**		
		1810 (1335)	150	270	**1FW6290-0■B07-2P B2**		108.8 (240)
6280 (4632)	3490 (2574)	3320 (2449)	40	73	**1FW6290-0■B11-7A■2**	334 (29.6)	159 (351)
		3200 (2360)	71	130	**1FW6290-0■B11-0L B2**		
		3100 (2287)	93	170	**1FW6290-0■B11-2P B2**		164.2 (362)
8570 (6321)	4760 (3511)	4590 (3386)	28	53	**1FW6290-0■B15-7A■2**	440 (38.9)	214.6 (473)
		4480 (3304)	50	89	**1FW6290-0■B15-0L B2**		
		4390 (3238)	67	120	**1FW6290-0■B15-2P B2**		219.8 (485)
10900 (8040)	6030 (4448)	5760 (4249)	38	68	**1FW6290-0■B20-0L B2**	546 (48.3)	260.6 (575)
		5670 (4182)	51	91	**1FW6290-0■B20-2P B2**		265.8 (586)

Cable outlet only for 1FW6160 to 1FW6290:	
Axial	**W**
Radially outwards	**V**
Tangential (only for types of connection C and D)	**T**
Type of connection:	
Permanently connected power and signal cables with exposed core ends[4)] Length: 2 m (6.56 ft)	**C**
Permanently connected power and signal cables pre-assembled with connectors Length: 0.5 m (1.64 ft)	**D**
Type of connection only for specific motors (Not configurable):	
Permanently connected power and signal cables with exposed core ends[4)] Length: 1 m (3.28 ft)	**B**

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Motor type (repeated)	Stall current [1)][3)]	Rated current [2)][3)]	Maxi-mum current[2)]	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield — Motor connection via power connector[4)]		
					Required rated current	Booksize format — For additional versions and components, see chapter SINAMICS S120 drive system	Power connector	Cable cross-section[5)]	Pre-assembled basic cable to the drive system
	I_0	I_{rated}	I_{max}	$P_{el, max}$	I_{rated}/I_{max}				
	A	A	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FW6290-0.B07-5G..	56	52	110	47.7 (64.0)	60/113	6SL312■-1TE26-0AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6290-0.B07-0LB.	100	86	210	70.6 (94.7)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6290-0.B07-2PB.	120	100	270	85.4 (115)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6290-0.B11-7A..	62	59	130	58 (77.8)	85/141	6SL312■-1TE28-5AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6290-0.B11-0LB.	100	91	210	78.2 (105)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6290-0.B11-2PB.	120	110	270	93.2 (125)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6290-0.B15-7A..	64	61	130	65.2 (87.4)	85/141	6SL312■-1TE28-5AA3	1.5	4 × 16	6FX8002-5CS24-....
1FW6290-0.B15-0LB.	100	94	210	85.2 (114)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6290-0.B15-2PB.	120	110	270	101 (135)	200/282	6SL312■-1TE32-0AA3	–	–	–
1FW6290-0.B20-0LB.	100	95	210	91.9 (123)	132/210	6SL312■-1TE31-3AA3	–	–	–
1FW6290-0.B20-2PB.	120	120	270	107 (144)	200/282	6SL312■-1TE32-0AA3	–	–	–

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**

Length code ....

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

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■ Accessories

Description	Order No.
Cooling connection adapter for	
• Torque motors 1FW6160 to 1FW6230	**1FW6160-1BA00-0AA0**
• Torque motors 1FW6290	**1FW6290-1BA00-0AA0**

Description	Order No.
Power connector[4)]	
• Size 1 for 4 × 2.5 mm²	**6FX2003-0LA00**
• Size 1.5 for 4 × 4/4 × 10/4 × 16 mm²	**6FX2003-0LA10**
Signal connector[4)]	
• M17 (socket) for 6 × 0.5 + 1 × 1.0 mm²	**6FX2003-0SU07**
Signal cable, pre-assembled For built-in torque motors SIMOTICS T-1FW6	**6FX7002-2SL10-....**

[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 µm
  - 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

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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[1]

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.

[1] 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	
Cooling	Forced ventilation	Water cooling
• Cooling water pressure at inlet, max.	–	6 bar
		Cooling water flow volume / **Connecting thread at NDE**[1]
- 1PH808	–	6 l/min (1.59 US gallons/min.) / G 1/8"
- 1PH810	–	8 l/min (2.11 US gallons/min.) / G 1/4"
- 1PH813	–	12 l/min (3.17 US gallons/min.) / G 3/8"
- 1PH816	–	15 l/min (3.96 US gallons/min.) / G 1/2"
- 1PH818	–	15 l/min (3.96 US gallons/min.) / G 3/8"
- 1PH822	–	20 l/min (5.28 US gallons/min.) / G 3/8"
- 1PH828	–	35 l/min (9.25 US gallons/min.) / G 1/2"
Ambient temperature, permissible	-15 ... +40 °C (5 ... 104 °F)	
Coolant inlet temperature	–	≤ 30 °C (86 °F)
Temperature monitoring	KTY84 temperature sensor in stator winding	
• 1PH818/1PH822/1PH828	Additional KTY 84 as reserve	
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	For an ambient temperature of up to 40 °C (104°F) Temperature class 180 (H)	
Motor fan ratings		–
• 1PH808	230 V 1 AC 50/60 Hz, 265 V 1 AC 60 Hz	–
• 1PH810 to 1PH816	400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz	–
• 1PH818/1PH822	200 V ... 277 V 1 AC, 50/60 Hz (EC fan)	–
• 1PH828	400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz	–
Encoder system, built-in	Without DRIVE-CLiQ interface or with DRIVE-CLiQ interface	
Sound pressure level L_{pA} (1 m) in accordance with DIN EN ISO 1680 max. tolerance +3 dB		
• 1PH808 to 1PH813	70 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm	68 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm
• 1PH816	73 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm	69 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm
• 1PH818/1PH822	73 dB at a rated pulse frequency of 2 kHz and a speed range: Forced ventilation (IP55) • 1PH818 up to 5000 rpm • 1PH822 up to 3500 rpm	70 dB at a rated pulse frequency of 2 kHz or 4 kHz and speed ranges: • 1PH818 up to 5000 rpm • 1PH822 up to 4500 rpm
• 1PH828	74 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm Forced ventilation (IP55) • 1PH828 up to 3300 rpm	72 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm
Connection		
• 1PH808/1PH810/1PH813	Power connector or terminal box	
• 1PH816/1PH818/1PH822/1PH828	Terminal box	Terminal box
• Fan		
- 1PH808	Power connector	–
- 1PH810/1PH813	Power connector or terminal box	–
- 1PH816/1PH818/1PH822/1PH828	Terminal box	–
• Encoder system	Connector for signals (without mating connector) or DRIVE-CLiQ	

S/R = signals/revolution

[1] DE is the drive end with shaft. NDE is the non-drive end.

[2] Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

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■ **Technical data** (continued)

Product name	SIMOTICS M-1PH8 motor	
Vibration severity	In accordance with Siemens/EN 60034-14 (IEC 60034-14)	
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[2]	Tolerance R	
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)		
• 1PH808/1PH810/1PH813/1PH16	IP55	IP65
• 1PH818/1PH822/1PH828	IP55	IP55
Rating plate	1 unit attached to motor 1 unit supplied loose in terminal box	
Paint finish	Anthracite RAL 7016	
Approvals, according to	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.[1]			Operating speed during field weakening[1)5)]	Rated power	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-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.

[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] Bearing version for High Performance (14th data position M).
[5] n_2: max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

**SIMOTICS M-1PH8 asynchronous motors
SH 80 to SH 160 – Forced ventilation**

Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx. [6]	Rated current	Stall current	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[7]	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	Type	A	Order No.
1PH8083-1.F...	80.9	0.0064 (0.06)	32 (70.6)	7.5	8	gk803	9	6SL312■-■TE21-0AA3
1PH8083-1.G...	83.2			11.6	12	gk803	18	6SL312■-■TE21-8AA3
1PH8083-1.M...	86.9			13.6	17	gk803	18	6SL312■-■TE21-8AA3
1PH8083-1.N...	86.4			17	23	gk803	18	6SL312■-■TE21-8AA3
1PH8087-1.F...	81.7	0.0089 (0.08)	39 (86.0)	10	11	gk803	18	6SL312■-■TE21-8AA3
1PH8087-1.G...	85.3			14.1	15	gk803	18	6SL312■-■TE21-8AA3
1PH8087-1.M...	87.1			17.3	23	gk803	18	6SL312■-■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■-■TE21-8AA3
1PH8103-1.D...	81.4	0.0172 (0.15)	51 (112)	10	11	gk813	18	6SL312■-■TE21-8AA3
1PH8103-1.F...	85.2			13.5	14	gk813	18	6SL312■-■TE21-8AA3
1PH8103-1.G...	87.7			17.5	19	gk813	18	6SL312■-■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■-■TE21-8AA3
1PH8107-1.D...	83.4	0.0289 (0.26)	73 (161)	17.5	25	gk813	18	6SL312■-■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[8]	6SL312■-1 TE28-5AA3

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

[6] Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).

[7] Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz.

[8] 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.[1]			Operating speed during field weakening[1)5]	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_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Order No.
Shaft height 100 – Forced ventilation – Star delta circuit – Line voltage 400 V 3 AC, operation on Active Line Module								
2000/5000	9000	12000	18000	8950/10000	4.9/4.9 (6.57/6.57)	23/9 (17.0/6.64)	29/19 (21.4/14.0)	**1PH8101-1■S■■-■■■1**
	9000	12000	18000	7650/10000	10/9.3 (13.4/12.5)	48/18 (35.4/13.3)	55/36 (40.6/26.6)	**1PH8105-1■S■■-■■■1**
	9000	12000	18000	8550/10000	11/11 (14.8/14.8)	53/21 (39.1/15.5)	63/42 (46.5/31.0)	**1PH8107-1■S■■-■■■1**
Shaft height 132 – Forced ventilation – Star delta circuit – Line voltage 400 V 3 AC, operation on Active Line Module								
2000/5000	8000	10000	15000	8000/10000	14.6/14.6 (19.6/19.6)	70/28 (51.6/20.7)	94/55 (69.3/40.6)	**1PH8131-1■S■■-■■■1**
	8000	10000	15000	6500/10000	24.5/24.5 (32.9/32.9)	117/47 (86.3/34.7)	157/94 (116/69.3)	**1PH8135-1■S■■-■■■1**
	8000	10000	15000	3000/6000	29/27.5 (38.9/36.9)	138/53 (102/39.1)	185/105 (136/77.4)	**1PH8137-1■S■■-■■■1**

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.

Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx. [6]	Rated current	Stall current	Terminal box	SINAMICS S120 Motor Module	
	Y/Δ			Y/Δ	Y/Δ		Rated output current[7]	**Booksize format** For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	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■-■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**

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[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] Bearing version for high performance (14th data position M).
[5] n_2: max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.
[6] Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).
[7] 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.[1]		Operating speed during field weakening[1][4]	Rated power	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_2	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-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.

[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 $P = P_{rated}$.

Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx.	Rated current	Stall current	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[5]	For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm² (lb$_f$-in-s²)	kg (lb)	A	A	Type	A	Order No.
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[6]	**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[6]	**6SL312■-1 TE28-5AA3**
1PH8224-1.C...	92.5	1.48 (13.10)	610 (1345)	136	136	1XB7322	132[6]	**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[6]	**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[6]	**6SL332■-1 TE35-0AA3**

Format:	
Booksize	1
Chassis	3

Cooling:	
Internal air cooling	0
External air cooling	1

Motor Module:	
Single Motor Module	1

[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.

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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.[1]			Operating speed during field weakening[1][5]	Rated power	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-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.

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Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx. [6]	Rated current	Stall current	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[7]	Booksize format
								For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	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■-■TE21-0AA3**
1PH8083-1.G2...	83.3			12.0	13	gk803	18	**6SL312■-■TE21-8AA3**
1PH8083-1.N2...	87.7			18.0	23	gk803	18	**6SL312■-■TE21-8AA3**
1PH8087-1.F2...	81.4	0.0089 (0.08)	44 (97.0)	13.7	15	gk803	18	**6SL312■-■TE21-8AA3**
1PH8087-1.G2...	84.3			17.5	19	gk803	18	**6SL312■-■TE21-8AA3**
1PH8087-1.N2...	89.1			24.0	31	gk803	30	**6SL312■-1TE23-0AA3**
1PH8101-1.F2...	81.3	0.0138 (0.12)	51 (113)	12.8	13	gk823	18	**6SL312■-1TE21-8AA3**
1PH8101-1.G2...	85.7			16.8	18	gk803	18	**6SL312■-■TE21-8AA3**
1PH8103-1.F2...	82.7	0.0172 (0.15)	60 (132)	19.7	20	gk823	30	**6SL312■-1TE23-0AA3**
1PH8103-1.G2...	85.7			23.8	24	gk823	30	**6SL312■-1TE23-0AA3**
1PH8103-1.M2...	90.0			30	35	gk823	30	**6SL312■-1TE23-0AA3**
1PH8105-1.F2...	84.3	0.0252 (0.22)	74 (163)	28.5	29	gk823	30	**6SL312■-1TE23-0AA3**
1PH8105-1.G2...	87.9			34.5	38	gk823	45	**6SL312■-1TE24-5AA3**
1PH8105-1.M2...	90.0			45	52	gk823	45	**6SL312■-1TE24-5AA3**
1PH8107-1.F2...	82.9	0.0289 (0.26)	83 (183)	43.7	44	gk823	45	**6SL312■-1TE24-5AA3**
1PH8107-1.M2...	90.0			60	73	gk823	60	**6SL312■-1TE26-0AA3**
1PH8131-1.F2...	88.3	0.059 (0.52)	105 (232)	30	30	gk843	30	**6SL312■-1TE23-0AA3**
1PH8131-1.G2...	90.8			40	44	gk843	45	**6SL312■-1TE24-5AA3**
1PH8133-1.F2...	89.7	0.076 (0.67)	123 (271)	38	45	gk843	45	**6SL312■-1TE24-5AA3**
1PH8133-1.G2...	90.9			52	61	gk843	60	**6SL312■-1TE26-0AA3**
1PH8135-1.F2...	90.1	0.094 (0.83)	141 (311)	51	58	gk843	60	**6SL312■-1TE26-0AA3**
1PH8135-1.G2...	92.4			64	73	gk843	85	**6SL312■-1TE28-5AA3**
1PH8137-1.F2...	90.0	0.109 (0.96)	157 (346)	67	73	gk843	85	**6SL312■-1TE28-5AA3**
1PH8138-1.F2...	88.2	0.109 (0.96)	160 (353)	80	88	gk843	85	**6SL312■-1TE28-5AA3**
1PH8163-1.F2...	91.6	0.216 (1.91)	229 (505)	84	96	gk873	85	**6SL312■-1TE28-5AA3**
1PH8163-1.G2...	93.7	0.216 (1.91)	229 (505)	93	120	gk873	132	**6SL312■-1TE31-3AA3**
1PH8165-1.F2...	93.0	0.232 (2.05)	264 (582)	104	112	gk873	132	**6SL312■-1TE31-3AA3**
1PH8165-1.G2...	93.8	0.232 (2.05)	264 (582)	110	135	gk873	132	**6SL312■-1TE31-3AA3**
1PH8166-1.F2...	93.6	0.232 (2.05)	269 (593)	116	127	gk873	132	**6SL312■-1TE31-3AA3**
1PH8166-1.G2...	93.7	0.232 (2.05)	269 (593)	125	147	gk873	132	**6SL312■-1TE31-3AA3**

Cooling:	
Internal air cooling	0
External air cooling	1

Motor Module:	
Single Motor Module	1
Double Motor Module	2

[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] Bearing version for High-Performance (14th data position M).
[5] n_2: max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.
[6] Extra weight for version with hollow shaft approx. 2.5 kg (5.51 lb).
[7] Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz.

6

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.[1]		Operating speed during field weakening[1)4)]	Rated power	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_2	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Order No.
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.

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Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

**SIMOTICS M-1PH8 asynchronous motors
SH 180 to SH 280 – Water cooling**

Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx.	Rated current	Stall current	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[5]	For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	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■-1TE26-0AA3**
1PH8184-1.C2...	87.2			77	77	1XB7322-P05	85	**6SL312■-1TE28-5AA3**
1PH8184-1.D2...	90.4			114	114	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8184-1.F2...	92.8			150	150	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8184-1.L2...	94.5			196	196	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8186-1.B2...	84.5	0.652 (5.77)	410 (904)	68	68	1XB7322-P05	85	**6SL312■-1TE28-5AA3**
1PH8186-1.C2...	89.8			97	97	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8186-1.D2...	92.0			148	148	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8186-1.F2...	93.5			198	198	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8186-1.L2...	94.8			250	250	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8224-1.B2...	85.8	1.45 (12.83)	610 (1345)	100	100	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8224-1.C2...	91.4			128	128	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8224-1.D2...	93.7			188	188	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8224-1.F2...	95.1			240	240	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8224-1.L2...	96.1			310	310	1XB7700-P02	310	**6SL3320-1TE33-1AA3**
1PH8226-1.B2...	87.5	1.90 (16.82)	740 (1632)	130	130	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8226-1.C2...	92.8			184	184	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8226-1.D2...	93.8			235	235	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8226-1.F2...	95.7			295	295	1XB7700-P02	310	**6SL3320-1TE33-1AA3**
1PH8226-1.L2...	96.3			380	380	1XB7700-P02	380	**6SL3320-1TE33-8AA3**
1PH8228-1.B2...	88.6	2.35 (20.8)	870 (1918)	154	154	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8228-1.C2...	93.0			210	210	1XB7322-P05	210	**6SL3320-1TE32-1AA3**
1PH8228-1.D2...	94.3			280	280	1XB7700-P02	310	**6SL3320-1TE33-1AA3**
1PH8228-1.F2...	95.9			390	390	1XB7700-P02	380[6]	**6SL3320-1TE33-8AA3**
1PH8228-1.L2...	96.4			455	455	1XB7700-P02	490	**6SL3320-1TE35-0AA3**
1PH8284-1.B2...	91.4	4.21 (37.26)	1280 (2822)	170	170	1XB7322-P05	200	**6SL312■-1TE32-0AA3**
1PH8284-1.C2...	94.5			260	260	1XB7700-P02	260	**6SL3320-1TE32-6AA3**
1PH8284-1.D2...	95.7			350	350	1XB7700-P02	380	**6SL3320-1TE33-8AA3**
1PH8284-1.F2...	96.4			445	445	1XB7700-P02	490	**6SL3320-1TE35-0AA3**
1PH8286-1.B2...	91.6	5.16 (45.67)	1490 (3285)	210	210	1XB7322-P05	210	**6SL3320-1TE32-1AA3**
1PH8286-1.C2...	94.8			320	320	1XB7700-P02	380	**6SL3320-1TE33-8AA3**
1PH8286-1.D2...	96.0			460	460	1XB7700-P02	490	**6SL3320-1TE35-0AA3**
1PH8288-1.B2...	92.5	6.29 (55.67)	1750 (3859)	260	260	1XB7700-P02	260	**6SL3320-1TE32-6AA3**
1PH8288-1.C2...	95.2			400	400	1XB7700-P02	490	**6SL3320-1TE35-0AA3**

Format:		
Booksize		1
Chassis		3
Cooling:		
Internal air cooling		0
External air cooling		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 $P = P_{rated}$.
[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.

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Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

**SIMOTICS M-1PH8 asnychronous 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 without DRIVE-CLiQ interface

Without encoder	**A**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)[1]	**M**
Incremental encoder sin/cos 1 V_{pp} 512 S/R without C and D tracks (encoder IN512S/R)[2]	**T**
Incremental encoder sin/cos 1 V_{pp} 256 S/R without C and D tracks (encoder IN256S/R)[3]	**L**
Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)[1]	**E**

Encoder systems for motors with DRIVE-CLiQ interface[8]

Incremental encoder 22 bit (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)[1]	**D**
Incremental encoder, 20 bit (resolution 1048576, internal 512 S/R)[2] without commutation position (encoder IN20DQ)	**U**
Incremental encoder, 19 bit (resolution 524288, internal 256 S/R)[3] without commutation position (encoder IN19DQ)	**V**
Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)[1]	**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[3]	–	**3**

Bearing version	Vibration severity acc. to Siemens[4]/EN 60034-14	Shaft and flange accuracy	
Standard	R/A	R	**B**
Standard	S/A	R	**C**
Standard	SR/A	R	**D**
Performance[5][6]	SPECIAL/B	SPECIAL	**L**
High Performance[6][7]	SPECIAL/B	SPECIAL	**M**
Advanced Lifetime[9]	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[8][10]	Right	DE	**E**
Power connector top[8][10]	Left	DE	**F**
Power connector top[8][10]	NDE	Left	**G**
Power connector top[8][10]	DE	Right	**H**

Version status | **1**

Special version (order codes are required for options) | **Z**

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[1] Limited to n_{max} = 12000 rpm.

[2] Limited to n_{max} = 15000 rpm.

[3] Only possible with 14th data position L or M and 9th data position L or V.

[4] For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

[5] 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.

[6] With 1PH816 not possible with 12th data position 2 (IM B5 type of construction).

[7] 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.

[8] Not possible with 10th data position S (star delta circuit).

[9] 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.

[10] 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.

6

Main spindle motors
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 without DRIVE-CLiQ interface

Without encoder	A
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	M
Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)	E

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
Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)	F

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

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)	0
• IM V5	• IM V5	• IM V5[4]	1
• IM B5 with A450 flange (IM V3)[1]	• IM B5 with A550 flange (IM V3)[2]	• IM B5 with A660 flange (IM V3)[3][4]	2
• IM B35 with A450 flange (IM V35)	• IM B35 with A550 flange (IM V35)	• IM B35 with A660 flange (IM V35)	3
• IM V15 with A450 flange	• IM V15 with A550 flange	• IM V15 with A660 flange[4]	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[5]/EN 60034-14	Shaft and flange accuracy	
Standard	R/A	R	B
Increased radial forces	A	N	E
Increased radial forces	R/A	R	F
Also possible with 1PH818/1PH822:			
Standard	S/A	R	C
Standard	SR/A	R	D
Performance[6]	SR/A	R	L

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] 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).

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Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asnychronous 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 (<u>Only</u> 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
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	M
Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)	E

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
Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)	F

Rated speed (winding version)

Cooling	Degree of protection	
Forced ventilation	IP55	1

Type of construction

IM B3 (IM V6)		0
IM V5[1]		1
IM B35 with A660 flange (IM V35)		3
IM V15 with A660 flange[1]		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[2]/EN 60034-14	Shaft and flange accuracy	
Standard	R/A	R	B
Increased radial forces	A	N	E
Increased radial forces	R/A	R	F

Power connection (DE view)	Cable entry	Signal connection	External fan NDE Air inlet from NDE, air-flow direction NDE → DE			
Terminal box NDE right	Bottom	DE	Top		U	
			Left	(order code **G00** required)	U	– Z
Terminal box NDE left	Bottom	DE	Top		V	
			Right	(order code **G02** required)	V	– Z
Terminal box NDE top	Right	DE	Left	(order code **G00** required)	W	– Z
			Right	(order code **G02** required)	W	– Z
Terminal box DE top[3]	Right	NDE	Top[3][4]		X	
			Left[3]	(order code **G00** required)	X	Z
			Right[3]	(order code **G02** required)	X	– Z

Version status										1

Special version (order codes are required for options)																			Z

[1] Only possible with 14th data position B (Standard bearing).
[2] For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.
[3] Only possible with 12th data position 0 (IM B3 type of construction) and 1 (IM V5 type of construction).
[4] Only possible for assignment with terminal box 1XB7712-P...

■ Options

Order code	Description of option 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)
A12	Additional PTC thermistor chain for alarm and tripping (<u>Only</u> possible for version with terminal box)	✔	✔	✔
A25	Additional KTY84 temperature sensor as reserve connected to signal terminal strip (<u>Only</u> possible for version with terminal box)	✔	Standard	Standard
G00	External fan NDE left (Possible if 15th data position is U, W or X)	–	–	✔
G02	External fan NDE right (Possible if 15th data position is V, W or X)	–	–	✔
G14	With air filter (<u>Only</u> possible with 10th data position 1)	✔ Only for SH 132 to SH 160	✔	✔
K08	Encoder connector mounted opposite (<u>Not</u> possible if 15th data position is X)	–	✔	✔
K09	Terminal box or power connector NDE <u>on the right</u>	✔ Only for SH 100[1] to SH 160	–	–
	Terminal box NDE right, cable entry DE, signal connection <u>top</u> (Possible if 15th data position is A)	–	✔	–
K10	Terminal box or power connector NDE <u>on the left</u>	✔ Only for SH 100[1] to SH 160	–	–
	Terminal box NDE left, cable entry DE, signal connection <u>top</u> (Possible if 15th data position is A)	–	✔	–
K16	Second shaft extension (SH 280 *d* x *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)	–	–	✔
K18	Radial shaft sealing ring DE[2]	✔	✔	–
K40	Regreasing system, DE and NDE	–	✔ Only for SH 180 and SH 225	Standard
K45	Anti-condensation heating 230 V AC	–	–	✔
K69	Pipe connection with pipe socket NDE <u>right</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)	–	–	✔
K70	Pipe connection with pipe socket NDE <u>left</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)	–	–	✔
K71	Pipe connection with pipe socket NDE <u>top</u> (Only possible with forced ventilation, <u>not</u> for G00 or G02)	–	–	✔
K80	Axial pipe connection NDE (Only possible with forced ventilation)	✔	✔ Only for SH 180 and SH 225	Options K69, K70, K71

✔	Option possible
–	Options not possible

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[1] Not possible with 12th data position 2 (IM B5 type of construction)
[2] 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 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)
K83	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)	–	✔ 4)	✔
K84	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)	–	✔ 4)	✔
K85	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)	–	✔	✔
K90	Version with flange size A400 (Possible if 12th data position is 2, 3 or 5)	–	✔ Only for SH 180	–
L00	Replace terminal box (standard) with the next largest terminal box (Note dimension implications in CAD CREATOR.).	–	✔	✔
L27	NDE bearing in insulated version	–	✔ Only for SH 180	Standard
L74	Fan version with IP65 degree of protection[3]	✔	–	–
M83	Additional back-off thread on motor feet (Only possible if 12th data position is 0 or 3)	–	–	✔
P00	Undrilled cable entry plate	–	✔	✔ Not for 1XB7820-P00
P01	Cable entry plate 3 x M63 x 1.5	–	✔ Only for 1XB7700-P02 1XB7712-P03	✔ Only for 1XB7712-P03
P02	Cable entry plate 3 x M75 x 1.5	–	✔ Only for 1XB7712-P03	✔ Only for 1XB7712-P01 1XB7712-P03
P03	Cable entry plate 4 x M75 x 1.5	–	–	✔ Only for 1XB7712-P01
P04	Cable entry plate 4 x M63 x 1.5	–	✔ Only for 1XB7712-P03	✔ Only for 1XB7712-P01 1XB7712-P03
V90	1PH7-compatible shaft extension (*d* x *l*: 42 mm (1.65 in) x 110 mm (4.33 in) (Note reduced radial forces!)	✔ Only for SH 132	–	–
V92	1PH7184-/1PL6184-compatible shaft extension (*d* x *l*: 60 mm (2.36 in) x 140 mm (5.51 in))	–	✔ Only for 1PH8184	–
	Paint finish (anthracite RAL 7016)	Standard	Standard	Standard
X01	Paint finish in RAL 9005 (jet black)	✔	✔	✔
X02	Paint finish in RAL 9001 (cream white)	✔	✔	✔
X03	Paint finish in RAL 6011 (reseda green)	✔	✔	✔
X04	Paint finish in RAL 7032 (pebble gray)	✔	✔	✔
X05	Paint finish in RAL 5015 (sky blue)	✔	✔	✔
X06	Paint finish in RAL 1015 (light ivory)	✔	✔	✔
X08	Paint finish in RAL 9006 (white aluminum)	✔	✔	✔
K24	Primer	✔ Pale green	✔ Red brown	✔ Red brown
K23	Special paint finish worldwide (anthracite RAL 7016)	✔	✔	✔
K23 + X..	Special finish worldwide in another color (X01 to X08)	✔	✔	✔
Y64	Hollow shaft prepared for bearingless rotary unions with flange diameter 114 H6	✔	–	–
Y84	Customer specifications on rating plate (max. 30 characters)	✔	✔	✔

✔   Option possible
–   Options not possible

[3] Regardless of the degree of protection, at high levels of atmospheric pollution, the fan must be cleaned.
[4] Not possible for 1PH822 and terminal box 1XB7712-P03

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SIMOTICS M-1PH8 asynchronous motors – Terminal box
assignment, max. connectable cross-sections

■ **More information**

Terminal box type (See selection and ordering data for assignment)	Cable entry Power	External signals	Max. outer cable diameter [3] mm (in)	Number of main terminals		Max. cross-section per terminal mm²	Max. rated current[4] A
gk803	1 × M25 × 1.5	1 × M16 × 1.5[1]	20 (0.79)	Phases: Grounding:	3 × M5 2 × M5	1 × 10	52
gk813	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: Grounding:	3 × M5 2 × M5	1 × 16	70
gk823	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: Grounding:	3 × M5 2 × M5	1 × 16	70
gk826	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: Grounding:	6 × M5 2 × M5	1 × 10	52
gk833	1 × M40 × 1.5	1 × M16 × 1.5[1]	32 (1.26)	Phases: Grounding:	3 × M6 2 × M6	1 × 35	110
gk843	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases: Grounding:	3 × M6 2 × M6	1 × 50	133
gk846	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases: Grounding:	6 × M6 2 × M6	1 × 25	88
gk863	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases: Grounding:	3 × M6 2 × M6	1 × 50	133
gk873	1 × M63 × 1.5	1 × M16 × 1.5[1]	42.6 (1.68)	Phases: Grounding:	3 × M6 2 × M6	1 × 50	133
1XB7322-P05	2 × M50 × 1.5	1 × M16 × 1.5[2]	38 (1.50)	Phases: Grounding:	3 × M12 4 × M6	2 × 50	210
1XB7422-P06	2 × M63 × 1.5	1 × M16 × 1.5[2]	53 (2.09)	Phases: Grounding:	3 × M12 4 × M8	2 × 70	270
1XB7700-P02	3 × M75 × 1.5	1 × M16 × 1.5[2]	68 (2.68)	Phases: Grounding:	3 × 2 × M12 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 x M63 x 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.

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[1] Thread M16 × 1.5 arranged with 90° to signal connection; thread only for options A12, A25 and 9th data position A (without encoder).

[2] 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).

[3] Dependent on the design of the metric cable gland.

[4] 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.

■ 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

■ Characteristic curves

Typical speed/power graph for synchronous motors SIMOTICS M-1PH8[1]

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.

[1] For further configuration information, see the 1PH8 Motors Configuration Manual.

■ **Technical specifications**

Product name	SIMOTICS M-1PH8 motor	
Cooling	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[1]		
- 1PH813	–	G 3/8"
- 1PH816	–	G 1/2"
- 1PH818/1PH822	–	G 3/8"
Permissible ambient temperature	-15 ... +40 °C (5 ... 104 °F)[2]	
Coolant inlet temperature	–	< 30 °C (86 °F)
Temperature monitoring	KTY84 temperature sensor in stator winding	
• 1PH818/1PH822	–	Additional KTY 84 as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	For an ambient temperature of up to +40 °C (104 °F) Temperature class 180 (H)[3]	
Motor fan ratings		
• 1PH813/1PH816	400 V 3 AC ± 10 %, 50/60 Hz 480 V 3 AC ± 10 %, 60 Hz	
• 1PH818/1PH822	EC fan: 200 ... 277 1 V AC ± 10 %, 50/60 Hz	
Encoder systems, built-in	Without DRIVE-CLiQ interface or with DRIVE-CLiQ interface	
Sound pressure level L_{pA} (1 m) in accordance with DIN EN ISO 1680 Tolerance + 3 dB		
• 1PH813	70 dB[4]	68 dB[4]
• 1PH816	73 dB[4]	69 dB[4]
• 1PH818/1PH822	73 dB[5]	70 dB[6]
Connection		
• 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	
Vibration severity	In accordance with Siemens/EN 60034-14 (IEC 60034-14)	
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[7]	Tolerance R	
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)		
• 1PH813/1PH816	IP55	IP65
• 1PH818/1PH822	IP55	IP55
Rating plate	1 unit attached to motor 1 unit supplied loose in terminal box	
Paint finish	Anthracite RAL 7016	
Approvals, according to	cURus	

[1] DE is the drive end with shaft. NDE is the non-drive end.

[2] 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.

[3] The following motors are designed to conform to temperature class 155 (F): 1PH8138-2.F2/1PH8138-2.G2 1PH8164/1PH8166/1PH8168

[4] For rated pulse frequency of 4 kHz and speed range up to 5000 rpm.

[5] For rated pulse frequency of 4 kHz or 2 kHz and speed range up to 5000 rpm (1PH818) or 3500 rpm (1PH822).

[6] For rated pulse frequency of 4 kHz or 2 kHz and speed range up to 5000 rpm (1PH818) or 4500 rpm (1PH822).

[7] 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. [1]	Operating speed, max. [2]	Rated power [3]	Rated torque [3]	Static torque	Synchronous motors SIMOTICS M-1PH8
n_{rated}	n_{max}	$n_{max, Inv}$	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Order No.
Shaft height 132 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module						
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**
Shaft height 132 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module						
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.

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Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx.	Rated current[3]	Stall current	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[3][4]	For additional versions and components, see chapter SINAMICS S120 drive system
η		J	m	I_{rated}	I_0		I_{rated}	
%		kgm² (lb$_f$-in-s²)	kg (lb)	A	A	Type	A	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[5]	gk833	85	**6SL312■-1TE28-5AA3**
1PH8137-2.M...	95.3	0.0885 (0.78)	136 (300)	104	115[5]	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[5]	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[5]	gk843	85	**6SL312■-1TE28-5AA3**
1PH8138-2.F2...	95.8	0.0885 (0.78)	156 (344)	118	120[5]	gk843	132	**6SL312■-1TE31-3AA3**
1PH8138-2.G2...	96.0	0.0885 (0.78)	156 (344)	131	133[5]	gk843	132	**6SL312■-1TE31-3AA3**

Format:
Booksize **1**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**

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[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.[1]	Operating speed, max.[2]	Rated power[3]	Rated torque[3]	Static torque	Synchronous motors SIMOTICS M-1PH8
n_{rated}	n_{max}	$n_{max, Inv}$	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	kW (HP)	Nm (lbf-ft)	Nm (lbf-ft)	Order No.
Shaft height 160 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module						
1500	4000	2600	61 (81.8)	390 (288)	440 (325)	**1PH8165-2■F■■-■■■1**
2500	4000	3900	84 (112.6)	320 (236)	440 (325)	**1PH8165-2■L■■-■■■1**
1500	4000	2600	69 (92.5)	435 (321)	500 (369)	**1PH8167-2■F■■-■■■1**
2500	4000	4000	95 (127.4)	360 (266)	500 (369)	**1PH8167-2■L■■-■■■1**
Shaft height 160 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module						
1500	4000	2400	59 (79.1)	375 (277)	440 (325)	**1PH8164-2■F 2■-■■■1**
2500	4000	4000	88 (118)	335 (247)	440 (325)	**1PH8164-2■L 2■-■■■1**
1500	4000	2600	74 (99.2)	475 (350)	550 (406)	**1PH8166-2■F 2■-■■■1**
2500	4000	3900	102 (136.8)	390 (288)	550 (406)	**1PH8166-2■L 2■-■■■1**
1500	4000	2600	84 (112.6)	530 (391)	620 (457)	**1PH8168-2■F 2■-■■■1**
2500	4000	4000	119 (159.6)	455 (336)	520 (384)	**1PH8168-2■L 2■-■■■1**

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 (repeated)	Effi-ciency	Moment of inertia	Weight, approx.	Rated current	Stall current[3]	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[3)4]	For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm² (lbf-in-s²)	kg (lb)	A	A	Type	A	Order No.
1PH8165-2.F...	94	0.216 (1.91)	218 (481)	119	126	gk874	132	**6SL312■-1TE31-3AA3**
1PH8165-2.L...	95.5	0.216 (1.91)	218 (481)	148	188	gk874	200	**6SL312■-1TE32-0AA4**
1PH8167-2.F...	94	0.244 (2.16)	240 (529)	133	143	gk874	132[5]	**6SL312■-1TE31-3AA3**
1PH8167-2.L...	95.5	0.244 (2.16)	240 (529)	177	230	gk874	200[5]	**6SL312■-1TE32-0AA4**
1PH8164-2.F2...	94	0.175 (1.55)	224 (494)	111	118	gk874	132	**6SL312■-1TE31-3AA3**
1PH8164-2.L2...	95.5	0.175 (1.55)	224 (494)	165	205	gk874	200[5]	**6SL312■-1TE32-0AA4**
1PH8166-2.F2...	94	0.216 (1.91)	257 (567)	148	159	gk874	200	**6SL312■-1TE32-0AA4**
1PH8166-2.L2...	95.5	0.216 (1.91)	257 (567)	188	240	gk874	200[5]	**6SL312■-1TE32-0AA4**
1PH8168-2.F2...	94	0.244 (2.16)	279 (615)	169	179	gk874	200	**6SL312■-1TE32-0AA4**
1PH8168-2.L2...	95.5	0.244 (2.16)	279 (615)	225	240	gk874	260[5]	**6SL332 0-1TE32-6AA3**

Format:
Booksize   **1**
Chassis   **3**

Cooling:
Internal air cooling   **0**
External air cooling   **1**

Motor Module:
Single Motor Module   **1**

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[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.[1]	Operating speed, max.[2]	Rated power[3]	Rated torque[3]	Static torque	Synchronous motors SIMOTICS M-1PH8
n_{rated}	n_{max}	$n_{max, Inv}$	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	Order No.
Shaft height 180 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module						
700	3800	1450	33 (44.3)	450 (332)	480 (354)	**1PH8184-2■C■■-■■■1**
1000	3800	1950	46 (61.7)	439 (324)	480 (354)	**1PH8184-2■D■■-■■■1**
1500	3800	2700	70 (93.9)	446 (329)	480 (354)	**1PH8184-2■F■■-■■■1**
700	3800	1450	44 (59)	600 (443)	640 (472)	**1PH8186-2■C■■-■■■1**
1000	3800	2050	62 (83.1)	592 (437)	640 (472)	**1PH8186-2■D■■-■■■1**
1500	3800	2950	93 (125)	592 (437)	640 (472)	**1PH8186-2■F■■-■■■1**
Shaft height 225 – Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module						
700	3500	1450	48 (64.4)	655 (483)	708 (522)	**1PH8224-2■C■■-■■■1**
1000	3500	2050	68 (91.2)	649 (479)	708 (522)	**1PH8224-2■D■■-■■■1**
1500	3500	2900	101 (135)	643 (474)	708 (522)	**1PH8224-2■F■■-■■■1**
700	3500	1550	64 (85.8)	873 (644)	944 (696)	**1PH8226-2■C■■-■■■1**
1000	3500	1950	91 (122)	869 (641)	944 (696)	**1PH8226-2■D■■-■■■1**
1500	3500	2700	134 (180)	853 (629)	944 (696)	**1PH8226-2■F■■-■■■1**
700	3500	1450	80 (107)	1091 (805)	1180 (870)	**1PH8228-2■C■■-■■■1**
1000	3500	1950	113 (152)	1079 (796)	1180 (870)	**1PH8228-2■D■■-■■■1**
1500	3500	2900	168 (225)	1070 (789)	1180 (870)	**1PH8228-2■F■■-■■■1**

For versions, see Order No. supplement and options.

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Motor type (repeated)	Effi-ciency	Moment of inertia	Weight, approx.	Rated current	Stall current[3]	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[3][4]	For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	Type	A	Order No.
1PH8184-2.C...	93.2	0.46 (4.07)	330 (728)	80	84	1XB7322-P05	85	**6SL312■-1TE28-5AA3**
1PH8184-2.D...	93.7	0.46 (4.07)	330 (728)	106	115	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8184-2.F...	95.1	0.46 (4.07)	330 (728)	148	157	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8186-2.C...	92.4	0.60 (5.31)	400 (882)	108	115	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8186-2.D...	94.3	0.60 (5.31)	400 (882)	148	157	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8186-2.F...	95.2	0.60 (5.31)	405 (893)	215	229	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8224-2.C...	96.1	1.28 (11.3)	580 (1279)	120	128	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8224-2.D...	96.4	1.28 (11.3)	580 (1279)	170	183	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8224-2.F...	96.5	1.28 (11.3)	580 (1279)	235	256	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8226-2.C...	96.3	1.66 (14.7)	700 (1544)	170	183	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8226-2.D...	96.7	1.66 (14.7)	700 (1544)	215	233	1XB7422-P06	260	**6SL3320-1TE32-6AA3**
1PH8226-2.F...	96.7	1.66 (14.7)	700 (1544)	295	320	1XB7700-P02	310[5]	**6SL3320-1TE33-1AA3**
1PH8228-2.C...	96.5	2.02 (17.9)	810 (1786)	200	213	1XB7322-P05	200[5]	**6SL312■-1TE32-0AA4**
1PH8228-2.D...	96.8	2.02 (17.9)	810 (1786)	265	284	1XB7422-P06	310	**6SL3320-1TE33-1AA3**
1PH8228-2.F...	96.7	2.02 (17.9)	810 (1786)	395	427	1XB7700-P02	490	**6SL3320-1TE35-0AA3**

Format:	
Booksize	**1**
Chassis	**3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**

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[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 synchrounous motors
SH 180/SH 225 – Water cooling

◼ Selection and ordering data

Rated speed	Speed, max.[1]	Operating speed, max.[2]	Rated power[3]	Rated torque[3]	Static torque	Synchronous motors SIMOTICS M-1PH8
n_{rated}	n_{max}	$n_{max, Inv}$	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	Order No.
Shaft height 180 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module						
700	3800	1450	42 (56.3)	573 (423)	590 (435)	**1PH8184-2■C2■-■■■1**
1000	3800	1950	61 (81.8)	583 (430)	600 (443)	**1PH8184-2■D2■-■■■1**
1500	3800	2700	90 (121)	573 (423)	600 (443)	**1PH8184-2■F2■-■■■1**
2500	3800	3800	127 (170)	485 (358)	530 (391)	**1PH8184-2■L2■-■■■1**
700	3800	1450	58 (77.8)	791 (583)	800 (590)	**1PH8186-2■C2■-■■■1**
1000	3800	2050	80 (107)	764 (564)	800 (590)	**1PH8186-2■D2■-■■■1**
1500	3800	2950	119 (160)	758 (559)	800 (590)	**1PH8186-2■F2■-■■■1**
2500	3800	3800	168 (225)	642 (474)	720 (531)	**1PH8186-2■L2■-■■■1**
Shaft height 225 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module						
700	3500	1450	72 (96.6)	982 (724)	1007 (743)	**1PH8224-2■C2■-■■■1**
1000	3500	2050	101 (135)	964 (711)	1007 (743)	**1PH8224-2■D2■-■■■1**
1500	3500	2900	151 (203)	961 (709)	1007 (743)	**1PH8224-2■F2■-■■■1**
2500	3500	3500	182 (244)	695 (513)	885 (631)	**1PH8224-2■L2■-■■■1**
700	3500	1550	95 (127)	1296 (956)	1330 (981)	**1PH8226-2■C2■-■■■1**
1000	3500	1950	135 (181)	1289 (951)	1330 (981)	**1PH8226-2■D2■-■■■1**
1500	3500	2700	201 (270)	1280 (944)	1330 (981)	**1PH8226-2■F2■-■■■1**
2500	3500	3500	228 (306)	871 (642)	1170 (863)	**1PH8226-2■L2■-■■■1**
700	3500	1450	121 (162)	1651 (1218)	1680 (1239)	**1PH8228-2■C2■-■■■1**
1000	3500	1950	169 (227)	1614 (1190)	1680 (1239)	**1PH8228-2■D2■-■■■1**

For versions, see Order No. supplement and options.

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Motor type (repeated)	Effi-ciency	Moment of inertia	Weight, approx.	Rated current[3]	Stall current[3]	Terminal box	SINAMICS S120 Motor Module	
							Rated output current[3][4]	For additional versions and components, see chapter SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0		I_{rated}	
	%	kgm² (lbf-in-s²)	kg (lb)	A	A	Type	A	Order No.
1PH8184-2.C2...	91.9	0.457 (4.04)	330 (728)	100	103	1XB7322-P05	132	**6SL312■-1TE31-3AA3**
1PH8184-2.D2...	93.7	0.457 (4.04)	330 (728)	140	143	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8184-2.F2...	95.1	0.457 (4.04)	330 (728)	190	196	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8184-2.L2...	95.7	0.457 (4.04)	330 (728)	260	278	1XB7700-P02	260[5]	**6SL332 0-1TE32-6AA0**
1PH8186-2.C2...	92.4	0.599 (5.30)	400 (882)	142	143	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8186-2.D2...	94.3	0.599 (5.30)	400 (882)	190	196	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8186-2.F2...	95.2	0.599 (5.30)	400 (882)	275	285	1XB7700-P02	310	**6SL332 0-1TE33-1AA0**
1PH8186-2.L2...	95.7	0.599 (5.30)	400 (882)	370	405	1XB7700-P02	380[5]	**6SL332 0-1TE33-8AA0**
1PH8224-2.C2...	94.7	1.28 (11.3)	580 (1279)	180	183	1XB7322-P05	200	**6SL312■-1TE32-0AA4**
1PH8224-2.D2...	95.6	1.28 (11.3)	580 (1279)	255	262	1XB7700-P02	260[5]	**6SL332 0-1TE32-6AA0**
1PH8224-2.F2...	96.2	1.28 (11.3)	580 (1279)	355	367	1XB7700-P02	380	**6SL332 0-1TE33-8AA0**
1PH8224-2.L2...	96.1	1.28 (11.3)	580 (1279)	365	460	1XB7700-P02	380[5]	**6SL332 0-1TE33-8AA0**
1PH8226-2.C2...	95.2	1.66 (14.7)	700 (1544)	255	260	1XB7700-P02	260	**6SL332 0-1TE32-6AA0**
1PH8226-2.D2...	96.0	1.66 (14.7)	700 (1544)	325	330	1XB7700-P02	380	**6SL332 0-1TE33-8AA0**
1PH8226-2.F2...	96.5	1.66 (14.7)	700 (1544)	445	454	1XB7700-P02	490	**6SL332 0-1TE35-0AA0**
1PH8226-2.L2...	96.2	1.66 (14.7)	700 (1544)	400	532	1XB7700-P02	490	**6SL332 0-1TE35-0AA0**
1PH8228-2.C2...	95.5	2.02 (17.9)	810 (1786)	305	306	1XB7700-P02	310	**6SL332 0-1TE33-1AA0**
1PH8228-2.D2...	96.2	2.02 (17.9)	810 (1786)	395	408	1XB7700-P02	490	**6SL332 0-1TE35-0AA0**

Format:	
Booksize	**1**
Chassis	**3**

Cooling:	
Internal air cooling	**0**
External air cooling	**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 (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

Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)		**M**
Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)		**E**

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**
Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)		**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)	**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[1]/EN 60034-14**	**Shaft and flange accuracy**	
Standard	R/A	R	**B**
Standard	S/A	R	**C**
Advanced Lifetime[2]	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[3]	Right	DE	**E**
Power connector top[3]	Left	DE	**F**
Power connector top[3]	NDE	Left	**G**
Power connector top[3]	DE	Left	**H**

Version status	
	1

Special version (order codes are required for options)	
	Z

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[1] For definition of the vibration severity according to Siemens, see 1PH8 Motors Configuration Manual.

[2] For 1PH813 limited to n_{max} = 4500 rpm.
   For 1PH816 limited to n_{max} = 4000 rpm.

[3] 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-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	
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
Absolute encoder 2048 S/R, 4096 revolutions multi-turn, with EnDat interface (AM2048S/R encoder)	**E**

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**
Absolute encoder 22 bit + 12 bit multi-turn (encoder AM22DQ)	**F**

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)[1][2]	**2**
IM B35 (IM V35)[2]	**3**
IM V15 (Not possible for belt coupling)[2]	**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[3]/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**

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[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 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	
		1PH813 1PH816	1PH818 1PH822
A12	Additional PTC thermistor chain for alarm and tripping (Only possible for versions with terminal box)	✔	✔
A25	Additional KTY84 temperature sensor as reserve connected to signal terminal strip (Only possible for versions with terminal box).	✔	Standard
G14	Fan unit with air filter (Only possible if 10th data position 1)	✔	✔
K08	Encoder connector mounted opposite	–	✔
K09	Terminal box or power connector NDE right (For terminal box type, see selection guides or CAD CREATOR)	✔ 1)	–
	Terminal box NDE right, cable infeed DE/signal connection top (Only possible if 15th data position A)	–	✔
K10	Terminal box or power connector NDE left (For terminal box type, see selection guides or CAD CREATOR)	✔ 1)	–
	Terminal box NDE left, cable infeed DE/signal connection top (Only possible if 15th data position A)	–	✔
K18	Radial shaft seal ring DE2) (Not possible if 14th data position F)	✔	✔
K40	Regreasing system, DE and NDE	–	✔
K83	Rotation of the terminal box by + 90° (Only possible in combination with options K09 or K10)	–	✔
K84	Rotation of the terminal box by – 90° (Only possible in combination with options K09 or K10)	–	✔
K85	Rotation of the terminal box by + 180° (Only possible in combination with options K09 or K10)	–	✔
K90	Version with flange size A400 (Possible only if 12th data position is 2, 3 or 5)	–	✔ With 1PH818 only
L00	Replace terminal box (standard) with the next largest terminal box (note dimension implications, see CAD CREATOR.)	–	✔
P00	Undrilled cable entry plate	–	✔
P01	Cable entry plate 3 × M63 × 1.5 (Only with terminal box type 1XB7700-P02)	–	✔
L27	NDE bearing in insulated version	–	✔ With 1PH818 only Standard for 1PH822
L74	Fan version with IP65 degree of protection3)	✔	–
V91	1FT6-compatible shaft extension ($d \times l$: 48 mm (1.89 in) × 82 mm (3.23 in)) (Only possible for 1PH813)	✔	–
Y84	Customer specifications on rating plate (max. 30 characters)	✔	✔
–	**Paint finish** (anthracite RAL 7016)	Standard	Standard
X01	Normal paint finish: Jet black RAL 9005	✔	✔
X02	Normal paint finish: Cream white RAL 9001	✔	✔
X03	Normal paint finish: Reseda green RAL 6011	✔	✔
X04	Normal paint finish: Pebble gray RAL 7032	✔	✔
X05	Normal paint finish: Sky blue RAL 5015	✔	✔
X06	Normal paint finish: Light ivory RAL 1015	✔	✔
X08	Normal paint finish: White aluminum RAL 9006	✔	✔
K24	Primer	✔ Pale green	✔ Red brown
K23	Special paint finish "Worldwide" Primer and paint finish in anthracite RAL 7016	✔	✔
K23+X..	Special paint finish "Worldwide" Primer and paint finish can be selected from X01 to X08	✔	✔

1) 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.

2) Only appropriate if oil spray or oil vapor is occasionally deposited on the sealing ring.

3) Regardless of the degree of protection, at high levels of atmospheric pollution, the fan must be cleaned.

SIMOTICS M-1PH8 synchronous motors – Terminal box assignment, max. connectable cross-sections

■ More information

Terminal box type (See selection and ordering data for assignment)	Cable entry Power	External signals	Max. outer cable diameter [3] mm (in)	Number of main terminals		Max. cross-section per terminal mm²	Max. rated current[4] A
gk833	1 × M40 × 1.5	1 × M16 × 1.5[1]	32 (1.26)	Phases:	3 × M6	1 × 35	110
				Grounding:	2 × M6		
gk843	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases:	3 × M6	1 × 50	133
				Grounding:	2 × M6		
gk874	1 × M63 × 1.5	1 × M16 × 1.5[1]	42.6 (1.68)	Phases:	3 × M10	2 × 70	240
				Grounding:	2 × M6		
1XB7322-P05	2 × M50 × 1.5	1 × M16 × 1.5[2]	38 (1.50)	Phases:	3 × M12	2 × 50	210
				Grounding:	2 × Fixing eyelet		
1XB7422-P06	2 × M63 × 1.5	1 × M16 × 1.5[2]	53 (2.09)	Phases:	3 × M12	2 × 70	270
				Grounding:	2 × Fixing eyelet		
1XB7700-P02	3 × M75 × 1.5	1 × M16 × 1.5[2]	68 (2.68)	Phases:	3 × 2 × M12	3 × 150	700
				Grounding:	2 × Fixing eyelet		

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.

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[1] Thread M16 × 1.5 arranged with 90° to signal connection. Thread only for option A12, A25 and 9th data position A (without encoder).
[2] 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).
[3] Dependent on the design of the metric cable gland.
[4] 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.

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Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

■ **Design** (continued)

Hollow shaft — Rotor — Rotor sleeve — Air gap — Annular jacket cooling channel — stator

G_NC01_EN_00148b

■ **Technical specifications**

Product name	SIMOTICS M-1FE1 built-in motors
Type of machine	Synchronous spindle with permanent-field rotor
Constant power range	1:2 (6-/8-pole)/1:4 (4-pole)
Recommended coolant inlet temperature, approx.	25 °C (77 °F)
Standard protection – temperature monitoring	2 KTY thermistors in the stator winding, 1 x spare
Full protection optional Application example: Processing at motor standstill	In addition to standard protection 3 × PTC thermistor triplet Evaluation possibility e.g. using thermal motor protection: Order No.: 3RN1013-1GW10
Universal protection optional	Full protection + NTC PT3-51F + NTC K227
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature of 25 °C (77 °F)
Type of construction (cf. ISO)	Individual components: Stator, rotor, motor encoder
Degree of protection in accordance with IEC 60034-5	IP00
Balance quality of rotor in accordance with ISO 1940-1	

• Rotor with sleeve	Version specific
	 - Pre-balanced,
	  balance quality G 2.5
	  Reference speed 3600 rpm
	 - Non-balanced for full balan-
	  cing after assembly

• Rotor without sleeve	Non-balanced
Encoder system (not included in scope of supply)	Hollow-shaft measuring system sinusoidal voltage signals 1 V_{pp} and with zero mark
Motor connection	Free cable ends with length l = 0.5/1.5 m (1.64 ft/4.92 ft)
Rating plate	2 units enclosed separately

■ **Characteristic curves**

Comparison of synchronous/asynchronous spindle

- ■ Motor spindle as induction motor
- ■ Permanently excited motor spindle (PE spindle) as synchronous motor

G_NC01_EN_00020a

Advantages of SIMOTICS M-1FE1 synchronous spindle over asynchronous spindle

G_NC01_EN_00021a

Comparison of power/speed characteristics

G_NC01_EN_00022a

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**

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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 for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	SIMOTICS M-1FE1 built-in motors Standard type	Moment of inertia of rotor without sleeve[8]	Weight, approx. stator + rotor without sleeve
P_{rated}		M_{rated}		n_{rated}	n_{max}		J	m
S1	S6-40 %	S1	S6-40 %					
kW (HP)	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FE1 High-Torque series, 6-pole – Water cooling								
7.4 (9.9)	10 (13.4)	4.5 (39.8)	6 (53.1)	15800	18000	**1FE1041-6WM** ■ 0- 1 B A ■	0.00019 (0.0017)	2.8 (6.2)
14.4 (19.3)	18 (24.1)	11 (97)	14 (124)	12500	18000	**1FE1042-6WN** ■ 0- 1 B A ■	0.00033 (0.0029)	6.5 (14.3)
11.5 (15.4)	14.7 (19.7)	11 (97)	14 (124)	10000	15000	**1FE1042-6WR** ■ 0- 1 B A ■	0.00033 (0.0029)	6.5 (14.3)
8.3 (11.1)	10.4 (13.9)	10 (89)	12.4 (110)	8000	15000	**1FE1051-6WK** ■ 0- 1 B ■ ■	0.00106 (0.0094)	5.5 (12.1)
6.3 (8.5)	7.9 (10.6)	10 (89)	12.5 (111)	6000	12000	**1FE1051-6WN** ■ 0- 1 B ■ ■	0.00106 (0.0094)	5.5 (12.1)
14 (18.8)	18 (24.1)	18 (159)	23 (204)	7500	15000	**1FE1052-6WK** ■ 0- 1 B ■ ■	0.00195 (0.0173)	8.2 (18.1)
11.5 (15.4)	14.5 (19.4)	20 (187)	25.4 (225)	5500	12000	**1FE1052-6WN** ■ 0- 1 B ■ ■	0.00195 (0.0173)	8.2 (18.1)
23 (30.8)	28.9 (38.8)	37 (328)	46 (407)	6000	12000	**1FE1054-6WN** ■ 0- 1 B A ■	0.0038 (0.0336)	14.3 (31.5)
11.6 (15.6)	15 (20.1)	13 (115)	17 (151)	8500	12000	**1FE1061-6WH** ■ 0- 1 B ■ ■	0.00141 (0.0125)	5.5 (12.1)
4 (5.4)	5.3 (7.1)	13 (115)	17 (151)	3000	5000	**1FE1061-6WY** ■ 0- 1 B ■ ■	0.00141 (0.0125)	5.5 (12.1)
25 (33.5)	36.5 (48.9)	56 (496)	81 (717)	4300	12000	**1FE1064-6WN** ■ 1- 1 B A ■	0.00553 (0.0489)	14.5 (32)
20 (26.8)	29 (38.9)	56 (496)	81 (717)	3400	10000	**1FE1064-6WQ** ■ 1- 1 B A ■	0.00553 (0.0489)	14.5 (32)
34 (45.6)	42 (56.3)	65 (575)	81 (717)	5000	8500	**1FE1082-6WP** ■ 0- 1 B ■ ■	0.01048 (0.0927)	14 (30.9)
29.3 (39.3)	36.5 (48.9)	65 (575)	81 (717)	4300	9000	**1FE1082-6WQ** ■ 1- 1 B ■ ■	0.01048 (0.0927)	14 (30.9)
24.5 (32.8)	30.5 (40.9)	65 (575)	81 (717)	3600	6000	**1FE1082-6WS** ■ 0- 1 B ■ ■	0.01048 (0.0927)	14 (30.9)
15 (20.1)	18.7 (25.1)	65 (575)	81 (717)	2200	9000	**1FE1082-6WW** ■ 1- 1 B ■ ■	0.01048 (0.0927)	14 (30.9)
35.5 (47.61)	46.5 (62.36)	97 (858.5)	127 (1124)	3500	5500	**1FE1083-6WP** ■ 0- 1 B ■ ■	0.016 (0.0142)	24 (52.9)
31 (41.6)	42 (56.3)	130 (1151)	175 (1549)	2300	9000	**1FE1084-6WR** ■ 1- 1 B ■ ■	0.02067 (0.1829)	30 (66.2)
23.1 (31)	31.1 (41.7)	130 (1151)	175 (1549)	1700	7000	**1FE1084-6WU** ■ 1- 1 B ■ ■	0.02067 (0.1829)	30 (66.2)
15 (20.1)	19 (25.5)	130 (1151)	175 (1549)	1100	4500	**1FE1084-6WX** ■ 1- 1 B ■ ■	0.02067 (0.1829)	30 (66.2)
10 (13.4)	13.2 (17.7)	28 (248)	36 (319)	3500	7000	**1FE1091-6WN** ■ 0- 1 B ■ ■	0.00814 (0.0720)	17 (37.5)
6.3 (8.5)	7.5 (10.1)	30 (266)	36 (319)	2000	4000	**1FE1091-6WS** ■ 0- 1 B ■ ■	0.00814 (0.0720)	17 (37.5)
24.2 (32.4)	31 (41.6)	66 (584)	85 (752)	3500	7000	**1FE1092-6WN** ■ 0- 1 B ■ ■	0.01566 (0.1386)	26 (57.3)
22 (29.5)	28.5 (38.2)	66 (584)	85 (752)	3200	7000	**1FE1092-6WR** ■ 1- 1 B ■ ■	0.01566 (0.1386)	26 (57.3)
36.6 (49.1)	47 (63)	100 (885)	128 (1133)	3500	7000	**1FE1093-6WN** ■ 0- 1 B ■ ■	0.02317 (0.2051)	36 (79.4)
21 (28.2)	27 (36.2)	100 (885)	128 (1133)	2000	4000	**1FE1093-6WS** ■ 0- 1 B ■ ■	0.02317 (0.2051)	36 (79.4)
16.8 (22.5)	21.5 (28.8)	100 (885)	128 (1133)	1600	7000	**1FE1093-6WV** ■ 1- 1 B ■ ■	0.02317 (0.2051)	36 (79.4)

- Standard protection: 2 × KTY[2] — **1**
- Full protection: 2 × KTY + 3 × PTC thermistor tiplet[6] — **3**
- Universal protection[7] — **5**

- Delivery of stator + rotor[2][4][5] — **1**

- Stator with cooling jacket[2][3] — **B**

- Without rotor sleeve, for d_i see dimensions table — **A**
- With rotor sleeve, for d^* see dimensions table (only for 1FE1061/1FE1082/1FE1091/1FE1092/1FE1093) — **B**
- With rotor sleeve, for d^{**} see dimensions table (only for 1FE1051/1FE1052/1FE108/1FE109) — **C**
- With rotor sleeve, for d^{**} see dimensions table (only for 1FE1082) — **D**

- Free cable ends, 1.5 m (4.92 ft) in length[9]
  Cable outlet at larger outer diameter of cooling jacket — **0**
  Cable outlet at smaller outer diameter of cooling jacket (on request) — **1**
- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)
  Cable outlet at larger outer diameter of cooling jacket — **2**
  Cable outlet at smaller outer diameter of cooling jacket (on request) — **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

Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors
Water cooling

Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module	SINAMICS S120 Motor Module	
				Required rated current	Booksize format
	I_{rated}			I_{rated}	For additional versions and components, see chapter SINAMICS S120 drive system
	S1	S6-40 %		S1 to n_{max}	
	A	A		A	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**

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Cooling:	
Internal air cooling	**0**
External air cooling	**1**

Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

[1] Data for ΔT = 105 K, special windings on request.

[2] Standard scope of supply: Encapsulated winding with 2 × KTY (1 × spare).

[3] Stator without cooling jacket, with impregnated winding on request.

[4] Ordering spare parts: Stator: 1FE1...-.....-2.W.

[5] Ordering spare parts: Rotor: 1FE1...-.....-3W..

[6] Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.

[7] Universal protection option: Full protection + NTC PT3-51F + NTC K227

[8] For moment of inertia with sleeve, see Configuration Manual.

[9] 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 for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	SIMOTICS M-1FE1 built-in motors Standard type	Moment of inertia of rotor without sleeve[9]	Weight, approx. stator + rotor without sleeve
P_{rated}		M_{rated}		n_{rated}	n_{max}		J	m
S1	S6-40 %	S1	S6-40 %					
kW (HP)	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FE1 High-Torque series, 6-pole – Water cooling								
33 (44.2)	35 (46.9)	150 (1328)	190 (1682)	2100	6500	**1FE1113-6WU** ■ **1- 1 B** ■ ■	0.0470 (0.4160)	53 (117)
22 (29.5)	24 (32.2)	150 (1328)	190 (1682)	1400	5700	**1FE1113-6WX** ■ **1- 1 B** ■ ■	0.0470 (0.4160)	53 (117)
41.9 (56.2)	53.6 (71.9)	200 (1770)	257 (2275)	2000	6500	**1FE1114-6WR** ■ **1- 1 B** ■ ■	0.06239 (0.5522)	67 (148)
29.3 (39.3)	37.5 (50.3)	200 (1770)	257 (2275)	1400	6500	**1FE1114-6WT** ■ **1- 1 B** ■ ■	0.06239 (0.5522)	67 (148)
20.9 (28.0)	26.8 (35.9)	200 (1770)	257 (2275)	1000	6000	**1FE1114-6WW** ■ **1- 1 B** ■ ■	0.06239 (0.5522)	67 (148)
41.6 (55.8)	45.0 (60.4)	265 (2345)	340 (3009)	1500	6500	**1FE1115-6WT** ■ **1- 1 B C** ■	0.078 (0.690)	81 (179)
37.7 (50.5)	48.3 (64.8)	300 (2655)	385 (3408)	1200	6500	**1FE1116-6WR** ■ **1- 1 B** ■ ■	0.09285 (0.8218)	92 (203)
28.3 (37.9)	36.2 (48.5)	300 (2655)	385 (3408)	900	5500	**1FE1116-6WT** ■ **1- 1 B** ■ ■	0.09285 (0.8218)	92 (203)
22 (29.5)	28 (37.5)	300 (2655)	385 (3408)	700	4000	**1FE1116-6WW** ■ **1- 1 B** ■ ■	0.09285 (0.8218)	92 (203)
1FE1 High-Torque series, 8-pole – Water cooling								
63 (84.5)	80 (107)	430 (3806)	620 (5487)	1400	6500	**1FE1144-8WL** ■ **1- 1 B** ■ ■	0.11447 (1.032)	84.5 (186)
104 (139.4)	125 (168)[2]	585 (5188)	795 (7036)[2]	1700	8000	**1FE1145-8WN** ■ **1- 1 B** ■ ■	0.21636 (1.9148)[11]	117 (258)
79.6 (106.7)	97 (130)	585 (5188)	795 (7036)	1300	6000	**1FE1145-8WQ** ■ **1- 1 B** ■ ■	0.21636 (1.9148)[11]	117 (258)
67.4 (90.4)	80 (107)	585 (5188)	795 (7036)	1100	5000	**1FE1145-8WS** ■ **1- 1 B** ■ ■	0.21636 (1.9148)[11]	117 (258)
103 (138.1)	124 (166)[2]	820 (7258)	1110 (9824)[2]	1200	5500	**1FE1147-8WN** ■ **1- 1 B** ■ ■	0.28823 (2.5508)[11]	155 (342)
81.6 (109.4)	96 (129)	820 (7258)	1110 (9824)	950	4200	**1FE1147-8WQ** ■ **1- 1 B** ■ ■	0.28823 (2.5508)[11]	155 (342)
64.4 (86.3)	80 (107)	820 (7258)	1110 (9824)	750	3500	**1FE1147-8WS** ■ **1- 1 B** ■ ■	0.28823 (2.5508)[11]	155 (342)

- Standard protection: 2 × KTY[3]   **1**
- Full protection: 2 × KTY + 3 × PTC thermistor tiplet[7]   **3**
- Universal protection[8]   **5**

- Delivery of stator + rotor[3][5][6]   **1**

- Stator with cooling jacket[3][4]   **B**

- Without rotor sleeve (only for 1FE1113/1FE1114/1FE1115/1FE1116/1FE1144)   **A**
- With rotor sleeve, for d^* see dimensions table (only for 1FE1114/1FE1116)   **B**
- With rotor sleeve, for d^{**} see dimensions table (not for 1FE1113)   **C**
- With rotor sleeve, for d^{**} see dimensions table (only for 1FE1113/1FE1145/1FE1147)   **D**
- With rotor sleeve, for d^{**} see dimensions table (only for 1FE1113/1FE1145)   **E**

- Free cable ends, 1.5 m (4.92 ft) in length[10]
  Cable outlet at larger outer diameter of cooling jacket   **0**
  Cable outlet at smaller outer diameter of cooling jacket (on request)   **1**
- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)
  Cable outlet at larger outer diameter of cooling jacket   **2**
  Cable outlet at smaller outer diameter of cooling jacket (on request)   **3**

S1 = Continuous duty
S6 = Intermittent duty:
    Type 1FE111/1FE114: Duty cycle time 2 min

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Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module	SINAMICS S120 Motor Module	
	I_{rated} S1 A	S6-40 % A		Required rated current I_{rated} S1 A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system Order No.
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[2]	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[2]	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

6

[1] Data for ΔT = 105 K, special windings on request.
[2] Observe the Motor Module limit.
[3] Standard scope of supply: Encapsulated winding with 2 × KTY (1 × spare).
[4] Stator without cooling jacket, with impregnated winding on request.
[5] Ordering spare parts: Stator: 1FE1...-.....-2.W.
[6] Ordering spare parts: Rotor: 1FE1...-.....-3W..
[7] Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.
[8] Universal protection option: Full protection + NTC PT3-51F + NTC K227
[9] For moment of inertia with sleeve, see Configuration Manual.
[10] For cable design, see Configuration Manual.
[11] 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 for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	SIMOTICS M-1FE1 built-in motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor without sleeve
P_{rated}		M_{rated}		n_{rated}	n_{max}		J	m
S1	S6-40 %	S1	S6-40 %					
kW (HP)	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FE1 High-Speed series, 4-pole – Water cooling								
12.6 (16.9)	17.6 (23.6)	5 (44.3)	7 (62)	24000	40000	**1FE1051-4HC** ■ 0- 1 B A ■	0.00045 (0.004)	4.1 (9.0)
6.5 (8.7)	8.0 (10.7)	6.5 (57.5)	9.0 (79.7)	9500	30000	**1FE1051-4WN** ■ 1- 1 B A ■	0.00057 (0.005)	4.2 (9.3)
31.4 (42.1)	35 (46.9)	12 (106)	15.5 (137.2)	25000	40000[8]	**1FE1052-4HD** ■ 0- 1 B A ■	0.00087 (0.007)	7.15 (15.77)
23.9 (32.0)	30 (40.2)	12 (106)	15.5 (137.2)	19000	40000[8]	**1FE1052-4HG** ■ 1- 1 B A ■	0.00087 (0.007)	7.15 (15.77)
17.5 (23.1)	19 (25.5)	13 (115)	17 (151)	12500	30000	**1FE1052-4WK** ■ 1- 1 B A ■	0.00110 (0.0097)	7.35 (16.21)
11 (15)	12 (16.1)	13 (115)	18 (159)	8000	30000	**1FE1052-4WN** ■ 1- 1 B A ■	0.00110 (0.0097)	7.35 (16.21)
25.5 (34.2)	32.5 (43.6)	18 (159)	23 (204)	13500	40000[8]	**1FE1053-4HH** ■ 1- 1 B A ■	0.00128 (0.0113)	10.2 (22.5)
23 (31)	25 (33.5)	20 (177)	27 (239)	11000	30000	**1FE1053-4WJ** ■ 1- 1 B A ■	0.00163 (0.0144)	10.5 (23.2)
16.5 (22.1)	18 (24.1)	20 (177)	27 (239)	7900	30000	**1FE1053-4WN** ■ 1- 1 B A ■	0.00163 (0.0144)	10.5 (23.2)
28.5 (38.2)	28.5 (38.2)	28 (248)	40 (354)	9700	24000	**1FE1072-4WH** ■ 1- 1 B A ■	0.00287 (0.0254)	11.2 (24.7)
20 (27)	20 (26.8)	28 (248)	40 (354)	6800	24000	**1FE1072-4WL** ■ 1- 1 B A ■	0.00287 (0.0254)	11.2 (24.7)
16 (21)	16 (21.5)	28 (248)	40 (354)	5500	24000	**1FE1072-4WN** ■ 1- 1 B A ■	0.00287 (0.0254)	11.2 (24.7)
30 (40)	30 (40.2)	42 (372)	59 (522)	6800	24000	**1FE1073-4WN** ■ 1- 1 B A ■	0.00430 (0.0381)	16 (35.3)
15 (20)	15 (20.1)	45 (398)	64 (566)	3200	14000	**1FE1073-4WT** ■ 1- 1 B A ■	0.00430 (0.0381)	16 (35.3)
48 (64)	51 (68.4)	60 (531)	86 (761)	7700	20000	**1FE1074-4WM** ■ 1- 1 B A ■	0.00573 (0.0507)	21 (46.3)
41 (55)	41 (55)	56 (496)	79 (699)	7000	20000	**1FE1074-4WN** ■ 1- 1 B A ■	0.00573 (0.0507)	21 (46.3)
25.8 (34.6)	28 (37.5)	60 (531)	85 (752)	4100	18000	**1FE1074-4WT** ■ 1- 1 B A ■	0.00573 (0.0507)	21 (46.3)
15.5 (20.8)	15.5 (20.8)	42 (372)	55 (487)	3500	20000	**1FE1082-4WN** ■ 1- 1 B A ■	0.00559 (0.0495)	15.1 (33.3)
8.8 (11.8)	8.8 (11.8)	42 (372)	55 (487)	2000	11000	**1FE1082-4WR** ■ 1- 1 B A ■	0.00559 (0.0495)	15.1 (33.3)
28 (38)	28 (37.5)	63 (558)	83 (735)	4200	20000	**1FE1083-4WN** ■ 1- 1 B A ■	0.00847 (0.0750)	22 (48.5)
38 (51)	38 (51)	84 (744)	110 (974)	4300	20000	**1FE1084-4WN** ■ 1- 1 B A ■	0.01118 (0.0989)	28.5 (62.9)
35 (47)	35 (46.9)	78 (690)	110 (974)	4300	20000	**1FE1084-4WP** ■ 1- 1 B A ■	0.01118 (0.0989)	28.5 (62.9)
30 (40)	30 (40.2)	84 (743)	110 (974)	3400	18000	**1FE1084-4WQ** ■ 1- 1 B A ■	0.01118 (0.0989)	28.5 (62.9)
26.4 (35.4)	26.4 (35.4)	84 (743)	110 (974)	3000	15000	**1FE1084-4WT** ■ 1- 1 B A ■	0.01118 (0.0989)	28.5 (62.9)
38 (51)	38 (51)	105 (929)	138 (1221)	3500	18000	**1FE1085-4WN** ■ 1- 1 B A ■	0.01388 (0.1228)	35 (77.2)
33 (44)	33 (44.3)	105 (929)	140 (1239)	3000	16000	**1FE1085-4WQ** ■ 1- 1 B A ■	0.01388 (0.1228)	35 (77.2)
24 (32)	24 (32.2)	105 (929)	140 (1239)	2200	12000	**1FE1085-4WT** ■ 1- 1 B A ■	0.01388 (0.1228)	35 (77.2)

- Standard protection: 2 × KTY[2]   **1**
- Full protection: 2 × KTY + 3 × PTC thermistor triplet[6]   **3**
- Universal protection[7]   **5**

- Delivery of stator + rotor[2][4][5]   **1**

- Stator with cooling jacket[2][3]   **B**

- Without rotor sleeve   **A**

- Free cable ends, 1.5 m (4.92 ft) in length[9]
  Cable outlet at larger outer diameter of cooling jacket   **0**
  Cable outlet at smaller outer diameter of cooling jacket (on request) **1**
- Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant)
  Cable outlet at larger outer diameter of cooling jacket   **2**
  Cable outlet at smaller outer diameter of cooling jacket (on request) **3**

S1 = Continuous duty
S6 = Intermittent duty:
    Type 1FE105/1FE107: Duty cycle time 1 min
    Type 1FE108: Duty cycle time 2 min

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Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors
Water cooling

Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module	SINAMICS S120 Motor Module	
	I_{rated} S1 A	S6-40 % A		Required rated current I_{rated} S1 to n_{max} A	Booksize format For additional versions and components, see chapter SINAMICS S120 drive system 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

[1] Data for ΔT = 105 K, special windings on request.
[2] Standard scope of supply: Encapsulated winding with 2 × KTY (1 × spare).
[3] Stator without cooling jacket, with impregnated winding on request.
[4] Ordering spare parts: Stator: 1FE1...-.....-2.W.
[5] Ordering spare parts: Rotor: 1FE1...-.....-3W..
[6] Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.
[7] Universal protection option: Full protection + NTC PT3-51F + NTC K227
[8] Series reactor required, see Configuration Manual.
[9] 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 for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	SIMOTICS M-1FE1 built-in motors Standard type	Moment of inertia of rotor	Weight, approx. stator + rotor without sleeve
P_{rated}		M_{rated}		n_{rated}	n_{max}		J	
S1	S6-40 %	S1	S6-40 %					
kW (HP)	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-ft)	rpm	rpm	Order No.	kgm^2 (lb$_f$-in-s^2)	kg (lb)
1FE1 High-Speed series, 4-pole – Water cooling								
16 (21)	16 (21)	45 (398)	60 (531)	3400	18000	**1FE1092-4WP** ■ **1- 1 B R** ■	0.00916 (0.0811)[9]	30 (66.2)
10.5 (14.1)	10.5 (14.1)	50 (443)	64 (310)	2000	10000	**1FE1092-4WV** ■ **1- 1 B R** ■	0.00916 (0.0811)[9]	30 (66.2)
27.5 (36.9)	27.5 (36.9)	75 (664)	103 (912)	3500	18000	**1FE1093-4WM** ■ **1- 1 B** ■ ■	0.01350 (0.1195)[9]	41.6 (91.7)
26 (35)	26 (35)	75 (664)	103 (912)	3300	16000	**1FE1093-4WN** ■ **1- 1 B** ■ ■	0.01350 (0.1195)[9]	41.6 (91.7)
35 (47)	35 (47)	75 (664)	103 (912)	4500	18000	**1FE1093-4WH** ■ **1- 1 B** ■ ■	0.01350 (0.1195)[9]	41.6 (91.7)
46 (62)	46 (62)	100 (885)	137 (1213)	4400	18000	**1FE1094-4WK** ■ **1- 1 B** ■ ■	0.01808 (0.1600)[9]	48.5 (107)
40 (54)	40 (54)	100 (885)	137 (1213)	3800	18000	**1FE1094-4WL** ■ **1- 1 B** ■ ■	0.01808 (0.1600)[9]	48.5 (107)
26 (35)	26 (35)	100 (885)	125 (1106)	2500	13000	**1FE1094-4WS** ■ **1- 1 B** ■ ■	0.01808 (0.1600)[9]	48.5 (107)
18 (24)	18 (24)	95 (841)	118 (1044)	1800	10000	**1FE1094-4WU** ■ **1- 1 B** ■ ■	0.01808 (0.1600)[9]	48.5 (107)
46 (62)	46 (62)	125 (1106)	170 (1505)	3500	18000	**1FE1095-4WN** ■ **1- 1 B** ■ ■	0.02242 (0.1984)[9]	56.8 (125)
52 (70)	52 (70)	150 (1328)	206 (1823)	3300	16000	**1FE1096-4WN** ■ **1- 1 B** ■ ■	0.02700 (0.2390)[9]	64.2 (142)
38.5 (51.6)	45 (60)	102 (903)	142 (1257)	3600	16000	**1FE1103-4WN** ■ **1- 1 B A** ■	0.01589 (0.1406)	34 (75)
54 (72)	64 (86)	136 (1204)	190 (1682)	3800	16000	**1FE1104-4WN** ■ **1- 1 B A** ■	0.02098 (0.1857)	42.5 (93.7)
53.4 (71.6)	64 (86)	170 (1505)	236 (2089)	3000	16000	**1FE1105-4WN** ■ **1- 1 B A** ■	0.02608 (0.2309)	52 (115)
72.6 (97.3)	85 (114)	204 (1806)	283 (2505)	3400	16000	**1FE1106-4WN** ■ **1- 1 B A** ■	0.03147 (0.2785)	61.5 (136)
62 (83)	66 (89)	204 (1806)	270 (2390)	2900	14000	**1FE1106-4WR** ■ **1- 1 B A** ■	0.03147 (0.2785)	61.5 (136)
56.5 (75.7)	60 (80)	200 (1770)	270 (2390)	2700	12500	**1FE1106-4WS** ■ **1- 1 B A** ■	0.03147 (0.2785)	61.5 (136)
25 (34)	30 (40)	200 (1770)	270 (2390)	1200	6000	**1FE1106-4WY** ■ **1- 1 B A** ■	0.03147 (0.2785)	61.5 (136)
63 (85)	75 (101)	200 (1770)	275 (2434)	3000	14000	**1FE1124-4WN** ■ **1- 1 B A** ■	0.05112 (0.4524)	62.6 (138)
78.5 (105.2)	90 (121)	250 (2213)	345 (3054)	3000	14000	**1FE1125-4WN** ■ **1- 1 B A** ■	0.06337 (0.5608)	76 (168)
65.5 (87.8)	82 (110)	250 (2213)	345 (3054)	2500	12500	**1FE1125-4WP** ■ **1- 1 B A** ■	0.06337 (0.5608)	76 (168)
94 (126)	112 (150)[2]	300 (2655)	410 (3629)[2]	3000	14000	**1FE1126-4WN** ■ **1- 1 B A** ■	0.07604 (0.6729)	90 (198)
78.5 (105.2)	100 (134)[2]	300 (2655)	410 (3629)[2]	2500	12500	**1FE1126-4WP** ■ **1- 1 B A** ■	0.07604 (0.6729)	90 (198)
63 (85)	82 (110)	300 (2655)	410 (3629)	2000	10000	**1FE1126-4WQ** ■ **1- 1 B A** ■	0.07604 (0.6729)	90 (198)

• Standard protection: 2 × KTY[3] • Full protection: 2 × KTY + 3 × PTC thermistor triplet[7] • Universal protection[8]	**1** **3** **5**
• Delivery of stator + rotor[3)5)6]	**1**
• Stator with cooling jacket[3)4]	**B**
• Without rotor sleeve • Without rotor sleeve, d_i = 80 mm (3.15 in) for 1FE109.-4W... only	**A** **R**

• Free cable ends, 1.5 m (4.92 ft) in length[10]
   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 1FE109/1FE110/1FE112: Duty cycle time 2 min

6

Main spindle motors
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

Standard-type SIMOTICS M-1FE1 synchronous built-in motors
Water cooling

Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module	SINAMICS S120 Motor Module	
	I_{rated} S1 A	S6-40 % A		Required rated current I_{rated} S1 A	Booksize format (For additional versions and components, see chapter SINAMICS S120 drive system) Order No.
1FE1092-4WP...	41	58	VPM 120	45	**6SL312■-1TE24-5AA3**
1FE1092-4WV...	24	35	VPM 120	30	**6SL312■-1TE23-0AA3**
1FE1093-4WM...	64	92	VPM 120	85	**6SL312■-1TE28-5AA3**
1FE1093-4WN...	60	86	VPM 120	60	**6SL312■-1TE26-0AA3**
1FE1093-4WH...	83	120	VPM 120	85	**6SL312■-1TE28-5AA3**
1FE1094-4WK...	108	156	VPM 120	132	**6SL312■-1TE31-3AA3**
1FE1094-4WL...	90	130	VPM 120	132	**6SL312■-1TE31-3AA3**
1FE1094-4WS...	60	85	VPM 120	60	**6SL312■-1TE26-0AA3**
1FE1094-4WU...	45	64	VPM 120	45	**6SL312■-1TE24-5AA3**
1FE1095-4WN...	108	156	VPM 120	132	**6SL312■-1TE31-3AA3**
1FE1096-4WN...	120	173	VPM 120	132	**6SL312■-1TE31-3AA3**
1FE1103-4WN...	84	127	VPM 120	85	**6SL312■-1TE28-5AA3**
1FE1104-4WN...	120	181	VPM 200	132	**6SL312■-1TE31-3AA3**
1FE1105-4WN...	120	180	VPM 200	132	**6SL312■-1TE31-3AA3**
1FE1106-4WN...	159	240	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1106-4WR...	128	184	VPM 200	132	**6SL312■-1TE31-3AA3**
1FE1106-4WS...	120	170	VPM 200	132	**6SL312■-1TE31-3AA3**
1FE1106-4WY...	60	85	VPM 120	60	**6SL312■-1TE26-0AA3**
1FE1124-4WN...	135	198	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1125-4WN...	162	240	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1125-4WP...	147	215	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1126-4WN...	200	295[2]	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1126-4WP...	180	265[2]	VPM 200	200	**6SL312■-1TE32-0AA3**
1FE1126-4WQ...	147	215	VPM 200	200	**6SL312■-1TE32-0AA3**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
Single Motor Module **1**

[1] Data for ΔT = 105 K, special windings on request.
[2] Observe the Motor Module limit.
[3] Standard scope of supply: Encapsulated winding with 2 × KTY (1 × spare).
[4] Stator without cooling jacket, with impregnated winding on request.
[5] Ordering spare parts: Stator: 1FE1...-.....-2.W.
[6] Ordering spare parts: Rotor: 1FE1...-.....-3W..
[7] Full protection option, application example: Load at motor standstill, external tripping unit required: Order No. 3RN1013-1GW10.
[8] Universal protection option: Full protection + NTC PT3-51F + NTC K227
[9] For moment of inertia for version R without rotor sleeve d_i = 80 mm (3.15 in), see Configuration Manual.
[10] 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 spin-
dle 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 spin-
dle 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

Hollow shaft | Rotor | Rotor sleeve | Air gap | Annular jacket cooling channel | stator

Application

SIMOTICS M-1PH2 built-in motors are used for machines requir-
ing an extremely high standard of machining quality, accuracy
and running smoothness.

● Turning machines

● Grinding machines

Technical specifications

Product name	SIMOTICS M-1PH2 built-in motor
Coolant inlet temperature	Because of the formation of condensation, we recommend a coolant inlet temperature of approx. 25 °C (77 °F), depending on the ambient conditions.
Cooling water pressure at inlet, max.	7 bar
Coolant flow rate (water)	8 l/min (2.11 US gallons/min.)
Connection thread	Dependent on cooling unit used
Temperature monitoring	2 KTY 84 temperature sensors in the stator winding, 1 × as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature up to 25 °C (77 °F)
Recommended motor encoder	Hollow shaft system (not included in scope of supply)
Type of construction (cf. ISO)	Individual components: Stator, rotor
Motor connection type	Free cable ends with length of 0.5 m (19.7 in) m or 1.5 m (59.1 in)
Balance quality of rotor in accordance with ISO 1940-1	1PH2093 to 1PH2118: G 2.5 Reference speed 3600 rpm
Degree of protection in accordance with IEC 60034-5	IP00
Rating plate	1 unit enclosed separately

Refer to Liquid cooling for a list of cooling unit manufacturers.

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■ **Characteristic curves**

Typical speed/power graph for AC motors[1]

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}	n_2[2] S1	S6-60 %	S6-40 %
	rpm	rpm	rpm	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

[1] For further configuration information, see the SIMOTICS M-1PH2 Motors Configuration Manual.

[2] 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.

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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[1]				SIMOTICS M-1PH2 asynchronous built-in motor for direct drive **Standard type**	Rated torque[1]	
n_{rated}	n_{max}	P_{rated}					M_{rated}	
		S1	S1 ΔT=105 K	S6-60 %	S6-40 %			ΔT=105 K
rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.	Nm (lb$_f$-ft)	Nm (lb$_f$-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**

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[1] Data for ΔT = 70 K, unless specified otherwise.

**SIMOTICS M-1PH2 asynchronous built-in motors
for direct drive – Water cooling**

Motor type (repeated)	Moment of inertia of rotor	Weight (rotor and stator), approx.	Rated current for duty type[1]			SINAMICS S120 Motor Module	
						Required rated output current for S1 duty	Booksize format
							For additional versions and components, see chapter SINAMICS S120 drive system
	J	m	I_{rated}			I_{rated}	
			S1	S6-60 %	S6-40 %		
	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	A	A	Order No.
1PH2093-6W...	0.028 (0.25)	33 (72.8)	24	26	28	30	**6SL312■-1TE23-0AA3**
1PH2095-6W...	0.036 (0.32)	42 (92.6)	30	32	34	30	**6SL312■-1TE23-0AA3**
1PH2113-6W...	0.066 (0.58)	51 (112)	56	61	67	60	**6SL312■-1TE26-0AA3**
1PH2115-6W...	0.073 (0.65)	56 (123)	55	60	66	60	**6SL312■-1TE26-0AA3**
1PH2117-6W...	0.079 (0.70)	62 (137)	60	67	74	60	**6SL312■-1TE26-0AA3**
1PH2118-6W...	0.100 (0.89)	78 (172)	82	90	100	85	**6SL312■-1TE28-5AA3**

Cooling:
Internal air cooling **0**
External air cooling **1**

Motor Module:
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: Mr. Walker	Benzstraße 2 72649 WOLFSCHLUGEN, Germany Tel.: +49 7022 5003-0 Fax: +49 7022 5003-30 E-mail: info@bkw-kuema.de www.bkw-kuema.de

DELTATHERM Hirmer GmbH

Contact: Mr. Hirmer	Gewerbegebiet Bövingen122 53804 MUCH, Germany Tel.: +49 2245 6107-0 Fax: +49 2245 6107-10 E-mail: info@deltatherm.de www.deltatherm.com

Glen Dimplex Deutschland GmbH
RIEDEL Kältetechnik Division

Contact: Mr. Schneider	Am Goldenen Feld 18 95326 KULMBACH, Germany Tel.: +49 9221 709-555 Fax: +49 9221 709-549 E-mail: info@riedel-cooling.com www.riedel-cooling.com

Helmut Schimpke Industriekühlanlagen GmbH + Co. KG

Contact: Mr. Geerkens	Ginsterweg 25-27 42781 HAAN, Germany Tel.: +49 2129 9438-0 Fax: +49 2129 9438-99 E-mail: info@schimpke.de www.schimpke.com

Hydac System GmbH

Contact: Mr. Klein	Postfach 1251 66273 SULZBACH/SAAR, Germany Tel.: +49 6897 509-708 Fax: +49 6897 509-454 E-mail: winfried.klein@hydac.com www.hydac.com

Hyfra Industriekühlanlagen GmbH

Contact: Mr. Forberger	Industriepark 54 56593 KRUNKEL, Germany Tel.: +49 2687 898-0 Fax: +49 2687 898-25 E-mail: infohyfra@hyfra.com www.hyfra.com

KKT Kraus Kälte- und Klimatechnik GmbH

Contact: Mr. Titschack	Industriestraße 23a 91207 LAUF A. D. PEGNITZ, Germany Tel.: +49 9123 174-909 Fax: +49 9123 174-910 E-mail: goetz.titschack@kkt.kraus.com www.kkt-kraus.com

Pfannenberg GmbH

Contact: Mr. Hille	Werner-Witt-Strasse 1 D-21035 HAMBURG, Germany Tel.: +49 40 73412-127 Fax: +49 40 73412-101 E-mail: werner.hille@pfannenberg.com www.pfannenberg.com

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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.

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Main spindle motors
Asynchronous and synchronous motors for SINAMICS S120

2SP1 motor spindles

■ **Technical specifications**

	2SP120	2SP125
Product name	Motor spindles	Motor spindles
Standard functions		
Speed, max.	15000 rpm	10000 rpm
Housing	Cartridge with flange mounting	Cartridge with flange mounting
Operating position	Horizontal/vertical	Horizontal/vertical
Tool holder	HSK A63	SK 40 for tools with asymmetrical slot nuts
Tool clamping device	• Release using pneumatic cylinder, 6 bar • Clamp using cup-spring assembly	• Release using pneumatic cylinder, 6 bar • Clamp using cup-spring assembly
Tool taper cleaning	Compressed air through the draw bar 5 ... 6 bar	Compressed air through the draw bar 5 ... 6 bar
Cooling with water	• Max. 5 bar, 10 l/min (2.64 US gallons/min) • Max. 25 % anti-corrosion agent Clariant Antifrogen N or Tyfocor • Filter grade 100μm	• Max. 5 bar, 10 l/min (2.64 US gallons/min) • Max. 25 % anti-corrosion agent Clariant Antifrogen N or Tyfocor • Filter grade 100μm
Recommended coolant inlet temperature, approx.	25 °C (77 °F) (depending on the ambient temperature)	25 °C (77 °F) (depending on the ambient temperature)
Standard protection – temperature monitoring	• Motor thermal sensor KTY84-130 • PTC for full thermal protection • NTC PT3-51F • NTC K227	• Motor thermal sensor KTY84-130
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	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)
Degree of protection in accordance with IEC 60034-5	IP64 (in working area) IP53 (behind the spindle flange)	IP64 (in working area) IP53 (behind the spindle flange)
Bearing lubrication	Grease, permanent lubrication	Grease, permanent lubrication
Bearing seal at the front	Sealing air 1 ... 1.5 m^3/h, filter mesh 8 μm	Sealing air 1 ... 1.5 m^3/h, filter mesh 8 μm
Encoder system	Hollow-shaft measuring system, incremental, sin/cos 1 V$_{pp}$ 256 S/R with zero mark	Hollow-shaft measuring system, incremental, sin/cos 1 V$_{pp}$ 256 S/R with zero mark
Clamping status monitoring		
• Analog sensors	• Tool clamped • Draw bar in the release position • Clamped without tool	–
• Digital sensors	• Position of release piston	• Tool clamped • Draw bar in the release position • Clamped without tool
Connections for the media • Cooling • Sealing air • Air purge • Release tool • Clamp tool	2 × hose plug-in connector, Ø 12/10 mm (0.47/0.39 in) 1 × G 1/8" radial/Ø 5 mm (0.20 in) axial 1 × G 1/4" 1 × G 1/4" 1 × G 1/8"	2 × G 1/2" (Ø 9 mm (0.35 in)) 1 × G 1/8" (Ø 8 mm (0.31 in)) 1 × G 1/4" 1 × M16×1.5 1 × G 1/8"
Electrical connections	• Power via cable 1.5 m (4.92 ft) • Sensors through signal plug	• Power via cable 1.5 m (4.92 ft) • Sensors through signal plug
Options		
Increased max. speed	18000 rpm	15.000 rpm^{-1} (with HSK A63)
Internal tool cooling	• 50 bar, up to 54 l/min (11.89 US gallons/min) • Filter grade 50 μm according to -/16/13 ISO 4406 • 1 × G 1/4" cooling lubricant • 1 × G 1/8" leakage	• 50 bar, up to 54 l/min (11.89 US gallons/min) • Filter grade 50 μm according to -/16/13 ISO 4406 • 1 × G 1/4" cooling lubricant • 1 × G 1/8" leakage
External tool cooling	• Ring with 6 adjustable nozzles • 5 bar • Filter grade 50 μm according to -/16/13 ISO 4406	–
Tool clamping device	• Release using hydraulic cylinder, 80 bar • Clamp using cup-spring assembly • 1 × G 1/4", release the tool • 1 × G 1/4", clamp the tool	–
Tool interface	–	BT 40, CAT 40, HSK A63

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Main spindle motors
Asynchronous and synchronous motors for SINAMICS S120

■ **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

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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 Star/delta for duty type		Rated torque Star/delta for duty type		Rated speed Star/delta	Maximum speed	2SP1 motor spindles Standard type
	P_{rated}		M_{rated}		n_{rated}	n_{max}	
	S1	S6-40 %	S1	S6-40 %			
mm (in)	kW (HP)	kW (HP)	Nm (lb$_f$-ft)	Nm (lb$_f$-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■ ■-1 D ■ ■**
	15.5/– (20.8/–)	15.5/– (20.8/–)	42/– (372/–)	55/– (487/–)	3500/–	18000	**2SP1202-1HB■ ■-2 D ■ ■**
	26.4/– (35.4/–)	26.4/– (35.4/–)	84/– (744/–)	110/– (974/–)	3000/–	15000	**2SP1204-1HA■ ■-1 D ■ ■**
	35.0/– (46.9/–)	35.0/– (46.9/–)	78/– (690/–)	110/– (974/–)	4300/–	18000	**2SP1204-1HB■ ■-2 D ■ ■**
2SP1 asynchronous – water cooling							
250	13.2/13.2 (17.7/17.7)	18.9/18.9 (25.3/25.3)	70/32 (620/283)	100/45 (885/398)	1800/4000	10000	**2SP1253-8HA 0 ■-0 ■ ■ 2**
	13.2/13.2 (17.7/17.7)	18.9/18.9 (25.3/25.3)	70/32 (620/283)	100/45 (885/398)	1800/4000	15000	**2SP1253-8HA 0 ■-1 D ■ 2**
	11.7/11.7 (15.7/15.7)	16.7/16.7 (22.4/22.4)	140/62 (1239/549)	200/89 (1170/788)	800/1800	10000	**2SP1255-8HA 0 ■-0 ■ ■ 2**
	11.7/11.7 (15.7/15.7)	16.7/16.7 (22.4/22.4)	140/62 (1239/549)	200/89 (1170/788)	800/1800	15000	**2SP1255-8HA 0 ■-1 D ■ 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 ■-1 D ■ 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 ■-1 D ■ 2**

Tool clamping and release mechanism:
Pneumatic (only for 2SP125) — 0
Pneumatic (only for 2SP120) — 2
Hydraulic (only 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 (only for 2SP120) — 4
Closed cooling jacket, internal tool cooling and ring for external tool cooling (only for 2SP120) — 5

Tool interfaces:
Tool interface SK 40 — A
Tool interface BT 40 45° — B
Tool interface CAT 40 — C
Tool interface HSK A63 — D
Tool interface BT 40 30° — E
Tool interface HSKA63, latching (only for 2SP120) — R

Sensors:
Sensor: Tool clamped/draw bar in the release position/clamped without tool — D
As for D + sensor: Position release piston (only for 2SP120) — F

Type of connection:
Permanently connected cable, sensor cable with signal connector, length: 1.5 m (4.92 ft)
Power cable with open core ends — 2
Power cable with connector (2SP1202: Connector size 1.5/2SP1204: Connector size 3) — 6

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Main spindle motors
Asynchronous and synchronous motors for SINAMICS S120

2SP1 standard type motor spindles
Water cooling

Motor type (repeated)	Moment of inertia	Weight.[1] approx.	Rated current Star/delta for duty type		Voltage Protection Module	SINAMICS S120 Motor Module	
						Required rated power for S1 duty	Booksize format
	J	m	I_{rated}			I_{rated}	
			S1	S6-40 %			
	kgm^2 (lb$_f$-in-s^2)	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:
Internal air cooling	**0**
External air cooling	**1**

Motor Module:
Single Motor Module	**1**

6

[1] 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

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	o_2 –	s_2 S	g_1 –	Connector size Size 1 g_2 –	Size 1.5 g_2 –	**d** **D**	d_6 –	l E	t GA	u F
1FT7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake																	
36	1FT703.-5A		90 (3.54)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	48 (1.89)	6.5 (0.26)	77 (3.03)	80 (3.15)	–	**14** **(0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
48	1FT704.-5A		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	53 (2.09)	6.5 (0.26)	93 (3.66)	90 (3.54)	–	**19** **(0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
63	1FT706.-5A		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	53 (2.09)	9 (0.35)	93 (3.66)	104 (4.09)	–	**24** **(0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
80	1FT708.-5A		195 (7.68)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	51 (2.01)	11 (0.43)	93 (3.66)	119 (4.69)	140 (5.51)	**32** **(1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
100	1FT710.-5A		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	56 (2.20)	14 (0.55)	93 (3.66)	–	160 (6.30)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

Shaft height	Type	DIN IEC	Flange 0 f_2 –	i_2 –	without brake k LB	o_1 –	with brake k LB	o_1 –	Flange 1 (1FT6-compatible) i_2 –	without brake k LB	o_1 –	with brake k LB	o_1 –
36	1FT7034		5.5 (0.22)	36.5 (1.44)	189 (7.44)	127 (5.00)	216 (8.50)	154 (6.06)	30 (1.18)	195 (7.68)	133 (5.24)	222 (8.74)	160 (6.30)
	1FT7036				237 (9.33)	175 (6.89)	264 (10.39)	202 (7.95)		243 (9.57)	181 (7.13)	270 (10.63)	208 (8.19)
48	1FT7042		5.5 (0.22)	46 (1.81)	163 (6.42)	96 (3.78)	195 (7.68)	128 (5.04)	40 (1.57)	169 (6.65)	102 (4.02)	201 (7.91)	134 (5.28)
	1FT7044				213 (8.39)	146 (5.75)	245 (9.65)	178 (7.01)		219 (8.62)	152 (5.98)	251 (9.88)	184 (7.24)
	1FT7046				253 (9.96)	186 (7.32)	285 (11.22)	218 (8.58)		259 (10.20)	192 (7.56)	291 (11.46)	224 (8.82)
63	1FT7062		6 (0.24)	56.5 (2.22)	167 (6.57)	99 (3.90)	202 (7.95)	135 (5.31)	50 (1.97)	173 (6.81)	106 (4.17)	208 (8.19)	141 (5.55)
	1FT7064				198 (7.80)	131 (5.16)	233 (9.17)	166 (6.54)		205 (8.07)	137 (5.39)	240 (9.45)	173 (6.81)
	1FT7066				230 (9.06)	162 (6.38)	265 (10.43)	198 (7.80)		236 (9.29)	169 (6.65)	272 (10.71)	204 (8.03)
	1FT7068				277 (10.91)	210 (8.27)	312 (12.28)	245 (9.65)		284 (11.18)	216 (8.50)	319 (12.56)	252 (9.92)
80	1FT7082		6 (0.24)	64.5 (2.54)	184 (7.24)	124 (4.88)	241 (9.49)	176 (6.93)	58 (2.28)	196 (7.72)	130 (5.12)	248 (9.76)	183 (7.20)
	1FT7084				236 (9.29)	175 (6.89)	293 (11.54)	228 (8.98)		247 (9.72)	182 (7.17)	299 (11.77)	234 (9.21)
	1FT7086				287 (11.30)	227 (8.94)	345 (13.58)	279 (10.98)		299 (11.77)	234 (9.21)	351 (13.82)	286 (11.26)
100	1FT7102		6.5 (0.26)	87 (3.43)	209 (8.23)	144 (5.67)	266 (10.47)	196 (7.72)	80 (3.15)	221 (8.70)	151 (5.94)	273 (10.75)	203 (7.99)
	1FT7105				296 (11.65)	231 (9.09)	353 (13.90)	283 (11.14)		307 (12.09)	238 (9.37)	360 (14.17)	290 (11.42)
	1FT7108				365 (14.37)	300 (11.81)	422 (16.61)	352 (13.86)		377 (14.84)	307 (12.09)	429 (16.89)	359 (14.13)

Shaft version with feather key   Flange 1   Flange 0

G_PM21_XX_00170

G_PM21_XX_00167

■ Dimensional drawings

Shaft height	Type	DIN IEC P	a₁ P	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	o₂ —	s₂ S	g₁ —	g₂ (Size 1) —	g₂ (Size 1.5) —	**d D**	d₆ —	l E	t GA	u F
Dimensions in mm (inches) — Connector size Size 1 / Size 1.5; Shaft extension DE																	

Shaft height	Type	DIN IEC	a₁ P	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	o₂ —	s₂ S	g₁ —	g₂ Size 1 —	g₂ Size 1.5 —	**d D**	d₆ —	l E	t GA	u F
1FT7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake																		
36	1FT703.-5A		90 (3.54)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	48 (1.89)	6.5 (0.26)	77 (3.03)	80 (3.15)	–	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
48	1FT704.-5A		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	53 (2.09)	6.5 (0.26)	93 (3.66)	90 (3.54)	–	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
63	1FT706.-5A		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	53 (2.09)	9 (0.35)	93 (3.66)	104 (4.09)	–	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
80	1FT708.-5A		195 (7.68)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	51 (2.01)	11 (0.43)	93 (3.66)	119 (4.69)	140 (5.51)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
100	1FT710.-5A		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	56 (2.20)	14 (0.55)	93 (3.66)	–	160 (6.30)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

Shaft height	Type	DIN IEC	Flange 0 f₂ —	Flange 0 i₂ —	Flange 0 without brake k LB	Flange 0 without brake o₁ —	Flange 0 with brake k LB	Flange 0 with brake o₁ —	Flange 1 i₂ —	Flange 1 without brake k LB	Flange 1 without brake o₁ —	Flange 1 with brake k LB	Flange 1 with brake o₁ —
36	1FT7034		5.5 (0.22)	36.5 (1.44)	189 (7.44)	127 (5.00)	216 (8.50)	154 (6.06)	30 (1.18)	196 (7.72)	133 (5.24)	223 (8.78)	160 (6.30)
	1FT7036				237 (9.33)	175 (6.89)	264 (10.39)	202 (7.95)		244 (9.61)	181 (7.13)	271 (10.67)	208 (8.19)
48	1FT7042		5.5 (0.22)	46 (1.81)	158 (6.22)	96 (3.78)	190 (7.48)	128 (5.04)	40 (1.57)	164 (6.46)	102 (4.02)	196 (7.72)	134 (5.28)
	1FT7044				208 (8.19)	146 (5.75)	240 (9.45)	178 (7.01)		214 (8.43)	152 (5.98)	246 (9.69)	184 (7.24)
	1FT7046				248 (9.76)	186 (7.32)	280 (11.02)	218 (8.58)		254 (10.00)	192 (7.56)	286 (11.26)	224 (8.82)
63	1FT7062		6 (0.24)	56.5 (2.22)	161 (6.34)	99 (3.90)	197 (7.76)	135 (5.31)	50 (1.97)	168 (6.61)	106 (4.17)	203 (7.99)	141 (5.55)
	1FT7064				193 (7.60)	131 (5.16)	228 (8.98)	166 (6.54)		200 (7.87)	137 (5.39)	235 (9.25)	173 (6.81)
	1FT7066				225 (8.86)	162 (6.38)	260 (10.24)	198 (7.80)		231 (9.09)	169 (6.65)	267 (10.51)	204 (8.03)
	1FT7068				272 (10.71)	210 (8.27)	307 (12.09)	245 (9.65)		279 (10.98)	216 (8.50)	314 (12.36)	252 (9.92)
80	1FT7082		6 (0.24)	64.5 (2.54)	189 (7.44)	124 (4.88)	236 (9.29)	176 (6.93)	58 (2.28)	191 (7.52)	130 (5.12)	243 (9.57)	183 (7.20)
	1FT7084				236 (9.29)	175 (6.89)	288 (11.34)	228 (8.98)		242 (9.53)	182 (7.17)	294 (11.57)	234 (9.21)
	1FT7086				287 (11.30)	227 (8.94)	340 (13.39)	279 (10.98)		294 (11.57)	234 (9.21)	346 (13.62)	286 (11.26)
100	1FT7102		6.5 (0.26)	87 (3.43)	209 (8.23)	144 (5.67)	261 (10.28)	196 (7.72)	80 (3.15)	216 (8.50)	151 (5.94)	268 (10.55)	203 (7.99)
	1FT7105				296 (11.65)	231 (9.09)	348 (13.70)	283 (11.14)		303 (11.93)	238 (9.37)	355 (13.98)	290 (11.42)
	1FT7108				365 (14.37)	300 (11.81)	417 (16.42)	352 (13.86)		372 (14.65)	307 (12.09)	424 (16.69)	359 (14.13)

Shaft version with feather key — Flange 1 — Flange 0

G_PM21_XX_00168 G_PM21_XX_00169

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 con-nector	Power connector			Connector		
												Size 1	Size 1.5	Size 3	Size 1	Size 1.5	Size 3
Shaft height	Type	DIN IEC	a_1 P	b –	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	s_2 S	g_1 –	g_2 –	g_2 –	g_2 –	o_2 –	o_2 –	o_2 –
1FT7 water cooling, type of construction IM B5, with connector, without/with brake																	
63	1FT06.-.W		155 (6.10)	135 (5.31)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	9 (0.35)	93 (3.66)	108 (4.25)	132.5 (5.22)	–	52 (2.05)	57 (2.24)	–
80	1FT08.-.W		194 (7.68)	165 (6.50)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	11 (0.43)	93 (3.66)	–	140.5 (5.53)	168.5 (6.63)	–	50 (1.97)	67 (2.64)
100	1FT10.-5W		245 (9.65)	206 (8.11)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	14 (0.55)	93 (3.66)	–	159.5 (6.28)	187.5 (7.38)	–	55 (2.17)	72 (2.83)

			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					
Shaft height	Type	DIN IEC	i_2 –	k LB	o_1 –	o_1 –	o_1 –	f_2 –	i_2 –	k LB	o_1 –	o_1 –	o_1 –	d D	d_6 –	l E	t GA	u F
63	1FT7062		50 (1.97)	208 (8.19)	141 (5.55)	–	–	6 (0.24)	56.5 (2.22)	202 (7.95)	135 (5.31)	–	–	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT7064			240 (9.45)	173 (6.81)	–	–			233 (9.17)	166 (6.54)	–	–					
	1FT7065			292 (11.50)	220 (8.66)	–	–			286 (11.26)	214 (8.43)	–	–					
	1FT7066			272 (10.71)	204 (8.03)	–	–			265 (10.43)	198 (7.80)	–	–					
	1FT7067			332 (13.07)	260 (10.24)	–	–			325 (12.80)	254 (10.00)	–	–					
	1FT7068			319 (12.56)	252 (9.92)	–	–			312 (12.28)	245 (9.65)	–	–					
80	1FT7082		58 (2.28)	248 (9.76)	–	183 (7.20)	–	6 (0.24)	64.5 (2.54)	241 (9.49)	–	176 (6.93)	–	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7084			299 (11.77)	–	234 (9.21)	–			293 (11.54)	–	228 (8.98)	–					
	1FT7085			319 (12.56)	–	254 (10.00)	237 (9.33)			312.5 (12.30)	–	247 (9.72)	231 (9.09)					
	1FT7086			351 (13.82)	–	286 (11.26)	–			345 (13.58)	–	279 (10.98)	–					
	1FT7087			379 (14.92)	–	314 (12.36)	297 (11.69)			372.5 (14.67)	–	307 (12.09)	291 (11.46)					
100	1FT7102		80 (3.15)	273 (10.75)	–	203 (7.99)	187 (7.36)	6.5 (0.26)	87 (3.43)	266 (10.47)	–	196 (7.72)	180 (7.09)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT7105			360 (14.17)	–	290 (11.42)	273 (10.75)			353 (13.90)	–	283 (11.14)	266 (10.47)					
	1FT7108			429 (16.89)	–	359 (14.13)	342 (13.46)			422 (16.61)	–	352 (13.86)	335 (13.19)					

Flange 1 (1FT6-compatible) Shaft version with feather key Flange 0

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Dimensional drawings
SIMOTICS S servomotors for SINAMICS S120
SIMOTICS S-1FT7 synchronous motors
Compact/High Dynamic with DRIVE-CLiQ – Water cooling

Dimensional drawings

Shaft height	Type	DIN IEC	a₁ P	b –	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	s₂ S	Signal connector g₁ –	Power connector Size 1 g₂ –	Size 1.5 g₂ –	Size 3 g₂ –	Connector Size 1 o₂ –	Size 1.5 o₂ –	Size 3 o₂ –
1FT7 water cooling, type of construction IM B5, with connector, without/with brake																	
63	1FT06.-.W		155 (6.10)	135 (5.31)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	9 (0.35)	93 (3.66)	108 (4.25)	132.5 (5.22)	–	50 (1.97)	55 (2.17)	–
80	1FT08.-.W		194 (7.68)	165 (6.50)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	11 (0.43)	93 (3.66)	–	140.5 (5.53)	168.5 (6.63)	–	48 (1.89)	63 (2.48)
100	1FT10.-5W		245 (9.65)	206 (8.11)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	14 (0.55)	93 (3.66)	–	159.5 (6.28)	187.5 (7.38)	–	53 (2.09)	69 (2.72)

Shaft height	Type	DIN IEC	Flange 1 (1FT6-compatible) without/with brake i₂ –	k LB	Power connector Size 1 o₁ –	Size 1.5 o₁ –	Size 3 o₁ –	Flange 0 without/with brake f₂ –	i₂ –	k LB	Power connector Size 1 o₁ –	Size 1.5 o₁ –	Size 3 o₁ –	Shaft extension DE d D	d₆ –	l E	t GA	u F
63	1FT7062		50 (1.97)	204 (8.03)	141 (5.55)	–	–	6 (0.24)	56.5 (2.22)	197 (7.76)	135 (5.31)	–	–	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT7064			235 (9.25)	173 (6.81)	–	–			229 (9.02)	166 (6.54)	–	–					
	1FT7065			287 (11.30)	220 (8.66)	–	–			281 (11.06)	214 (8.43)	–	–					
	1FT7066			267 (10.51)	204 (8.03)	–	–			260 (10.24)	198 (7.80)	–	–					
	1FT7067			327 (12.87)	260 (10.24)	–	–			321 (12.64)	254 (10.00)	–	–					
	1FT7068			314 (12.36)	252 (9.92)	–	–			308 (12.13)	245 (9.65)	–	–					
80	1FT7082		58 (2.28)	243 (9.57)	–	183 (7.20)	–	6 (0.24)	64.5 (2.54)	237 (9.33)	–	176 (6.93)	–	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7084			295 (11.61)	–	234 (9.21)	–			288 (11.34)	–	228 (8.98)	–					
	1FT7085			314 (12.36)	–	254 (10.00)	237 (9.33)			308 (12.13)	–	247 (9.72)	231 (9.09)					
	1FT7086			346 (13.62)	–	286 (11.26)	–			340 (13.39)	–	279 (10.98)	–					
	1FT7087			374 (14.72)	–	314 (12.36)	297 (11.69)			368 (14.49)	–	307 (12.09)	291 (11.46)					
100	1FT7102		80 (3.15)	267 (10.51)	–	203 (7.99)	187 (7.36)	6.5 (0.26)	87 (3.43)	262 (10.31)	–	196 (7.72)	180 (7.09)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT7105			355 (13.98)	–	290 (11.42)	273 (10.75)			348 (13.70)	–	283 (11.14)	266 (10.47)					
	1FT7108			424 (16.69)	–	359 (14.13)	342 (13.46)			417 (16.42)	–	352 (13.86)	335 (13.19)					

Flange 1 (1FT6-compatible)   Shaft version with feather key   Flange 0

G_PM21_XX_00181

Dimensional drawings
SIMOTICS S servomotors for SINAMICS S120

SIMOTICS S-1FT7 synchronous motors
Compact without/with DRIVE-CLiQ – Forced ventilation

Dimensional drawings

Shaft height	Type	DIN IEC / P (a_1)	b (–)	b_1 (N)	c_1 (LA)	e_1 (M)	f (AB)	f_1 (T)	s_2 (S)	g_2 (–) Size 1.5	g_2 (–) Size 3	g_3 (–)	h (H)	h_1 (–)	h_2 (–)
										Connector size					Fan
1FT7 Compact, type of construction IM B5, forced ventilation, with connector, with/without brake															
63	1FT706.-.S	155 (6.10)	158 (6.22)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	11 (0.43)	125 (4.92)	–	102 (4.02)	26 (1.02)	143 (5.36)	135 (5.31)
80	1FT708.-.S	194 (7.68)	186 (7.32)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	11 (0.43)	139 (5.47)	167 (6.57)	137.5 (5.41)	27 (1.06)	177 (6.97)	186.5 (7.34)
100	1FT710.-5S	245 (9.65)	224 (8.82)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	14 (0.55)	159 (6.26)	187 (7.36)	151 (5.94)	27 (1.06)	220 (8.66)	222 (8.74)

Shaft height	Type	DIN IEC (i_2 –)	Flange 1 (1FT6-compatible) without brake k (LB)	o_1 (–)	with brake k (LB)	o_1 (–)	Flange 0 f_2 (–)	i_2 (–)	without brake k (LB)	o_1 (–)	with brake k (LB)	o_1 (–)	Shaft extension DE d (D)	d_6 (–)	l (E)	t (GA)	u (F)
63	1FT7065-7S	50 (1.97)	380 (14.96)	220 (8.66)	380 (14.96)	220 (8.66)	6 (0.24)	56.5 (2.22)	373.5 (14.70)	214 (8.43)	373.5 (14.70)	214 (8.43)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT7067-7S		420 (16.54)	260 (10.24)	420 (16.54)	260 (10.24)			413.5 (16.28)	254 (10.00)	413.5 (16.28)	254 (10.00)					
80	1FT7084-5S	58 (2.28)	342 (13.46)	182 (7.17)	394 (15.51)	234 (9.21)	6 (0.24)	64.5 (2.54)	336 (13.23)	175 (6.89)	387 (15.24)	228 (8.98)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7085-7S		414 (16.30)	254 (10.00)	414 (16.30)	254 (10.00)			408 (16.06)	247 (9.72)	408 (16.06)	247 (9.72)					
	1FT7086-5S		394 (15.51)	234 (9.21)	446 (17.56)	286 (11.26)			387 (15.24)	227 (8.94)	440 (17.32)	379 (14.92)					
	1FT7087-7S		474 (18.66)	314 (12.36)	474 (18.66)	314 (12.36)			468 (18.43)	307 (12.09)	468 (18.43)	307 (12.09)					
100	1FT7105	80 (3.15)	404 (15.91)	238 (9.37)	456 (17.95)	290 (11.42)	6.5 (0.26)	87 (3.43)	397 (15.63)	231 (9.09)	449 (17.68)	283 (11.14)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT7108		473 (18.62)	307 (12.09)	525 (20.67)	359 (14.13)			466 (18.35)	300 (11.81)	518 (20.39)	352 (13.86)					

6

1FT706
1FT708
1FT710

Shaft design with feather key

Dimensional drawings

Shaft height	Type	DIN IEC	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	g₂ —	i₂ —	s₂ S	**d D**	d₆ —	l E	t GA	u F
													Shaft extension DE		
1FK7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake															
20	1FK701		30 (1.18)	7 (0.28)	46 (1.81)	40 (1.57)	2.5 (0.10)	66 (2.60)	18 (0.71)	4.5 (0.18)	**8 (0.31)**	– (0.59)	18 (0.71)	8.8 (0.35)	2 (0.08)
28	1FK702		40 (1.57)	10 (0.39)	63 (2.48)	55 (2.17)	2.5 (0.10)	75 (2.95)	20 (0.79)	5.4 (0.21)	**9 (0.35)**	M3	20 (0.79)	10.2 (0.40)	3 (0.12)

Encoder system:
Resolver
Absolute encoders AM16S/R / AM15DQ

Encoder system:
Incremental encoders IC2048S/R / IC22DQ
Absolute encoders AM2048S/R / AM22DQ
AM512S/R / AM20DQ
AM32S/R / AM16DQ

Dimensions in mm (inches)

Shaft height	Type	without brake k LB	o₁ —	o₂ —	with brake k LB	o₁ —	o₂ —	without brake k LB	o₁ —	o₂ —	with brake k LB	o₁ —	o₂ —
20	1FK7011	140 (5.51)	89 (3.50)	118 (4.65)	140 (5.51)	89 (3.50)	118 (4.65)	155 (6.10)	89 (3.50)	118 (4.65)	155 (6.10)	89 (3.50)	118 (4.65)
	1FK7015	165 (6.50)	114 (4.59)	143 (5.63)	165 (6.50)	114 (4.49)	143 (5.63)	180 (7.09)	114 (4.49)	143 (5.63)	180 (7.09)	114 (4.49)	143 (5.63)
28	1FK7022	153 (6.02)	95 (3.74)	128 (5.04)	175 (6.89)	95 (3.74)	150 (5.91)	178 (7.01)	95 (3.74)	128 (5.04)	200 (7.87)	95 (3.74)	150 (5.91)

1FK701
1FK702

Shaft design
with feather key

6

■ **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	a₁ P	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	i₂ –	s₂ S	**d** **D**	d₆ –	l E	t GA	u F

Shaft extension DE

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	i_2 –	s_2 S	**d** **D**	d_6 –	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 (3.54)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	30 (1.18)	6.5 (0.26)	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
48	1FK704		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	40 (1.57)	6.5 (0.26)	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
63	1FK706		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	50 (1.97)	9 (0.35)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
80	1FK708		194 (7.64)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	58 (2.28)	11 (0.43)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
100	1FK710		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	80 (3.15)	14 (0.55)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

1FK703
1FK704
1FK706
1FK708
1FK710

Shaft design with feather key

Version with DRIVE-CLiQ interface

Version without DRIVE-CLiQ interface

■ Dimensional drawings

For motor		**DQI encoder** with DRIVE-CLiQ interface (without resolver) Dimensions in mm (inches)							**Encoder system** without DRIVE-CLiQ interface (without resolver)						
					without brake		with brake					without brake		with brake	
Shaft height	Type	g_1 –	g_2 –	o_2 –	k LB	o_1 –	k LB	o_1 –	g_1 –	g_2 –	o_2 –	k LB	o_1 –	k LB	o_1 –
1FK7 Compact															
36	1FK7032-2A	104.5 (4.11)	78 (3.07)	50 (1.97)	173 (6.81)	111 (4.37)	200 (7.87)	138 (5.43)	77 (3.03)	78 (3.07)	47 (1.85)	173 (6.81)	111 (4.37)	200 (7.87)	138 (5.43)
	1FK7034-2A				198 (7.80)	136 (5.35)	225 (8.86)	263 (6.42)				198 (7.80)	136 (5.35)	225 (8.86)	163 (6.42)
48	1FK7040-2A	104.5 (4.11)	90 (4.09)	50 (1.97)	147 (6.61)	85 (4.17)	179 (7.99)	117 (5.55)	93 (3.66)	90 (4.09)	52 (2.05)	152 (6.81)	85 (4.17)	184 (8.19)	117 (5.55)
	1FK7042-2A				174 (6.85)	112 (4.41)	206 (8.11)	144 (5.67)				179 (7.05)	112 (4.41)	211 (8.31)	144 (5.57)
63	1FK7060-2A	104.5 (4.11)	104 (4.09)	50 (1.97)	168 (6.61)	106 (4.17)	203 (7.99)	141 (5.55)	93 (3.66)	104 (4.09)	52 (2.05)	173 (6.81)	106 (4.17)	208 (8.19)	141 (5.55)
	1FK7062-2A				190 (7.48)	128 (5.04)	226 (8.90)	163 (6.42)				195 (7.68)	128 (5.04)	231 (9.09)	163 (6.42)
	1FK7063-2A				213 (8.39)	151 (5.94)	248 (9.76)	186 (7.32)				218 (8.58)	151 (5.94)	253 (9.96)	186 (7.32)
80	1FK7080-2A	104.5 (4.11)	119 (4.69)	48 (1.89)	171 (6.73)	111 (4.37)	223 (8.78)	163 (6.42)	93 (3.66)	119 (4.69)	50 (1.97)	176 (6.93)	111 (4.37)	228 (8.98)	163 (6.42)
	1FK7081-2A				190 (7.48)	130 (5.12)	242 (9.53)	182 (7.17)				196 (7.68)	130 (5.12)	247 (9.72)	182 (7.17)
	1FK7083-2A				209 (8.23)	149 (5.87)	261 (10.28)	201 (7.91)				214 (8.43)	149 (5.87)	266 (10.47)	201 (7.91)
	1FK7084-2A				229 (9.02)	168 (6.61)	281 (11.06)	221 (8.70)				234 (9.21)	168 (6.61)	286 (11.26)	221 (8.70)
100	1FK7100-2A	104.5 (4.11)	137 (5.39)	53 (2.09)	183 (7.20)	118 (4.65)	220 (8.66)	170 (6.69)	93 (3.66)	137 (5.39)	55 (2.17)	188 (7.40)	118 (4.65)	225 (8.86)	170 (6.69)
	1FK7101-2A		158 (6.22)		209 (8.23)	144 (5.67)	261 (10.28)	196 (7.72)		158 (6.22)		214 (8.43)	144 (5.67)	266 (10.47)	196 (7.72)
	1FK7103-2A				235 (9.25)	170 (6.69)	287 (11.30)	222 (8.74)				240 (9.45)	170 (6.69)	292 (11.50)	222 (8.74)
	1FK7105-2A				287 (11.30)	222 (8.74)	339 (13.35)	274 (10.79)				292 (11.50)	222 (8.74)	344 (13.54)	274 (10.79)
1FK7 High Dynamic															
36	1FK7033-4C	104.5 (4.11)	78 (3.07)	50 (1.97)	183 (7.20)	121 (4.76)	210 (8.27)	148 (5.83)	77 (3.03)	78 (3.07)	47 (1.85)	183 (7.20)	121 (4.76)	210 (8.27)	148 (5.83)
48	1FK7043-4C	104.5 (4.11)	90 (3.54)	56 (2.20)	200 (7.87)	132 (5.20)	232 (9.13)	164 (6.46)	93 (3.66)	90 (3.54)	58 (2.28)	205 (8.07)	132 (5.20)	237 (9.33)	164 (6.46)
	1FK7044-4C				225 (8.86)	157 (6.18)	257 (10.12)	189 (7.44)				230 (9.06)	157 (6.18)	262 (10.31)	189 (7.44)
63	1FK7061-4C	104.5 (4.11)	104 (4.09)	50 (1.97)	203 (7.99)	141 (5.55)	238 (9.37)	176 (6.93)	93 (3.66)	104 (4.09)	52 (2.05)	208 (8.19)	141 (5.55)	243 (9.57)	176 (6.93)
	1FK7064-4C				267 (10.51)	205 (8.07)	302 (11.89)	240 (9.45)				272 (10.71)	205 (8.07)	307 (12.09)	240 (9.45)
80	1FK708.-4CC	104.5 (4.11)	119 (4.69)	48 (1.89)	257 (10.12)	197 (7.76)	309 (12.17)	249 (9.80)	93 (3.66)	119 (4.69)	50 (1.97)	262 (10.31)	197 (7.76)	314 (12.36)	249 (9.80)
	1FK708.-4CF		139 (5.47)							139 (5.47)					
1FK7 High Inertia															
48	1FK7042-3B	104.5 (4.11)	90 (3.54)	50 (1.97)	187 (7.36)	125 (4.92)	219 (8.62)	157 (6.18)	93 (3.66)	90 (3.54)	52 (2.05)	192 (7.56)	125 (4.92)	224 (8.82)	157 (6.18)
63	1FK7060-3B	104.5 (4.11)	104 (4.09)	50 (1.97)	182 (7.17)	120 (4.72)	217 (8.54)	155 (6.10)	93 (3.66)	104 (4.09)	52 (2.05)	187 (7.36)	120 (4.72)	222 (8.74)	155 (6.10)
	1FK7062-3B				216 (8.50)	153 (6.02)	251 (9.88)	189 (7.44)				221 (8.70)	153 (6.02)	256 (10.08)	189 (7.44)
80	1FK7081-3B	104.5 (4.11)	119 (4.69)	48 (1.89)	211 (8.31)	151 (5.94)	264 (10.39)	203 (7.99)	93 (3.66)	119 (4.69)	50 (1.97)	216 (8.50)	151 (5.94)	269 (10.59)	203 (7.99)
	1FK7084-3B				270 (10.63)	209 (8.23)	322 (12.68)	262 (10.31)				275 (10.83)	209 (8.23)	327 (12.87)	262 (10.31)

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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									Shaft extension DE				
			Dimensions in mm (inches)													
Shaft height	Type	DIN IEC	a₁ P	b₁ N	c₁ LA	e₁ M	f AB	f₁ T	i₂ –	s₂ S	d D	d₆ –	l E	t GA	u F
1FK7 Compact/High Dynamic															
36	1FK703		90 (3.54)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	30 (1.18)	6.5 (0.26)	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
48	1FK704		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	40 (1.57)	6.5 (0.26)	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
63	1FK706		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	50 (1.97)	9 (0.35)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
80	1FK708		194 (7.64)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	58 (2.28)	11 (0.43)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
100	1FK710		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	80 (3.15)	14 (0.55)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

1FK703
1FK704
1FK706
1FK708
1FK710

Shaft design with feather key

Version with resolver

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■ Dimensional drawings

For motor		Resolver with/without DRIVE-CLiQ interface							
		Dimensions in mm (inches)							
					without brake		with brake		
Shaft height	Type	g_1 –	g_2 –	o_2 –	k LB	o_1 –	k LB	o_1 –	
1FK7 Compact									
36	1FK7032-2A	80 (3.15)	80 (3.15)	15 (0.59)	153 (6.02)	117 (4.61)	180 (7.09)	144 (5.67)	
	1FK7034-2A				178 (7.01)	142 (5.59)	205 (8.07)	169 (6.65)	
48	1FK7040-2A	90 (3.54)	90 (3.54)	23 (0.91)	132 (5.20)	85 (3.35)	164 (6.46)	117 (4.61)	,
	1FK7042-2A				160 (6.30)	112 (4.41)	192 (7.56)	144 (5.67)	
63	1FK7060-2A	103 (4.06)	104 (4.09)	23 (0.91)	153 (6.02)	106 (4.17)	189 (7.44)	141 (5.55)	
	1FK7062-2A				176 (6.93)	128 (5.04)	211 (8.31)	163 (6.42)	
	1FK7063-2A				198 (7.80)	151 (5.94)	234 (9.21)	186 (7.32)	
80	1FK7080-2A	118 (4.65)	119 (4.69)	21 (0.83)	157 (6.18)	111 (4.37)	209 (8.23)	163 (6.42)	
	1FK7081-2A				176 (6.93)	130 (5.12)	228 (8.98)	182 (7.17)	
	1FK7083-2A				195 (7.68)	149 (5.87)	247 (9.72)	201 (7.91)	
	1FK7084-2A				214 (8.43)	168 (6.61)	266 (10.47)	221 (8.70)	
100	1FK7100-2A	136 (5.35)	137 (5.39)	26 (1.02)	169 (6.65)	118 (4.65)	206 (8.11)	155 (6.10)	
	1FK7101-2A		158 (6.22)		195 (7.68)	144 (5.67)	247 (9.72)	196 (7.72)	
	1FK7103-2A				221 (8.70)	170 (6.69)	273 (10.75)	222 (8.74)	
	1FK7105-2A				273 (10.75)	222 (8.74)	325 (12.80)	274 (10.79)	
1FK7 High Dynamic									
36	1FK7033-4C	81 (3.19)	80 (3.15)	15 (0.59)	163 (6.42)	127 (5.00)	190 (7.48)	154 (6.06)	
48	1FK7043-4C	90 (3.54)	90 (3.54)	23 (0.9)	186 (7.32)	138 (5.43)	218 (8.58)	170 (6.69)	
	1FK7044-4C				211 (8.31)	163 (6.42)	243 (9.57)	195 (7.68)	
63	1FK7061-4C	103 (4.06)	104 (4.09)	23 (0.9)	188 (7.40)	141 (5.55)	224 (8.82)	176 (6.93)	
	1FK7064-4C				252 (9.92)	205 (8.07)	288 (11.34)	240 (9.45)	
80	1FK708.-4CC	118 (4.65)	119 (4.69)	21 (0.83)	243 (9.57)	197 (7.76)	295 (11.61)	250 (9.84)	
	1FK708.-4CF		139 (5.47)						

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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
1FT7/1FK7 with SP+ series planetary gearbox 1-stage/2-stage										
SP060S-MF1/-MF2	16 (0.63)	60 (2.36)	68 (2.68)	5.5 (0.22)	62 (2.48)	28 (1.10)	20 (0.79)	6 (0.24)	18 (0.71)	5 (0.20)
SP075S-MF1/-MF2	22 (0.87)	70 (2.76)	85 (3.35)	6.6 (0.26)	76 (2.99)	36 (1.42)	20 (0.79)	7 (0.28)	24.5 (0.96)	6 (0.24)
SP100S-MF1/-MF2	32 (1.26)	90 (3.54)	120 (4.72)	9 (0.35)	101 (3.98)	58 (2.28)	30 (1.18)	10 (0.39)	35 (1.38)	10 (0.39)
SP140S-MF1/-MF2	40 (1.57)	130 (5.12)	165 (6.50)	11 (0.43)	141 (5.55)	82 (3.23)	30 (1.18)	12 (0.47)	43 (1.69)	12 (0.47)
SP180S-MF1/-MF2	55 (2.17)	160 (6.30)	215 (8.46)	13.5 (0.53)	182 (7.17)	82 (3.23)	30 (1.18)	15 (0.59)	59 (2.32)	16 (0.63)
SP210S-MF1/-MF2	75 (2.95)	180 (7.09)	250 (9.84)	17 (0.67)	215 (8.46)	105 (4.13)	38 (1.50)	17 (0.67)	79.5 (3.13)	20 (0.79)
SP240S-MF1/-MF285	85 (3.35)	200 (7.87)	290 (11.42)	17 (0.67)	245 (9.65)	130 (5.12)	40 (1.57)	20 (0.79)	90 (3.54)	22 (0.87)

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■ **Dimensional drawings**

Planetary gearbox	Motor	SP+ series planetary gearbox 1-stage -MF1			SP+ series planetary gearbox 2-stage -MF2		
Type	Type	D1	F1	L1	D1	F1	L1
1FT7/1FK7 with SP+ series planetary gearbox 1-stage/2-stage							
SP060S-	1FT702/1FK702	68 (2.68)	70 (2.76)	89.3 (3.52)	70 (2.76)	60 (2.36)	108 (4.25)
	1FT703/1FK703	68 (2.68)	70 (2.76)	94 (3.70)	68 (2.68)	70 (2.76)	116 (4.57)
	1FT704/1FK704	91 (3.58)	90 (3.54)	106 (4.17)	–	–	–
SP075S-	1FT702/1FK702	91 (3.58)	90 (3.54)	107.8 (4.24)	95 (3.74)	70 (2.76)	119 (4.69)
	1FT703/1FK703	91 (3.58)	90 (3.54)	107.8 (4.24)	95 (3.74)	70 (2.76)	123.4 (4.86)
	1FT704/1FK704	91 (3.58)	90 (3.54)	111.5 (4.39)	91 (3.58)	90 (3.54)	135.6 (5.34)
SP100S-	1FT702/1FK702	–	–	–	118 (4.65)	90 (3.54)	142.3 (5.60)
	1FT703/1FK703	–	–	–	118 (4.65)	90 (3.54)	142.3 (5.60)
	1FT704/1FK704	115 (4.53)	120 (4.72)	122 (4.80)	118 (4.65)	90 (3.54)	146 (5.75)
	1FT704/1FK706	115 (4.53)	120 (4.72)	129 (5.08)	115 (4.53)	120 (4.72)	164 (6.46)
SP140S-	1FT704/1FK704	–	–	–	152 (5.98)	120 (4.72)	186.3 (7.33)
	1FT706/1FK706	146 (5.75)	150 (5.91)	162.3 (6.39)	152 (5.98)	120 (4.72)	193.3 (7.61)
	1FT708/1FK708	146 (5.75)	150 (5.91)	171.3 (6.74)	146 (5.75)	150 (5.91)	220 (8.66)
	1FT710/1FK710	146 (5.75)	190 (7.48)	171.3 (6.74)	–	–	–
SP180S-	1FT706/1FK706	–	–	–	212 (8.35)	150 (5.91)	234 (9.21)
	1FT708/1FK708	207 (8.15)	210 (8.27)	198 (7.80)	212 (8.35)	150 (5.91)	242.9 (9.56)
	1FT710/1FK710	207 (8.15)	210 (8.27)	203.5 (8.01)	212 (8.35)	190 (7.48)	242.9 (9.56)
SP210S-	1FT708/1FK708	–	–	–	215 (8.46)	210 (8.27)	272 (10.71)
	1FT710/1FK710	215 (8.46)	190 (7.48)	242 (9.53)	215 (8.46)	210 (8.27)	272 (10.71)
SP240S-	1FT708/1FK708	–	–	–	245 (9.65)	210 (8.27)	297.5 (11.71)
	1FT710/1FK710	245 (9.65)	240 (9.45)	273 (10.75)	245 (9.65)	210 (8.27)	297.5 (11.71)

For SP+ series planetary gearboxes on SIMOTICS S-1FT7/-1FK7 motors

Dimensions in mm (inches)

6

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	Motor												
Type	Type	L1	L2	L3	L5	L6	L7	D1	D2	D3	D4	D5
1FK7 with LP+ series planetary gearbox													
LP050-MO1	1FK702	63 (2.48)	18 (0.71)	6.5 (0.26)	8 (0.31)	13.5 (0.53)	4 (0.16)	50 (1.97)	12 (0.47)	35 (1.38)	44 (1.73)	M4
LP070-MO1	1FK702	83 (3.27)	28 (1.10)	8 (0.31)	10 (0.39)	18 (0.71)	5 (0.20)	70 (2.76)	16 (0.63)	52 (2.05)	62 (2.44)	M5
	1FK703	90 (3.54)										
LP090-MO1	1FK704	112 (4.41)	36 (1.42)	10 (0.39)	12 (0.47)	24.5 (0.96)	6 (0.24)	90 (3.54)	22 (0.87)	68 (2.68)	80 (3.15)	M6
	1FK706	122 (4.80)										
	1FK708	132 (5.20)										
LP120-MO1	1FK706	140 (5.51)	58 (2.28)	12 (0.47)	16 (0.63)	35 (1.38)	10 (0.39)	120 (4.72)	32 (1.26)	90 (3.54)	108 (4.25)	M8
	1FK708	150 (5.91)										
LP155-MO1	1FK708	168.5 (6.63)	82 (3.23)	15 (0.59)	20 (0.79)	43 (1.69)	12 (0.47)	155 (6.10)	40 (1.57)	120 (4.72)	140 (5.51)	M10
	1FK710	188.5 (7.42)										

1FK703
1FK704
1FK706
1FK708
1FK710

G_NC01_XX_00448

■ 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 and cover		Secondary section length
Type	b_M	h_M	b_M	h_M	L_P	Type	b_S	h_S	b_S	h_S	L_S
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)						

G_DA65_XX_00238

1FN3050 to 1FN3450 without precision cooling

G_DA65_XX_00240

1FN3600 to 1FN3900 without precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

G_DA65_XX_00239

1FN3050 to 1FN3450 with precision cooling

G_DA65_XX_00241

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_M	h_M	b_M	h_M	L_P	Type	b_S	h_S	b_M	h_M	L_S
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)	1FN3100-4SA00-0AA0	88 (3.46)	11.8 (0.46)	105 (4.13)	14.8 (0.58)	120 (4.72)
1FN3100-2NC					267 (10.51)						
1FN3100-3NC					372 (14.65)						
1FN3100-4NC					477 (18.78)						
1FN3150-1NC	126 (4.96)	61.4 (2.42)	135 (5.31)	76.3 (3.00)	162 (6.38)	1FN3150-4SA00-0AA0	118 (4.65)	13.8 (0.54)	135 (5.31)	16.8 (0.66)	120 (4.72)
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)						

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G_DA65_XX_00238

1FN3050 to 1FN3450 without precision cooling

G_DA65_XX_00240

1FN3600 to 1FN3900 without precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

G_DA65_XX_00239

1FN3050 to 1FN3450 with precision cooling

G_DA65_XX_00241

1FN3600 to 1FN3900 with precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

■ **Dimensional drawings**

Primary section	Dimensions in mm (inches)			Secondary section	Dimensions in mm (inches)		
			Primary section length				Secondary section length
Type	B_P	H_P	L_P	Type	B_S	H_S	L_S
1FN6 natural cooling							
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)				

G_NC01_XX_00393

SIMOTICS L-1FN6 primary section

G_NC01_XX_00394

SIMOTICS L-1FN6 secondary section

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Dimensional drawings
SIMOTICS L linear motors for SINAMICS S120

SIMOTICS L-1FN6 synchronous linear motors
Water cooling

■ **Dimensional drawings**

Primary section	Dimensions in mm (inches)		Primary section length	Secondary section	Dimensions in mm (inches)		Secondary section length
Type	B$_P$	H$_P$	L$_P$	Type	B$_S$	H$_S$	L$_S$
1FN6 water cooling							
1FN6003-1WC	80 (3.15)	49.4 (1.94)	219 (8.62)	1FN6003-1SC00-0AA0	75 (2.95)	20 (0.79)	200 (7.87)
1FN6003-1WE			344 (13.54)	1FN6003-1SF00-0AA0			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	110 (4.33)	26 (1.02)	200 (7.87)
1FN6007-1WE			344 (13.54)	1FN6007-1SF00-0AA0			500 (19.69)
1FN6007-1WG			469 (18.46)				
1FN6007-1WJ			594 (23.39)				
1FN6007-1WL			719 (28.31)				
1FN6007-1WN			844 (33.23)				

G_NC01_XX_00402

SIMOTICS L-1FN6 primary section

G_NC01_XX_00403

SIMOTICS L-1FN6 secondary section

6

■ **Dimensional drawings**

For motor	Dimensions in mm (inches)				
Type	D1	D2	D3	L1	L2
1FW6, individual components, water cooling					
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

G_NC01_XX_00500

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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
1FW6, individual components, water cooling					
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

G_DA65_XX_00244

6
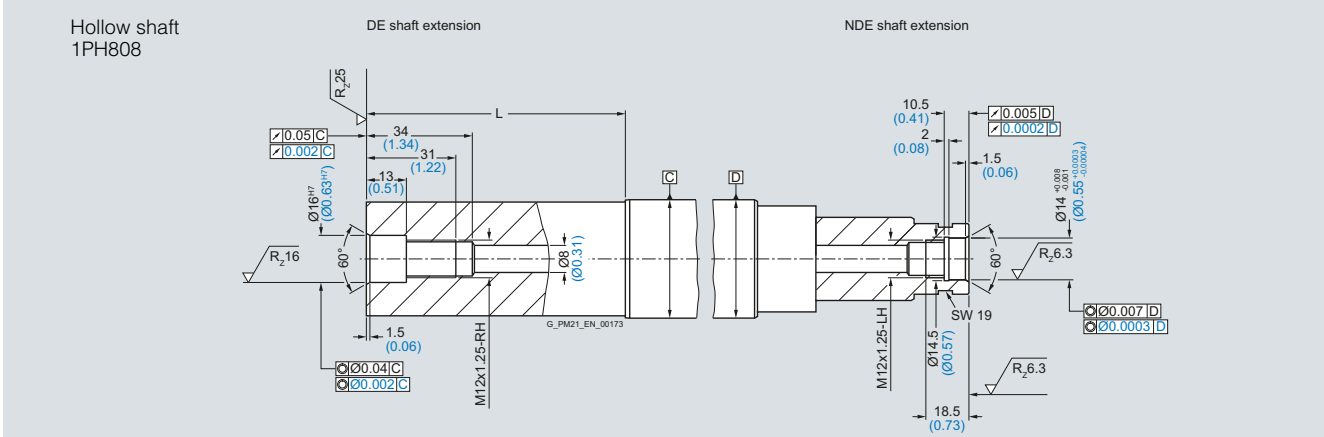
■ Dimensional drawings

For motor	Dimensions in mm (inches)				
Type	D1	D2	D3	L1	L2
1FW6, individual components, water cooling					
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

G_DA65_XX_00245

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	m₁ –	m₂ –	n AA	p HD	p₁ –	s K	s₃ –	w₁ C
1PH8, type of construction IM B3, forced ventilation																
80	1PH8083		194 (7.64)	125 (4.92)	8 (0.31)	155 (6.10)	80 (3.15)	375 (14.76)	42 (1.65)	62 (2.44)	20 (0.79)	35 (1.38)	216 (8.5)	253.5 (9.98)	10 (0.39)	M25×1.5	38 (1.50)
	1PH8087		244 (9.61)					425 (16.73)									

Shaft height	Type	DIN IEC	Shaft extension DE					Design with hollow shaft	
			d D	l L	d₆ –	t GA	u F	k LB	k₁ –
80	1PH8083		**32 (1.26)**	80 (3.15)	M12	35 (1.39)	10 (0.39)	575 (22.64)	319.3 (12.57)
	1PH8087							625 (24.61)	369.3 (14.54)

1PH808

Design with hollow shaft

Hollow shaft

DE shaft extension

NDE shaft extension

■ **Dimensional drawings**

For motor		Dimensions in mm (inches)											
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB	p HD	p_1 –	s_2 –	s_3 –
1PH8, type of construction IM B5, forced ventilation														
80	1PH8083		200 (7.87)	130 (5.12)	12 (0.47)	165 (6.50)	155 (6.10)	3.5 (0.14)	77.5 (3.05)	375 (14.76)	213.5 (8.41)	251 (9.88)	12 (0.47)	M25×1.5
	1PH8087									425 (16.73)				

Shaft height	Type	DIN IEC	Shaft extension DE						Design with hollow shaft		
			d **D**	l L	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	
80	1PH8083		**32** **(1.26)**	80 (3.15)	M12	80 (3.15)	35 (1.38)	10 (0.39)	575 (22.64)	319.3 (12.57)	
	1PH8087								625 (24.61)	369.3 (14.54)	

1PH808

Variant with power connector size 1.5

Connector size 1 for connection of fan

G_PM21_EN_00042a

Hollow shaft

DE shaft extension

NDE shaft extension

G_PM21_EN_00173

6

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	m₁ –	m₂ –	n AA	p HD	p₁ –	p₂ –	p₃ –
1PH8, type of construction IM B3, forced ventilation																
100	1PH8101		167 (6.57)	160 (6.30)	11 (0.43)	196 (7.72)	100 (3.94)	369.5 (14.55)	49 (1.93)	74 (2.91)	24 (0.94)	40 (1.57)	252 (9.92)	294 (11.6)	198 (7.80)	276.5 (10.89)
	1PH8103		202.5 (7.97)					405 (15.94)								
	1PH8105		262 (10.31)					464.5 (18.29)								
	1PH8107		297.5 (11.71)					500 (19.69)								
132	1PH8131		220.5 (8.68)	216 (8.50)	15 (0.59)	260 (10.24)	132 (5.2)	439 (17.28)	57 (2.24)	93 (3.66)	27 (1.06)	52 (2.05)	317.5 (12.50)	347 (13.66)	262 (10.31)	357.5 (14.07)
	1PH8133		265.5 (10.45)					484 (19.06)								
	1PH8135		310.5 (12.22)					529 (20.83)								
	1PH8137		350.5 (13.80)					569 (22.40)								

Shaft height	Type	DIN IEC	s K	s₃ –	s₄ –	w₁ C	**d D**	l L	d₆ –	t GA	u F	k LB	k₁ –	p HD	p₃ –	s₃ –
							Shaft extension DE					Design with hollow shaft				
100	1PH8101		12 (0.47)	M32×1.5	M20×1.5	43 (1.69)	**38 (1.50)**	80 (3.15)	M12	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.30)	266.5 (10.49)	276.5 (10.89)	M32×1.5
	1PH8103											605 (23.82)	347.8 (13.69)			
	1PH8105											664.5 (26.16)	407.3 (16.04)			
	1PH8107											700 (27.56)	442.8 (17.43)			
132	1PH8131		12 (0.47)	M40×1.5	M20×1.5	53 (2.09)	**48 (1.89)**	110 (4.33)	M16	51.5 (2.03)	14 (0.55)	639 (25.16)	372.8 (14.68)	347.5 (13.68)	357.5 (14.07)	M50×1.5
	1PH8133											684 (26.93)	417.8 (16.45)			
	1PH8135											729 (28.70)	462.8 (18.22)			
	1PH8137											769 (30.28)	502.8 (19.80)			

6

■ **Dimensional drawings**

1PH810

Variant with power connector size 1.5

Connector size 1 for fan connection

G_PM21_XX_00067

G_PM21_EN_00044

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

G_PM21_XX_000b6

G_PM21_EN_00045

Design with hollow shaft

G_PM21_XX_00046

6

Hollow shaft
1PH810
1PH813

DE shaft extension

NDE shaft extension

R_z25

$\boxed{0.05}$ C
$\boxed{0.002}$ C

45
(1.78)

38
(1.50)

17
(0.67)

$\varnothing20^{H7}$
$(\varnothing0.79^{H7})$

60°

R_z16

$\varnothing11.5$
$(\varnothing0.45)$

L

$\boxed{C}$

$\boxed{D}$

1.5
(0.06)

M16x1.5-RH

$\boxed{\varnothing0.04}$ C
$\boxed{\varnothing0.002}$ C

G_PM21_EN_00174

10.5
(0.41)

2
(0.08)

$\boxed{0.005}$ D
$\boxed{0.0002}$ D

1.5
(0.06)

$\varnothing18^{+0.007}_{-0.003}$
$(\varnothing0.71^{+0.0003}_{-0.0001})$

60°

$R_z6.3$

SW 27

M16x1.5-LH

$\varnothing18.5$
$(\varnothing0.73)$

18.5
(0.73)

$R_z6.3$

$\boxed{\varnothing0.007}$ D
$\boxed{\varnothing0.0003}$ D

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 100 – Forced ventilation

Dimensional drawings

Shaft height	Type	DIN IEC B	a P	a_1 A	b N	b_1 HA	c LA	c_1 M	e_1 AB	f T	f_1 H	h LB	k BA	m –	m_1 –	m_2 AA	n HD	p –	p_1
			a B	P	A	N	HA	LA	M	AB	T	H	LB	BA	–	–	AA	HD	–
1PH8, type of construction IM B35, forced ventilation																			
100	1PH8101		167 (6.57)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	16 (0.63)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	369.5 (14.55)	44 (1.73)	74 (2.91)	19 (0.75)	40 (1.57)	252 (9.92)	294 (11.57)
	1PH8103		202.5 (7.97)										405 (15.94)						
	1PH8105		262 (10.31)										464.5 (18.29)						
	1PH8107		297.5 (11.71)										500 (19.69)						

										Shaft extension DE						Design with hollow shaft				
Shaft height	Type	DIN IEC –	p_2 –	p_3 –	s K	s_2 –	s_3 –	s_4 –	w_1 C	**d D**	l L	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	p_3 –	s_3 –
100	1PH8101		198 (7.80)	276.5 (10.89)	12 (0.47)	14 (0.55)	M32×1.5	M20×1.5	43 (1.69)	**38 (1.50)**	80 (3.15)	M12	80 (3.15)	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.30)	266.5 (10.49)	276.5 (10.89)	M32×1.5
	1PH8103															605 (23.82)	347.8 (13.69)			
	1PH8105															664.5 (26.16)	407.3 (16.04)			
	1PH8107															700 (27.56)	442.8 (17.43)			

1PH810

Variant with power connector size 1.5

Connector size 1 for fan connection

G_PM21_EN_00045

■ **Dimensional drawings**

For motor		Dimensions in mm (inches)										
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB	p HD	p_1 –
1PH8, type of construction IM B5, forced ventilation												
100	1PH8101		250 (9.84)	180 (7.09)	16 (0.63)	215 (8.46)	196 (7.72)	4 (0.16)	98 (3.86)	369.5 (14.55)	250 (9.84)	292 (11.50)
	1PH8103									405 (15.94)		
	1PH8105									464.5 (18.29)		
	1PH8107									500 (19.69)		

						Shaft extension DE						Design with hollow shaft			
Shaft height	Type	DIN IEC	s_2 –	s_3 –	s_4 –	**d** **D**	l L	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	s_3 –
100	1PH8101		14 (0.55)	M32×1.5	M20×1.5	**38** **(1.50)**	80 (3.15)	M12	80 (3.15)	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.30)	264.5 (10.41)	M32×1.5
	1PH8103											605 (23.82)	347.8 (13.69)		
	1PH8105											664.5 (16.16)	407.3 (16.04)		
	1PH8107											700 (17.56)	442.8 (17.43)		

1PH810

Variant with power connector size 1.5

Connector size 1 for fan connection

G_PM21_EN_00044

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 132 – Forced ventilation

Dimensional drawings

Shaft height	Type	DIN IEC	a / B	a₁ / P	b / A	b₁ / N	c / HA	c₁ / LA	e₁ / M	f / AB	f₁ / T	h / H	k / LB	m / BA	m₁ / –	m₂ / –	n / AA	p / HD	p₁ / –
			a / B	a₁ / P	b / A	b₁ / N	c / HA	c₁ / LA	e₁ / M	f / AB	f₁ / T	h / H	k / LB	m / BA	m₁ / –	m₂ / –	n / AA	p / HD	p₁ / –
1PH8, type of construction IM B35, forced ventilation																			
132	1PH8131		220.5 (8.68)	340 (13.39)	216 (8.50)	250 (9.84)	15 (0.59)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	439 (17.28)	65 (2.56)	93 (3.66)	35 (1.38)	52 (2.05)	317.5 (12.50)	347 (13.66)
	1PH8133		265.5 (10.45)										484 (19.06)						
	1PH8135		310.5 (12.22)										529 (20.83)						
	1PH8137		350.4 (13.80)										569 (22.40)						

Shaft height	Type	DIN IEC	p₂ / –	p₃ / –	s / K	s₂ / –	s₃ / –	s₄ / –	w₁ / C	Shaft extension DE d / D	l / L	d₆ / –	i₂ / E	t / GA	u / F	Design with hollow shaft k / LB	k₁ / –	p / HD	p₃ / –	s₃ / –
132	1PH8131		262 (10.31)	357.5 (14.07)	12 (0.47)	18 (0.71)	M40×1.5	M20×1.5	53 (2.09)	**48 (1.89)**	110 (4.33)	M16	110 (4.33)	51.5 (2.03)	14 (0.55)	639 (25.16)	372.8 (14.68)	347.5 (13.68)	357.5 (14.07)	M50×1.5
	1PH8133															684 (26.93)	417.8 (16.45)			
	1PH8135															729 (28.70)	462.8 (18.22)			
	1PH8137															769 (30.28)	502.8 (19.80)			

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB	p HD	p_1 –
For motor		**Dimensions in mm (inches)**										
1PH8, type of construction IM B5, forced ventilation												
132	1PH8131		340 (13.39)	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	130 (5.12)	439 (17.28)	315.5 (12.42)	345 (13.58)
	1PH8133									484 (19.06)		
	1PH8135									529 (20.83)		
	1PH8137									569 (22.40)		

Shaft height	Type	DIN IEC	s_2 –	s_3 –	s_4 –	**d** **D**	l L	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	s_3 –
						Shaft extension DE						**Design with hollow shaft**			
132	1PH8131		18 (0.71)	M40×1.5	M20×1.5	**48 (1.89)**	110 (4.33)	M16	110 (4.33)	51.5 (2.03)	14 (0.55)	639 (25.16)	372.8 (14.68)	345.5 (13.60)	M50×1.5
	1PH8133											684 (26.93)	417.8 (16.45)		
	1PH8135											729 (28.70)	462.8 (18.22)		
	1PH8137											769 (30.28)	502.8 (19.80)		

6

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

G_PM21_EN_00045

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120
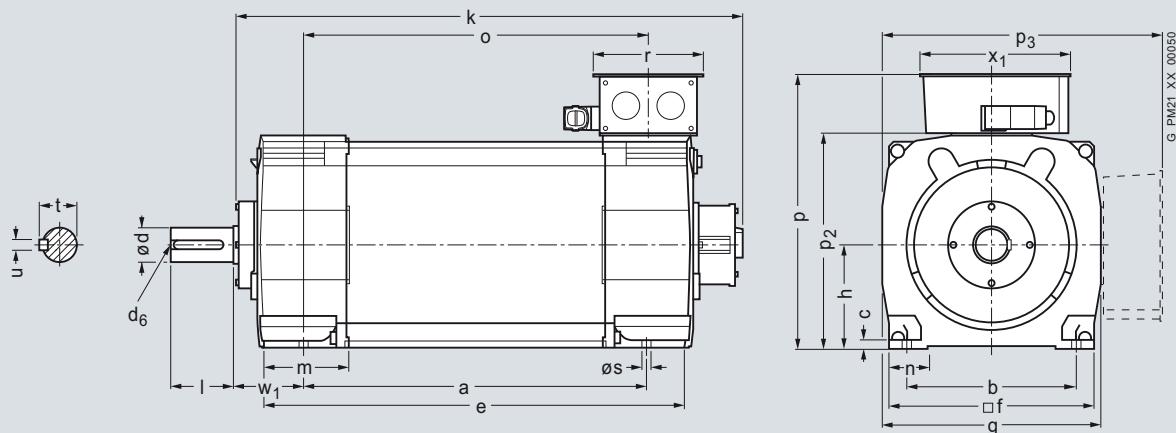
SIMOTICS M-1PH8 asynchronous motors
SH 160 – Forced ventilation

Dimensional drawings

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA

(Dimensions in mm (inches))

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
1PH8, type of construction IM B3, forced ventilation																	
160	1PH8163		346.5 (13.64)	–	254 (10.00)	–	17 (0.67)	23 (0.91)	–	314 (12.36)	–	160 (6.30)	610.5 (24.04)	64 (2.52)	99.5 (3.92)	28 (1.10)	70 (2.76)
	1PH8165		406.5 (16.00)										670.5 (26.40)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ Cv	**d D**	d₆ –	l L	t GA	u F	k LB	k₁ –	p HD	s₃ –
											Shaft extension DE							Design with hollow shaft			
160	1PH8163		382.5 (15.06)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	–	M50×1.5	M20×1.5	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)	810.5 (31.91)	520.8 (20.50)	415.5 (16.36)	M63 × 1.5
	1PH8165																870.5 (34.27)	580.8 (22.87)		

1PH816

Design with hollow shaft

Hollow shaft

DE shaft extension

NDE shaft extension

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
For motor		Dimensions in mm (inches)															
1PH8, type of construction IM B5/IM B35, forced ventilation																	
160	1PH8163		346.5 (13.64)	393 (15.47)	254 (10.00)	300 (11.81)	17 (0.67)	–	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	610.5 (24.04)	55 (2.17)	99.5 (3.92)	19 (0.75)	70 (2.76)
	1PH8165		406.5 (16.00)										670.5 (26.40)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	d D	d₆ –	i₂ E	t GA	u F	k LB	k₁ –	p HD	s₃ –
												Shaft extension DE					Design with hollow shaft			
160	1PH8163		382.5 (15.06)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	18 (0.71)	M50×1.5	M20×1.5	61 (2.40)	**55** (**2.17**)	M20	110 (4.33)	59 (2.32)	16 (0.63)	810.5 (31.91)	520.8 (20.50)	415.5 (16.36)	M63 × 1.5
	1PH8165																870.5 (34.27)	580.8 (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**

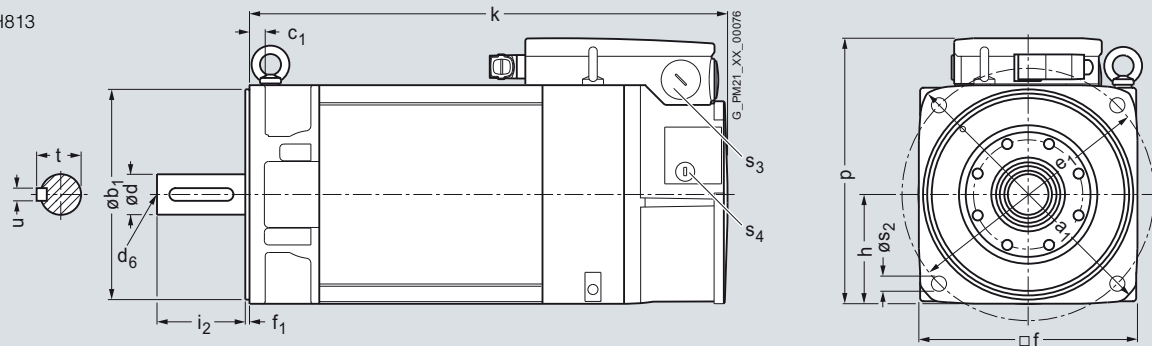| For motor		Dimensions in mm (inches)																
Shaft height	Type	IEC A	AB	AC	B	BB	C	D	DB	E	F	GA	H	HA	HC	K	L
1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE																	
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)
	1PH8186				520 (20.47)	635 (25.00)											1085 (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 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

G_PM21_EN_00129a

■ **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																		
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)
	1PH8186				520 (20.47)	635 (25.00)											1137 (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 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

6

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 180 – Forced ventilation

Dimensional drawings

Shaft height	Type	IEC A	AB	AC	B	BB	C	D	DB	E	F	GA	H	HA	HC	K	L	M	N	P	S
For motor		Dimensions in mm (inches)																			
1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A400 (option K90)																					
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)	350 (13.78)	300 (11.81)	400 (15.75)	18.5 (0.73)
	1PH8186				520 (20.47)	635 (25.00)											1085 (42.72)				

Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box		Dimensions in mm (inches)				
Terminal box type 1XB7 322						
180	1PH8184	490 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)
	1PH8186				519 (20.43)	

LE   Air inlet
LA   Air outlet

■ **Dimensional drawings**

For motor Shaft height	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 A400																					
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)	350 (13.78)	300 (11.81)	400 (15.75)	18.5 (0.73)
	1PH8186				520 (20.47)	635 (25.00)											1137 (44.76)				

Terminal box Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
180	1PH8184	490 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

6

SIMOTICS M-1PH8 asynchronous motors
SH 180 – 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	M	N	P	S
1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A450																					
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)	400 (15.75)	350 (13.78)	450 (17.72)	18.5 (0.73)
	1PH8186				520 (20.47)	635 (25.00)											1085 (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 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

■ **Dimensional drawings**

For motor																							
Shaft height	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 A450																							
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)	400 (15.75)	350 (13.78)	450 (17.72)	18.5 (0.73)		
	1PH8186				520 (20.47)	635 (25.00)											1137 (44.76)						

Terminal box							
Shaft height	Type	IEC AD	AG	AS	BC	LL	
Terminal box type 1XB7 322							
180	1PH8184	490 (19.29)	245 (9.65)	140 (5.51)	429 (16.89)	196 (7.72)	
	1PH8186				519 (20.43)		
Terminal box type 1XB7 422							
180	1PH8184	533 (20.98)	281 (11.06)	176 (6.93)	429 (16.89)	233 (9.17)	
	1PH8186				519 (20.43)		
Terminal box type 1XB7 700							
180	1PH8184	586 (23.07)	297 (11.69)	156 (6.14)	429 (16.89)	310 (12.20)	
	1PH8186				519 (20.43)		

LE Air inlet
LA Air outlet

6

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
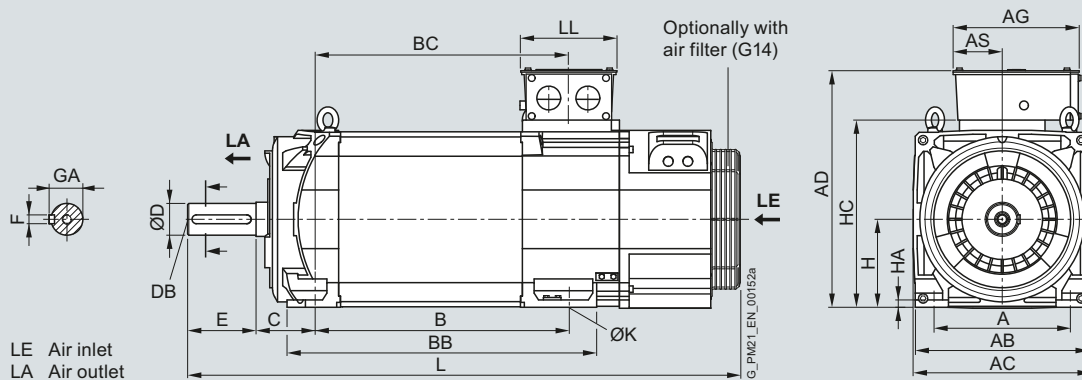**SH 225 – Forced ventilation**

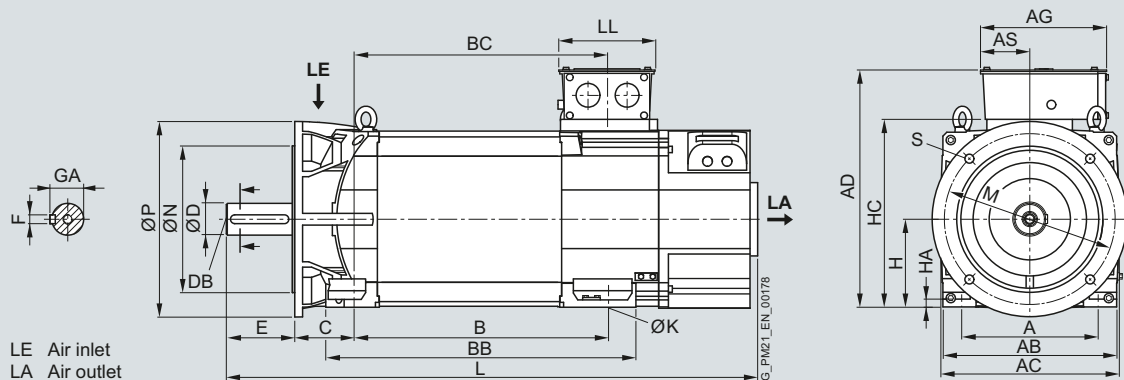### ■ Dimensional drawings

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 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1171 (46.10)
	1PH8226				545 (21.46)	725 (28.54)											1271 (40.04)
	1PH8228				635 (25.00)	815 (32.09)											1361 (53.58)

Terminal box		Dimensions in mm (inches)				
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
225	1PH8224	582 (22.91)	245 (9.65)	140 (5.51)	481 (18.94)	196 (7.72)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	625 (24.61)	281 (11.06)	176 (6.93)	481 (18.94)	233 (9.17)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	678 (26.69)	297 (11.69)	156 (6.14)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

■ **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 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1206 (47.48)
	1PH8226				545 (21.46)	725 (28.54)											1306 (51.42)
	1PH8228				635 (25.00)	815 (32.09)											1396 (54.96)

Terminal box		Dimensions in mm (inches)				
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
225	1PH8224	582 (22.91)	245 (9.65)	140 (5.51)	481 (18.94)	196 (7.72)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	625 (24.61)	281 (11.06)	176 (6.93)	481 (18.94)	233 (9.17)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	678 (26.69)	297 (11.69)	156 (6.14)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 225 – Forced ventilation

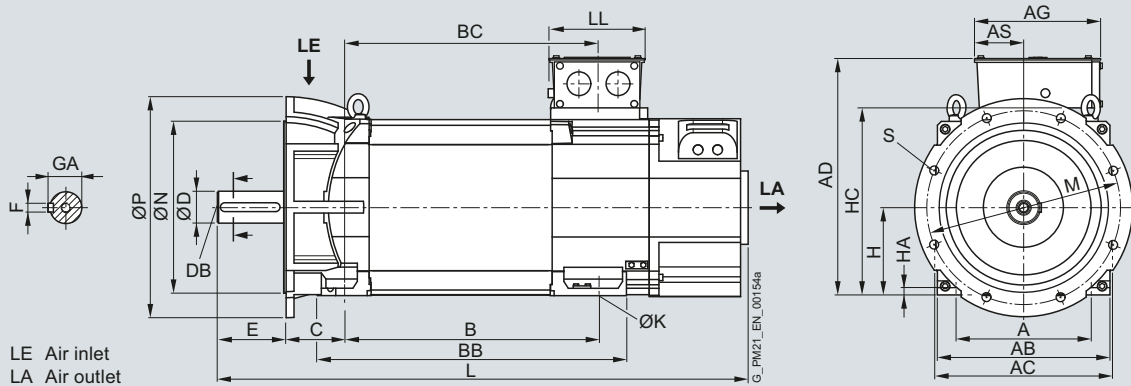### Dimensional drawings

Shaft height	Type	IEC	A	AB	AC	B	BB	C	D	DB	E	F	GA	H	HA	HC	K	L	M	N	P	S
For motor		**Dimensions in mm (inches)**																				
1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A550																						
225	1PH8224		356 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1171 (46.10)	500 (19.69)	450 (17.72)	550 (21.65)	18.5 (0.73)
	1PH8226					545 (21.46)	725 (28.54)											1271 (50.04)				
	1PH8228					635 (25.00)	815 (32.09)											1361 (53.58)				

Shaft height	Type	IEC	AD	AG	AS	BC	LL
Terminal box		**Dimensions in mm (inches)**					
Terminal box type 1XB7 322							
225	1PH8224		582 (22.91)	245 (9.65)	140 (5.51)	481 (18.94)	196 (7.72)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	
Terminal box type 1XB7 422							
225	1PH8224		625 (24.61)	281 (11.06)	176 (6.93)	481 (18.94)	233 (9.17)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	
Terminal box type 1XB7 700							
225	1PH8224		678 (26.69)	297 (11.69)	156 (6.14)	481 (18.94)	310 (12.20)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	

LE   Air inlet
LA   Air outlet

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■ **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	M	N	P	S
1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A550																					
225	1PH8224	356 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1206 (47.48)	500 (19.69)	450 (17.72)	550 (21.65)	18.5 (0.73)
	1PH8226				545 (21.46)	725 (28.54)											1306 (51.42)				
	1PH8228				635 (25.00)	815 (32.09)											1396 (54.96)				

Terminal box		Dimensions in mm (inches)				
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
225	1PH8224	582 (22.91)	245 (9.65)	140 (5.51)	481 (18.94)	196 (7.72)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	625 (24.61)	281 (11.06)	176 (6.93)	481 (18.94)	233 (9.17)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	678 (26.69)	297 (11.69)	156 (6.14)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

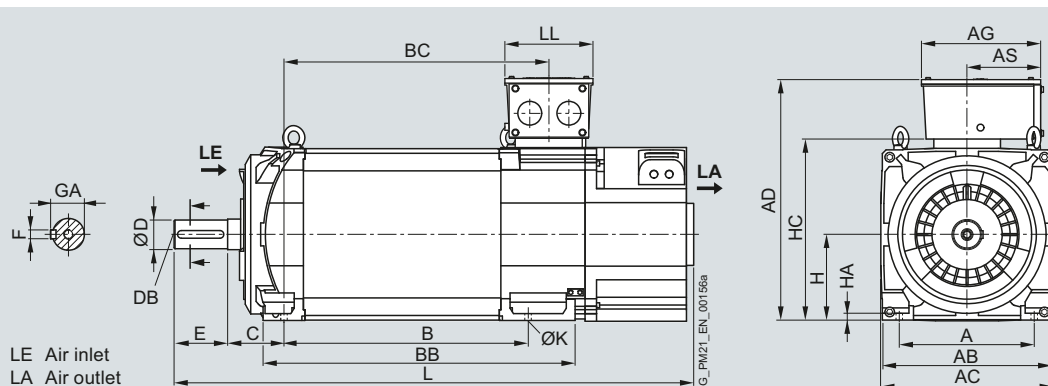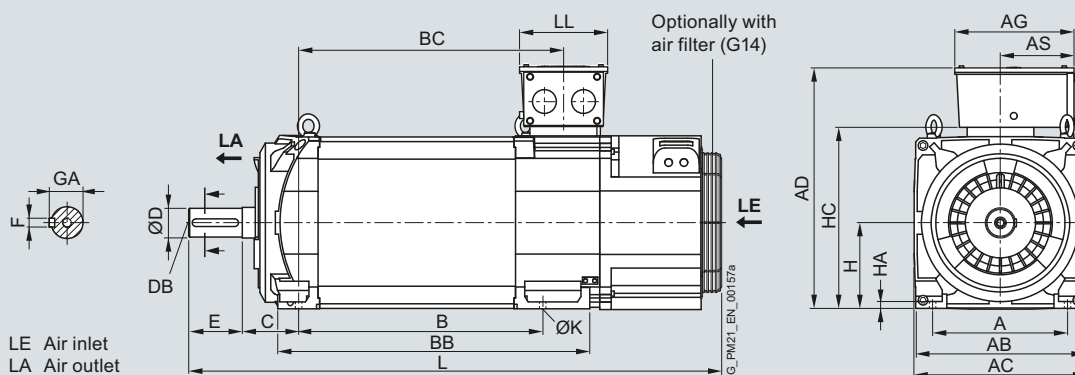**SIMOTICS M-1PH8 asynchronous motors**
SH 280 – Forced ventilation

■ **Dimensional drawings**

For motor		Dimensions in mm (inches)																		
Shaft height	Type	IEC A	AB	AC	B	BB	C	D	DB	E	F	GA	H	K	L	Q	QA	R	SA	Y
1PH8, type of construction IM B3, forced ventilation – direction of air flow NDE → DE																				
280	1PH8284	457 (17.99)	560 (22.05)	582 (22.91)	684 (26.93)	840 (33.07)	190 (7.48)	95 (3.74)	M24	170 (6.69)	25 (0.98)	100 (3.94)	280 (11.02)	24 (0.94)	1316 (51.81)	489 (19.25)	560 (22.05)	700 (27.56)	1146 (45.12)	1042 (41.02)
	1PH8286				794 (31.26)	950 (37.40)									1426 (56.14)	599 (23.58)			1256 (49.45)	
	1PH8288				924 (36.38)	1080 (42.52)									1556 (61.26)	729 (28.70)			1386 (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 (31.06)	297 (11.69)	186 (7.32)	677 (26.65)	310 (12.20)
	1PH8286				787 (30.98)	
	1PH8288				917 (36.10)	
Terminal box type 1XB7 712						
280	1PH8284	836 (32.91)	371 (14.61)	201 (7.91)	691 (27.20)	370 (14.57)
	1PH8286				801 (31.54)	
	1PH8288				931 (36.65)	

LE Air inlet
LA Air outlet

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■ 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 (17.99)	560 (22.05)	582 (22.91)	684 (26.93)	840 (33.07)	190 (7.48)	95 (3.74)	M24	170 (6.69)	25 (0.98)	100 (3.94)	280 (11.02)
	1PH8286				794 (31.26)	950 (37.40)							
	1PH8288				924 (36.38)	1080 (42.52)							

		K	L	M	N	P	Q	QA	R	S	SA	Y	
	1PH8284	24 (0.94)	1316 (51.81)	600 (23.62)	550 (21.65)	660 (25.98)	489 (19.25)	560 (22.05)	700 (27.56)	24 (0.94)	1146 (45.12)	1042 (41.02)	
	1PH8286		1426 (56.14)				599 (23.58)				1256 (49.45)		
	1PH8288		1556 (61.26)				729 (28.70)				1386 (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 (31.06)	297 (11.69)	186 (7.32)	677 (26.65)	310 (12.20)
	1PH8286				787 (30.98)	
	1PH8288				917 (36.10)	
Terminal box type 1XB7 712						
280	1PH8284	836 (32.91)	371 (14.61)	201 (7.91)	691 (27.20)	370 (14.57)
	1PH8286				801 (31.54)	
	1PH8288				931 (36.65)	

LE Air inlet
LA Air outlet

Dimensional drawings

SIMOTICS M asynchronous and synchronous motors for SINAMICS S120
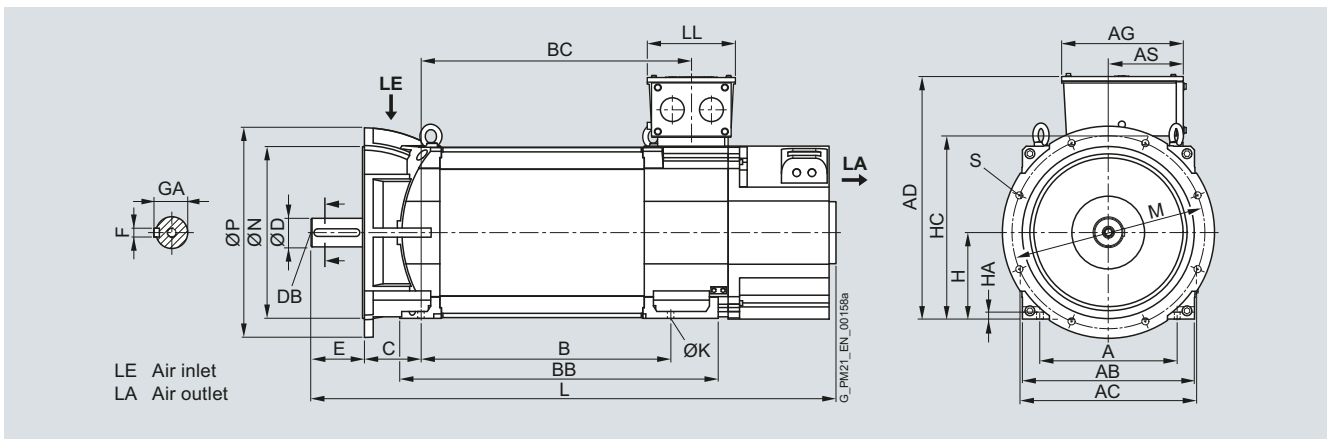
SIMOTICS M-1PH8 asynchronous motors
SH 80 to SH 132 – Water cooling

■ **Dimensional drawings**

For motor			Dimensions in mm (inches)						Standard/ Advanced/ Performance	High Performance/ hollow shaft encoder					
										without hollow shaft	with hollow shaft				
Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	h H	k LB	k LB	k LB	m BA	m₁ –	m₂ –	n AA
1PH8, type of construction IM B3, water cooling														
80	1PH8083		194 (7.64)	125 (4.92)	8 (0.31)	155 (6.10)	80 (3.15)	301.5 (11.87)	306.3 (12.06)	319.3 (12.57)	37 (1.46)	63.5 (2.50)	15 (0.59)	35 (1.38)
	1PH8087		244 (9.61)					351.5 (13.84)	356.3 (14.03)	369.3 (14.54)				
100	1PH8101		167 (6.57)	160 (6.30)	11 (0.43)	196 (7.72)	100 (3.94)	289.5 (11.40)	294.5 (11.59)	312.3 (12.30)	44 (1.73)	68 (2.68)	19 (0.75)	43 (1.69)
	1PH8103		202.5 (7.97)					325 (12.80)	330 (12.99)	347.8 (13.69)				
	1PH8105		262 (10.31)					384.5 (15.14)	389.5 (15.33)	407.3 (16.04)				
	1PH8107		297.5 (11.71)					420 (16.54)	425 (16.73)	442.8 (17.43)				
132	1PH8131		220.5 (8.68)	216 (8.50)	15 (0.59)	260 (10.24)	132 (5.20)	347.5 (13.68)	355 (13.98)	372.8 (14.68)	43 (1.69)	81 (3.19)	13 (0.51)	43 (1.69)
	1PH8133		265.5 (10.45)					392.5 (15.45)	400 (15.75)	417.8 (16.45)				
	1PH8135		310.5 (12.22)					437.5 (17.22)	445 (17.52)	462.8 (18.22)				
	1PH8137		350.5 (13.80)					477.5 (18.80)	485 (19.09)	502.8 (19.80)				
	1PH8138		350.5 (13.80)					477.5 (18.80)	485 (19.09)	502.8 (19.80)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₃ –		Shaft extension DE				
									w₁ C	**d** **D**	d₆ –	t GA	u F	l L
80	1PH8083		216 (8.50)	253.5 (9.98)	–	–	10 (0.39)	M25×1.5	38 (1.50)	**32** **(1.26)**	M12	35 (1.38)	10 (0.39)	80 (3.15)
	1PH8087													
100	1PH8101		266.5 (10.49)	294 (11.57)	198 (7.80)	276.5 (10.89)	12 (0.47)	M32×1.5	43 (1.69)	**38** **(1.50)**	M12	41 (1.61)	10 (0.39)	80 (3.15)
	1PH8103													
	1PH8105													
	1PH8107													
132	1PH8131		347.5 (13.68)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	M50×1.5	53 (2.09)	**48** **(1.89)**	M16	51.5 (2.03)	14 (0.55)	110 (4.33)
	1PH8133													
	1PH8135													
	1PH8137													
	1PH8138													

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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

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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/ Advanced/ Performance	High Performance/ hollow shaft encoder	
												without hollow shaft	with hollow shaft
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	h H	l L	k LB	k LB	k LB
1PH8, type of construction IM B5, water cooling													
80	1PH8083		199 (7.83)	130 (5.12)	12 (0.47)	165 (6.50)	155 (6.10)	3.5 (0.14)	77.5 (3.05)	80 (3.15)	301.5 (11.87)	306.3 (12.06)	319.3 (12.57)
	1PH8087										351.5 (13.84)	356.3 (14.03)	369.3 (14.51)
100	1PH8101		250 (9.84)	180 (7.09)	16 (0.63)	215 (8.46)	196 (7.72)	4 (0.16)	98 (3.86)	80 (3.15)	289.5 (11.40)	294.5 (11.59)	312.3 (12.30)
	1PH8103										325 (12.80)	330 (12.99)	347.8 (13.69)
	1PH8105										384.5 (15.14)	389.5 (15.33)	407.3 (16.04)
	1PH8107										420 (16.54)	425 (16.73)	442.8 (17.43)
132	1PH8131		340 (13.39)	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	130 (5.12)	110 (4.33)	347.5 (13.68)	355 (13.98)	372.8 (14.68)
	1PH8133										392.5 (15.45)	400 (15.75)	417.8 (16.45)
	1PH8135										437.5 (17.22)	445 (17.52)	462.8 (18.22)
	1PH8137										477.5 (18.80)	485 (19.09)	502.8 (19.80)
	1PH8138										477.5 (18.80)	485 (19.09)	502.8 (19.80)

							Shaft extension DE				
Shaft height	Type	DIN IEC	p HD	p_1 –	s_2 –	s_3 –	**d** **D**	d_6 –	i_2 E	t GA	u F
80	1PH8083		213.5 (8.41)	251 (9.88)	12 (0.47)	M25×1.5	**32** **(1.25)**	M12	80 (3.15)	35 (1.38)	10 (0.39)
	1PH8087										
100	1PH8101		264.5 (10.41)	292 (11.50)	14 (0.55)	M32×1.5	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH8103										
	1PH8105										
	1PH8107										
132	1PH8131		345.5 (13.6)	345 (13.58)	18 (0.71)	M50×1.5	**48** **(1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133										
	1PH8135										
	1PH8137										
	1PH8138										

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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

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Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 100/SH 132 – Water cooling

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	l L	Standard/ Advanced/ Performance k LB	High Performance without hollow shaft k LB	with hollow shaft k LB	m BA
			a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	l L	k LB	k LB	k LB	m BA

Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a / B	a₁ / P	b / A	b₁ / N	c / HA	c₁ / LA	e₁ / M	f / AB	f₁ / T	h / H	l / L	Std/Adv/Perf k / LB	HP without hollow shaft k / LB	HP with hollow shaft k / LB	m / BA
1PH8, type of construction IM B35, water cooling																	
100	1PH8101		167 (6.57)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	16 (0.63)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	80 (3.15)	289.5 (11.40)	294.5 (11.59)	312.3 (12.30)	37 (1.46)
	1PH8103		202.5 (7.97)											325 (12.80)	330 (12.99)	347.8 (13.69)	
	1PH8105		262 (10.31)											384.5 (15.14)	389.5 (15.33)	407.3 (16.04)	
	1PH8107		297.5 (11.71)											420 (16.54)	425 (16.73)	442.8 (17.43)	
132	1PH8131		220.5 (8.68)	340 (13.39)	216 (8.50)	250 (9.84)	15 (0.59)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	110 (4.33)	347.5 (13.68)	355 (13.98)	372.8 (14.68)	42 (1.65)
	1PH8133		265.5 (10.45)											392.5 (15.45)	400 (15.75)	417.8 (16.45)	
	1PH8135		310.5 (12.22)											437.5 (17.22)	445 (17.52)	462.8 (18.22)	
	1PH8137		350.5 (13.80)											477.5 (18.80)	485 (19.09)	502.8 (19.80)	
	1PH8138		350.5 (13.80)											477.5 (18.80)	485 (19.09)	502.8 (19.80)	

Shaft height	Type	DIN IEC	m₁ –	m₂ –	n AA	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	w₁ C	Shaft extension DE d / D	d₆ –	i₂ E	t GA	u F
100	1PH8101		68 (2.68)	12 (0.47)	43 (1.69)	266.5 (10.49)	294 (11.57)	198 (7.80)	276.5 (10.89)	12 (0.47)	14 (0.55)	M32×1.5	43 (1.69)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH8103																	
	1PH8105																	
	1PH8107																	
132	1PH8131		81 (3.19)	12 (0.47)	43 (1.69)	347.5 (13.68)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	18 (0.71)	M50×1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133																	
	1PH8135																	
	1PH8137																	
	1PH8138																	

6

■ Dimensional drawings

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 160 – Water cooling

■ **Dimensional drawings**

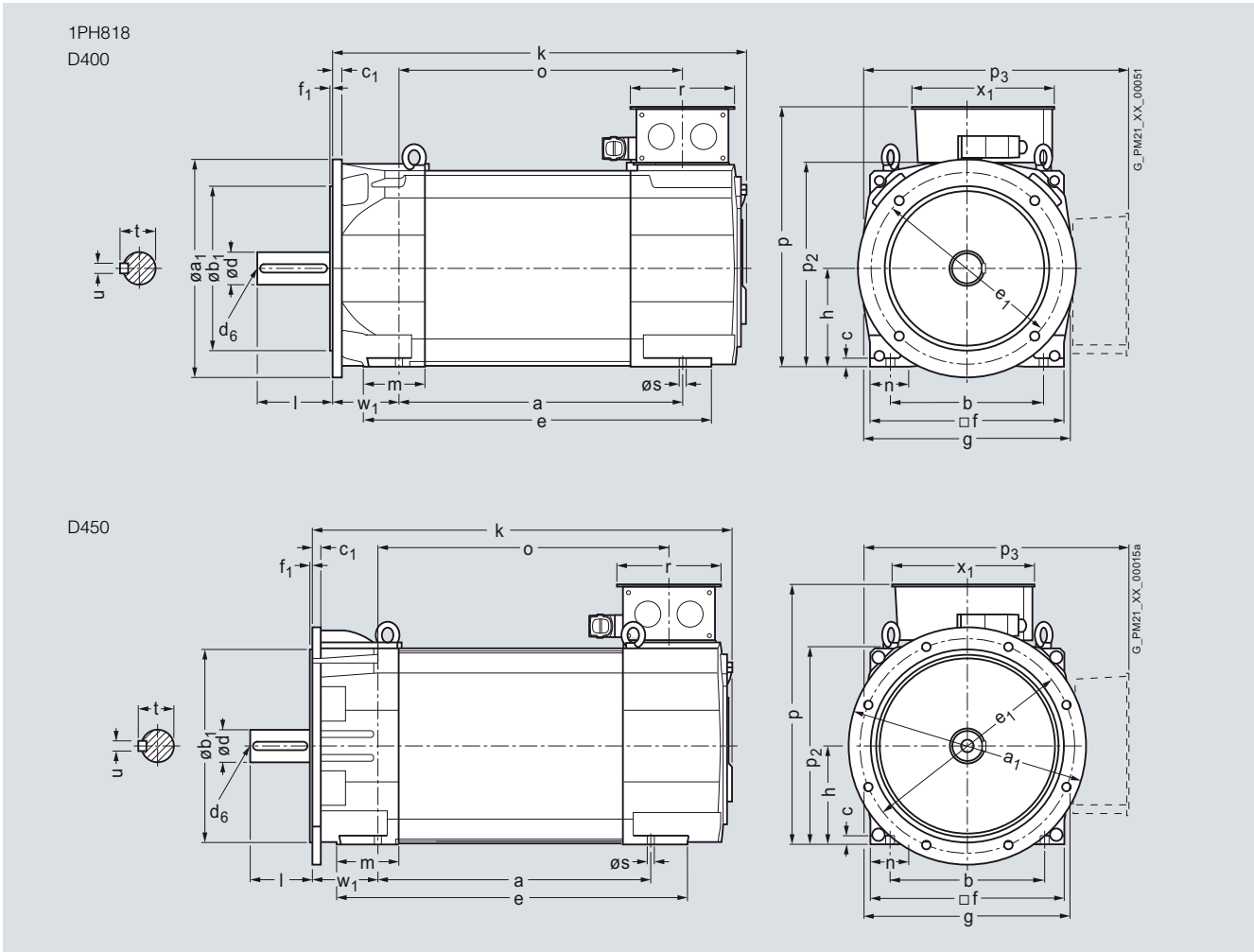| Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
For motor		**Dimensions in mm (inches)**															
1PH8, type of construction IM B3, water cooling																	
160	1PH8163		346.5 (13.64)	–	254 (10.00)	–	17 (0.67)	23 (0.91)	–	314 (12.36)	–	160 (6.30)	488.5 (19.23)	53 (2.09)	91 (3.58)	17 (0.67)	70 (2.76)
	1PH8165		406.5 (16.00)										548.5 (21.59)				
	1PH8166																

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	**d D**	d₆ –	l L	t GA	u F	k LB
												Shaft extension DE					**Design with hollow shaft**
160	1PH8163		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	–	M63 × 1.5	–	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)	520.8 (20.50)
	1PH8165																580.8 (22.87)
	1PH8166																580.8 (22.87)

1PH816

Design with hollow shaft

Hollow shaft

■ **Dimensional drawings**

For motor		Dimensions in mm (inches)													
Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h Hv	k LB	m BA	m₁ –	m₂ –	n AA

(header columns: DIN IEC, a/B, a₁/P, b/A, b₁/N, c/HA, c₁/LA, e₁/M, f/AB, f₁/T, h/Hv, k/LB, m/BA, m₁/–, m₂/–, n/AA)

1PH8, type of construction IM B5/IM B35, water cooling

Shaft height	Type	DIN IEC	a/B	a₁/P	b/A	b₁/N	c/HA	c₁/LA	e₁/M	f/AB	f₁/T	h/Hv	k/LB	m/BA	m₁/–	m₂/–	n/AA
160	1PH8163		346.5 (13.64)	393 (15.47)	254 (10.00)	300 (11.81)	17 (0.67)	–	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	488.5 (19.23)	53 (2.09)	91 (3.58)	17 (0.67)	70 (2.76)
	1PH8165		406.5 (16.00)										548.5 (21.59)				
	1PH8166																

										Shaft extension DE					Design with hollow shaft
Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	d D	d₆ –	i₂ E	t GA	u F	k LB
160	1PH8163		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	18 (0.71)	M63 × 1.5	–	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)	520.8 (20.50)
	1PH8165																580.8 (22.87)
	1PH8166																580.8 (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

Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	g AC	h H	k LB	m BA	n AA	p₂ –	s K	w₁ C
1PH8, types of construction IM B3/IM V5, water cooling														
180	1PH8184		430 (16.93)	279 (10.98)	15 (0.59)	356 (14.02)	384 (15.12)	180 (7.09)	670 (26.38)	138 (5.43)	73 (2.87)	372 (14.65)	14.5 (0.57)	121 (4.76)
	1PH8186		520 (20.47)						760 (29.92)					

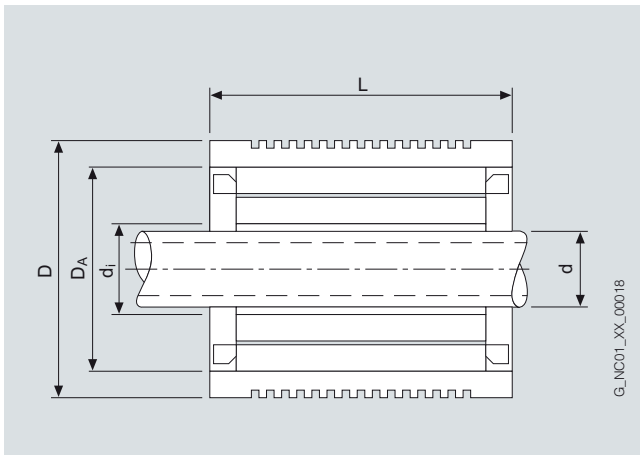| | | | Shaft extension DE | | | | | Terminal box type | | | | | | | | | | |
| | | | | | | | | 1XB7322 | | | | 1XB7422 | | | | 1XB7700 | | | |
Shaft height	Type	DIN IEC	d **D**	d₆ –	l E	t GA	u F	p HD	p₃ –	r LL	x₁ AG	p HD	p₃ –	r LL	x₁ AG	p HD	p₃ –	r LL	x₁ AG
180	1PH8184		**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)	484 (19.06)	485 (19.09)	197 (7.76)	258 (10.16)	539 (21.22)	540 (21.26)	230 (9.06)	303 (11.93)	588 (23.15)	574 (22.60)	310 (12.20)	295 (11.61)
	1PH8186																		

1PH818

■ Dimensional drawings

Shaft height	Type	DIN IEC	a B	D400 a₁ P	D450	b A	D400 b₁ N	D450	c HA	c₁ LA	D400 e₁ M	D450	f AB	f₁ T	g AC	h H	k LB	m BA
For motor			Dimensions in mm (inches)															

1PH8, types of construction IM B5/IM B35/IM V15, water cooling

Shaft height	Type	DIN IEC	a B	a₁ P		b A	b₁ N		c HA	c₁ LA	e₁ M		f AB	f₁ T	g AC	h H	k LB	m BA
				D400	D450		D400	D450			D400	D450						
180	1PH8184		430 (16.93)	400 (15.75)	450 (17.72)	279 (10.98)	300 (11.81)	350 (13.78)	15 (0.59)	16 (0.63)	350 (13.78)	400 (15.75)	356 (14.02)	5 (0.20)	384 (15.12)	180 (7.09)	670 (26.38)	123 (4.84)
	1PH8186		520 (20.47)														760 (29.92)	

			Shaft extension DE								Terminal box type
											Dimensions as for types of construction IM B3/IM V5

Shaft height	Type	DIN IEC n AA	p₂ –	s K	w₁ C	**d D**	d₆ –	l E	t GA	u F
180	1PH8184	73 (2.87)	372 (14.65)	14.5 (0.57)	121 (4.76)	**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)
	1PH8186									

1PH818 D400

D450

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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	p2 _	s K	w1 C
1PH8, types of construction IM B3/IM V5, water cooling														
225	1PH8224		445 (17.52)	356 (14.02)	18 (0.71)	446 (17.56)	474 (18.66)	225 (8.86)	775 (30.51)	154 (6.06)	88 (3.46)	462 (18.19)	18.5 (0.73)	149 (5.87)
	1PH8226		545 (21.46)						875 (34.45)					
	1PH8228		635 (25.0)						965 (37.99)					

			Shaft extension DE					Terminal box type									
								1XB7322				1XB7422				1XB7700	
Shaft height	Type	DIN IEC	d D	d6 _	l E	t GA	u F	p HD	p3 _	r LL	x1 AG	p HD	p3 _	r LL	x1 AG	p HD	p3 _	r LL	x1 AG
225	1PH8224		**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)	579 (22.80)	577 (22.72)	197 (7.76)	258 (10.16)	634 (24.96)	632 (24.88)	230 (9.06)	303 (11.93)	683 (26.89)	666 (26.22)	310 (12.20)	295 (11.61)
	1PH8226																		
	1PH8228																		

1PH822

■ **Dimensional drawings**

Shaft height	Type	DIN IEC a B	a_1 P	b A	b_1 N	c HA	c_1 LA	e_1 M	f AB	f_1 T	g AC	h H	k LB	m BA	n AA	p_2 –	w_1 C
**1PH8, types of construction IM B5/IM B35/IM V15 D550, water cooling**
225	1PH8224	445 (17.52)	550 (21.65)	356 (14.02)	450 (17.72)	18 (0.71)	20 (0.79)	500 (19.69)	446 (17.56)	5 (0.20)	474 (18.66)	225 (8.86)	770 (30.31)	144 (5.67)	88 (3.46)	462 (18.19)	149 (5.87)
	1PH8226	545 (21.46)											872 (34.33)				
	1PH8228	635 (25.00)											962 (37.87)				

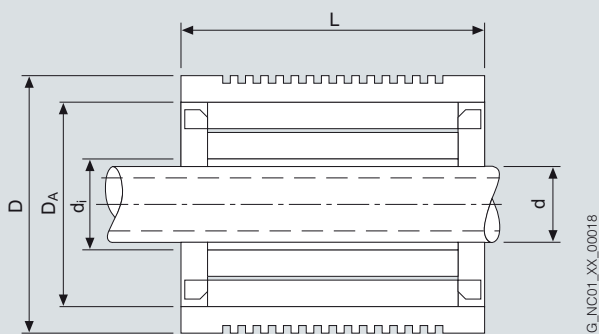|			Shaft extension DE				Terminal box type
							Dimensions as for types of construction IM B3/IM V5
Shaft height	Type	DIN IEC **d** D	d_6 –	l E	t GA	u F	
225	1PH8224	**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)	
	1PH8226						
	1PH8228						

1PH822

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Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors
SH 280 – Water cooling

Dimensional drawings

Shaft height	Type	DIN IEC	a B	b A	c LA/HA	f AB	g AC	h H	k LB	m BA	n AA	p₂ –	s K	w₁ C	d D	d₆ –	l E	t GA	u F
															Shaft extension DE				
1PH8, types of construction IM B3/IM V5, water cooling																			
280	1PH8284		684 (26.93)	457 (17.99)	21 (0.83)	556 (21.89)	588 (23.15)	280 (11.02)	1134 (44.65)	220 (8.66)	105 (4.13)	574 (22.60)	24 (0.94)	190 (7.48)	**95m6**	M24	170 (6.69)	100 (3.94)	25 (0.98)
	1PH8286		794 (31.26)						1244 (48.98)										
	1PH8288		924 (36.38)						1374 (54.09)										

Shaft height	Type	DIN IEC	1XB7322 p HD	1XB7322 p₃ –	1XB7322 r LL	1XB7322 x₁ AG	1XB7422 p HD	1XB7422 p₃ –	1XB7422 r LL	1XB7422 x₁ AG	1XB7700 p HD	1XB7700 p₃ –	1XB7700 r LL	1XB7700 x₁ AG	1XB7712 p HD	1XB7712 p₃ –	1XB7712 r LL	1XB7712 x₁ AG
280	1PH8284		709 (27.91)	716 (28.19)	197 (7.76)	258 (10.16)	724 (28.5)	731 (28.78)	230 (9.06)	303 (11.93)	770 (30.31)	777 (30.59)	310 (12.2)	318 (12.52)	820 (32.28)	827 (32.56)	377 (14.84)	370 (14.57)
	1PH8286																	
	1PH8288																	

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1PH828

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	g AC	h H	i₂ EB	k LB	m BA	n AA	p₂ –	s K
	For motor		Dimensions in mm (inches)																

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	g AC	h H	i₂ EB	k LB	m BA	n AA	p₂ –	s K
1PH8, types of construction IM B5/IM B35/IM V15 D660, water cooling																		
280	1PH8284		684 (26.93)	660 (25.98)	457 (17.99)	550 (21.65)	21 (0.83)	24 (0.94)	600 (23.62)	556 (21.89)	6 (0.24)	588 (23.15)	280 (11.02)	140 (5.51)	1134 (44.65)	220 (8.66)	105 (4.13)	574 (22.60)	24 (0.94)
	1PH8286		794 (31.26)												1244 (48.98)				
	1PH8288		924 (36.38)												1374 (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	w₁ C	**d D**	d₆ –	l E	t GA	u F
280	1PH8284		220 (8.66)	105 (4.13)	24 (0.94)	190 (7.48)	**95m6**	M24	170 (6.69)	100 (3.94)	25 (0.98)
	1PH8286										
	1PH8288										

1PH828

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Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors
SH 132 – Forced ventilation

■ Dimensional drawings

Shaft height	Type	DIN IEC	a B	b A	c HA	c₁ LA	f AB	h H	k LB	m BA	m₁ –	m₂ –	n AA

For motor — Dimensions in mm (inches)

1PH8, type of construction IM B3, forced ventilation

Shaft height	Type	DIN IEC	a B	b A	c HA	c₁ LA	f AB	h H	k LB	m BA	m₁ –	m₂ –	n AA
132	1PH8131		220.5 (8.68)	216 (8.50)	15 (0.59)	18 (0.71)	260 (10.24)	132 (5.20)	439 (17.28)	57 (2.24)	93 (3.66)	27 (1.06)	52 (2.05)
	1PH8133		265.5 (10.45)						484 (19.06)				
	1PH8135		310.5 (12.22)						529 (20.83)				
	1PH8137		350.5 (13.80)						569 (22.40)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₃ –	s₄ –	w₁ C	d **D**	d₆ –	l L	t GA	u F
											Shaft extension DE				
132	1PH8131		317.5 (12.50)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	M40×1.5	M20×1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133														
	1PH8135														
	1PH8137														

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

G_PM21_EN_00045

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB
						Dimensions in mm (inches)				
1PH8, type of construction IM B5, forced ventilation										
132	1PH8131		340 (13.39)	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	130 (5.12)	439 (17.28)
	1PH8133									484 (19.06)
	1PH8135									529 (20.83)
	1PH8137									569 (22.40)

Shaft height	Type	DIN IEC	p HD	p_1 –	s_2 –	s_3 –	s_4 –	d D	d_6 –	i_2 E	t GA	u F
								Shaft extension DE				
132	1PH8131		315.5 (12.42)	345 (13.58)	18 (0.71)	M40×1.5	M20×1.5	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133											
	1PH8135											
	1PH8137											

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

G_PM21_EN_00045

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors
SH 132 – Forced ventilation

Dimensional drawings

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
								Dimensions in mm (inches)								
1PH8, type of construction IM B35, forced ventilation																
132	1PH8131		220.5 (8.68)	340 (13.39)	216 (8.50)	250 (9.84)	15 (0.59)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	439 (17.28)	65 (2.56)	93 (3.66)	35 (1.38)	52 (2.05)
	1PH8133		265.5 (10.45)									484 (19.06)				
	1PH8135		310.5 (12.22)									529 (20.83)				
	1PH8137		350.5 (13.80)									569 (22.40)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	d D	d₆ –	i₂ E	t GA	u F
												Shaft extension DE				
132	1PH8131		317.5 (12.42)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	18 (0.71)	M40×1.5	M20×1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133															
	1PH8135															
	1PH8137															

1PH813

Variant with power connector size 3

Connector size 1 for fan connection

G_PM21_XX_00007a

G_PM21_EN_00045

■ Dimensional drawings

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
For motor		Dimensions in mm (inches)															
1PH8, type of construction IM B3, forced ventilation																	
160	1PH8165		406.5 (16.00)	–	254 (10.00)	–	17 (0.67)	23 (0.91)	–	314 (12.36)	–	160 (6.30)	670.5 (26.40)	64 (2.52)	99.5 (3.92)	28 (1.10)	70 (2.76)
	1PH8167		446.5 (17.58)										710.5 (27.97)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	**d D**	d₆ –	l L	t GA	u F
												Shaft extension DE				
160	1PH8165		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	–	M63 × 1.5	M20×1.5	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH8167															

1PH816

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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	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
1PH8, type of construction IM B5/IM B35, forced ventilation																	
160	1PH8165		406.5 (16.00)	393 (15.47)	254 (10.00)	300 (11.81)	17 (0.67)	–	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	670.5 (26.40)	55 (2.17)	99.5 (3.92)	19 (0.75)	70 (2.76)
	1PH8167		446.5 (17.58)										710.5 (27.97)				

												Shaft extension DE				
Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	d D	d₆ –	i₂ E	t GA	u F
160	1PH8165		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	18 (0.71)	M63 × 1.5	M20×1.5	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH8167															

1PH816

■ **Dimensional drawings**

Shaft height	Type	IEC A	AB	AC	B	BB	C	D	DB	E	F	GA	H	HA	HC	K	L
							Dimensions in mm (inches)										
1PH8, type of construction IM B3, forced ventilation – direction of air flow DE → NDE																	
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)
	1PH8186				520 (20.47)	635 (25.00)											1085 (42.72)

Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box		Dimensions in mm (inches)				
Terminal box type 1XB7 322						
180	1PH8184	484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

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Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors
SH 180 – Forced ventilation

■ Dimensional drawings

For motor																		
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																		
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)
	1PH8186				520 (20.47)	635 (25.00)											1137 (44.76)

Terminal box						
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
180	1PH8184	484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

■ **Dimensional drawings**

For motor																							
Shaft height	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 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)	350 (13.78)	300 (11.81)	400 (15.75)	18.5 (0.73)
	1PH8186					520 (20.47)	635 (25.00)											1085 (42.72)				

Terminal box							
Shaft height	Type	IEC	AD	AG	AS	BC	LL
Terminal box type 1XB7 322							
180	1PH8184		484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186					519 (20.43)	
Terminal box type 1XB7 422							
180	1PH8184		499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186					519 (20.43)	
Terminal box type 1XB7 700							
180	1PH8184		525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186					519 (20.43)	

LE Air inlet
LA Air outlet

6

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 height	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 A400 (option K90)																					
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)	350 (13.78)	300 (11.81)	400 (15.75)	18.5 (0.73)
	1PH8186				520 (20.47)	635 (25.00)											1137 (44.76)				

Terminal box		Dimensions in mm (inches)				
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
180	1PH8184	484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

Optionally with air filter (G14)

■ **Dimensional drawings**

For motor																							
Shaft height	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 B3, forced ventilation – direction of air flow DE → NDE, flange A450																							
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	995 (39.17)	400 (15.75)	350 (13.78)	450 (17.72)	18.5 (0.73)		
	1PH8186				520 (20.47)	635 (25.00)											1085 (42.72)						

Terminal box						
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
180	1PH8184	484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

6

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 height	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 B3, forced ventilation – direction of air flow NDE → DE, flange A450																					
180	1PH8184	279 (10.98)	356 (14.02)	364 (14.33)	430 (16.93)	545 (21.46)	121 (4.76)	65 (2.56)	M20	140 (5.51)	18 (0.71)	69 (2.72)	180 (7.09)	15 (0.59)	383 (15.08)	14.5 (0.57)	1047 (41.22)	400 (15.75)	350 (13.78)	450 (17.72)	18.5 (0.73)
	1PH8186				520 (20.47)	635 (25.00)											1137 (44.76)				

Terminal box		Dimensions in mm (inches)				
Shaft height	Type	IEC AD	AG	AS	BC	LL
Terminal box type 1XB7 322						
180	1PH8184	484 (19.06)	258 (10.16)	100 (3.94)	429 (16.89)	197 (7.76)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 422						
180	1PH8184	499 (19.65)	303 (11.93)	120 (4.72)	429 (16.89)	230 (9.06)
	1PH8186				519 (20.43)	
Terminal box type 1XB7 700						
180	1PH8184	525 (20.67)	310 (12.20)	185 (7.28)	429 (16.89)	295 (11.61)
	1PH8186				519 (20.43)	

LE Air inlet
LA Air outlet

■ **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 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1171 (46.10)
	1PH8226				545 (21.46)	725 (28.54)											1271 (50.04)
	1PH8228				635 (25.00)	815 (32.09)											1361 (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 (24.13)	258 (10.16)	100 (3.94)	481 (18.94)	197 (7.76)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	628 (24.72)	303 (11.93)	120 (4.72)	481 (18.94)	230 (9.06)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	654 (25.75)	295 (11.61)	185 (7.28)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

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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 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1206 (47.48)
	1PH8226				545 (21.46)	725 (28.54)											1306 (51.42)
	1PH8228				635 (25.00)	815 (32.09)											1396 (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 (24.13)	258 (10.16)	100 (3.94)	481 (18.94)	197 (7.76)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	628 (24.72)	303 (11.93)	120 (4.72)	481 (18.94)	230 (9.06)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	654 (25.75)	295 (11.61)	185 (7.28)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

■ **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	M	N	P	S
1PH8, type of construction IM B35, forced ventilation – direction of air flow DE → NDE, flange A550																							
225	1PH8224		356 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1171 (46.10)	500 (19.69)	450 (17.72)	550 (21.65)	18.5 (0.73)
	1PH8226					545 (21.46)	725 (28.54)											1271 (50.04)				
	1PH8228					635 (25.00)	815 (32.09)											1361 (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 (24.13)	258 (10.16)	100 (3.94)	481 (18.94)	197 (7.76)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	
Terminal box type 1XB7 422							
225	1PH8224		628 (24.72)	303 (11.93)	120 (4.72)	481 (18.94)	230 (9.06)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	
Terminal box type 1XB7 700							
225	1PH8224		654 (25.75)	295 (11.61)	185 (7.28)	481 (18.94)	310 (12.20)
	1PH8226					581 (22.87)	
	1PH8228					671 (26.42)	

LE Air inlet
LA Air outlet

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	M	N	P	S
1PH8, type of construction IM B35, forced ventilation – direction of air flow NDE → DE, flange A550																					
225	1PH8224	356 (14.02)	446 (17.56)	454 (17.87)	445 (17.52)	625 (24.61)	149 (5.87)	75 (2.95)	M20	140 (5.51)	20 (0.79)	79.5 (3.13)	225 (8.86)	18 (0.71)	475 (18.70)	18.5 (0.73)	1206 (47.48)	500 (19.69)	450 (17.72)	550 (21.65)	18.5 (0.73)
	1PH8226				545 (21.46)	725 (28.54)											1306 (51.42)				
	1PH8228				635 (25.00)	815 (32.09)											1396 (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 (24.13)	258 (10.16)	100 (3.94)	481 (18.94)	197 (7.76)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 422						
225	1PH8224	628 (24.72)	303 (11.93)	120 (4.72)	481 (18.94)	230 (9.06)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	
Terminal box type 1XB7 700						
225	1PH8224	654 (25.75)	295 (11.61)	185 (7.28)	481 (18.94)	310 (12.20)
	1PH8226				581 (22.87)	
	1PH8228				671 (26.42)	

LE Air inlet
LA Air outlet

Dimensional drawings

For motor			Dimensions in mm (inches)														
Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
1PH8, type of construction IM B3, water cooling																	
132	1PH8131		220.5 (8.68)	–	216 (8.50)	–	15 (0.59)	–	–	260 (10.24)	–	132 (5.20)	347.5 (13.68)	42 (1.65)	81 (3.19)	12 (0.47)	43 (1.69)
	1PH8133		265.5 (10.45)										392.5 (15.45)				
	1PH8135		310.5 (12.22)										437.5 (17.22)				
	1PH8137		350.5 (13.80)										477.5 (18.80)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	w₁ C	Shaft extension DE				
											d D	d₆ –	l E	t GA	u F
132	1PH8131		347.5 (13.68)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	–	M50×1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133														
	1PH8135														
	1PH8137														

1PH813

Variant with power connector size 3

G_PM21_XX_00048

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_1 P	b A	b_1 N	c HA	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB	m BA	m_1 –	m_2 –	n AA
1PH8, type of construction IM B5, water cooling																	
132	1PH8131		–	340 (13.39)	–	250 (9.84)	–	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	347.5 (13.68)	–	–	–	–
	1PH8133												392.5 (15.45)				
	1PH8135												437.5 (17.22)				
	1PH8137												477.5 (18.80)				

											Shaft extension DE				
Shaft height	Type	DIN IEC	p HD	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	w_1 C	d D	d_6 –	i_2 E	t GA	u F
132	1PH8131		345.5 (13.60)	345 (13.58)	–	–	18 (0.71)	M50×1.5	–	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133													
	1PH8135													
	1PH8137													

1PH813

Variant with power connector size 3

G_PM21_XX_00048

Dimensional drawings

Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c HA	c_1 LA	e_1 M	f AB	f_1 T	h H	k LB	m BA	m_1 –	m_2 –	n AA
For motor		**Dimensions in mm (inches)**															
1PH8, type of construction IM B35, water cooling																	
132	1PH8131		220.5 (8.68)	340 (13.39)	216 (8.50)	250 (9.84)	15 (0.59)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	347.5 (13.68)	42 (1.65)	81 (3.19)	12 (0.47)	43 (1.69)
	1PH8133		265.5 (10.45)										392.5 (15.45)				
	1PH8135		310.5 (12.22)										437.5 (17.22)				
	1PH8137		350.5 (13.80)										477.5 (18.80)				

Shaft height	Type	DIN IEC	p HD	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	w_1 C	Shaft extension DE d D	d_6 –	i_2 E	t GA	u F
132	1PH8131		347.5 (13.68)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	18 (0.71)	M50×1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133														
	1PH8135														
	1PH8137														

1PH813

G_PM21_XX_00010a

Variant with power connector size 3

G_PM21_XX_00048

6

Dimensional drawings
SIMOTICS M asynchronous and synchronous motors for SINAMICS S120

SIMOTICS M-1PH8 synchronous motors
SH 160 – Water cooling

■ **Dimensional drawings**

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
1PH8, type of construction IM B3, water cooling																
160	1PH8164		346.5 (13.64)	–	254 (10.00)	–	17 (0.67)	23 (0.91)	–	314 (12.36)	–	160 (6.30)	488.5 (19.23)	53 (2.09)	91 (3.58)	17 (0.67)	70 (2.76)
	1PH8166		406.5 (16.00)										548.5 (21.59)				
	1PH8168		446.5 (17.58)										588.5 (23.17)				

												Shaft extension DE				
Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	**d D**	d₆ –	l L	t GA	u F
160	1PH8164		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	–	M63 × 1.5	–	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH8166															
	1PH8168															

1PH816

Dimensional drawings

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
						Dimensions in mm (inches)											

1PH8, type of construction IM B5/IM B35, water cooling

Shaft height	Type	DIN IEC	a B	a₁ P	b A	b₁ N	c HA	c₁ LA	e₁ M	f AB	f₁ T	h H	k LB	m BA	m₁ –	m₂ –	n AA
160	1PH8164		346.5 (13.64)	393 (15.47)	254 (10.00)	300 (11.81)	17 (0.67)	–	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	488.5 (19.23)	53 (2.09)	91 (3.58)	17 (0.67)	70 (2.76)
	1PH8166		406.5 (16.00)										548.5 (21.59)				
	1PH8168		446.5 (17.58)										588.5 (23.17)				

Shaft height	Type	DIN IEC	p HD	p₁ –	p₂ –	p₃ –	s K	s₂ –	s₃ –	s₄ –	w₁ C	Shaft extension DE d D	d₆ –	i₂ E	t GA	u F
160	1PH8164		415.5 (16.36)	–	317 (12.48)	412.5 (16.24)	14 (0.55)	18 (0.71)	M63 × 1.5	–	61 (2.40)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (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

Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	g AC	h H	k LB	m BA	n AA	p₂ –	s K	w₁ C
							Dimensions in mm (inches)							
1PH8, types of construction IM B3/IM V5, water cooling														
180	1PH8184		430 (16.93)	279 (10.98)	15 (0.59)	356 (14.02)	384 (15.12)	180 (7.09)	670 (26.38)	138 (5.43)	73 (2.87)	372 (14.65)	14.5 (0.57)	121 (4.76)
	1PH8186		520 (20.47)						760 (29.92)					

Shaft height	Type	DIN IEC	Shaft extension DE					Terminal box type											
								1XB7322				1XB7422				1XB7700			
			d D	d₆ –	l E	t GA	u F	p HD	p₃ –	r LL	x₁ AG	p HD	p₃ –	r LL	x₁ AG	p HD	p₃ –	r LL	x₁ AG
180	1PH8184		**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)	484 (19.06)	485 (19.09)	197 (7.76)	258 (10.16)	539 (21.22)	540 (21.26)	230 (9.06)	303 (11.93)	588 (23.15)	574 (22.60)	310 (12.20)	295 (11.61)
	1PH8186																		

1PH818

■ **Dimensional drawings**

For motor			Dimensions in mm (inches)															
				D400	D450		D400	D450				D400	D450						
Shaft height	Type	DIN IEC	a B	a_1 P	A	b N	b_1 N	HA	c HA	c_1 LA	e_1 M	M	f AB	f_1 T	g AC	h H	k LB	m BA
1PH8, types of construction IM B5/IM B35/IM V15, water cooling																		
180	1PH8184		430 (16.93)	400 (15.75)	450 (17.72)	279 (10.98)	300 (11.81)	350 (13.78)	15 (0.59)	16 (0.63)	350 (13.78)	400 (15.75)	356 (14.02)	5 (0.20)	384 (15.12)	180 (7.09)	670 (26.38)	123 (4.84)
	1PH8186		520 (20.47)														760 (29.92)	

							Shaft extension DE					Terminal box type	
												Dimensions as for types of construction IM B3/IM V5	
Shaft height	Type	DIN IEC	n AA	p_2 –	s K	w_1 C	**d** **D**	d_6 –	l E	t GA	u F		
180	1PH8184		73 (2.87)	372 (14.65)	14.5 (0.57)	121 (4.76)	**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)		
	1PH8186												

1PH818
D400

D450

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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	p₂ _	s K	w₁ C
1PH8, types of construction IM B3/IM V5, water cooling														
225	1PH8224		445 (17.52)	356 (14.02)	18 (0.71)	446 (17.56)	474 (18.66)	225 (8.86)	775 (30.51)	154 (6.06)	88 (3.46)	462 (18.19)	18.5 (0.73)	149 (5.87)
	1PH8226		545 (21.46)						875 (34.45)					
	1PH8228		635 (25.0)						965 (37.99)					

			Shaft extension DE					Terminal box type										
								1XB7322				1XB7422				1XB7700			
Shaft height	Type	DIN IEC	d D	d₆ –	l E	t GA	u F	p HD	p₃ _	r LL	x₁ AG	p HD	p₃ _	r LL	x₁ AG	p HD	p₃ _	r LL	x₁ AG
225	1PH8224		**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)	579 (22.80)	577 (22.72)	197 (7.76)	258 (10.16)	634 (24.96)	632 (24.88)	230 (9.06)	303 (11.93)	683 (26.89)	666 (26.22)	310 (12.20)	295 (11.61)
	1PH8226																		
	1PH8228																		

1PH822

G_PM21_XX_00049

Dimensional drawings

Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c HA	c_1 LA	e_1 M	f AB	f_1 T	g AC	h H	k LB	m BA	n AA	p_2 –	w_1 C
For motor			**Dimensions in mm (inches)**															
1PH8, types of construction IM B5/IM B35/IM V15 D550, water cooling																		
225	1PH8224		445 (17.52)	550 (21.65)	356 (14.02)	450 (17.72)	18 (0.71)	20 (0.79)	500 (19.69)	446 (17.56)	5 (0.20)	474 (18.66)	225 (8.86)	770 (30.31)	144 (5.67)	88 (3.46)	462 (18.19)	149 (5.87)
	1PH8226		545 (21.46)											872 (34.33)				
	1PH8228		635 (25.00)											962 (37.87)				

Shaft height	Type	DIN IEC	Shaft extension DE					Terminal box type
			d D	d_6 –	l E	t GA	u F	Dimensions as for types of construction IM B3/IM V5
225	1PH8224		**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (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**

G_NC01_XX_00018

For motor	Dimensions in mm (inches)			
Type	Total length	Total outer dia-meter	Stator outer dia-meter	Rotor inner dia-meter
	L	D	D_A	d_i
1FE1 High Speed series				
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	Dimensions in mm (inches)							
Type	Total length	Total outer diameter	Stator outer diameter	Rotor inner diameter	Rotor inner diameter with sleeve			
	L	D	D_A	d_i	d*	d**	d**	d**
				-..A.	-..B.	-..C.	-..D.	-..E.
1FE1 High Torque series								
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)	–

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■ **Dimensional drawings**

For motor	Dimensions in mm (inches)				
Type	Standard spindle diameter	Rotor inner diameter	Stator outer diameter	Total outer diameter	Total length
	d	d_i	D_A	D	L
1PH2 water cooling					
1PH2093	67 (2.64)	85 (3.35)	180 (7.09)	205 (8.07)	250 (9.84)
1PH2095					300 (11.81)
1PH2113	82 (3.23)	100 (3.94)	220 (8.66)	250 (9.84)	290 (11.42)
1PH2115					310 (12.20)
1PH2117					330 (12.99)
1PH2118					390 (15.35)

G_NC01_XX_00018

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[1]	L2	L3	L4
2SP1 water cooling									
2SP1202	200 (7.88)	199 (7.84)	250 (9.85)	225 (8.87)	150 (5.91)	735[4] (28.94)	115.5 (4.55)	309[4] (12.17)	58[4] (2.28)
2SP1204						835[4] (32.87)			
2SP1253[2]	250 (9.85)	237 (9.34)	310 (12.21)	275 (10.84)	150 (5.91)	813 (32.03)	124.4 (4.90)	310 (12.21)	43 (1.69)
2SP1255[2]						913 (35.97)			
2SP1253[3]						819 (32.27)	130.0 (5.12)		
2SP1255[3]						919 (36.21)			

2SP120

G_DA65_XX_00246

2SP125

G_DA65_XX_00247

[1] The spindle is approx. 43 mm (1.69 in) shorter without turning bushing.
[2] HSK A63 tool interface.
[3] SK40, CAT40, BT40 tool interfaces.
[4] 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

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 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 M-1PH810 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 M-1PH810 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 M-1PH810 M-1PH813 M-1PH816	✔ 35 mm^2 or larger	✔ 16 mm^2 or smaller	**7/16, 7/17**

✔ = Possible
– = Not possible

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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 M-1PH810 M-1PH813	✔	✔	**7/27**
Extensions for signal cables with SPEED-CONNECT connector				
	S-1FK7	✔	✔	**7/27**
	M-1PH808 M-1PH810 M-1PH813	✔	✔	**7/27**
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	–	✔[1]	**7/27**
	L-1FN6	–	✔	**7/27**
	T-1FW6	–	✔	**7/27**

✔ = Possible
– = Not possible

[1] MOTION-CONNECT 700

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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.

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■ 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[1]). 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
o—	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^2

Acceleration for power cables
MOTION-CONNECT 800PLUS with 25 mm^2, 35 mm^2 and 50 mm^2

[1] 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	Current carrying capacity			
	rms AC 50/60 Hz or DC in amps for installation type			
	B1	**B2**	**C**	**E**
	Single-core cables in protection tubes or installation ducts	Multi-core cables in protection tubes or installation ducts	Multi-core cables, vertically or horizontally on walls / open, without protection tubes and installation ducts / with contact	Multi-core cables, horizontally or vertically on perforated cable racks / open, without protection tubes and installation ducts / with contact
mm²				
Electronics[1]				
0.20	–	4.3	4.4	4.4
0.30	–	7.5	7.5	7.8
0.75	–	9	9.5	10
Power[2]				
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 °C (°F)	Derating factor 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

[1] One control circuit pair.

[2] 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.0**4**2-5...-....

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.0**1**2-5....-....

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 MOTION-CONNECT 800PLUS
1.5 mm²	with/without	50 m (164 ft), 100 m (328 ft), 200 m (656 ft), 500 m (1641 ft)
2.5 mm²	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 mm²	with/without	≤ 500 m (1641 ft)	≤ 500 m (1641 ft)
6 mm²	with/without	≤ 500 m (1641 ft)	≤ 500 m (1641 ft)
10 mm²	with/without	≤ 500 m (1641 ft)	≤ 500 m (1641 ft)
16 mm²	with/without	≤ 200 m (656 ft)	≤ 200 m (656 ft)
25 mm²	without	≤ 200 m (656 ft)	–
	with	≤ 200 m (656 ft)	≤ 200 m (656 ft)
35 mm²	without	≤ 200 m (656 ft)	–
	with	≤ 200 m (656 ft)	≤ 200 m (656 ft)
50 mm²	without	≤ 200 m (656 ft)	–
	with	≤ 200 m (656 ft)	≤ 200 m (656 ft)
70 mm²	without	≤ 100 m (328 ft)	≤ 100 m (328 ft)
95 mm²	without	≤ 100 m (328 ft)	≤ 100 m (328 ft)
120 mm²	without	≤ 100 m (328 ft)	≤ 100 m (328 ft)

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MOTION-CONNECT connection systems
Power cables for SINAMICS S120

■ **Technical specifications**

Power cables	MOTION-CONNECT 500 6FX500.-.....-....	MOTION-CONNECT 800PLUS 6FX800.-.....-....
Approvals, according to		
• VDE[1]	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.[2]	Yes	Yes
• RoHS conformity	Yes	Yes
Rated voltage V_0/V in accordance with EN 50395		
• 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)
Test voltage, rms		
• Power conductors	4 kV	4 kV
• Signal conductors	2 kV	2 kV
Operating temperature on the surface		
• 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)
Tensile stress, max.		
• Fixed installation	50 N/mm^2 (7252 lb$_f$/in^2)	50 N/mm^2 (7252 lb$_f$/in^2)
• Flexible installation	20 N/mm^2 (2901 lb$_f$/in^2)	20 N/mm^2 (2901 lb$_f$/in^2)
Smallest bending radius		
• Fixed installation	$5 \times D_{max}$	$4 \times D_{max}$
• Flexible installation	See selection and ordering data	See selection and ordering data
Torsional stress	Absolute 30°/m	Absolute 30°/m
Bending	100000	10 million
Traversing velocity	30 m/min (98.4 ft/min)	Up to 300 m/min (984 ft/min)
Acceleration	2 m/s^2 (6.56 ft/s^2)	Up to 50 m/s^2 (164 ft/s^2), see characteristics on page 7/5
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-2-1 (mineral oil only)	EN 60811-2-1
Outer jacket	PVC	PUR, HD22.10 S2 (VDE 0282, Part 10)
	DESINA color orange RAL 2003	DESINA color orange RAL 2003
Flame-retardant	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.

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[1] The respective registration number is printed on the cable jacket (only applies to power cables).
[2] 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, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **without** brake cores	Cable sold by the meter[1] **without** brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	Order No.	mm (in)	mm (in)	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5	1	6FX■002-5CN01-....	6FX■008-1BB11-....	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1.5	6FX■002-5CN21-....							
	4 × 2.5	1	6FX■002-5CN11-....	6FX■008-1BB21-....	10.0 (0.39)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
		1.5	6FX■002-5CN31-....							
	4 × 4	1.5	6FX■002-5CN41-....	6FX■008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.27 (0.18)	210 (8.27)	100 (3.94)
	4 × 6	1.5	6FX■002-5CN51-....	6FX■008-1BB41-....	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
	4 × 10	1.5	6FX■002-5CN61-....	6FX■008-1BB51-....	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)
Ring cable lugs[4]	4 × 6	1.5	6FX■002-5CN54-....	6FX■008-1BB41-....	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
	4 × 10	1.5	6FX■002-5CN64-....	6FX■008-1BB51-....	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)
MOTION-CONNECT 500			5	5						
MOTION-CONNECT 800PLUS			8	8						
Length code			....	....						

For SIMOTICS S-1FT7 motors with holding brake and with SPEED-CONNECT connector on SINAMICS S120 Motor Modules in booksize format

Connection method, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **with** brake cores	Cable sold by the meter[1] **with** brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	Order No.	mm (in)	mm (in)	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5+2 × 1.5	0.5	6FX■002-5DN20-....	6FX■008-1BA11-....	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.16 (0.11)	195 (7.68)	90 (3.54)
		1	6FX■002-5DN01-....							
		1.5	6FX■002-5DN21-....							
	4 × 2.5+2 × 1.5	1	6FX■002-5DN11-....	6FX■008-1BA21-....	12.4 (0.49)	13.8 (0.54)	0.25 (0.17)	0.30 (0.20)	225 (8.86)	105 (4.13)
		1.5	6FX■002-5DN31-....							
	4 × 4+2 × 1.5	1.5	6FX■002-5DN41-....	6FX■008-1BA31-....	14.0 (0.55)	15.2 (0.60)	0.35 (0.24)	0.38 (0.26)	255 (10.04)	115 (4.53)
	4 × 6+2 × 1.5	1.5	6FX■002-5DN51-....	6FX■008-1BA41-....	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	6FX■002-5DN61-....	6FX■008-1BA51-....	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)
Ring cable lugs[4]	4 × 6+2 × 1.5	1.5	6FX■002-5DN54-....	6FX■008-1BA41-....	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	6FX■002-5DN64-....	6FX■008-1BA51-....	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)
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] For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.
[4] For SINAMICS S120 Motor Modules 45 A and 60 A in booksize format.

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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 <u>without</u> holding brake and with SPEED-CONNECT connector on SINAMICS S120 Power Modules

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **without brake cores**	Cable sold by the meter[1] **without brake cores**	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	**6FX8**	**6FX5**	**6FX8**	**6FX5**	**6FX8**
	mm²		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	**6FX■002-5CG10-....**	**6FX■008-1BB11-....**	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1.5	**6FX■002-5CG22-....**							
	4 × 2.5	1	**6FX■002-5CG12-....**	**6FX■008-1BB21-....**	10.0 (0.39)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
		1.5	**6FX■002-5CG32-....**							
	4 × 4	1.5	**6FX■002-5CG42-....**	**6FX■008-1BB31-....**	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.27 (0.18)	210 (8.27)	100 (3.94)
	4 × 6	1.5	**6FX■002-5CG52-....**	**6FX■008-1BB41-....**	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
	4 × 10	1.5	**6FX■002-5CG62-....**	**6FX■008-1BB51-....**	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)

MOTION-CONNECT 500	5	5
MOTION-CONNECT 800PLUS	8	8
Length code	....	....

For SIMOTICS S-1FK7 motors <u>with</u> holding brake and with SPEED-CONNECT connector on SINAMICS S120 Power Modules

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **with brake cores**	Cable sold by the meter[1] **with brake cores**	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	**6FX8**	**6FX5**	**6FX8**	**6FX5**	**6FX8**
	mm²		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+2 × 1.5	0.5	**6FX■002-5DN30-....**	**6FX■008-1BA11-....**	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.16 (0.11)	195 (7.68)	90 (3.54)
	4 × 1.5+2 × 1.5	1	**6FX■002-5DG10-....**							
		1.5	**6FX■002-5DG22-....**							
	4 × 2.5+2 × 1.5	1	**6FX■002-5DG12-....**	**6FX■008-1BA21-....**	12.4 (0.49)	13.8 (0.54)	0.25 (0.17)	0.30 (0.20)	225 (8.86)	105 (4.13)
		1.5	**6FX■002-5DG32-....**							
	4 × 4+2 × 1.5	1.5	**6FX■002-5DG42-....**	**6FX■008-1BA31-....**	14.0 (0.55)	15.2 (0.60)	0.35 (0.24)	0.38 (0.26)	255 (10.04)	115 (4.53)
	4 × 6+2 × 1.5	1.5	**6FX■002-5DG52-....**	**6FX■008-1BA41-....**	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	**6FX■002-5DG62-....**	**6FX■008-1BA51-....**	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)

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.

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, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable without brake cores	Cable sold by the meter[1] without brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
	mm²		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	**6FX■002-5CF10-....**	**6FX■008-1BB11-....**	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.16 (0.11)	155 (6.10)	75 (2.95)
		1.5	**6FX■002-5CF14-....**							
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, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable with brake cores	Cable sold by the meter[1] with brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
	mm²		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+2 × 1.5	1	**6FX■002-5DF10-....**	**6FX■008-1BB11-....**	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.25 (0.17)	155 (6.10)	75 (2.95)
		1.5	**6FX■002-5DF14-....**							
MOTION-CONNECT 500			5	5						
MOTION-CONNECT 800PLUS			8	8						
Length code			....	....						

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[1] Note type of delivery.
[2] 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, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable without brake cores	Cable sold by the meter[1] without brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	Order No.	mm (in)	mm (in)	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5	1	6FX■002-5CS01-....	6FX■008-1BB11-....	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1.5	6FX■002-5CS21-....							
		e. c.[4]	6FX 5 002-5CS02-....							
	4 × 2.5	1	6FX■002-5CS11-....	6FX■008-1BB21-....	10.0 (0.39)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
		1.5	6FX■002-5CS31-....							
		e. c.[4]	6FX 5 002-5CS12-....							
	4 × 4	1.5	6FX■002-5CS41-....	6FX■008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.27 (0.18)	210 (8.27)	100 (3.94)
		e. c.[4]	6FX 5 002-5CS42-....							
	4 × 6	1.5	6FX■002-5CS51-....	6FX■008-1BB41-....	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
		e. c.[4]	6FX 5 002-5CS52-....							
	4 × 10	1.5	6FX■002-5CS61-....	6FX■008-1BB51-....	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)
		3	6FX■002-5CS13-....							
		e. c.[4]	6FX 5 002-5CS62-....							
Ring cable lugs[5]	4 × 6	1.5	6FX■002-5CS54-....	6FX■008-1BB41-....	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
	4 × 10	1.5	6FX■002-5CS64-....	6FX■008-1BB51-....	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)
		3	6FX■002-5CS14-....							
	4 × 16	1.5	6FX 8 002-5CS24-....	6FX■008-1BB61-....	24.2 (0.95)	22.3 (0.88)	1.10 (0.74)	1.01 (0.68)	440 (17.32)	170 (6.69)
		3	6FX■002-5CS23-....							

MOTION-CONNECT 500	5	5
MOTION-CONNECT 800PLUS	8	8
Length code	....	....

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[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
[3] For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.
[4] e. c. = exposed core ends; suitable for motors with terminal box.
[5] 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 full-thread connector

■ 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, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable with brake cores	Cable sold by the meter[1] with brake cores	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	6FX8	6FX5	6FX8	6FX5	6FX8
mm²			Order No.	Order No.	mm (in)	mm (in)	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5+2 × 1.5	0.5	**6FX 5 002-5DA20-....**	6FX5008-1BA11-....	10.8 (0.43)	–	0.22 (0.15)	–	195 (7.68)	–
		1	**6FX■002-5DS01-....**	6FX■008-1BA11-....	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.16 (0.11)	195 (7.68)	90 (3.54)
		1.5	**6FX■002-5DS21-....**							
	4 × 2.5+2 × 1.5	1	**6FX■002-5DS11-....**	6FX■008-1BA21-....	12.4 (0.49)	13.8 (0.54)	0.25 (0.17)	0.30 (0.20)	225 (8.86)	105 (4.13)
		1.5	**6FX■002-5DS31-....**							
	4 × 4+2 × 1.5	1.5	**6FX■002-5DS41-....**	6FX■008-1BA31-....	14.0 (0.55)	15.2 (0.60)	0.35 (0.24)	0.38 (0.26)	255 (10.04)	115 (4.53)
	4 × 6+2 × 1.5	1.5	**6FX■002-5DS51-....**	6FX■008-1BA41-....	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	**6FX■002-5DS61-....**	6FX■008-1BA51-....	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)
		3	**6FX■002-5DS13-....**							
Ring cable lugs[4]	4 × 6+2 × 1.5	1.5	**6FX■002-5DS54-....**	6FX■008-1BA41-....	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	**6FX■002-5DS64-....**	6FX■008-1BA51-....	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)
		3	**6FX■002-5DS14-....**							
	4 × 16+2 × 1.5	3	**6FX■002-5DS23-....**	6FX■008-1BA61-....	25.0 (0.98)	23.8 (0.94)	1.12 (0.75)	1.03 (0.69)	450 (17.72)	180 (7.09)
Exposed core ends[5]	4 × 16+2 × 1.5	3	**6FX■002-5DG23-....**	6FX■008-1BA61-....	25.0 (0.98)	23.8 (0.94)	1.12 (0.75)	1.03 (0.69)	450 (17.72)	180 (7.09)
	4 × 25+2 × 1.5	3	**6FX■002-5DG33-....**	6FX■008-1BA25-....	29.4 (1.16)	27.6 (1.09)	1.62 (1.09)	1.47 (0.99)	530 (20.87)	280 (11.02)
	4 × 35+2 × 1.5	3	**6FX■002-5DG43-....**	6FX■008-1BA35-....	32.6 (1.28)	31.9 (1.26)	2.06 (1.38)	1.92 (1.29)	590 (23.23)	320 (12.60)
	4 × 50+2 × 1.5	3	**6FX■002-5DG53-....**	6FX■008-1BA50-....	38.0 (1.50)	35.0 (1.38)	3.04 (2.04)	2.56 (1.72)	685 (26.97)	350 (13.78)

MOTION-CONNECT 500		**5**	**5**	
MOTION-CONNECT 800PLUS		**8**	**8**	
Length code		**....**	**....**	

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[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
[3] For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.
[4] For SINAMICS S120 Motor Modules 45 A and 60 A in booksize format.
[5] 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 <u>without</u> holding brake/SIMOTICS S-1FK7 motors <u>without</u> 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, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **without brake cores**	Cable sold by the meter[1] **without brake cores**	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	**6FX8**	**6FX5**	**6FX8**	**6FX5**	**6FX8**
	mm²		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	**6FX■002-5CG01-....**	**6FX■008-1BB11-....**	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1.5	**6FX■002-5CG21-....**							
	4 × 2.5	1	**6FX■002-5CG11-....**	**6FX■008-1BB21-....**	10.0 (0.39)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
		1.5	**6FX■002-5CG31-....**							
	4 × 4	1.5	**6FX■002-5CG41-....**	**6FX■008-1BB31-....**	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.27 (0.18)	210 (8.27)	100 (3.94)
	4 × 6	1.5	**6FX■002-5CG51-....**	**6FX■008-1BB41-....**	13.6 (0.54)	14.9 (0.59)	0.37 (0.25)	0.41 (0.28)	245 (9.65)	120 (4.72)
	4 × 10	1.5	**6FX■002-5CG61-....**	**6FX■008-1BB51-....**	20.0 (0.79)	18.2 (0.72)	0.73 (0.49)	0.62 (0.42)	360 (14.17)	140 (5.51)
		3	**6FX■002-5CG13-....**							
	4 × 16	3	**6FX■002-5CG23-....**	**6FX■008-1BB61-....**	24.2 (0.95)	22.3 (0.88)	1.10 (0.74)	1.01 (0.68)	440 (17.32)	170 (6.69)
MOTION-CONNECT 500			5	5						
MOTION-CONNECT 800PLUS			8	8						
Length code			....	....						

*For SIMOTICS S-1FT7 motors <u>with</u> holding brake/SIMOTICS S-1FK7 motors <u>with</u> holding brake and with full-thread connector on
SINAMICS S120 Motor Modules in booksize compact format and Power Modules*

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable **with brake cores**	Cable sold by the meter[1] **with brake cores**	D_{max}		Weight (without connector)		Smallest perm. bending radius[2]	
					6FX5	**6FX8**	**6FX5**	**6FX8**	**6FX5**	**6FX8**
	mm²		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+2 × 1.5	0.5	**6FX5 002-5DA30-....**	**6FX 5 008-1BA11-....**	10.8 (0.43)	–	0.22 (0.15)	–	195 (7.68)	–
		1	**6FX■002-5DG01-....**	**6FX■008-1BA11-....**	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.16 (0.11)	195 (7.68)	90 (3.54)
		1.5	**6FX■002-5DG21-....**							
	4 × 2.5+2 × 1.5	1	**6FX■002-5DG11-....**	**6FX■008-1BA21-....**	12.4 (0.49)	13.8 (0.54)	0.25 (0.17)	0.30 (0.20)	225 (8.86)	105 (4.13)
		1.5	**6FX■002-5DG31-....**							
	4 × 4+2 × 1.5	1.5	**6FX■002-5DG41-....**	**6FX■008-1BA31-....**	14.0 (0.55)	15.2 (0.60)	0.35 (0.24)	0.38 (0.26)	255 (10.04)	115 (4.53)
	4 × 6+2 × 1.5	1.5	**6FX■002-5DG51-....**	**6FX■008-1BA41-....**	16.1 (0.63)	17.3 (0.68)	0.49 (0.33)	0.50 (0.34)	290 (11.42)	130 (5.12)
	4 × 10+2 × 1.5	1.5	**6FX■002-5DG61-....**	**6FX■008-1BA51-....**	21.7 (0.85)	20.1 (0.79)	0.81 (0.54)	0.71 (0.48)	395 (15.55)	150 (5.91)
		3	**6FX■002-5DG13-....**							
	4 × 16+2 × 1.5	3	**6FX■002-5DG23-....**	**6FX■008-1BA61-....**	25.0 (0.98)	23.8 (0.94)	1.12 (0.75)	1.03 (0.69)	450 (17.72)	180 (7.09)
	4 × 25+2 × 1.5	3	**6FX■002-5DG33-....**	**6FX■008-1BA25-....**	29.4 (1.16)	27.6 (1.09)	1.62 (1.09)	1.47 (0.99)	530 (20.87)	280 (11.02)
	4 × 35+2 × 1.5	3	**6FX■002-5DG43-....**	**6FX■008-1BA35-....**	32.6 (1.28)	31.9 (1.26)	2.06 (1.38)	1.92 (1.29)	590 (23.23)	320 (12.60)
	4 × 50+2 × 1.5	3	**6FX■002-5DG53-....**	**6FX■008-1BA50-....**	38.0 (1.50)	35.0 (1.38)	3.04 (2.04)	2.56 (1.72)	685 (26.97)	350 (13.78)
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.

■ **Accessories**

Extensions for power cables with SPEED-CONNECT or full-thread connector

No. of cores × cross-section		Connector size, motor end	Basic cable for motors on SINAMICS S120		**Extension**
without brake cores	with brake cores		Motor Modules	Power Modules	
mm²	mm²		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[1]	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[1]	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[1]	6FX.002-5DG33-....	6FX.002-5DG33-....	**6FX■002-5DX38-....**
–	4 × 35+2 × 1.5	3[1]	6FX.002-5DG43-....	6FX.002-5DG43-....	**6FX■002-5DX48-....**
–	4 × 50+2 × 1.5	3[1]	6FX.002-5DG53-....	6FX.002-5DG53-....	**6FX■002-5DX58-....**

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.

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[1] 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 Type SIMOTICS	Thread	No. of cores × cross-section mm²	Connection method Motor Module end	Pre-assembled cable Order No.	Cable sold by the meter[1] Order No.	D_{max} mm (in)	Weight (without gland) kg/m (lb/ft)	Smallest perm. bend- ing radius[2] mm (in)
M-1PH808	M25	4 × 2.5	Connector[3]	**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[3]	**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 core ends[4]	**6FX8002-5CR41-....**				
M-1PH813	M40	4 × 10	Connector[3]	**6FX8002-5CP42-....**	**6FX8008-1BB51-....**	18.2 (0.72)	0.62 (0.42)	140 (5.51)
			Exposed core ends[4]	**6FX8002-5CR42-....**				
	M50	4 × 10	Connector[3]	**6FX8002-5CP43-....**				
			Exposed core ends[4]	**6FX8002-5CR43-....**				
	M40	4 × 16	Exposed core ends[4]	**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 core ends[4]	**6FX8002-5CR53-....** –	**6FX8008-1BB61-....** **6FX5008-1BB61-....**	22.3 (0.88) 24.2 (0.95)	1.01 (0.68) 1.10 (0.74)	170 (6.69) 440 (17.32)
		4 × 35		**6FX5002-5CR73-....** –	**6FX5008-1BB35-....** **6FX8008-1BA35-....**	31.5 (1.24) 29.6 (1.17)	1.93 (1.30) 2.00 (1.34)	570 (22.44) 300 (11.81)
		4 × 50		**6FX5002-5CR83-....** –	**6FX5008-1BB50-....** **6FX8008-1BA50-....**	38.0 (1.50) 34.4 (1.35)	3.04 (2.04) 2.66 (1.79)	685 (26.97) 345 (13.58)
	M63	4 × 25		–	**6FX5008-1BB25-....** **6FX8008-1BA25-....**	28.0 (1.10) 27.6 (1.09)	1.62 (1.09) 1.51 (1.01)	505 (19.88) 280 (11.02)
		4 × 35		–	**6FX5008-1BB35-....** **6FX8008-1BA35-....**	31.5 (1.24) 29.6 (1.17)	1.93 (1.30) 2.00 (1.34)	570 (22.44) 300 (11.81)
		4 × 50		–	**6FX5008-1BB50-....** **6FX8008-1BA50-....**	38.0 (1.50) 34.4 (1.35)	3.04 (2.04) 2.66 (1.79)	685 (26.97) 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	**....**	**....**

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
[3] For SINAMICS S120 Motor Modules 3 A to 30 A in booksize format.
[4] 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.

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MOTION-CONNECT connection systems
Power cables for SINAMICS S120

■ **Selection and ordering data** (continued)

For SIMOTICS M-1PH808/-1PH810/-1PH813/-1PH816 motors with terminal box on SINAMICS S120 Power Modules

Motor Type SIMOTICS	Thread	No. of cores × cross-section mm²	Connection method Power Module end	Pre-assembled cable Order No.	Cable sold by the meter[1] Order No.	D_{max} mm (in)	Weight (without gland) kg/m (lb/ft)	Smallest perm. bend- ing radius[2] mm (in)
M-1PH808	M25	4 × 2.5	Exposed core ends[3]	**6FX8002-5CR10-....** –	**6FX8008-1BB21-....** **6FX5008-1BB21-....**	11.0 (0.43) 10.0 (0.39)	0.20 (0.13) 0.21 (0.14)	90 (3.54) 180 (7.09)
		4 × 4		**6FX8002-5CR20-....** –	**6FX8008-1BB31-....** **6FX5008-1BB31-....**	12.3 (0.48) 11.4 (0.45)	0.27 (0.18) 0.27 (0.18)	100 (3.94) 210 (8.27)
M-1PH810	M32	4 × 2.5	Exposed core ends[3]	**6FX8002-5CR11-....** –	**6FX8008-1BB21-....** **6FX5008-1BB21-....**	11.0 (0.43) 10.0 (0.39)	0.20 (0.13) 0.21 (0.14)	90 (3.54) 180 (7.09)
		4 × 4		**6FX8002-5CR21-....** –	**6FX8008-1BB31-....** **6FX5008-1BB31-....**	12.3 (0.48) 11.4 (0.45)	0.27 (0.18) 0.27 (0.18)	100 (3.94) 210 (8.27)
		4 × 10		**6FX8002-5CR41-....** –	**6FX8008-1BB51-....** **6FX5008-1BB51-....**	18.2 (0.72) 20.0 (0.79)	0.62 (0.42) 0.73 (0.49)	140 (5.51) 360 (14.17)
M-1PH813	M40	4 × 10	Exposed core ends[3]	**6FX8002-5CR42-....** –	**6FX8008-1BB51-....** **6FX5008-1BB51-....**	18.2 (0.72) 20.0 (0.79)	0.62 (0.42) 0.73 (0.49)	140 (5.51) 360 (14.17)
	M50			**6FX8002-5CR43-....** –				
	M40	4 × 16		**6FX8002-5CR52-....** –	**6FX8008-1BB61-....** **6FX5008-1BB61-....**	22.3 (0.88) 24.2 (0.95)	1.01 (0.68) 1.10 (0.74)	170 (6.69) 440 (17.32)
	M50			**6FX8002-5CR53-....** –				
	M40	4 × 35		**6FX5002-5CR72-....**	**6FX5008-1BB35-....**	31.5 (1.24)	1.93 (1.30)	570 (22.44)
	M50			**6FX5002-5CR73-....**	**6FX8008-1BA35-....**	29.6 (1.17)	2.00 (1.34)	300 (11.81)
	M50	4 × 50		**6FX5002-5CR83-....** –	**6FX5008-1BB50-....** **6FX8008-1BA50-....**	38.0 (1.50) 34.4 (1.35)	3.04 (2.04) 2.66 (1.79)	685 (26.97) 345 (13.58)
M-1PH816	M50	4 × 16	Exposed core ends[3]	**6FX8002-5CR53-....** –	**6FX8008-1BB61-....** **6FX5008-1BB61-....**	22.3 (0.88) 24.2 (0.95)	1.01 (0.68) 1.10 (0.74)	170 (6.69) 440 (17.32)
		4 × 35		**6FX5002-5CR73-....** –	**6FX5008-1BB35-....** **6FX8008-1BA35-....**	31.5 (1.24) 29.6 (1.17)	1.93 (1.30) 2.00 (1.34)	570 (22.44) 300 (11.81)
		4 × 50		**6FX5002-5CR83-....** –	**6FX5008-1BB50-....** **6FX8008-1BA50-....**	38.0 (1.50) 34.4 (1.35)	3.04 (2.04) 2.66 (1.79)	685 (26.97) 345 (13.58)
	M63	4 × 25		– –	**6FX5008-1BB25-....** **6FX8008-1BA25-....**	28.0 (1.10) 27.6 (1.09)	1.62 (1.09) 1.51 (1.01)	505 (19.88) 280 (11.02)
		4 × 35		– –	**6FX5008-1BB35-....** **6FX8008-1BA35-....**	31.5 (1.24) 29.6 (1.17)	1.93 (1.30) 2.00 (1.34)	570 (22.44) 300 (11.81)
		4 × 50		– –	**6FX5008-1BB50-....** **6FX8008-1BA50-....**	38.0 (1.50) 34.4 (1.35)	3.04 (2.04) 2.66 (1.79)	685 (26.97) 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				**....**	**....**			

7

[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 Type SIMOTICS	Thread	No. of cores × cross-section mm²	Connection method Power Module end	Pre-assembled cable Order No.	Cable sold by the meter[1] Order No.	D_{max} 6FX5 mm (in)	6FX8 mm (in)	Weight (without gland) 6FX5 kg/m (lb/ft)	6FX8 kg/m (lb/ft)	Smallest perm. bending radius[2] 6FX5 mm (in)	6FX8 mm (in)
M-1PH808	M25	4 × 2.5	Exposed core ends[3]	6FX■002-5CE02-....	6FX8008-1BB21-....	11.0 (0.43)	11.0 (0.43)	0.21 (0.14)	0.23 (0.16)	180 (7.09)	90 (3.54)
M-1PH810	M32	4 × 4	Exposed core ends[3]	6FX■002-5CE04-....	6FX8008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.31 (0.21)	210 (8.27)	100 (3.94)
M-1PH813	M40	4 × 6	Exposed core ends[3]	6FX■002-5CE06-....	6FX8008-1BB41-....	20.0 (0.79)	15.1 (0.59)	0.37 (0.25)	0.42 (0.28)	245 (9.65)	120 (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 × cross-section mm²	Connection method Power Module end	Pre-assembled cable Order No.	Cable sold by the meter[1] Order No.	D_{max} mm (in)	Weight (without gland) kg/m (lb/ft)	Smallest perm. bending radius[2] mm (in)
4 × 95		–	6FX5008-1BB05-....	51.7 (2.04)	5.55 (3.73)	935 (36.81)
4 × 120		–	6FX5008-1BB12-....	56.0 (2.20)	6.60 (4.43)	1010 (39.76)
MOTION-CONNECT 500			5			
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 L-1FN3 motors**

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 Interface	Pre-assembled basic cable to the drive system	Cable sold by meter[1] for pre-assembled adapter cable	D_{max}	Weight (without connector)	Smallest perm. bending radius[2]
mm^2		Order No. [3]		Order No.	Order No.	mm (in)	kg/m (lb/ft)	mm (in)
4 × 2.5	M20	**6FX7002-5LM42-....** *)	1	**6FX8002-5CS11-....**	6FX8008-1BB21-....	11.0 (0.43)	0.20 (0.13)	90 (3.54)
4 × 2.5	M20	**6FX7002-5LM62-....** **)	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-....** ***)	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	Connector size	Pre-assembled basic cable to the drive system	Extension
mm^2		Type	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-....**

MOTION-CONNECT 800PLUS	**8**	
Length code		**....**

The combinations of power cable extensions shown are only provided by way of example.

7

[1] Note type of delivery.

[2] Valid for installation in a cable carrier.

[3] The 6FX7002-5LM.. cables comprise MOTION-CONNECT 800PLUS cables which are sold by the meter.

*) For SIMOTICS L-1FN30/-1FN31 motors only.

**) For SIMOTICS L-1FN33/-1FN34/-1FN36/-1FN39 motors only.

***)For SIMOTICS L-1FN3 linear motors in the peak load version, the pre-assembled basic cable 6FX8002-5CS54-.... (4 × 6 mm^2) 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	Connector size, motor end	Pre-assembled cable to the drive system	Cable sold by the meter[1]	D_{max}	Weight (without connector)	Smallest perm. bending radius[2]
mm²		Order No.	Order No.	mm (in)	kg/m (lb/ft)	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-....** *)	**6FX8008-1BB51-....**	18.2 (0.72)	0.62 (0.42)	140 (5.51)
MOTION-CONNECT 800PLUS		**8**	**8**			
Length code		**....**	**....**			

■ Accessories

Power cable extensions for SIMOTICS L-1FN6 linear motors with SPEED-CONNECT connector

No. of cores × cross-section	Connector size, motor end	Pre-assembled cable to the drive system	Extension
mm²		Type	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-.... *)	**6FX8002-5DQ68-....**
MOTION-CONNECT 800PLUS			**8**
Length code			**....**

The combinations of power cable extensions shown are only provided by way of example.

7

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
*) Module end with ring cable lugs.

MOTION-CONNECT connection systems
Power cables for SINAMICS S120

■ 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	Connector size, motor end	Pre-assembled cable to the drive system	Cable sold by the meter[1]	D_{max}	Weight (without connector)	Smallest perm. bending radius[2]
mm²		Order No.	Order No.	mm (in)	kg/m (lb/ft)	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)
MOTION-CONNECT 800PLUS		**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	Connector size	Pre-assembled cable to the drive system	Extension
mm²		Type	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-....**
MOTION-CONNECT 800PLUS			**8**
Length code			**....**

The combinations of power cable extensions shown are only provided by way of example.

7

[1] Note type of delivery.
[2] 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.0**4**2-2C...-....

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.0**1**2-2C...-....

Note:

Once the contacts have latched into the insulator, they can no longer be removed.

■ **Technical specifications**

DRIVE-CLiQ signal cables	DRIVE-CLiQ	DRIVE-CLiQ MOTION-CONNECT 500	DRIVE-CLiQ MOTION-CONNECT 800PLUS
	6FX2...-1DC..-....	6FX5...-.DC..-....	6FX8...-.DC..-....
Approvals, according to			
• 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.[1]	Yes	Yes	Yes
• RoHS conformity	Yes	Yes	Yes
Rated voltage according to EN 50395	30 V	30 V	30 V
Test voltage, rms	500 V	500 V	500 V
Operating temperature on the surface			
• 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)
Tensile stress, max.			
• Fixed installation	45 N/mm^2 (6526 lb$_f$/in^2)	80 N/mm^2 (11603 lb$_f$/in^2)	50 N/mm^2 (7252 lb$_f$/in^2)
• Flexible installation	–	30 N/mm^2 (4351 lb$_f$/in^2)	20 N/mm^2 (2901 lb$_f$/in^2)
Smallest bending radius			
• 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)
Torsional stress	–	Absolute 30°/m	Absolute 30°/m
Bending	–	100000	10 million
Traversing velocity	–	30 m/min (98.4 ft/min)	300 m/min (984 ft/min)
Acceleration	–	2 m/s^2 (6.56 ft/s^2)	Up to 50 m/s^2 (164 ft/s^2), see characteristics on page 7/5
Insulation material, incl. jacket	CFC/silicone-free	CFC/silicone-free	CFC/halogen/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-2-1	EN 60811-2-1 (mineral oil only)	EN 60811-2-1
Outer jacket	PVC	PVC	PUR, HD22.10 S2 (VDE 0282, Part 10)
	Gray RAL 7032	DESINA color green RAL 6018	DESINA color green RAL 6018
Flame-retardant	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.

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[1] 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	MOTION-CONNECT 800PLUS
	6FX500.-.....-....	6FX800.-.....-....
Approvals, according to		
• cURus or UR/CSA	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90
• UR-CSA File No.[1]	Yes	Yes
• RoHS conformity	Yes	Yes
Rated voltage according to EN 50395	30 V	30 V
Test voltage, rms	500 V	500 V
Operating temperature on the surface		
• 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)
Tensile stress, max.		
• Fixed installation	50 N/mm^2 (7252 lb$_f$/in^2)	50 N/mm^2 (7252 lb$_f$/in^2)
• Flexible installation	20 N/mm^2 (2901 lb$_f$/in^2)	20 N/mm^2 (2901 lb$_f$/in^2)
Smallest bending radius		
• Fixed installation	60 mm (2.36 in)	$4 \times D_{max}$
• Flexible installation	100 mm (3.94 in)	70 mm (2.76 in)
Torsional stress	Absolute 30°/m	Absolute 30°/m
Bending	2 million	10 million
Traversing velocity	180 m/min (591 ft/min)	Up to 300 m/min (984 ft/min)
Acceleration	5 m/s^2 (16.41 ft/s^2)	Up to 50 m/s^2 (164 ft/s^2), see characteristics on page 7/5
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-2-1 (mineral oil only)	EN 60811-2-1
Outer jacket	PVC	PUR, HD22.10 S2 (VDE 0282, Part 10)
	DESINA color green RAL 6018	DESINA color green RAL 6018
Flame-retardant	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.

7

[1] The File No. is printed on the cable jacket.

MOTION-CONNECT connection systems
Signal cables for SINAMICS S120

■ **Selection and ordering data**

Pre-assembled DRIVE-CLiQ signal cables without 24 V DC cores

Type	Length	D_{max}	Degree of protection Connector	DRIVE-CLiQ signal cable without 24 V DC cores Order No.
	m (ft)	mm (in)		
Fixed lengths	0.11 (0.36)		IP20/IP20	6SL3060-4AB00-0AA0
	0.16 (0.52)			6SL3060-4AD00-0AA0
	0.21 (0.69)			6SL3060-4AF00-0AA0
	0.26 (0.85)			6SL3060-4AH00-0AA0
	0.31 (1.02)			6SL3060-4AK00-0AA0
	0.36 (1.18)			6SL3060-4AM00-0AA0
	0.41 (1.35)			6SL3060-4AP00-0AA0
	0.60 (1.97)			6SL3060-4AU00-0AA0
	0.95 (3.12)			6SL3060-4AA10-0AA0
	1.20 (3.94)			6SL3060-4AW00-0AA0
	1.45 (4.76)			6SL3060-4AF10-0AA0
	2.80 (9.19)			6SL3060-4AJ20-0AA0
	5.00 (16.4)			6SL3060-4AA50-0AA0
To the meter	max. 70 (230)	7.0 (0.28)	IP20/IP20	6FX2002-1DC00-....
To the meter	max. 70 (230)	7.0 (0.28)	IP67/IP67	6FX2002-1DC20-....
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 <u>with</u> 24 V DC cores

Type	Application	Connector/ Degree of protection motor end	Connector/ Degree of protection Module end	Length, max.	D_{max}	Cable length	MOTION-CONNECT DRIVE-CLiQ signal cable <u>with</u> 24 V DC cores
				m (ft)	mm (in)	m (ft)	Order No.
To the meter	For components with DRIVE-CLiQ interface in the control cabinet.	RJ45/IP20	RJ45/IP20	100 (328)	7.1 (0.28)		**6FX5002-2DC00-....**
	For example, for making the connection between SINAMICS S120 Motor Modules or Power Modules and the cabinet bushing.	RJ45/IP20	RJ45/IP20	75 (246)	7.1 (0.28)		**6FX8002-2DC00-....**
To the meter	For built-in or built-on encoder systems with DRIVE-CLiQ.	RJ45/IP20	RJ45/IP67	100 (328)	7.1 (0.28)		**6FX5002-2DC10-....**
	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 (246)	7.1 (0.28)		**6FX8002-2DC10-....**
To the meter	For built-in or built-on encoder systems with DRIVE-CLiQ.	RJ45/IP67	RJ45/IP67	100 (328)	7.1 (0.28)		**6FX5002-2DC20-....**
	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 (246)	7.1 (0.28)		**6FX8002-2DC20-....**
	For built-on encoder systems with DRIVE-CLiQ.	RJ45/IP20	M12/IP67	30 (98.4)	7.1 (0.28)	3 (9.8)	**6FX■002-2DC30-1AD0**
	For example, as a <u>basic cable</u> between third-party direct measuring systems with DRIVE-CLiQ interface and SINAMICS S120 Motor Modules and Power Modules.					6 (19.7)	**6FX■002-2DC30-1AG0**
						15 (49.2)	**6FX■002-2DC30-1BF0**
						30 (98.4)	**6FX■002-2DC30-1DA0**
	For example, as an <u>extension to the basic cable</u> 6FX.002-2DC30.[1]	M12/IP67	M12/IP67	30 (98.4)	7.1 (0.28)	3 (9.8)	**6FX■002-2DC34-1AD0**
						6 (19.7)	**6FX■002-2DC34-1AG0**
MOTION-CONNECT 500							**5**
MOTION-CONNECT 800PLUS							**8**
Length code							**....**

7

[1] The total cable length (basic cable plus extension cable) must not exceed 30 m (98.4 ft).

MOTION-CONNECT connection systems
Signal cables for SINAMICS S120

**Signal cables for motors
with SPEED-CONNECT/full-thread connector**

■ **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-....**	**6FX8002-2EN24-....**
Absolute encoder with EnDat	S-1FK7[1]	SMC20	100 (328)	9.8 (0.39)	70 (2.76)	IP20/IP67	**6FX■002-2EQ31-....**	**6FX■002-2EQ34-....**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R	S-1FK701	SMC20	50 (164)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX■002-2CN20-....**	**6FX8002-2CN24-....**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks	S-1FK7[1]	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-....**	**6FX8002-2FN24-....**
• 2-pole	S-1FK701	SMC10	130 (426)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX■002-2FN20-....**	**6FX8002-2FN24-....**
MOTION-CONNECT 500							**5**	**5**
MOTION-CONNECT 800PLUS							**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-....**	**6FX5002-2EQ24-....**
Absolute encoder with EnDat	S-1FK7[2]/ 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	**6FX8002-2AD04-....**	–
Resolver	S-1FK701	SMC10	50 (164)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX■002-2CF20-....**	**6FX5002-2CF24-....**
Resolver • Multi-pole	S-1FT/-1FK[2]/ T-1FW3	SMC10	50 (164)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX■002-2CF02-....**	**6FX■002-2CF04-....**
• 2-pole	S-1FT/-1FK[2]/ 1PH7/1PL6	SMC10	130 (426)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX■002-2CF02-....**	**6FX■002-2CF04-....**
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[3]	SME120/ SME125	10 (32.8)	11.9 (0.47)	85 (3.35)	IP67/IP67	**6FX7002-2SL10-....**	**6FX7002-2SL01-....**
Temperature sensor	L-1FN3300 ... L-1FN3900[3]	SME120/ SME125	10 (32.8)	11.9 (0.47)	85 (3.35)	IP67/IP67	**6FX7002-2SL10-....**	**6FX7002-2SL02-....**
Temperature sensor	L-1FN6/ T-1FW6	SME120/ SME125	10 (32.8)	11.9 (0.47)	85 (3.35)	IP67/IP67	**6FX7002-2SL10-....**	–
MOTION-CONNECT 500							**5**	**5**
MOTION-CONNECT 800PLUS							**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.

[1] Possible for SIMOTICS M-1PH808/-1PH810/-1PH813 motors.
[2] Not for SIMOTICS S-1FK701.
[3] Continuous load version.

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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 <u>full-thread</u> 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_{pp} 2048 S/R	S-1FK701	SMC20	50 (164)	9.8 (0.39)	70 (2.76)	IP20/IP67	**6FX■002-2CA20-....**	**6FX5002-2CA24-....**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R								
• With C and D tracks	S-1FK7[1]/ M-1PH8/ 1PH7/1PL6	SMC20	100 (328)	9.8 (0.39)	70 (2.76)	IP20/IP67	**6FX■002-2CA31-....**	**6FX■002-2CA34-....**
• Without C and D tracks	M-1PH8/ 1PH7/1PL6	SMC20	50 (164)	9.2 (0.36)	70 (2.76)	IP20/IP67	**6FX8002-2CA80-....**	**6FX■002-2CA34-....**
HTL incremental encoder	M-1PH8/ 1PH7/1PL6	SMC30	300 (984)[2]	9.3 (0.37)	70 (2.76)	IP20/IP67	**6FX■002-2AH00-....**	**6FX■002-2AH04-....**
HTL incremental encoder	M-1PH8/ 1PH7/1PL6	CU310-2 DP	100 (328)	9.3 (0.37)	70 (2.76)	IP20/IP67	**6FX■002-2AH11-....**	–
Incremental encoder sin/cos 1 V_{pp} without C and D tracks 6FX2001-3		SMC20	50 (164)	9.3 (0.37)	70 (2.76)	IP20/IP67	**6FX■002-2CG00-....**	**6FX■002-2CB54-....**
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	**6FX■002-2CR00-....**	**6FX■002-2CB54-....**
• 24 V DC		SMC30	100 (328)	9.3 (0.37)	70 (2.76)	IP20/IP67	**6FX■002-2CD24-....**	**6FX■002-2CB54-....**
Incremental encoder sin/cos 1 V_{pp} 5 V DC without C and D tracks		SME20	3 (9.84)[3]	9.3 (0.37)	70 (2.76)	IP67/IP67	**6FX■002-2CB54-....**	–
Direct incremental encoder sin/cos 1 V_{pp}	L-1FN3/-1FN6/ T-1FW6	SME120	3 (9.84)[3]	9.3 (0.37)	70 (2.76)	IP67/IP67	**6FX8002-2CB54-....**	–
MOTION-CONNECT 500							5	5
MOTION-CONNECT 800PLUS							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.

[1] Not for SIMOTICS S-1FK701.
[2] With evaluation of difference signals A*, A, B*, B, otherwise ≤ 100 m (328 ft).
[3] Up to 10 m (32.8 ft) possible, depending on the encoder current consumption.

Overview

Data position in Order No.																		
MOTION-CONNECT 500	6	F	X	5	0	.	2	−	5	.	.	.	.	−	.	.	.	.
MOTION-CONNECT 800PLUS	6	F	X	8	0	.	2	−	5	.	.	.	.	−	.	.	.	.

	9	10	11	12
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			

	9
Without brake cores	C
With brake cores	D

Basic cable between	and	9	10	11	12
SINAMICS S120 Motor Module, booksize format up to 30 A	Motor full-thread connector size 0.5	D	A	2	0
	Motor full-thread connector size 1/1.5		S		1
	Motor full-thread connector size 3		S	1	3
	Motor with terminal box (exposed core ends)		S		2
	Motor SPEED-CONNECT connector size 0.5	D	N	2	0
	Motor SPEED-CONNECT connector size 1/1.5		N		1
SINAMICS S120 Motor Module, booksize format, 45 A or higher	Motor full-thread connector size 1/1.5		S		4
	Motor full-thread connector size 3		S	2	3
	Motor SPEED-CONNECT connector size 1/1.5		N		4
SINAMICS S120 Power Module/Motor Module, booksize compact format	Motor full-thread connector size 0.5	D	A	3	0
	Motor full-thread connector size 1/1.5		G		1
	Motor full-thread connector size 3		G		3
	Motor SPEED-CONNECT connector size 0.5	D	N	3	0
	Motor SPEED-CONNECT connector size 1/1.5		G	1	0
SINAMICS S120 Power Module, Combi format	Motor SPEED-CONNECT connector size 1/1.5		F		
SINAMICS S120 Power Module/Motor Module, booksize format	SIMOTICS M-1PH8 with terminal box	C	R		
SINAMICS S120 Power Module, Combi format	SIMOTICS M-1PH8 with terminal box	C	E		

Extension between basic cable with connector	and motor connector	9	10	11	12
Full-thread size 0.5	Full-thread size 0.5	M	E	0	5
Full-thread size 1	Full-thread size 1		A		5
Full-thread size 1.5	Full-thread size 1.5		A		8
Full-thread size 3	Full-thread size 3		X		8
SPEED-CONNECT size 0.5	SPEED-CONNECT size 0.5	M	N	0	5
SPEED-CONNECT size 1	SPEED-CONNECT size 1		Q		5
SPEED-CONNECT size 1.5	SPEED-CONNECT size 1.5		Q		8

Adapter cable for SIMOTICS L-1FN3	6 F X 7 0 0 2	L	M

Cross-section

Length code
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
MOTION-CONNECT 500		6	F	X	5	0	.	2	–	2	.	.	.	.	–	.	.	.	.
MOTION-CONNECT 800PLUS		6	F	X	8	0	.	2	–	2	.	.	.	.	–	.	.	.	.
6FX2 cables		6	F	X	2	0	0	2	–	2	.	.	.	.	–	.	.	.	.

	6	9	10	11	12
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	9	10	11	12
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	9	10	11	12
SMC20	Incremental encoder (sin/cos 1 V_{pp}) 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_{pp}) 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	9	10	11	12
Full-thread or SPEED-CONNECT	Full-thread or SPEED-CONNECT				4

Variant: Signal cables for external encoder

Basic cable between	and	9	10	11	12
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_{pp}) 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	9	10	11	12
Full thread	Full thread				4

Variant: Signal cables for temperature sensor

	1	2	3	4	5	6	7		9	10	11	12
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

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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
Length code for pre-assembled cables	

6FX.0.2-.....-	■	■	■	■
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
Length code for power and signal cables, sold by the meter[1]	

6FX.008-.....-	■	■	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

G_D211_XX_00144

Cable with exposed core ends and pre-assembled connector

G_D211_XX_00142

Cable with pre-assembled connectors at both ends

Tolerances:
- Cable lengths up to 10 m (32.8 ft): ± 2 %
- Cable lengths of 10 m (32.8 ft) and longer: ± 1 %

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[1] Note type of delivery.

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

G_NC01_EN_00420d

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

SINAMICS S120 Power Module PM340 Blocksize format	Order No. **Pre-assembled cables**
Line connection — U1/L1 V1/L2 W1/L3	Power supply cable see power cables for motors (by the meter)

Control Unit CU310-2

X100 — **6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) — X500 Terminal Modules
6FX2002-1DC00-.... ≤ 70 m (230 ft)

PM-IF interface — X100 — **6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) — X500 SMC10
6FX2002-1DC00-.... ≤ 70 m (230 ft) — X500 SMC20
— X500 SMC30

Motor encoder interface via SMC for motors without DRIVE-CLiQ interface

X100 — **6FX5002- 2DC10-....** ≤ 100 m (328 ft) — Absolute encoder with DRIVE-CLiQ 6FX2001-5.D..
6FX8002- 2DC10-.... ≤ 75 m (246 ft) — Motor encoder for motors with DRIVE-CLiQ interface 1FK/1FT/1PH8

Motor encoder interface for motors with DRIVE-CLiQ interface

Direct connection Motor encoder HTL/TTL — X23 — **6FX.002-2CR00-....** ≤ 100 m (328 ft) with 5 V DC — Incremental encoder TTL RS422 (5 V) 6FX2001-2...
6FX.002-2CD24-.... ≤ 100 m (328 ft) with 24 V DC — Incremental encoder TTL RS422 (24 V) 6FX2001-2...
6SX7002-0AN30-.... ≤ 100 m (328 ft) with 5 V DC — Incremental encoder HTL Type 1XP8001 on 1LA motor[1]

X21 — PROFIBUS connection **6ES7972-0BA42-0XA0** (without PG socket) **6ES7972-0BB42-0XA0** (with PG socket)

X200-X201 — PROFINET

Motor connection — **Pre-assembled power cables, see power cables for motors** (max. cable length, see technical specifications of Motor Modules) — Motors

G_NC01_EN_00510a

[1] Not for 2KG geared motors.

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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 Motor Module Booksize format	Order No. Pre-assembled cables	
X200-X203[1]	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X200-X202 Smart Line Module
		X200-X202 Active Line Module
		X200-X203[1] Motor Module
		SINUMERIK 840D sl type 1B X100-X105 NCU 710.3 PN / NCU 720.3 PN / NCU 730.3 PN
		NX10.3/NX15.3
X200-X203[1]	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X200-X203[1] Further Motor Modules
Motor encoder interface via SMC for motors without DRIVE-CLiQ interface	X200-X203[1]	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X500 SMC10 / X500 SMC20 / X500 SMC30
Motor encoder interface for motors with DRIVE-CLiQ interface	X200-X203[1]	**6FX5002- 2DC10-....** ≤ 100 m (328 ft) **6FX8002- 2DC10-....** ≤ 75 m (246 ft)	Absolute encoder with DRIVE-CLiQ 6FX2001-5.D.. / Motor encoder in motors with DRIVE-CLiQ interface 1FK/1FT/1PH8
Motor connection	**Pre-assembled power cables, see power cables for motors** (max. cable length, see technical specifications of Motor Modules)	Motors

G_NC01_EN_00508a

[1] 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

SINAMICS S120 Power Module PM340 Blocksize format

Line connection
U1/L1
V1/L2
W1/L3

Order No.
Pre-assembled cables

Power supply cables, see power cables for motors (by the meter)

Control Unit Adapter CUA31

X200

6SL3060-4A..0-0AA0
≤ 5 m (16 ft)

6FX2002-1DC00-....
≤ 70 m (230 ft)

X100-X103[1] Control Unit CU310 -2 DP/CU320-2

X100-X105 SINUMERIK 840D sl type 1B
NCU 710.3 PN
NCU 720.3 PN
NCU 730.3 PN

NX10.3/NX15.3

X201

6SL3060-4A..0-0AA0
≤ 5 m (16 ft)

6FX2002-1DC00-....
≤ 70 m (230 ft)

Further CUA31/CUA32 or Motor Modules or Terminal Modules

PM-IF interface

Motor encoder interface via SMC for motors without DRIVE-CLiQ interface

X202

6SL3060-4A..0-0AA0
≤ 5 m (16 ft)

6FX2002-1DC00-....
≤ 70 m (230 ft)

X500 SMC10

X500 SMC20

X500 SMC30

Motor encoder interface for motors with DRIVE-CLiQ interface

X202

6FX5002- 2DC10-....
≤ 100 m (328 ft)

6FX8002- 2DC10-....
≤ 75 m (246 ft)

Absolute encoder with DRIVE-CLiQ 6FX2001-5.D..

Motor encoder in motors with DRIVE-CLiQ interface 1FK/1FT/1PH8

Motor connection

Pre-assembled power cables, see power cables for motors
(max. cable length, see technical specifications of Motor Modules)

Motors

G_NC01_EN_00509a

[1] For Control Unit CU310 DP: X100
For Control Unit CU320: X100-X103

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MOTION-CONNECT connection systems
Connection overviews

■ **Integration** (continued)

Connection overview of SINAMICS S120 CU320-2 Control Unit in chassis format

SINAMICS S120 Control Unit CU320-2		Order No. Pre-assembled cables		
			X400-X402	Basic Line Module
X100-X103		**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft)	X400-X402	Smart Line Module
		6FX2002-1DC00-.... ≤ 70 m (230 ft)	X400-X402	Active Line Module
X100-X103		**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X400-X402	Motor Module
X100-X103		**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X500-X501	Terminal Module
X126		PROFIBUS connection **6ES7972-0BA42-0XA0** (without PG socket) **6ES7972-0BB42-0XA0** (with PG socket)		
X140		**6FX8002-1AA01-1AF0** (5 m) (16 ft)	PC/PG	

Active Line Module connection: **6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) / **6FX2002-1DC00-....** ≤ 70 m (230 ft) → X500 Active Interface Module

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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

SINAMICS S120 Motor Module Chassis format		Order No. **Pre-assembled cables**			
	X400-X402	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X400-X402	Active Line Module	
				6SL3060-4A..0-0AA0 ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)	X500 Active Interface Module
					X400-X402 Motor Module
					SINUMERIK 840D sl type 1B
					X100-X105 NCU 710.3 PN NCU 720.3 PN NCU 730.3 PN
					NX10.3/NX15.3
	X400-X402	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)			X400-X402 Further Motor Modules
Motor encoder interface via SMC for motors without DRIVE-CLiQ interface	X400-X402	**6SL3060-4A..0-0AA0** ≤ 5 m (16 ft) **6FX2002-1DC00-....** ≤ 70 m (230 ft)			X500 SMC10
					X500 SMC20
					X500 SMC30
Motor encoder interface for motors with DRIVE-CLiQ interface	X400-X402	**6FX5002- 2DC10-....** ≤ 100 m (328 ft)			Absolute encoder with DRIVE-CLiQ 6FX2001-5.D..
		6FX8002- 2DC10-.... ≤ 75 m (246 ft)			Motor encoder in motors with DRIVE-CLiQ interface 1FK/1FT/1PH8
Motor connection		**Pre-assembled power cables, see power cables for motors** (max. cable length, see technical specifications of Motor Modules)			Motors

G_NC01_EN_00514

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MOTION-CONNECT connection systems
Connection overviews

■ **Integration** (continued)

Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC10

SINAMICS S120 Sensor Module Cabinet-Mounted SMC10	Order No. Pre-assembled cables	
X520	**6FX.002-2FN20-....** ≤ 50 m (164 ft) (multi-pole resolvers) ≤ 130 m (427 ft) (2-pole resolvers)	Resolver in 1FK701 motor
	6FX.002-2CF02-.... ≤ 50 m (164 ft) (multi-pole resolvers) ≤ 130 m (427 ft) (2-pole resolvers)	Resolver in 1FT7/1FK7 motors

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Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC30

SINAMICS S120 Sensor Module Cabinet-Mounted SMC30	Order No. Pre-assembled cables	
X520	**6FX.002-2CC11-....** ≤ 100 m (328 ft) with 24 V DC	SSI absolute encoder 6FX2001-5.S.
	6FX.002-2CR00-.... ≤ 100 m (328 ft) with 5 V DC	TTL incremental encoder RS 422 (5 V) 6FX2001-2...
	6FX.002-2CD24-.... ≤ 100 m (328 ft) with 24 V DC	TTL incremental encoder RS 422 (24 V) 6FX2001-2...
X521 X531	**6FX5002-2CA12-....** ≤ 100 m (328 ft)	HTL incremental encoder 24 V 6FX2001-4....
	6FX.002-2AH00-.... ≤ 300 m (984 ft)[1]	HTL incremental encoder in 1PH8 motor
	6SX7002-0AN00-....[2] **6SX7002-0AL00-....**[3] ≤ 300 m[1] (984 ft) **6SX7002-0AN10-....**[4]	HTL increm. encoder type 1XP8001 on 1LA motor[5]

G_D211_EN_00513

[1] With evaluation of difference signals A*, A and B*, B, otherwise ≤ 100 m (328 ft).
[2] Signals A*, A, B*, B, R*, R.
[3] Signals A, B.
[4] With right-angled connector.
[5] Not for 2KG geared motor.

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Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC20

SINAMICS S120 Sensor Module Cabinet-Mounted SMC20	Order No. Pre-assembled cables	
X520	**6FX.002-2CA20-....** ≤ 100 m (328 ft)	Incremental encoder sin/cos 1 V_{pp} in 1FK701 motor
	6FX.002-2CQ31-.... ≤ 100 m (328 ft)	Incremental encoder sin/cos 1 V_{pp} with C/D tracks in 1FT7 motor
	6FX.002-2CA31-.... ≤ 100 m (328 ft)	Incremental encoder sin/cos 1 V_{pp} with C/D tracks in 1FT7/1FK7/1PH8 motors
	6FX8002-2CQ80-.... ≤ 50 m (164 ft)	Incremental encoder sin/cos 1 V_{pp} without C/D tracks in 1PH8 motor[3]
	6FX8002-2CA80-.... ≤ 50 m (164 ft)	Incremental encoder sin/cos 1 V_{pp} without C/D tracks in 1PH8 motor[4]
	6FX.002-2CG00-.... ≤ 50 m (164 ft)	Incremental encoder sin/cos 1 V_{pp} 6FX2001-3...
	Adapter cable[1]	Direct linear increm. encoder sin/cos 1 V_{pp} LS 187(C)/ LF 183(C) LB 382(C) LS 487(C)/ LF 481(C)
	6FX.002-2EQ20-.... ≤ 100 m (328 ft)	Absolute encoder with EnDat in 1FK701 motor
	6FX.002-2EQ31-.... ≤ 100 m (328 ft)	Absolute encoder with EnDat in 1FT7/ 1PH8[2] motors
	6FX.002-2EQ10-.... ≤ 100 m (328 ft)	Absolute encoder with EnDat in 1FK7/1PH8 motors
	Adapter cable[1]	Direct linear absolute encoder EnDat LC 183/LC 483
	6FX.002-2CH00-.... ≤ 100 m (328 ft)	Absolute encoder with EnDat 6FX2001-5.E.

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[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

Order No.
Pre-assembled cables

G_NC01_EN_00340i

[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.

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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

SINAMICS S120 Motor Module Booksize format	**Order No. Pre-assembled cables**

1FE1 built-in motors incremental encoder sin/cos 1 V_{pp}, temperature sensor KTY84-130

1FE1 built-in motors incremental encoder sin/cos 1 V_{pp}, temperature sensor KTY84-130 and PTC for full thermal protection

Direct incremental encoder sin/cos 1 V_{pp}

Direct absolute encoder EnDat

Incremental encoder sin/cos 1 V_{pp}

Absolute encoder EnDat

1FW6 torque motors with temperature sensor KTY and PTC

1FE1 built-in motors with temperature sensor KTY and PTC

6FX8002-2CA80-1..0

6FX8002-2CA31-....

6FX8002-1AA51-1AB0

Tripping device 3RN1 (for PTC)

Evaluation via PLC

NTC PT3-51F/ NTC K227

6FX5002-2DC10-.... ≤ 100 m (328 ft)
6FX8002-2DC10-.... ≤ 75 m (246 ft)

SME120

6FX8002-2CB54-.... ≤ 3 m (9.8 ft)[1]

SME125

6FX8002-2AD04-.... ≤ 3 m (9.8 ft)[1]

6SL3060-4A..0-0AA0 ≤ 5 m (16 ft)
6FX2002-1DC00-.... ≤ 70 m (230 ft)

X500
X501
TM120

6SL3060-4A..0-0AA0 ≤ 5 m (16 ft)
6FX2002-1DC00-.... ≤ 70 m (230 ft)

SMC20
X500
X520

6FX.002-2CG00-.... ≤ 50 m (164 ft)

6FX.002-2CH00-.... ≤ 100 m (328 ft)

6FX7002-2SL10-.... ≤ 10 m (32.8 ft)

6FX7002-2SL20-.... ≤ 100 m (328 ft)

6FX8002-5CS..-....

U2/V2/W2/PE

6FX8008-.....-.... ≤ 1.5 (5 ft)

VPM 120/VPM 200

6FX.008-.....-.... ≤ 50 m (164 ft) Power cable MOTION-CONNECT

6FX7002-2SL20-.... ≤ 100 m (328 ft)

6FX7002-2SL00-.... ≤ 10 m (32.8 ft)

6SL3060-4A..0-0AA0 ≤ 5 m (16 ft) DRIVE-CLiQ cable

X500   SMC20   X520

Motor encoder interface via SME for motors without DRIVE-CLiQ interface

G_NC01_EN_00516b

[1] Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

[2] 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).

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Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format and SIMOTICS 2SP1 main spindle motors

SINAMICS S120 Motor Module Booksize format	Order No. **Pre-assembled cables 6SL3060-4A..0-0AA0** ≤ 5 m (16 ft)

SINAMICS S120 Motor Module Booksize format

X200-X203

Order No.
Pre-assembled cables
6SL3060-4A..0-0AA0
≤ 5 m (16 ft)
6FX2002-1DC00-....
≤ 70 m (230 ft)

X500   SMC20   X520

6FX8002-2CA80-1..0

Incremental encoder sin/cos 1 V_{pp}, temperature sensor KTY84-130

6FX8002-2CA31-....

Incremental encoder sin/cos 1 V_{pp}, temperature sensor KTY84-130 and PTC for full thermal protection

6FX8002-1AA51-1AB0

Evaluation via PLC   ...   Tripping device 3RN1 (for PTC)

Evaluation via PLC

...   **3RX1535**

Sensor clamping status, analog signals

...   **3RX1548**

Sensor clamping status, digital signals

U2/V2/W2/PE

6FX8008-.....-....
≤ 1.5 m (5 ft)

VPM 120/VPM 200

6FX.008-.....-....
MOTION-CONNECT power cable
≤ 50 m (164 ft)

2SP1 motor spindles synchronous

6FX.008-.....-....
MOTION-CONNECT power cable

2SP1 motor spindles asynchronous

G_NC01_EN_00339d

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■ **Integration** (continued)

Connection of a machine encoder (direct measuring system)

SINAMICS S120 Control Unit CU310-2 DP, CU320-2 or		Order No. **Pre-assembled cables**				

Connections shown in diagram:

- **6FX8002-2CA88-....** ≤ 3 m (9.8 ft) → Incremental encoder sin/cos 1 V_{pp} without C and D tracks in 1FE1 motor
- X500 SME20 X520
- **6FX.002-2CB54-....** ≤ 3 m (9.8 ft) → Incremental encoder sin/cos 1 V_{pp} (5 V)
- X100-X105 **6FX5002-2DC10-....** ≤ 100 m (328 ft)
- **6FX8002-2DC10-....** ≤ 75 m (246 ft)
- X500 SME25 X520
- **6FX.002-2AD04-....** ≤ 3 m (9.8 ft) → Absolute encoder EnDat (5 V)
- → Absolute encoder SSI with incremental signals sin/cos 1 V_{pp} (5 V)
- → Absolute encoder with DRIVE-CLiQ 6FX2001-5.D..

SINUMERIK 840D sl Type 1B
NCU 710.3 PN
NCU 720.3 PN
NCU 730.3 PN

- X100-X105 **6SL3060-4A..0-0AA0** ≤ 5 m (16 ft)
- **6FX2002-1DC00-....** ≤ 70 m (230 ft)
- X500 SMC30 X520
- **6FX.002-2CC11-....** ≤ 100 m (328 ft) → Absolute encoder with SSI 6FX2001-5.S..
- **6FX.002-2DC30-....** ≤ 30 m (98 ft)
- X100-X105 **6FX.002-2DC30-....** [1] ≤ 30 m (98 ft) **6FX.002-2DC34-....** [1] ≤ 30 m (98 ft)
- X100-X105 **6FX.002-2DC30-....** [1] ≤ 30 m (98 ft) **6FX2003-0DT67-....** (cabinet bushing) **6FX.002-2DC34-....** [1] ≤ 30 m (98 ft)
- → 3rd party direct measuring systems with DRIVE-CLiQ interface

G_NC01_EN_00515a

[1] The total cable length (basic cable and extension cable) must not exceed 30 m (98.4 ft).

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MOTION-CONNECT connection systems
Accessories for power and signal cables

Power connector	Power and signal connectors for SIMOTICS T-1FW6 built-in torque motors

■ 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.

■ 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.
Power connector	**6SL3162-2MA00-0AA0**
For Motor Modules 3 … 30 A booksize format with screw-type connection (enclosure, insulator, 4 coding pins and 1 interlock bolt, screw-type connections Motor: 1.5 ... 10 mm^2, Holding brake: 1.5 mm^2	

■ Selection and ordering data

Description	Order No.
Power connectors for SIMOTICS T-1FW6 built-in torque motors	
• Size 1 for 4 × 2.5 mm^2 connectors with pins and full external thread	**6FX2003-0LA00**
• Size 1.5 for 4 × 4 mm^2/ 4 × 6 mm^2/ 4 × 10 mm^2/ 4 × 16 mm^2 connectors with pins and full external thread	**6FX2003-0LA10**
Signal connector for SIMOTICS T-1FW6 built-in torque motors	
• M17 for 5 × 0.5 mm^2 + 1 × 1.0 mm^2 connectors with socket and full-thread cap nut	**6FX2003-0SU07**

■ More information

A special tool is needed to crimp the contacts. For further information, please go to:
www.intercontec.biz

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MOTION-CONNECT connection systems
Accessories for power and signal cables

Mounting flange	HF (high-frequency) clamp

■ 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.

■ 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.
Mounting flange for	
• Power connector size 0.5 and signal connector M17	**6FX2003-7HX00**
• Power connector size 1	**6FX2003-7BX00**
• Power connector size 1.5	**6FX2003-7CX00**
• Power connector size 3	**6FX2003-7AX00**
• Signal connector M23	**6FX2003-7DX00**

■ Selection and ordering data

Description	Order No.
HF (high-frequency) clamp for	
• Power connector size 0.5 and signal connector M17	**6FX2003-7FA00**
• Power connector size 1 and signal connector M23	**6FX2003-7FX00**
• Power connector size 1.5	**6FX2003-7GX00**

■ Dimensional drawings

Dimen-sions	Power connector				Signal connector	
	Connector size 0.5	Connector size 1	Connector size 1.5	Connector size 3	M17	M23
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
a	Ø 23 (0.91)	Ø 28.6 (1.13)	Ø 47 (1.85)	Ø 66 (2.6)	Ø 23 (0.91)	Ø 27.6 (1.09)
b	22.6 (0.89)	28.3 (1.11)	42.4 (1.67)	75 (2.95)	22.6 (0.89)	28.3 (1.11)
c	4 × M2.5	4 × M3	4 × M4	4 × M4	4 × M2.5	4 × M3
d	Ø 32 (1.26)	Ø 40 (1.57)	Ø 60 (2.36)	Ø 63 (2.48)	Ø 32 (1.26)	Ø 40 (1.57)
e	32 (1.26)	35 (1.38)	55 (2.17)	84.9 (3.34)	32 (1.26)	35 (1.38)
f	M3	M4	M5	M6	M3	M4
g	6.5 (0.26)	6.5 (0.26)	7 (0.28)	10 (0.39)	6.5 (0.26)	6.5 (0.26)

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MOTION-CONNECT connection systems
Accessories for power and signal cables

DRIVE-CLiQ cabinet bushing (RJ45)	DRIVE-CLiQ cabinet bushing (M12)

■ 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.
DRIVE-CLiQ cabinet bushing	**6SL3066-2DA00-0AA0**
For MOTION-CONNECT DRIVE-CLiQ signal cables (RJ45)	

■ Dimensional drawings

Cabinet cut-out for DRIVE-CLiQ cabinet bushing

Dimensions in mm (in)

■ 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 a external thread on the inside of the cabinet.

■ Selection and ordering data

Description	Order No.
DRIVE-CLiQ cabinet bushing	**6FX2003-0DT67**
For MOTION-CONNECT DRIVE-CLiQ signal cables (M12)	

■ Dimensional drawings

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.
DRIVE-CLiQ coupler For MOTION-CONNECT DRIVE-CLiQ signal cables	**6SL3066-2DA00-0AB0**

SINUMERIK
Manufacturing Excellence

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SINUMERIK Manufacturing Excellence
Full-lifecycle services

Overview

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

or please contact your local Siemens sales office or Regional Company.

*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.

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SINUMERIK Manufacturing Excellence
Full-lifecycle services

■ 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

| Mechanical design study | → | Selection of electrical components | → | Prototype | → | **Commissioning and test phase** Changes to prototype Time, overhead, cost, automation solution | → | Result: Completed machine |

Virtual prototyping

Mechatronic Support

Interdisciplinary design study

Mechanics Electronics IT	→	Optimization of the machine concept		Result		
Machine Simulator		Prototype = completed machine	←	Savings potential: Time, resources, time-to-market security		
Testing and optimization of the automation solution						

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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.
Consulting Technical consultation with customer	**6FC5088-1....**
Machine optimization Optimum setting of control and drives on the customer's machine	**6FC5088-2....**
Machine analysis and optimization Analysis of the machine and its limits. Recommendations for manufacturer	**6FC5088-3....**
Machine simulation Simulation of individual axes and the dynamic response on the machine	**6FC5088-4....**
Machine simulation with interpolating axes Simulation of interpolating axes	**6FC5088-5....**
Machine simulation with FE model Modeling of machine using the Finite Element method	**6FC5088-6....**

More information

Please contact your local Siemens sales office or Regional Company for more information.

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SINUMERIK Manufacturing Excellence
Full-lifecycle services

SIMIT – Simulation platform for virtual commissioning

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 failsafe 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.
SIMIT MS Basic V7.0 For operating systems Windows XP/7 Professional, 32-bit	**9AP1416-1BB10**
SIMIT MS OPEN V7.0 For operating systems Windows XP/7 Professional, 32-bit incl. component type editor CTE	**9AP1426-1BB10**
SIMIT interface IM-PBDP-2 Connection to the PC via Ethernet	**9AP2440-1AB10**

More information

More information is available on the Internet at:

www.siemens.com/simit

Or please contact:

Siemens AG

Industry Sector
SIMIT Infoline
Tel.: +49 9131 7-43406
E-mail: simit.industry@siemens.com

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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

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■ **Overview** (continued)

**Condition Monitoring with
SINUMERIK Integrate Analyze MyCondition
(local or ASP[1])**

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

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[1] 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

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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.

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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[1].

The following components are <u>not</u> defined as spare parts:

- Motors[2]
- Cables[3]
- Special or customer-specific modules and components not available from Siemens as spare parts.

Defective components are replaced free of charge within the agreed[4] 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

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[5].

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.

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[1] 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**.

[2] 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.

[3] The delivery times known to you usually apply.

[4] 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

[5] 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"[1]. 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
Country group 1	
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
Country group 2	
Africa	South Africa
Americas	Argentina, Canada
Asia	Indonesia, Malaysia, Singapore
Australia	New Zealand
Europe	Bulgaria, Estonia, Ireland, Latvia, Lithuania, Norway, Slovenia
Country group 3	
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
Countries not mentioned	
	Remaining countries. 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.

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[1] 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.
Repair Service Contract RSC	
For Siemens I IA&DT components on machine tools for countries in country groups 1 to 3	
• 12 month contract period[1]	**6FC8506-1■X0■-0AA0**
• 24 month contract period[2]	**6FC8506-2■X0■-0AA0**
• Master contract	**R**
• Individual contract	**E**
• 0 to 4 measuring circuits[3]	**1**
• 5 to 6 measuring circuits[3]	**2**
• 7 to 8 measuring circuits[3]	**3**
• 9 measuring circuits[3] (basic RSC for ≥ 9 measuring circuits[3])	**8**
• > 9 measuring circuits[3] (measuring circuit supplement for RSC > 9 measuring circuits[4])	**0**
Repair Service Contract RSC Extension of contract by 6 or 12 months	
For Siemens I IA&DT components on machine tools for countries in country groups 1 to 3	
• Basic RSC 12 months	**6FC8506-0■X0■-■AA1**
• Basic RSC 24 months	**6FC8506-0■X0■-■AA2**
• Master contract	**R**
• Individual contract	**E**
• 0 to 4 measuring circuits[3]	**1**
• 5 to 6 measuring circuits[3]	**2**
• 7 to 8 measuring circuits[3]	**3**
• 9 measuring circuits[3] (basic RSC for ≥ 9 measuring circuits[3])	**8**
• > 9 measuring circuits[3] (measuring circuit supplement for RSC > 9 measuring circuits[4])	**0**
Contract extension (possible once per RSC)	
• By 6 months	**6**
• By 12 months	**1**

Description	Order No.
OEM service levels	
Surcharge for Repair Service Contract for Siemens components on machine tools with OEM applications. Measuring circuits 1 to n for countries in country groups 1 to 4	
• Surcharge for OEM service level 1	**6FC8506-3SX01-0AA0**
• Surcharge for OEM service level 2	**6FC8506-3SX02-0AA0**
• Surcharge for OEM service level 3	**6FC8506-3SX03-0AA0**
• Surcharge for OEM service level 4	**6FC8506-3SX04-0AA0**

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[1] Max. 24 months from the transfer of risk (delivery of components).
[2] Max. 36 months from the transfer of risk (delivery of components).
[3] Physical axes and spindles count as measuring circuits.
[4] 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.

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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

Please contact your local Siemens sales office for more information.

Contact information is available on the Internet at:

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
Standard	Cost-optimized: Contracted shipping company	Delivery within the normal national delivery times through the contracted shipping company
Plant stoppage	Time-optimized: Express, courier, collection	You choose the shortest possible delivery time for your own benefit: • Delivery by means of collection or courier service • Delivery by express service
Emergency service	Special logistics: 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	Spare parts services Repair

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
Standard	Cost-optimized: Contracted shipping company	Delivery within the normal national delivery times through the contracted shipping company
Plant stoppage	Time-optimized: Express, courier, collection	You choose the shortest possible delivery time for your own benefit: • Delivery by means of collection or courier service • Delivery by express service
Emergency service	Special logistics: 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

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

■ 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

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SINUMERIK Manufacturing Excellence
Full-lifecycle services

| Spare parts services
Function check | Spare parts services
Return of diagnostic parts |

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

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

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Spare parts services
Stock reduction in spare parts store

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

Spare parts services
Extended spare part availability

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

If you require longer availability of spare parts, please contact your regional sales representative.

Benefits

■ Higher plant availability
■ Investment protection
■ Reduction of lifecycle costs

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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

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

Training

Extend your competitive edge – through practical know-how directly from the manufacturer.

www.siemens.com/sitrain

Contact information is available in the Internet at:
www.siemens.com/automation/partner

SINUMERIK Manufacturing Excellence
Siemens Industry Online Support

**Unmatched complete service
for the entire life cycle**

Engineering Support

Support during project engineering and development with services fine-tuned to your requirements, from configuration through to implementation of an automation project.

Field Service

Our Field Service offers you services for commissioning and maintenance – to ensure that your machines and plants are always available.

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.

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.

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.

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 over 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.

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

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Contact information is available in the Internet at:
www.siemens.com/automation/partner

SINUMERIK Manufacturing Excellence
SINORIX al-deco PLUS

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

G_NC01_EN_00379a

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

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■ 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

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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.
Visual inspection of control cabinet schematic diagrams	**6FC8500-0BX01-0AA0**
Inspection result report to the control cabinet designer	
Individual certification	
• On-site inspection of control cabinet	**6FC8500-0EE01-0AA0**
• Each additional control cabinet	**6FC8500-0EE02-0AA0**
Series certification	
On-site inspection of control cabinet	
• Up to 10 control cabinets	**6FC8500-0SE01-0AA0**
• Up to 20 control cabinets	**6FC8500-0SE02-0AA0**
• Up to 30 control cabinets	**6FC8500-0SE03-0AA0**
• Up to 50 control cabinets	**6FC8500-0SE05-0AA0**
• Up to 100 control cabinets	**6FC8500-0SE10-0AA0**
• More than 100 control cabinets	**6FC8500-0SE11-0AA0**
Follow-up for series certification	**6FC8500-0FE01-0AA0**
Repeat certification after 12 months	

More information

Please contact your local Siemens sales office or Regional Company for more information.

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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	• Packages, bundling • Total equipment • Procurement	Combination into complete equipment packages; procurement of material from other production locations.
Customer-specific configuration/sorting	• Machine package • Stowage plan • Mounting • Testing	Machine packages, also assembled according to stowage plan; pre-assembly of components into units, and their testing.
Labeling Delivery notes	• Customer material number/ID No. • Customer designation • Barcode • Language	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	• Standard carton • Pallet • Reusable container • Air freight container • Sea freight container • Wooden boxes compliant with IPPC regulation	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	• Export declaration • Customs formalities • Worldwide • Multi-partner/region handling	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 (volume-dependent)	• Fixed date • Tour • Ship-to-line	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

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[1] 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

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[1] 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[1]
- 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

▮ Selection and ordering data

Description	Order No.
SinuTrain for SINUMERIK Operate, for SINUMERIK 828D BASIC/ 828D/840D sl On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• SinuTrain trial version for 60 days Specific software version	**6FC5870-0YC2▮-▮YA0**
SinuTrain ShopMill On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single-user license Specific software version	**6FC5870-2YC2▮-▮YA0**
• Classroom license Specific software version	**6FC5870-6YC2▮-▮YA0**
SinuTrain ShopTurn On DVD-ROM Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single-user license Specific software version	**6FC5870-3YC2▮-▮YA0**
• Classroom license Specific software version	**6FC5870-7YC2▮-▮YA0**

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.

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[1] 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.
ShopMill training booklet – Milling Made Easy	
• Print version:	
- Black/white	**6FC5095-0AB50-0■P0**
- Color	**6FC5095-0AB50-1■P0**
ShopTurn training booklet – Turning Made Easy	
• Print version:	
- Black/white	**6FC5095-0AB80-0■P0**
- Color	**6FC5095-0AB80-1■P0**
• Languages:[1]	
- 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

www.siemens.com/jobshop

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[1] Other languages on request.

SINUMERIK Manufacturing Excellence
Training equipment

SINUMERIK 840D sl training case	SINUMERIK 840D sl OP 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.

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.

Technical specifications

Product name	SINUMERIK 840D sl training case
	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)

Technical specifications

Product name	SINUMERIK 840D sl OP training case
	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.
SINUMERIK 840D sl training case	**6ZB2410-0BA00**

Selection and ordering data

Description	Order No.
SINUMERIK 840D sl OP training case	**6ZB2410-0BB00**

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SINUMERIK Manufacturing Excellence
Training equipment

SINUMERIK 840D sl training rack

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
	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**

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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 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

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SINUMERIK Manufacturing Excellence
Siemens Automation Cooperates with Education

Comprehensive teaching support for educational institutions

Siemens Automation Cooperates with Education (SCE)
offers a global system for sustained support of technical skills.
SCE supports educational institutions in their teaching assign-
ment 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 ser-
vices 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 materi-
als 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 docu-
ments, 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

Trainer packages for hands-on learning

Our SCE trainer packages offer a specific combination of origi-
nal 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 pack-
ages. SCE can currently offers more than 80 SCE trainer pack-
ages 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.

Trainer packages are available for:

- Introduction to automation technology with LOGO!
  compact controller and SIMATIC S7-1200
- PLC engineering with SIMATIC S7 hardware and
  STEP 7 software
- Operator control and monitoring with SIMATIC HMI
- 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

Important ordering notes:

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.

www.siemens.com/sce/tp

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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.

Our range of courses comprises a wide variety of training modules based on the principle of Totally Integrated Automation (TIA). The focus is on the same subject areas as with the SCE trainer packages.

Every PLC and drive course is oriented on state-of-the-art technology. Your graduates can thus be prepared optimally for their future professional life.

In some countries we are offering classes based on our training documents. Please inquire with your SCE contact partner.

www.siemens.com/sce/contact

Support for your projects/textbooks

Automation and drive technology is characterized by continuous and rapid developments. Service and Support therefore play an important role.

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
www.siemens.com/sce/books

Complete didactic solutions for your lessons

Our partners for learning systems offer a wide range of training systems and solutions for use in your courses or laboratory.

These models have been designed based on our trainer packages and thus save you the time and cost of self-construction of individual components. The Partner systems provide you with simple and effective help in the fulfillment of your teaching assignment.

www.siemens.com/sce/partner

Contact for individual support

You can find your personal SCE contact on our Internet site. Your local SCE Promoter will answer all your questions concerning the complete SCE offering, and provide you with timely and competent information about innovations. When you encounter challenges, you can profit from our global team of excellence.

If a direct SCE contact is not listed for your country, please contact your local Siemens office.

www.siemens.com/sce/contact

SCE Support Finder for your Internet request

You are an educator and need support on the topic of industry automation? Send us your request now:

www.siemens.com/sce/supportfinder

Scan the QR code for further information (SCE homepage)

SINUMERIK Manufacturing Excellence
Documentation

■ 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

More information is available on the Internet at:

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

■ More information

Please send any queries or suggestions to:

docu.motioncontrol@siemens.com

■ Selection and ordering data

Description	Order No.
Catalogs	
Catalog NC 62 · 2012 **SINUMERIK 840D sl Equipment for Machine Tools**	
• German	**E86060-K4462-A101-A1**
• English	**E86060-K4462-A101-A1-7600**
• French [1]	**E86060-K4462-A101-A1-7700**
• Italian [1]	**E86060-K4462-A101-A1-7200**
• Spanish [1]	**E86060-K4462-A101-A1-7800**
Decentralization with PROFIBUS DP/DPV1	**Via book trade** **ISBN: 978-3-89578-218-3**

Description	Order No.
User/Manufacturer documentation	
DOConCD SINUMERIK 840D sl/828D SINAMICS S120 Motors User and Manufacturer documentation on CD-ROM with Help Tool Edition: 02/2012 Languages: English, German	**6FC5398-0AC10-0YA7**
DOConCD The up-to-date version will be supplied Languages: English, German	**6FC5298-0CD00-0YG0**
Update service for DOConCD Languages: English, German	**6FC5298-0CD00-0YG2**
EMC Design Guidelines SINUMERIK, SIROTEC, SIMODRIVE, SIMOTION, SINAMICS S120	
• German	**6FC5297-0AD30-0AP2**
• English	**6FC5297-0AD30-0BP2**

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[1] Available soon.

SINUMERIK Manufacturing Excellence

Documentation

SINUMERIK 840D sl

■ **Selection and ordering data**

Description	Order No.
User documentation	
User Manual Collection	**6FC5298-7CA00-0YG7**
SINUMERIK 802S/802C/802D SINUMERIK 810D/840Di/840D SINUMERIK 802D sl/840DI sl/ 840D sl SINUMERIK 828D	
User documentation on CD-ROM Edition: 01/2012	
Languages: English, French, German, Italian, Spanish	
User Guide My SINUMERIK Operate	
• German	**6FC5095-0AA84-0AA0**
• English	**6FC5095-0AA84-0BA0**
Operating Manual HMI-Advanced SINUMERIK 840D sl/840D/840Di sl/ 810D	
• German	**6FC5398-2AP10-3AA0**
• English	**6FC5398-2AP10-3BA0**
• French	**6FC5398-2AP10-3DA0**
• Italian	**6FC5398-2AP10-3CA0**
• Spanish	**6FC5398-2AP10-3EA0**
Operating Manual SINUMERIK Operate universal SINUMERIK 840D sl	
• German	**6FC5398-6AP40-2AA0**
• English	**6FC5398-6AP40-2BA0**
• French	**6FC5398-6AP40-2DA0**
• Italian	**6FC5398-6AP40-2CA0**
• Spanish	**6FC5398-6AP40-2EA0**
Operating Manual SINUMERIK Operate Turning SINUMERIK 840D sl/828D	
• German	**6FC5398-8CP40-2AA0**
• English	**6FC5398-8CP40-2BA0**
• French	**6FC5398-8CP40-2DA0**
• Italian	**6FC5398-8CP40-2CA0**
• Spanish	**6FC5398-8CP40-2EA0**
Operating Manual SINUMERIK Operate Milling SINUMERIK 840D sl/828D	
• German	**6FC5398-7CP40-2AA0**
• English	**6FC5398-7CP40-2BA0**
• French	**6FC5398-7CP40-2DA0**
• Italian	**6FC5398-7CP40-2CA0**
• Spanish	**6FC5398-7CP40-2EA0**

Description	Order No.
User documentation	
Programming Manual Fundamentals SINUMERIK 840D sl/828D	
• German	**6FC5398-1BP40-2AA0**
• English	**6FC5398-1BP40-2BA0**
• French	**6FC5398-1BP40-2DA0**
• Italian	**6FC5398-1BP40-2CA0**
• Spanish	**6FC5398-1BP40-2EA0**
Programming Manual Job Planning SINUMERIK 840D sl/828D	
• German	**6FC5398-2BP40-2AA0**
• English	**6FC5398-2BP40-2BA0**
• French	**6FC5398-2BP40-2DA0**
• Italian	**6FC5398-2BP40-2CA0**
• Spanish	**6FC5398-2BP40-2EA0**
User Manual SINUMERIK 840D sl/828D Measuring Cycles	
• German	**6FC5398-4BP40-2AA0**
• English	**6FC5398-4BP40-2BA0**
• French	**6FC5398-4BP40-2DA0**
• Italian	**6FC5398-4BP40-2CA0**
• Spanish	**6FC5398-4BP40-2EA0**
Programming Manual ISO Milling SINUMERIK 840D sl/840Di sl/828D/ 802D sl	
• German	**6FC5398-7BP10-1AA0**
• English	**6FC5398-7BP10-1BA0**
• French	**6FC5398-7BP10-1DA0**
• Italian	**6FC5398-7BP10-1CA0**
• Spanish	**6FC5398-7BP10-1EA0**
Programming Manual ISO Turning SINUMERIK 840D sl/840Di sl/828D/ 802D sl	
• German	**6FC5398-5BP10-1AA0**
• English	**6FC5398-5BP10-1BA0**
• French	**6FC5398-5BP10-1DA0**
• Italian	**6FC5398-5BP10-1CA0**
• Spanish	**6FC5398-5BP10-1EA0**
Diagnostics Manual SINUMERIK 840D sl SINAMICS S120	
• German	**6FC5398-6BP40-2AA0**
• English	**6FC5398-6BP40-2BA0**

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■ **Selection and ordering data** (continued)

Description	Order No.	Description	Order No.
Manufacturer and service documentation		*Manufacturer and service documentation*	
Manual NCU SINUMERIK 840D sl		**Function Manual SINUMERIK 840D sl/828D Basic Functions**	
• German	6FC5397-1EP40-0AA0	• German	6FC5397-0BP40-2AA0
• English	6FC5397-1EP40-0BA0	• English	6FC5397-0BP40-2BA0
Manual Operator Components and Networking SINUMERIK 840D sl		**Function Manual SINUMERIK 840D sl/828D Extended Functions**	
• German	6FC5397-1AP10-6AA0	• German	6FC5397-1BP40-2AA0
• English	6FC5397-1AP10-6BA0	• English	6FC5397-1BP40-2BA0
Manual ADI 4 – Analog Drive Interface for 4 Axes		**Function Manual SINUMERIK 840D sl Special Functions**	
• German	6FC5297-0BA01-0AP5	• German	6FC5397-2BP40-2AA0
• English	6FC5297-0BA01-0BP5	• English	6FC5397-2BP40-2BA0
Commissioning Manual CNC: NCK, PLC, Drive SINUMERIK 840D sl SINAMICS S120		**Function Manual SINUMERIK 840D sl Tool Management**	
• German	6FC5397-2AP40-2AA0	• German	6FC5397-6BP40-2AA0
• English	6FC5397-2AP40-2BA0	• English	6FC5397-6BP40-2BA0
• French	6FC5397-2AP40-2DA0	**Function Manual SINUMERIK 840D sl Safety Integrated**	
• Italian	6FC5397-2AP40-2CA0		
• Spanish	6FC5397-2AP40-2EA0	• German	6FC5397-4BP40-2AA0
Commissioning Manual CNC: Basesoftware and HMI-Advanced SINUMERIK 840D sl/840D/840Di sl/810D		• English	6FC5397-4BP40-2BA0
		System Manual SINUMERIK 840D sl/828D Ctrl-Energy	
• German	6FC5397-0DP10-3AA0	• German	6FC5397-0EP40-2AA0
• English	6FC5397-0DP10-3BA0	• English	6FC5397-0EP40-2BA0
• French	6FC5397-0DP10-3DA0	**Function Manual SINUMERIK 840D sl Synchronized Actions**	
• Italian	6FC5397-0DP10-3CA0		
• Spanish	6FC5397-0DP10-3EA0	• German	6FC5397-5BP40-2AA0
Commissioning Manual CNC: Basesoftware and Operating Software SINUMERIK 840D sl		• English	6FC5397-5BP40-2BA0
		Function Manual SINUMERIK 840D sl/840Di sl/828D/802D sl ISO Dialects for SINUMERIK	
• German	6FC5397-1DP40-2AA0		
• English	6FC5397-1DP40-2BA0	• German	6FC5397-7BP10-1AA0
• French	6FC5397-1DP40-2DA0	• English	6FC5397-7BP10-1BA0
• Italian	6FC5397-1DP40-2CA0	**Function Manual Motion Control Information System RPC Computer Link**	
• Spanish	6FC5397-1DP40-2EA0		
Lists (Book 1) SINUMERIK 840D sl		• German	6FC5297-6AD61-0AP1
• German	6FC5397-7AP40-2AA0	• English	6FC5297-6AD61-0BP1
• English	6FC5397-7AP40-2BA0	**Function Manual Motion Control Information System SinTDI Tool Management**	
Lists (Book 2) SINUMERIK 840D sl			
• German	6FC5397-3CP40-2AA0	• German	6FC5297-6AE00-0AP0
• English	6FC5397-3CP40-2BA0	• English	6FC5297-6AE00-0BP0
Lists System variables SINUMERIK 840D sl		**Function Manual Motion Control Information System TDI Ident Connection**	
		• German	6FC5297-1AE60-0AP0
• German	6FC5397-6AP40-2AA0	• English	6FC5297-1AE60-0BP0
• English	6FC5397-6AP40-2BA0		

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SINUMERIK Manufacturing Excellence
Documentation

SINAMICS S120

■ **Selection and ordering data**

Description	Order No.
Manufacturer and service documentation	
Function Manual **Motion Control Information System** **NC Program Management DNC** **Machine**	
• German	6FC5297-1AE81-0AP0
• English	6FC5297-1AE81-0BP0
Function Manual **Motion Control Information System** **NC Program Management DNC**	
• German	6FC5297-2AE80-0AP4
• English	6FC5297-2AE80-0BP4
Function Manual **Motion Control Information System** **Preventive Maintenance** **TPM**	
• German	6FC5260-2FX28-0AG2
• English	6FC5260-2FX28-0BG2
Operating Manual **Motion Control Information System** **Tool Data Information TDI**	
• German	6FC5297-6AE01-0AP4
• English	6FC5297-6AE01-0BP4
• French	6FC5297-6AE01-0DP4
• Italian	6FC5297-6AE01-0CP4
Function Manual **Motion Control Information System** **Tool Data Communication SinTDC**	
• German	6FC5297-5AF30-0AP0
• English	6FC5297-5AF30-0BP0
User documentation	
SINAMICS Manual Collection	6SL3097-4CA00-0YG1
on DVD-ROM with full text search using the complete DVD	
Network-enabled (storage of the PDFs on a central server), Edition: 05/2012	
Languages: English, French, German, Italian, Spanish	
Manufacturer and service documentation	
Manual **SINAMICS S120** **Control Units and Additional System** **Components**	
• German	6SL3097-4AH00-0AP1
• English	6SL3097-4AH00-0BP1
• French	6SL3097-4AH00-0DP1
• Italian	6SL3097-4AH00-0CP1
Manual **SINAMICS S120** **Booksize Power Units**	
• German	6SL3097-4AC00-0AP3
• English	6SL3097-4AC00-0BP3

Description	Order No.
Manufacturer and service documentation	
Manual **SINAMICS S120** **Chassis Power Units**	
• German	6SL3097-4AE00-0AP1
• English	6SL3097-4AE00-0BP1
• French	6SL3097-4AE00-0DP1
• Italian	6SL3097-4AE00-0CP1
Function Manual **SINAMICS S120** **Drive Functions**	
• German	6SL3097-4AB00-0AP1
• English	6SL3097-4AB00-0BP1
• French	6SL3097-4AB00-0DP1
• Italian	6SL3097-4AB00-0CP1
Commissioning Manual **SINAMICS S120**	
• German	6SL3097-4AF00-0AP1
• English	6SL3097-4AF00-0BP1
• French	6SL3097-4AF00-0DP1
• Italian	6SL3097-4AF00-0CP1
Function Manual **SINAMICS S120** **Safety Integrated**	
• German	6SL3097-4AR00-0AP2
• English	6SL3097-4AR00-0BP2
• French	6SL3097-4AR00-0DP2
• Italian	6SL3097-4AR00-0CP2
Manual **SINAMICS S120** **AC Drive**	
• German	6SL3097-4AL00-0AP0
• English	6SL3097-4AL00-0BP0
• French	6SL3097-4AL00-0DP0
• Italian	6SL3097-4AL00-0CP0
List Manual **SINAMICS S120/150**	
• German	6SL3097-4AP00-0AP2
• English	6SL3097-4AP00-0BP2
• French	6SL3097-4AP00-0DP2
• Italian	6SL3097-4AP00-0CP2
Getting Started **SINAMICS S120**	
• German	6SL3097-2AG00-0AP3
• English	6SL3097-2AG00-0BP3
• French	6SL3097-2AG00-0DP3
• Italian	6SL3097-2AG00-0CP3

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SIMOTICS motors for SINAMICS		Measuring systems	

■ Selection and ordering data

Description	Order No.
SIMOTICS motors for SINAMICS	
Configuration Manual **1FT7 Synchronous Motors**	
• German	**6SN1197-0AD13-0AP4**
• English	**6SN1197-0AD13-0BP4**
Configuration Manual **1FK7 Synchronous Motors**	
• German	**6SN1197-0AD16-0AP4**
• English	**6SN1197-0AD16-0BP4**
• French	**6SN1197-0AD16-0DP4**
• Italian	**6SN1197-0AD16-0CP4**
• Spanish	**6SN1197-0AD16-0EP4**
Configuration Manual **1PH8 Synchronous/** **Asynchronous Motors**	
• German	**6SN1197-0AD74-0AP0**
• English	**6SN1197-0AD74-0BP0**
Configuration Manual **1PH2 Synchronous/** **Asynchronous Motors**	
• German	**6SN1197-0AC63-0AP0**
• English	**6SN1197-0AC63-0BP0**
• French	**6SN1197-0AC63-0DP0**
• Italian	**6SN1197-0AC63-0CP0**
• Spanish	**6SN1197-0AC63-0EP0**
Configuration Manual **1FN3 Linear Motors** **Peak Load and Continuous Load**	
• German	**6SN1197-0AB86-0AP0**
• English	**6SN1197-0AB86-0BP0**
Configuration Manual **1FN6 Linear Motors**	
• German	**6SN1197-0AB78-0AP3**
• English	**6SN1197-0AB78-0BP3**
Configuration Manual **1FE1 Synchronous Built-In Motors**	
• German	**6SN1197-0AC00-1AP0**
• English	**6SN1197-0AC00-1BP0**
• French	**6SN1197-0AC00-0DP7**
• Italian	**6SN1197-0AC00-0CP7**
• Spanish	**6SN1197-0AC00-0EP7**
Configuration Manual **1FW6 Built-In Torque Motors**	
• German	**6SN1197-0AE00-0AP5**
• English	**6SN1197-0AE00-0BP3**
• French	**6SN1197-0AE00-0DP3**
• Italian	**6SN1197-0AE00-0CP3**
• Spanish	**6SN1197-0AE00-0EP3**
Configuration Manual **2SP1 ECS Motor Spindles**	
• 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.
Measuring systems	
User Manual **SIMODRIVE sensor** **Absolute Value Encoder with** **PROFIBUS DP**	
• English/German	**6SN1197-0AB10-0YP4**

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SINUMERIK Manufacturing Excellence
Documentation

CAD CREATOR
Dimension drawing and 2D/3D CAD generator

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 (Booksize/Chassis)
  - Line-side components
  - Motor Modules (Booksize/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.
CAD CREATOR	**6SL3075-0AA00-0AG0**
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

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SINUMERIK Solution Partners

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

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SINUMERIK Solution Partners
Solution Partners for specific add-on functions

ARTIS GmbH CTM tool and process monitoring	ARTIS GmbH Genior Modular 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.

■ 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

- 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.

■ 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

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SINUMERIK Solution Partners
Solution Partners for specific add-on functions

Balance Systems S.r.l. – Measuring and monitoring system for grinding machines	Comara KG Intelligent feedrate control

■ 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
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■ 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

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| **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

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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

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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

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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

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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

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■ 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

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SINUMERIK Solution Partners
Solution Partners for specific add-on functions

OMATIVE Systems	Renishaw Plc.
Real-time feedrate optimization	**Non-contact tool monitoring**

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.

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

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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

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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.

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PROMETEC GmbH	PROMETEC GmbH
ACfeed	MCI (Machine Condition Indicator)

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

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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, I^2, 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).

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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 ±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.

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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
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
www.robolab.de

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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

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91207 LAUF, Germany

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E-mail: info@emuge.de
www.emuge-franken.de

FRANKEN GmbH & Co. KG
Factory for precision tools

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90607 RÜCKERSDORF, Germany

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www.emuge-franken.de

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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
www.etalon-ag.com

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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

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Machine Tool Automation

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E-mail: andreasschuhbauer@kuka-roboter.de
www.kuka-robotics.com

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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

■ **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

You start by selecting a

- Country,
- City/Region,
- Service.

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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

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

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

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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

Or via our product pages at:

www.siemens.com/automation

or

www.siemens.com/drives

To find out more about Siemens' current social media activities visit us at:

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.

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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.

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.

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

Selection and ordering data

Description	Order No.
Interactive catalog CA 01	**E86060-D4001-A510-D2-7600**
DVD-ROM including selection guide DT Configurator, 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

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

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.
Service & Support Knowledge Base On DVD-ROM	**6ZB5310-0EP30-0BA2**

Automation Value 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.
Automation Value Card	
200 Credits	**6ES7997-0BA00-0XA0**
500 Credits	**6ES7997-0BB00-0XA0**
1 000 Credits	**6ES7997-0BC00-0XA0**
10 000 Credits	**6ES7997-0BG00-0XA0**

Detailed information on the services offered is available on our Internet site at:

www.siemens.com/automation/service&support

Service & Support à la Card: Examples

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.

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.

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■ 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.

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Appendix
Notes on software

■ **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

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■ 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

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■ Overview (continued)

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Order
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Note:
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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

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To

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Can the texts be readily understood? ☐

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Appendix

Notes

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Explanation of the raw material/metal surcharges[1]

Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium[2] and/or neodym[2], 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[3]
  - Silver (sales price, processed)
  - Gold (sales price, processed)

  and for[4]
  - 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)[2]
8th digit	for neodym (Nd)[2]

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

L E A – – – – –

- 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

N – A 6 – – – –

- 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

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- 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

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[1] Refer to the separate explanation on the next page regarding the raw materials dysprosium and neodym (= rare earths).

[2] For a different method of calculation, refer to the separate explanation for these raw materials on the next page.

[3] Source: Umicore, Hanau (www.metalsmanagement.umicore.com).

[4] Source: German Trade Association for Cables and Conductors (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[1], copper[1], aluminum[1], lead[1], gold[1], 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[2]
  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)[1]
3rd digit	for copper (CU)[1]
4th digit	for aluminum (AL)[1]
5th digit	for lead (PB)[1]
6th digit	for gold (AU)[1]
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

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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 €

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[1] For a different method of calculation, refer to the separate explanation for these raw materials on the previous page.

[2] Source: Asian Metal Ltd (www.asianmetal.com)

Values of the metal factor

Percentage method	Basic official price in €	Step range in €	% surcharge 1st step Price in € 150.01 – 200.00	% surcharge 2nd step Price in € 200.01 – 250.00	% surcharge 3rd step Price in € 250.01 – 300.00	% surcharge 4th step Price in € 300.01 – 350.00	% sur-charge per addi-tional step
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						
2	100						
3	150						
4	175		Calculation based on raw material weight				
5	200						
6	225						
7	300						
8	400						
9	555						
Miscella-neous							
-	No metal surcharge						

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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.

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For customers with a seat or registered office in Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"[1] 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"[1] and,
- for other supplies and services, the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"[1].

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"[1] 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"[1] 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"[1].

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.

Illustrations are not binding.

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.

4. Export regulations

We shall not be obligated to fulfill any agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes and/or other sanctions.

Export of goods listed in this catalog may be subject to licensing requirements. We will indicate in the delivery details whether licenses are required under German, European and US export lists. Goods labeled with "AL" not equal to "N" are subject to European or German export authorization when being exported out of the EU. Goods labeled with "ECCN" not equal to "N" are subject to US re-export authorization.

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[1] The text of the Terms and Conditions of Siemens AG can be downloaded at www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

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