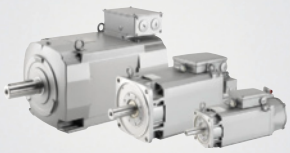
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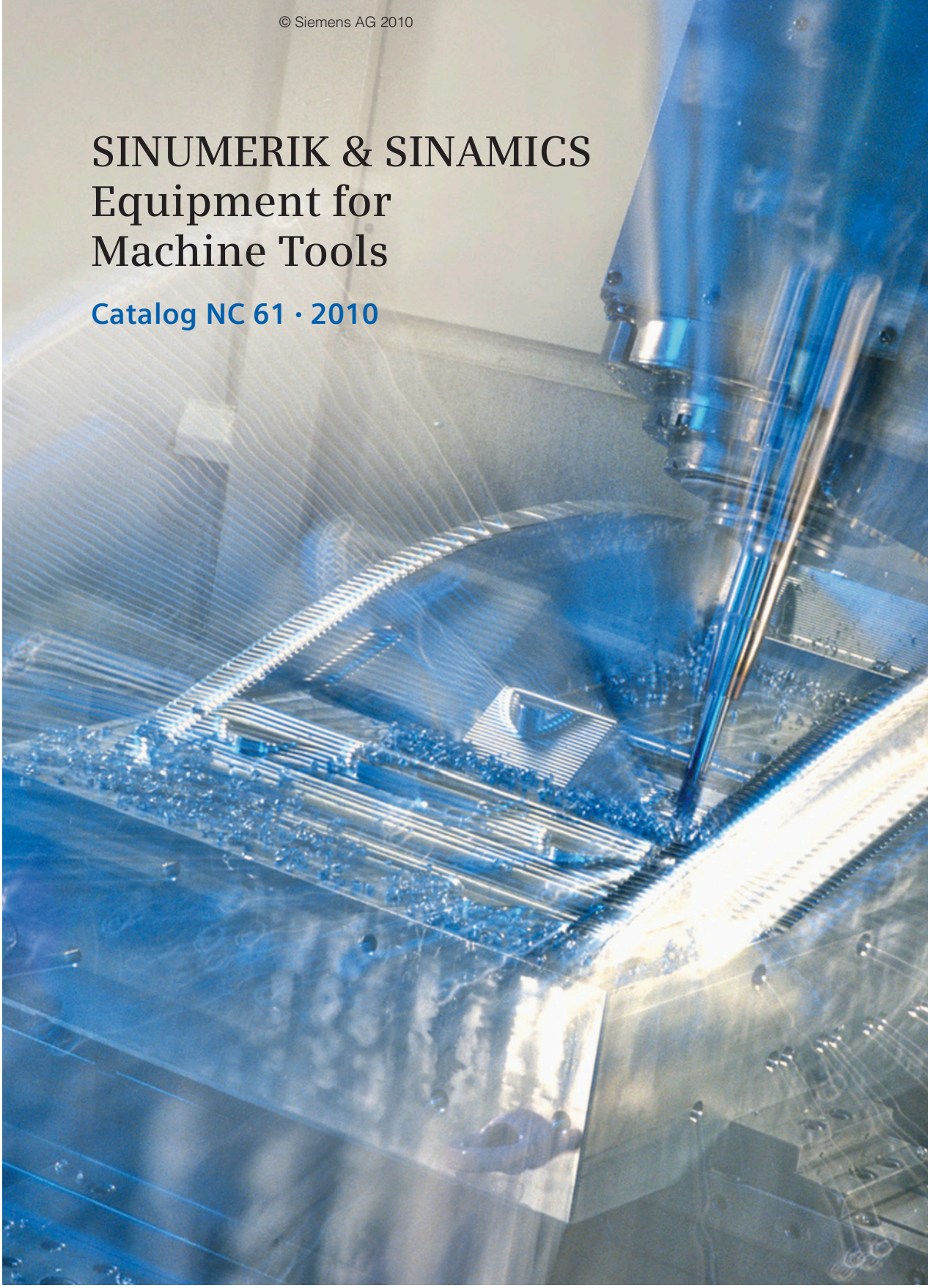






SINUMERIK & SINAMICS Equipment for Machine Tools

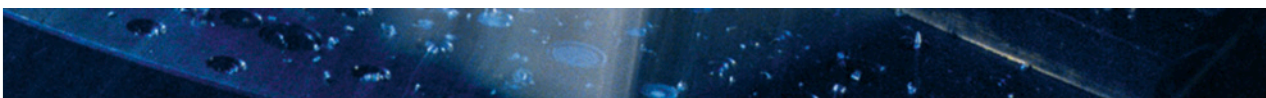
Catalog NC 61 · 2010



Motion Control

Answers for industry.

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Related catalogs

SINUMERIK & SIMODRIVE NC 60
Automation Systems
for Machine Tools

E86060-K4460-A101-B3-7600



SIMATIC ST 70
Products for Totally Integrated Automation
and Micro Automation

E86060-K4670-A101-B2-7600



SIMATIC HMI ST 80
Human Machine
Interface Systems

E86060-K4680-A101-B6-7600



SIMATIC NET IK PI
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Power Supply SITOP

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Interactive Catalog CA 01
Products for
Automation and Drives

E86060-D4001-A510-C8-7600



Industry Mall
Catalog and ordering system in the Internet
for Automation and Drives

www.siemens.com/industrymall



[1)] Language: German.

CD-ROM for Catalog NC 61 · 2010



In the CD-ROM that accompanies Catalog NC 61 · 2010, you will find:

- Information about planning/configuring based on the technical documentation; additional technical documentation can be found under: www.siemens.com/automation/doconweb
- Dimensional drawings of our motors in PDF/DXF format or via CAD CREATOR www.siemens.com/cadcreator
- Glossary for the explanation of terms and functions
- Catalog NC 61 · 2010 in electronic form (PDF format)

Hardware and software requirements:

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

Start
Insert the CD-ROM into the CD-ROM drive.
The program starts automatically.
If the AutoRun function is not activated in your system, start file start.hta from the CD-ROM using the Windows Explorer.

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

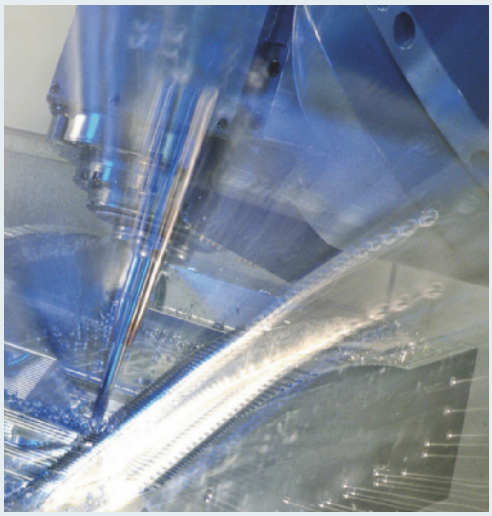
Hotline
Please send any questions or suggestions to:
docu.motioncontrol@siemens.com

For CD-ROM, please refer to end of catalog.

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Motion Control
SINUMERIK & SINAMICS Equipment for Machine Tools

Catalog NC 61 · 2010



The products and systems described in this catalog are distributed under application of a certified quality and environmental management system in accordance with DIN EN ISO 9001 (Certified Registration No. 001258 QM) and DIN EN ISO 14001 (Certified Registration No. 001258 UM). The certificates are recognized by all IQNet countries.

Supersedes:
Catalog NC 61 · 2007/2008

Refer to the Industry Mall for current updates of this catalog:
www.siemens.com/industrymall

The products contained in this catalog can also be found in the electronic catalog CA 01.
Order No.:
E86060-D4001-A510-C8-7600

Please contact your local Siemens branch

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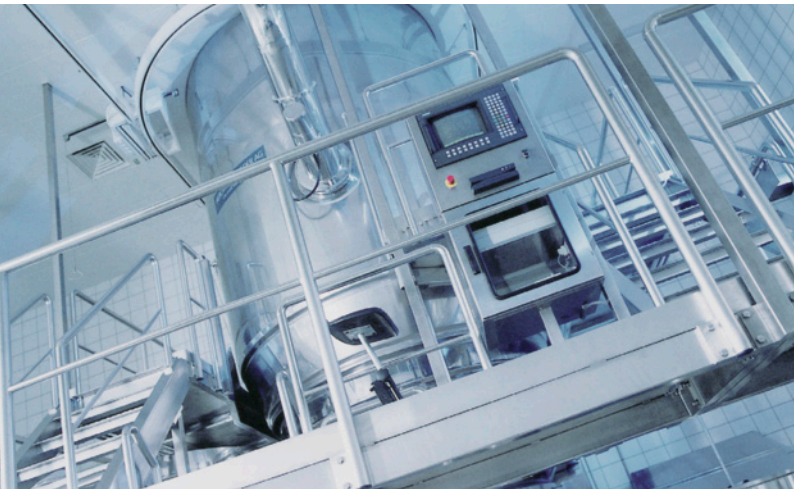
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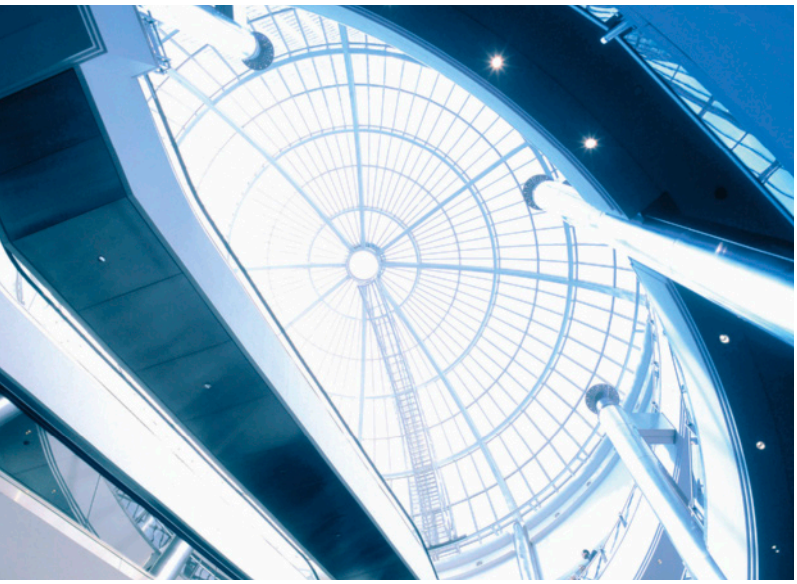
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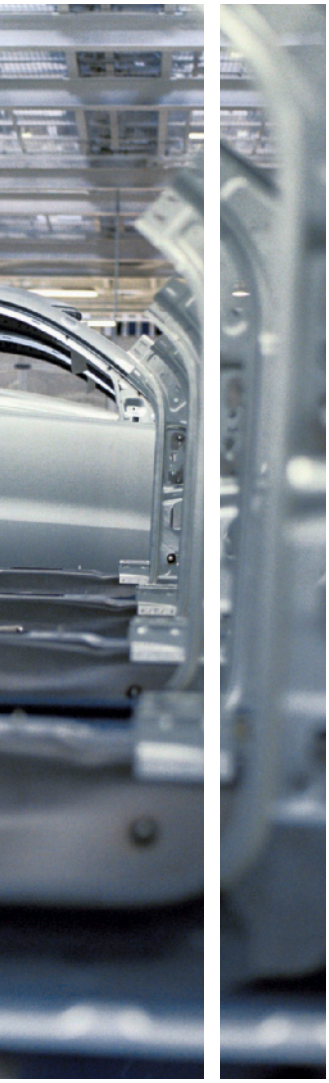
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Answers for industry.

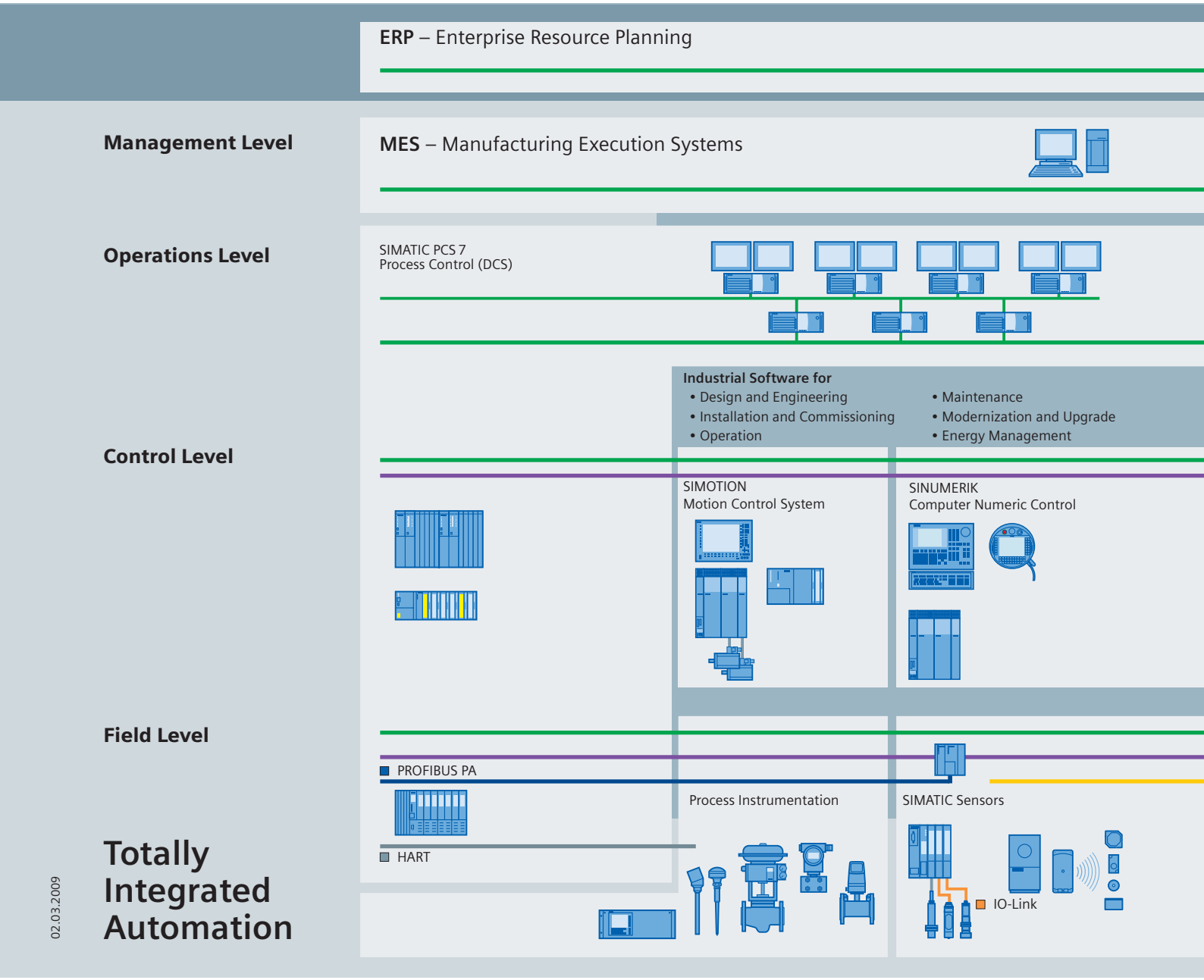
Siemens Industry answers the challenges in the manufacturing and the process industry as well as in the building automation business. Our drive and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are employed in all kinds of industry. In the manufacturing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

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

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.

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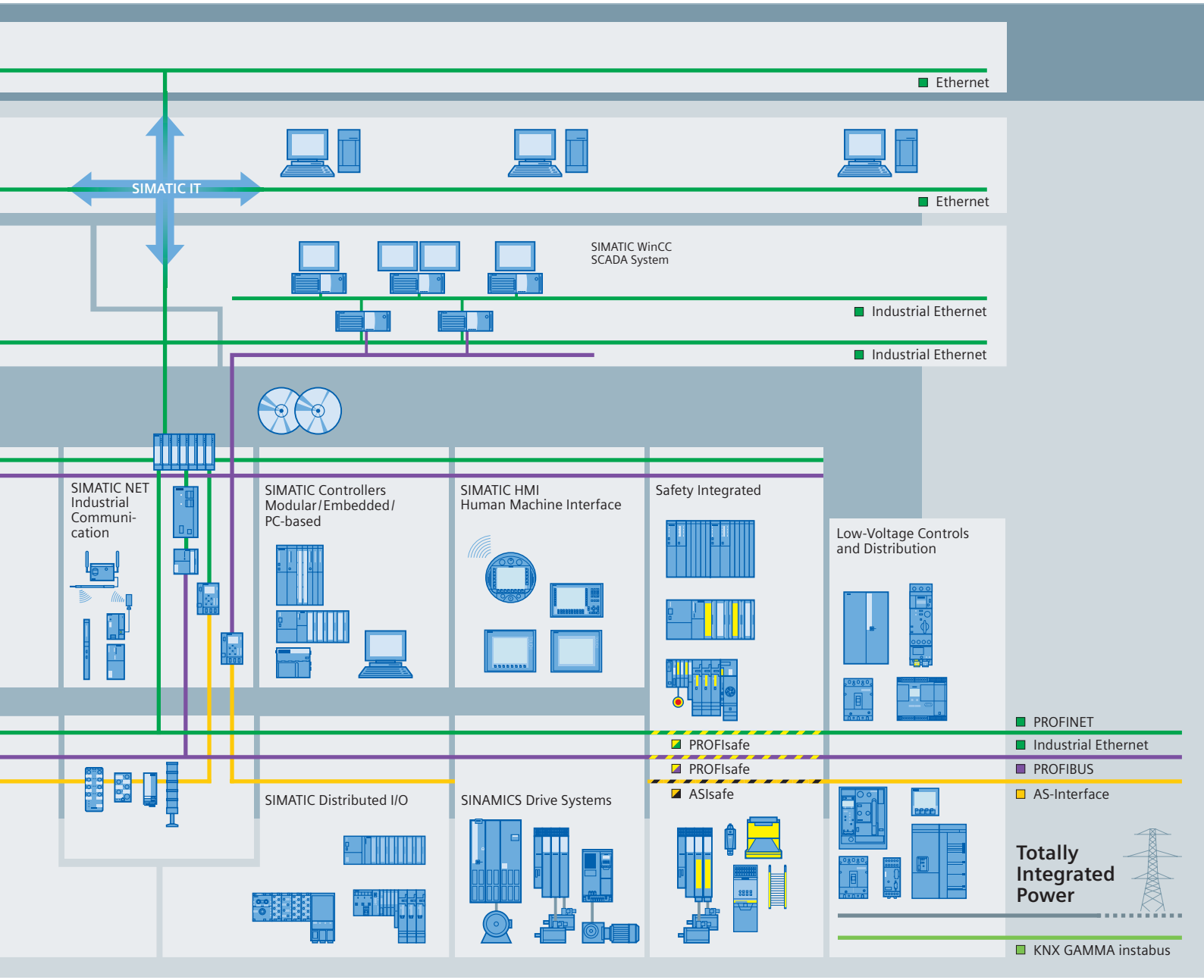


Setting standards in productivity and competitiveness.

Totally Integrated Automation.

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

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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.

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Introduction



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Automation solutions for the machine tool and beyond

Always the right CNC equipment

With SINUMERIK, Siemens offers a uniform system platform for the automation of machine tools with cost-efficient solutions for different sectors and technologies.

SINUMERIK is based on the following concept: One CNC system, many possibilities – from the computerized numerical control through drives and motors as far as the complete control cabinet.

Siemens is always opening up new and better opportunities for implementing machine tools efficiently, innovatively and uniformly. Siemens sets the standard in energy efficiency and energy management.

With PROFINET, demanding real-time communication and IT communication can take place over the same bus.

SINUMERIK Safety Integrated supports low-cost implementation of safety functions for persons and machines.

The specific requirements of the respective sectors are fulfilled with well-proven functions, integrated components and supporting services – whether for manufacturing large or small batches of simple or complex parts.

Siemens constantly strives to achieve the greatest possible benefit for the customer.

Shop floor manufacturing

With ShopMill and ShopTurn, we offer software solutions that are optimized for the requirements of shop floor manufacturing – practice-oriented and user-friendly.

Tool and mold making

In tool making and mold making, stringent demands are placed on surface quality, accuracy and speed. This requires a mixture of powerful hardware and intelligent software.

Automotive industry

With TRANSLINE sl, the automation concept for the automotive sector, we offer a modular and flexible system of building blocks. Assembly lines are automated with components from a single source, which perfectly interact to perform the respective task.

Aerospace industry

The aerospace industry places strict demands on the efficiency and accuracy of manufacturing. For this sector, Siemens also offers a broad spectrum of products and services, such as high-end CNC solutions with a tailored functional scope and optimization of the CAD/CAM process chain.

Medical engineering

Artificial joints, implants and medical instruments must be manufactured with a maximum level of accuracy and quality. SINUMERIK supports all the technologies used in medical engineering and can meet even the highest requirements.

Solutions for materials handling

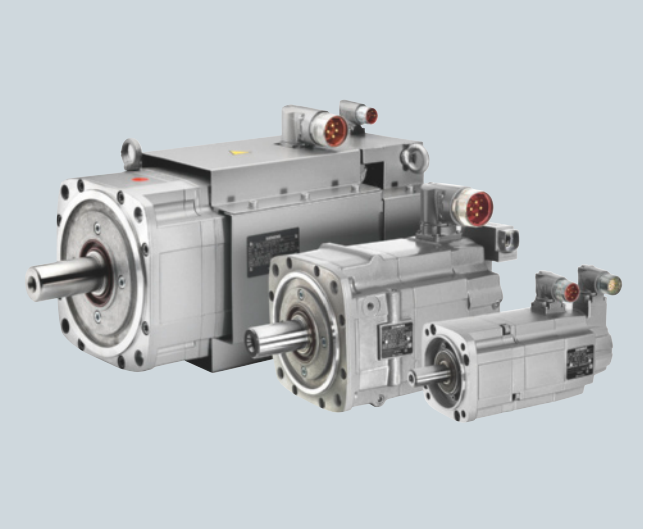
The interoperation of machine tools and handling units is becoming more and more important. With our handling solutions, we connect all the machines that operate in a process chain.



SINUMERIK operator panel front with machine control panel



SINUMERIK 840D sl with SINAMICS S120



1FT7 feed motors

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Efficient solutions thanks to the modular product palette and a comprehensive range of services

Siemens can always offer the right automation solution for machine tool manufacturing and for operators of machine tools:

- A comprehensive product portfolio from the numerical control through drives and motors as far as the complete control cabinet
- Rugged, integrated systems as well as standardized solutions
- Solutions expertise over the complete lifecycle in all technologies and sectors
- Strong in single machine assembly and mass production, in a work shop or industrial plant
- Innovative services for optimizing your machine or production
- An integrated CAD/CAM/CNC process chain

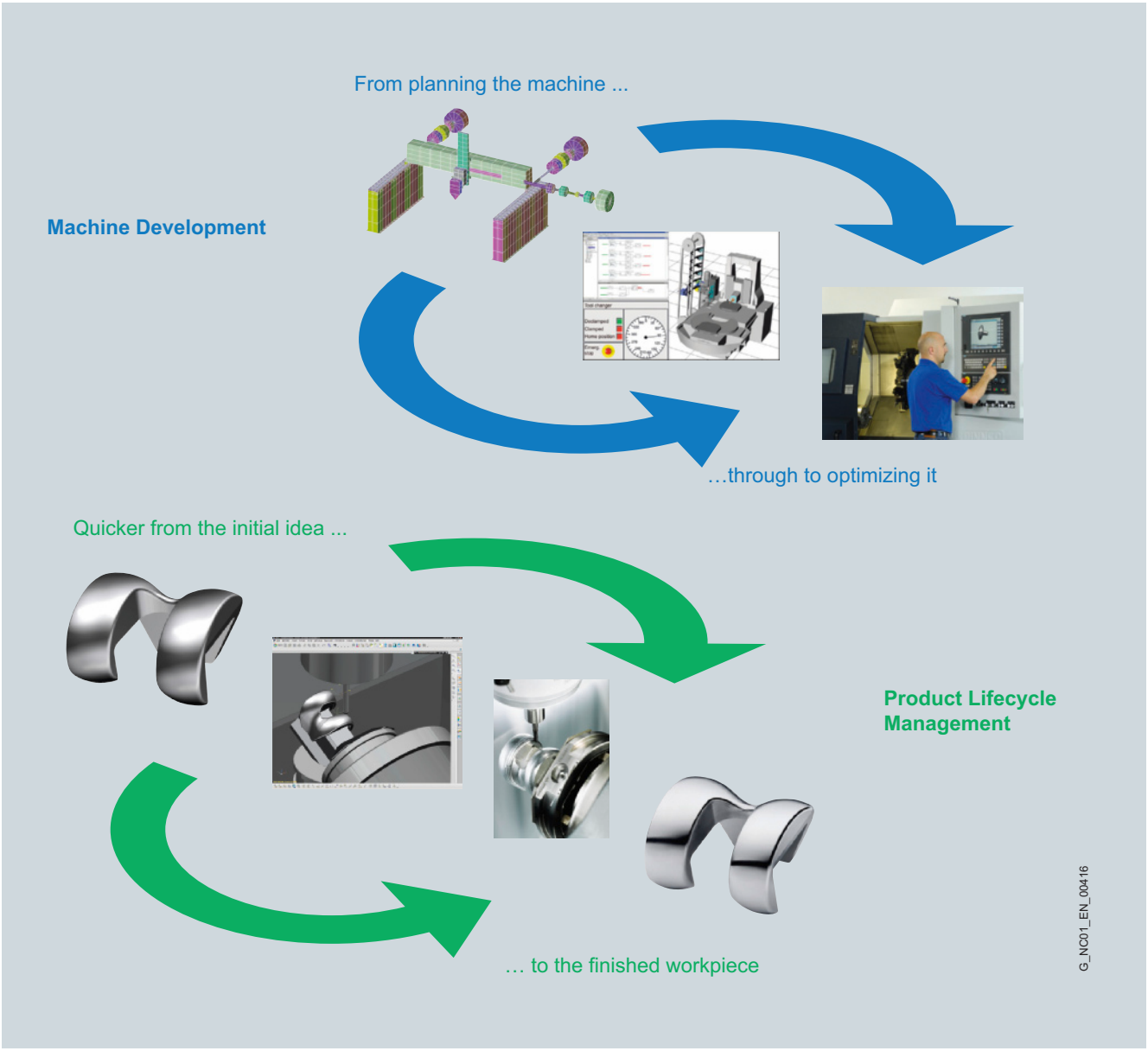
SINUMERIK Manufacturing Excellence – the portfolio of services for your machines and processes

With Machine Development from machine planning through to the optimized machine:

- Significant cost savings and higher productivity can be achieved for new machines already in the planning and construction phases.
- Appropriate solutions and services shorten the development time through to the finished machine for a faster product development process.

Solutions for Product Lifecycle Management reduce the time between the idea and the finished part:

- Fully integrated processes provide even greater efficiency and cost-effective production in the manufacture of workpieces.
- The CNC platform SINUMERIK offers innovative technology cycles, perfect usability and solutions for the machine tool and beyond, as well as a uniform process chain.



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SINUMERIK – the CNC solution with many possibilities

SINUMERIK – one CNC system, many possibilities

SINUMERIK is a rugged, integrated system that offers standardized solutions for a high degree of investment security. The uniform look and feel in terms of programming and operation as well as the high degree of safety for man and machine are paramount. Intelligent functions for programming and operation demonstrate the highest technological competence.

At home in any applications

Whether you operate in the aerospace or automotive industry, in tool and mold making or in classical shop floor manufacturing: SINUMERIK covers all technologies and requirements – from made-to-order production through to large batch production.

SINUMERIK – advantages at a glance:

- Distributed and simplified system structure via Ethernet, PROFINET and PROFIBUS
- Scalable in hardware and software
- The new user interface SINUMERIK Operate combines ease of use and functionality
- Openness in the user interface, CNC or PLC
- Diagnostics via DRIVE-CLiQ right down to the component level
- Fast commissioning due to automatic identification of the drive stations (Plug and Run)
- Safety functions for the protection of personnel and machines with SINUMERIK Safety Integrated

SINUMERIK 802D sl – the CNC system for standard machines



- The compact and economical panel CNC
- For turning, milling and grinding
- Up to 4 axes + 1 spindle or
  3 axes + 2 spindles plus
  1 PLC auxiliary axis

SINUMERIK 840Di sl – the PC-based alternative



- The PC-based alternative for demanding solutions
- Universally applicable to all technologies
- Up to 20 axes/spindles

SINUMERIK 840D sl – open and flexible



- The modular, scalable universal control with the SINAMICS S120 drives
- Universally applicable to all technologies
- Up to 31 axes/spindles

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SINAMICS S120 – the flexible, modular drive system for universal applications

With the SINAMICS S120 drive system, we offer the perfect solution platform for universal applications in industrial machine and plant construction: A modular system that supports maximum flexibility.

Numerous perfectly tuned components and functions support the implementation of customized solutions, individually tailored to the respective field of application.

SINAMICS S120 – advantages at a glance:

- An integrated, modular system for a wide performance range
- Simple system structure for modular, scalable and distributed machine concepts
- High-performance communication over PROFIBUS and PROFINET

SIZER – one tool for the complete system configuration

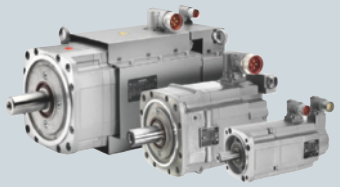
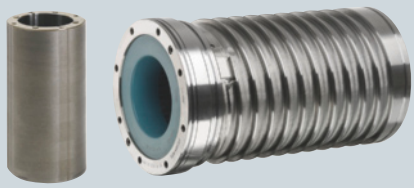
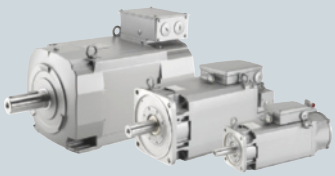
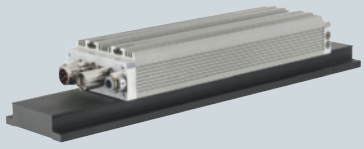
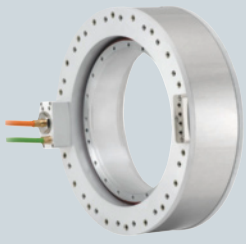
SIZER supports configuration of the complete drive and control system under a single user interface. From the simple single drive through to the complex multi-axis system.

SINAMICS S120 for single-axis applications		SINAMICS S120 for multi-axis applications	
Blocksize	Chassis	Booksize	Chassis
			
0.12 ... 90 kW	110 ... 250 kW	1.6 ... 107 kW	75 ... 1200 kW

The right motor for any application

Whether for high static torque or rated output, high maximum speed or a highly dynamic response, air or water cooling, linear or rotary motion – our comprehensive spectrum offers the right motor for every drive task in a wide performance range.

This includes feed motors, main spindle motors and motor spindles as well as highly innovative linear or rotary direct drives.

Selection of motors for machine tools		
1FT7 feed motors	1FN3 linear motor	1FE1 built-in motor
		
1PH8 main spindle motors	1FN6 linear motor	1FW6 built-in torque motor
		

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Energy efficiency due to targeted energy management

Siemens sets the standard in energy efficiency and energy management

In industrial applications, energy efficiency has a large impact on electrical drive systems in particular, as more than 70 % of industrial energy consumption takes place here. (Source: ZVEI EU-15/2002)

The CNC system SINUMERIK is combined with the SINAMICS S120 drive system and motors from Siemens to create energy-efficient solutions with high degrees of efficiency which help to reduce the power consumption considerably.

Energy efficiency in drive technology

Siemens supports its customers during every phase of the energy-management process, at the product and system levels and with planning.

At the product level with:
- Energy consumption measurement
- High degrees of energy efficiency already in the design phase

At the system level with:
- Energy savings due to a common DC link
- Energy buffering
- Energy control due to a regulated incoming supply

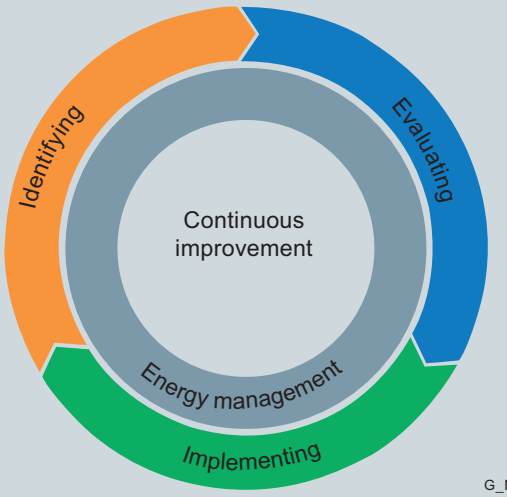
At the planning level with:
- Calculation of energy consumption
- Energy-optimized system solution

Energy management is a process in three phases:

1 **Identification of energy flows**
- Energy consumption displays

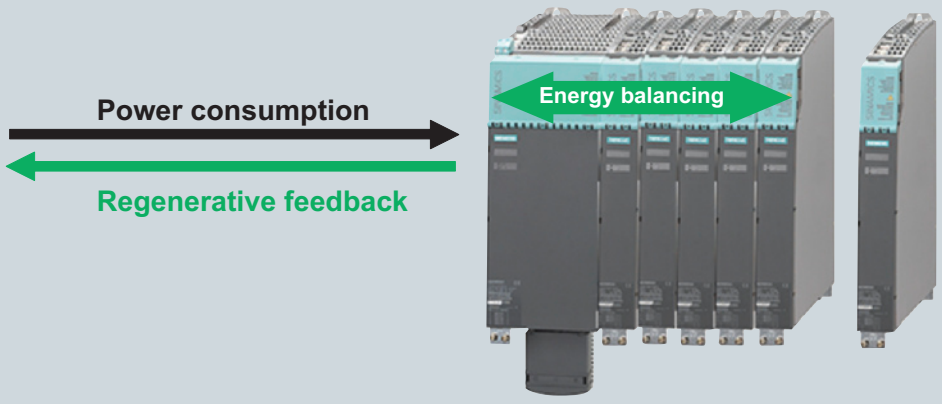
2 **Determining potentials for energy savings**
- Calculation of energy consumption
- Energy-optimized system solution

3 **Optimizing machines and processes**
- Energy savings due to a common DC link
- Energy buffering
- Energy control due to a regulated incoming supply for energy feedback and reactive power compensation (cos φ =1)



G_NC01_EN_00417

Example: Increasing the energy efficiency at the system level with the SINAMICS S120 drive system



G_NC01_EN_00418

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PROFINET – Communication across all levels

PROFINET is the innovative and open Industrial Ethernet standard for automation and supports integrated networking and communication from the field level through to the enterprise level.

PROFINET offers numerous benefits, even for machine tool applications:

Real-time communication

PROFINET satisfies all of the real-time requirements relevant to automation – including isochronous mode. PROFINET is also suitable for especially challenging applications – such as motion control.

Easy network installation

PROFINET consistently relies on 100 Mbit/s switching technology and supports linear network topologies in addition to the usual Ethernet point-to-point cabling. This minimizes the cabling costs and ensures a high degree of flexibility. With wireless communication through IWLAN, new industrial applications can be developed – even operator control and monitoring can be done wirelessly.

Simple and quick installation with FastConnect

Using the quick assembly system FastConnect for PROFINET, the Ethernet plugs can be assembled extremely quickly and easily on site.

IT standards & security

PROFINET provides all of the functions for optimal configuration and diagnostics. All relevant data can be accessed via the Internet – from any location in the world. In this way, PROFINET satisfies the increased requirements for data and network security.

Safety Integrated

With regard to seamless safety for people, machines and the environment, PROFINET meets all of the prerequisites. The use of PROFIsafe allows for a network for standard and safety-oriented communication on one and the same cable and wireless communication with Industrial Wireless LAN (IWLAN).

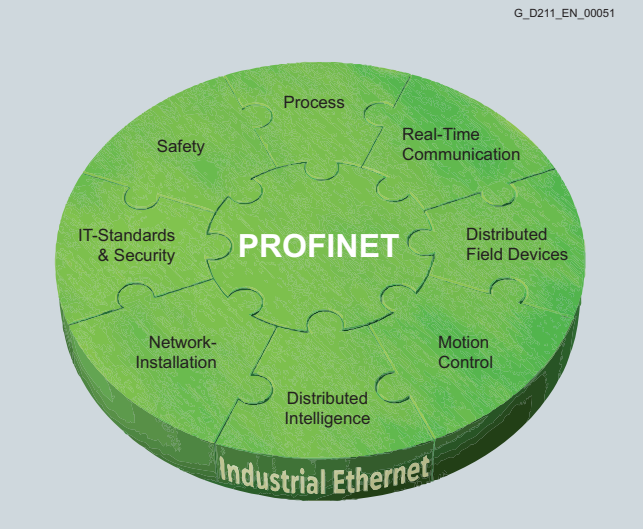
SINUMERIK and PROFINET

The combination of SINUMERIK 840D sl and PROFINET provides high performance for machine tools in terms of number of axes, data volume and cycle times.

Modular machine concepts can be easily implemented: PROFINET supports demanding real-time communication and IT communication over a bus as well as versatile communication to other SINUMERIK or SIMATIC controls and office applications.

The benefits with SINUMERIK and PROFINET:

- High performance for your machines in terms of number of axes, data volume and cycle times
- Demanding real-time communication and IT communication simultaneously over a bus
- Greater flexibility for implementing modular machine concepts



PROFINET: The open Industrial Ethernet standard



FastConnect: Easy connection without the need for a special tool

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1

SINUMERIK Safety Integrated – the quick and easy way to safe, productive machines

With SINUMERIK Safety Integrated, innovative safety concepts that offer maximum safety for personnel and machines are easy to implement.

Thanks to total integration of safety functions in the control and drive systems, personnel and machines are efficiently protected.

Your machine tool is safe and practical to operate under all required operating conditions. For example, in setup and test operation while the protective door is opened.

The functional scope of SINUMERIK Safety Integrated comprises:

- 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.

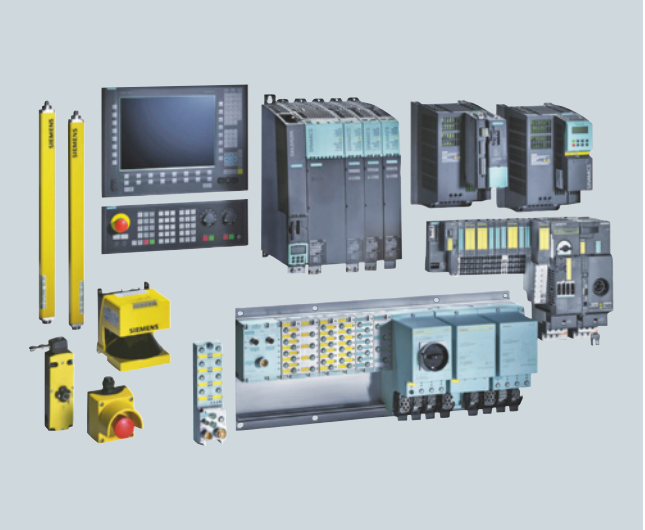
All safety functions are certified in accordance with the latest standards, through internationally recognized testing authorities. Depending on requirements, the safety functions are drive-integrated only or system-integrated in the computerized numerical control, drive or PLC.

Integrated acceptance testing

The effectiveness of the safety functions used can be easily tested with the integrated acceptance test – the report is generated automatically.

The benefits of SINUMERIK Safety Integrated:

- High degree of safety due to implementation of the safety functions without any gaps
- Highly flexible due to practical safety and operating concepts
- Very cost-effective due to reduced hardware and installation costs
- High availability because electromechanical switching elements susceptible to wear are omitted





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CNC solutions for shop floor manufacturing

Manufacturing of small or large batches on the shop floor requires excellent planning and smooth procedures. The manufacturing processes and CNC equipment must be tuned to each other and must comply with the demands for quick and easy programming and operation and efficient machining. The quality standards are high and must be fulfilled throughout the process, from the first to the last part, whether simple or complex parts are being produced.

Flexible and user-friendly for any applications

The CNC system SINUMERIK with its innovative functions and efficient machining step programming with ShopMill and ShopTurn.

Software for programming and operation

With ShopMill and ShopTurn, we offer you user-friendly programming and operator interfaces for CNC milling and turning machines in shop floor manufacturing.

ShopMill and ShopTurn allow single parts and small batches to be programmed extremely quickly. Without any need for DIN/ISO knowledge, technological manufacturing steps can be transformed quickly into work schedules in which all the technological information of the individual work steps are clearly presented. Dynamic displays allow the information to be entered without the need for documentation. Incorrect entries are prevented by the dynamic online graphics.

Program test by means of simulation

Due to simulation, pre-tested CNC programs ensure maximum process reliability – on the basis of real tool data. The workpiece is displayed optimally, in high-resolution 2D/3D graphics.

Benefits of SINUMERIK in shop floor manufacturing:

- Efficient CNC platform for all batch sizes
- The same look and feel for turning and milling
- The right programming methods for simple through to complex workpieces





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Solutions for tool making and mold making

CNC solutions for tool making and mold making

To maintain a leading position in the competitive environment, it is critical to get from the initial idea to the finished part as quickly as possible. Different shapes and designs require different machining processes and different machining strategies: Three axes, three plus two axes, or five axes. Uniform, convex curved freeform surfaces are usually machined using three controlled axes. However, five controlled axes are required for deep cavities or frequent curvature changes. Whether three or five axes – SINUMERIK supports all machining strategies.

The SINUMERIK system platform features a spectrum of excellent functions that considerably simplify daily tasks such as producing models, and shaping or injection-molding tools.

Siemens works closely with customers and partners in the tool making and mold making sector – in the fields of development, model making, mold making, contract manufacturing, and prototype construction.

SINUMERIK MDynamics: Bundled know-how for tool making and mold making

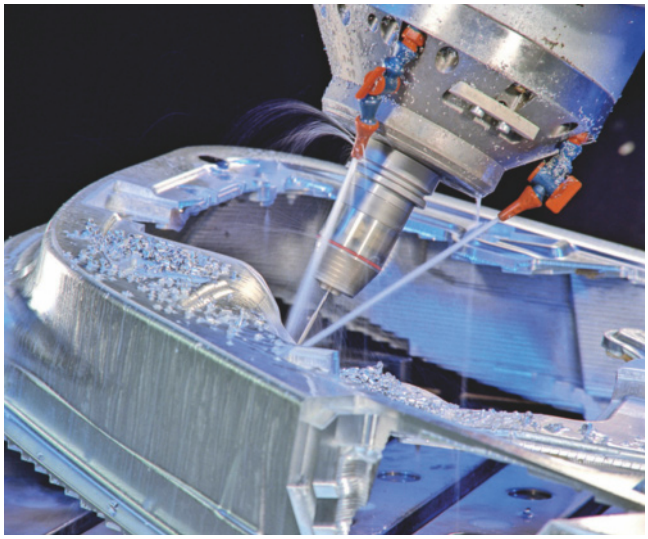
SINUMERIK MDynamics bundles our milling know-how for our customers in tool making and mold making: Special technology packages comprising CNC hardware, intelligent CNC functions and CAD/CAM solutions for 3-axis and 5-axis milling machines for our computerized numerical controls in the compact and premium class ensure best results for milling.

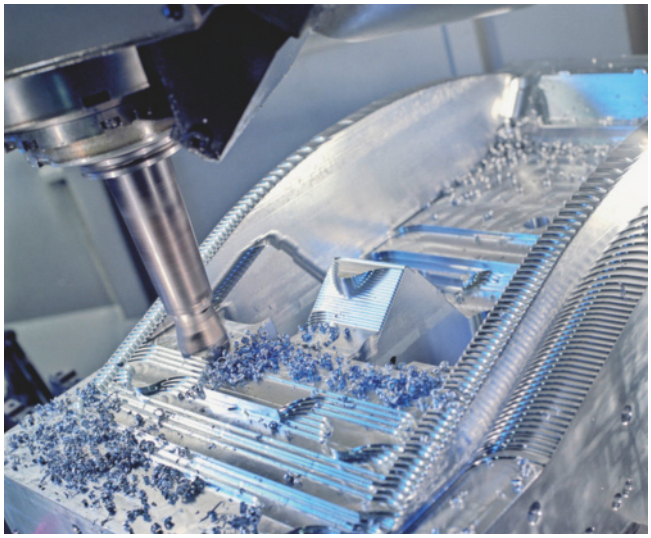
The integrated intelligent Advanced Surface motion control function provides the best milling results for perfect surface quality.

In tool making and in mold making in particular, but also in other sectors, the best milling results are demanded complete with perfect surface quality, precision and quality.

The benefits of SINUMERIK in tool and mold making:

- From the CAD/CAM system to the component much quicker, thanks to integrated solutions
- Graphical programming and simulation
- Simple set-up functions
- Special tool making and mold making functions as well as milling cycles
- Time-optimized processes due to high-speed CNC
- A surface quality that requires no remachining thanks to the innovative Advanced Surface motion control function





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Solutions for Powertrain – TRANSLINE sl

Solutions for Powertrain – TRANSLINE sl is the automation solution for the automotive industry that can be integrated across different manufacturing concepts.

Solutions for Powertrain means: Automation of assembly lines from a single source. With components that can be freely selected for resolving the specific task – and which prove in daily use in endless thousands of assembly plants how productively they work together.

The components are: SIMATIC, SINUMERIK, SINAMICS, PROFIBUS, PROFINET – names which have set standards in the market. Reliable standards which can be used to implement every system solution – from the control of simple PLC-controlled units through to complex high-speed processing modules.

The recipe for success is: Uniformity, integration, ease of use

The identical hardware design, identical user interfaces, identical tools for project engineering, commissioning and diagnostics ensures that machine manufacturers and machine operators profit from extensive synergies – starting with project engineering and commissioning through personnel training as far as maintenance and service.

Siemens solutions are building blocks integrated into a seamless system. This not only includes the planning phase and clarification of the interfaces, but also active support well into the operating phase of the plant – with the emphasis on training, courses and service.

This is why automation solutions from Siemens stand for maximum availability and productivity in assembly lines throughout the world.

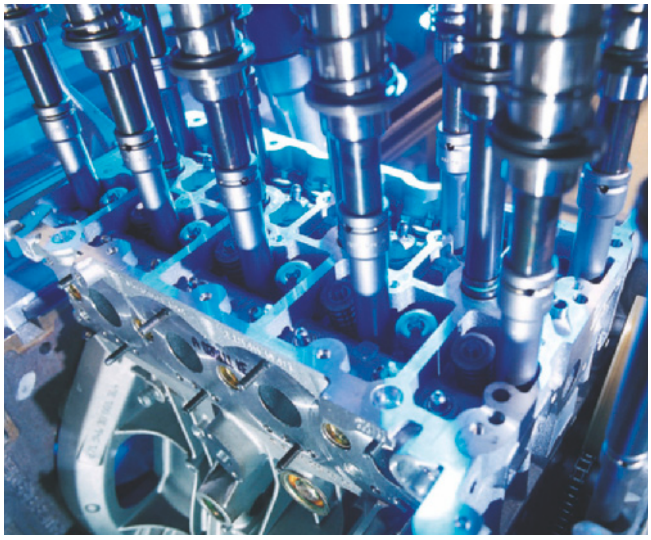
And because Solutions for Powertrain is consistently based on the modular design principle, every solution fits perfectly. This is clearly demonstrated in faster commissioning, minimal spare parts requirements and efficient service, as well as in reduced training costs and greater personnel flexibility.

Comprehensive support in all phases

Solutions for Powertrain is much more than the technical side of automation. It also stands for our project management, which takes the time-consuming task of coordination off your hands. And it comprises ideas and services for the complete operating phase: For a permanent reduction in costs – for increasing availability and productivity.

Benefits of SINUMERIK in the automotive industry:

- Support and project management – worldwide, from planning through to operation
- Uniform concepts reduce the lifecycle costs
- Reduced, cost-cutting stocking of spare parts
- Identical look and feel for PLC-based and CNC-based machines
- Scalable operating concepts due to the use of Thin Client technology
- Greater flexibility and reduced commissioning costs due to modular machine concepts
- Fast localization of sources of error, since all components are designed according to a uniform standard





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Solutions for the aerospace industry

CNC solutions for the aerospace industry

Before an aircraft is ready for take-off, innumerable processes have to be completed. The smoother and more reliably these processes run, the shorter the time span from the first technical drawing to the airborne aircraft becomes – with maximum stability and quality.

The innovative CNC platform SINUMERIK provides greater reliability in the manufacturing process – and greater productivity thanks to faster manufacturing, shorter machine set-up times and downtimes, as well as an optimized manufacturing process. And it provides greater technical advances through new, holistic and creative machine concepts as well as a uniform CAD/CAM/CNC process chain.

High demands on efficiency and precision

Efficiency and precision demand the use of high-speed milling machines: High-performance cutting in 5-axis simultaneous machining. The surface quality of components and their cutting time can be simulated on the machine before machining starts and optimized if necessary. The manufacturing of structural components from one piece saves assembly time, multiplies the strength, and reduces the component weight.

Optimization of the complete process chain

In the aircraft industry, it is particularly important to be able to control the complete process chain – from the drawing through to the finished workpiece. As a manufacturer of computerized numerical controls, we know how important integration with the CAM system is, when the complete process chain has to be optimized. For this reason we offer customer-specific system development, system integration as well as uniform system and process management.

Simulation offers many advantages

Early detection of programming errors, calculation of the machining times, enhanced surface quality of workpieces, higher machine productivity – these are just a few of the requirements from machine builders and users. With Virtual Production and Virtual NCK (VNCK), Siemens offers the innovative solutions that support these requirements and that enable the productivity and performance of machines to be improved further.

It is almost impossible to imagine the planning and design phases of new machines without the use of simulation methods. This is where Siemens offers machine builders the greatest benefits: For example, with Mechatronic Support, for shortening the machine development time; but also with the Machine Simulator, that tests and optimizes the interoperation between the machine and automation.

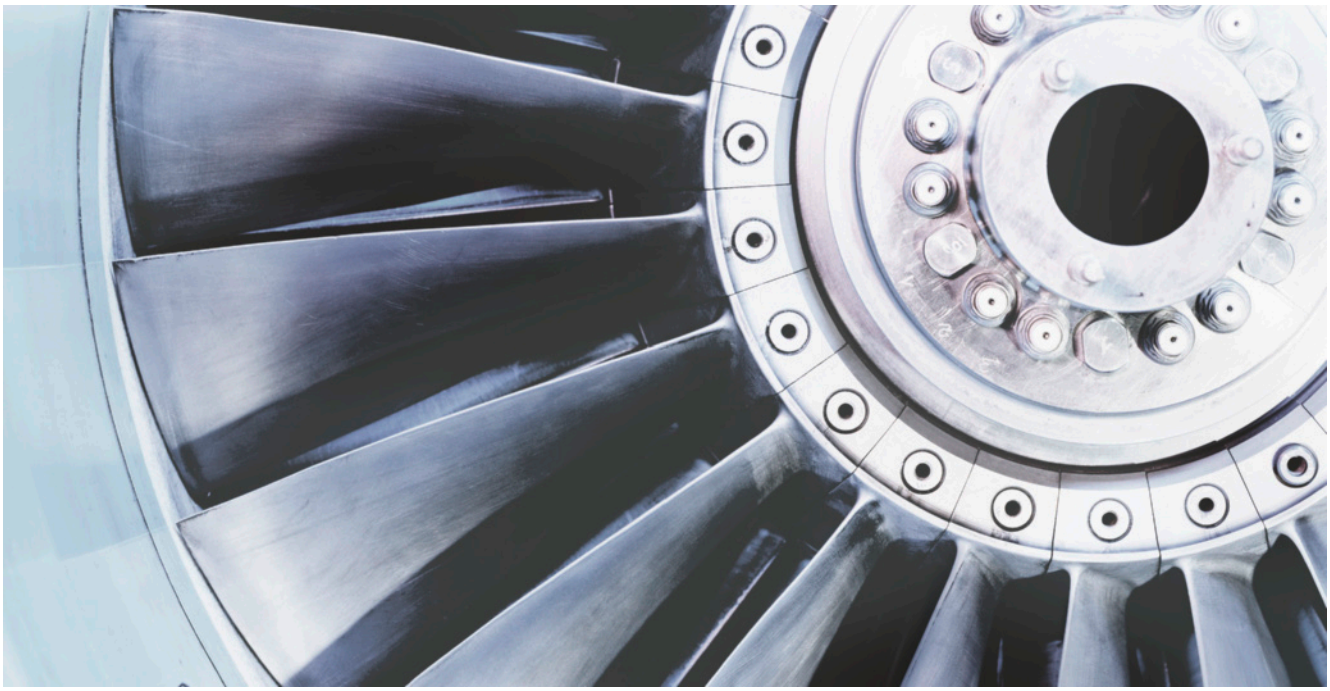
5-axis volume compensation

The SINUMERIK 840D sl is the first, and until now only, control worldwide that also contains special algorithms that can be used to correct all residual geometric errors, such as positioning errors, straight-line errors in the vertical or horizontal direction, rolling, pitching, swerving, perpendicularity errors in the linear axes, as well as geometric errors in the rotary axes on 3-axis and 5-axis machines. These errors cause a positioning error in the tool tip, and in the case of 5-axis kinematics, to an offset in the tool alignment.

Until now, these errors could only be reduced by mechanical means at disproportionately high costs. It is only possible to achieve the tolerances demanded today of less than 50 µm in large machining centers cost-effectively if VCS (Virtual Compensation System) is used.

Benefits of SINUMERIK in the aerospace industry:

- Support for innovative machine concepts
- High-end CNC solutions with optimized functionality
- Optimization of the CAD/CAM process chain
- Components for verification and simulation concepts
- Virtual production of components
- Comprehensive range add-ons and services



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SINUMERIK – the universal solution for medical engineering

New treatments and the constantly widening range of services in medical engineering also demand innovative solutions from CNC and a high degree of technical competence. The manufacture of hip and knee joints, spinal cord components, shoulder and elbow joints, dental bridges, implants as well as medical instruments has become an important commercial and competitive factor in medical engineering.

The fabrication of medical components must be performed with maximum precision and quality. Processes and work steps through to the finished product need to be designed to be faster, easier, and more flexible, because the cost aspect cannot be neglected. Due to these conditions, efficient manufacturing techniques are highly desirable in medical engineering.

SINUMERIK supports all the technologies used in medical engineering and can meet even the highest requirements. From turning and milling, through grinding as far as complex milling/turning or turning/milling machines, SINUMERIK is reliable equipment for precise machining.

The SINUMERIK 840D sl is the pioneering system platform for medical engineering and stands for perfect surfaces, precision, speed, flexibility and productivity.

We offer solutions for the complete process chain

Consistent use of CAD/CAM technology and an optimized CAM PP NC interface for activating the control functions of SINUMERIK play an important part in successful manufacturing in the medical engineering sector. From the idea through to the finished workpiece, Siemens accompanies the complete process chain.

NX CAM from Siemens PLM supports the latest machine tool technology and offers high-performance functions for CNC programming and simulation on high-speed machines.

With functions for programming different CNC machines, integrated simulation and post-processing, you can increase the throughput of your machine tools. NX CAM also offers extended functions for realistic simulation of the machining on machine tools based on the integrated SINUMERIK VNCK (Virtual NC Kernel).

Simply set up, program and get on with it

With SINUMERIK, setting up and programming the machine has never been easier. The integrated operator interface ensures simple and well-structured work processes in combination with smart functions on the machine.
The result: Perfect surfaces for stringent requirements in medical engineering.

Part Monitoring and Tracking

A particular challenge in medical engineering is the seamless tracking of the manufacturing recourses used, i.e. the precise machine and tools used to manufacture an implant.

Siemens has the perfect solution for this in MCIS "Part Monitoring and Tracking". Each machining step of an implant is recorded in terms of the machines, CNC programs and tools used. The manufactured implant can then be uniquely associated with the resources used.

In the case of faulty components, it is then possible to identify the source and to check those parts that were manufactured at the same time with the same resources. A high degree of reliability and quality is therefore assured.

Benefits of SINUMERIK in medical engineering:

- High degree of functionality and user-friendliness with setting up and measuring
- Perfect workpiece surfaces due to excellent motion control and highly dynamic drives
- High precision due to multi-axis kinematic measuring and optional correction of minute errors during operation of the machine.
- The best use of technology with functions for easy measurement or calibration of multi-axis kinematics, for jerk limitation, precontrol, look-ahead and coupled motion for orientation of the tool
- A well-tuned process from the idea to the workpiece, through perfectly tailored post processors from Siemens PLM with NX CAM



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Motion Control solutions for materials handling

The degree of automation for machine tools and production machines is constantly rising. The challenges call for flexible automation solutions and plants of a modular design which can maintain productivity for faster and faster product changeovers. From a simple feed axis in an assembly system through to complex mechanical systems – handling tasks are assuming greater significance in all sectors and applications.

The interoperation of machine tools and handling units is therefore becoming more and more important. Even in the primary and secondary processes, handling modules are being increasingly implemented in the form of industrial robots or as integral handling solutions.

The advantage is clear: The machine and materials handling can be controlled with a single system. We provide answers to the new hardware and software requirements with our control systems and drive systems. Our solutions assure a high product quality and maximum productivity, even with short product changeover cycles. The results are more efficient and more versatile production processes.

The right solution for any application

The requirements for handling tasks are numerous – from the basic functional scope, such as the simple positioners integrated into the drive through general motion control functions as far as interpolating path axes.

Based on our control and drive products, we can also offer you the right solution for your handling task.

Directly on the drive: Simple positioning and basic functions

Simple positioners as well as freely definable function blocks are already integrated into the drive. Whether highly dynamic servo control or vector-controlled asynchronous motors – simple open-loop control and closed-loop control functions can also be directly implemented in the drive.

Reliable monitoring of protection zones

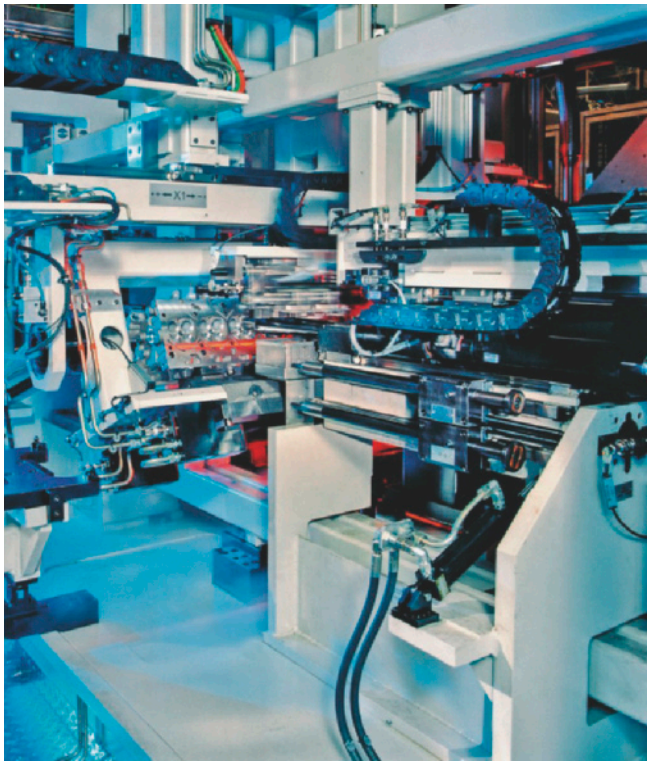
The mechanical conditions in the system can be described using different zones: Protection zones, working area limits and software limits.

Easy planning of the motion control

The motion path is defined using interpolation points in Cartesian space. Blending areas can be specified in the form of blending radii. The blending mode can be parameterized as an arc or polynomial.

Benefits of our handling solutions:

- Modular products/solutions set for handling tasks
- Drive-oriented basic functions
- Protection and monitoring zones
- Open communication interfaces
- Integrated safety functions
- Kinematic transformation for serial kinematics
- Integration into existing plant solutions is possible
- Application support





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SINUMERIK Manufacturing Excellence – the portfolio of services for your machines and processes

To optimize a manufacturing process, the machines must be viewed as a whole, complete with the associated processes. Only then is it possible to ensure that the right package of measures can be selected for each phase of the lifecycle and the largest possible optimization effects can be achieved.

SINUMERIK Manufacturing Excellence supports you – with a combination of products, solutions, and services. To suit your individual requirements, selected modules from this package of services are deployed, which can also be specially adapted to the characteristics of your manufacturing as required.

- Machine Development: Innovative services and solutions from the areas of mechatronic support and simulation shorten the time from the idea to the finished machine
- Manufacturing IT supports production optimization by integrating the machines in the IT processes of the company
- ePS Network Services supports optimization of the service and support processes
- Extended Machine Contracts: Calculable costs for servicing and maintenance
- Machine retrofit: Extension of the service life of the machine and ensuring the availability of the machine
- Productivity Improvement: Enhancing the productivity of older machine tools through modernization and enhancing the performance of hardware and software

Support during the entire lifecycle

Siemens accompanies machines over the complete lifecycle – from the initial idea and design to operation and retrofit. Because innovative services for machines offer enormous potential for optimizing the lifecycle costs.

The potentials for savings not only lie in the purchase price for new machines and plants, but also in the development, engineering and operating costs. Significantly reduced total construction costs and higher productivity can be achieved for new machines already in the planning and construction phases.

In the production process, a central requirement is for reduction of the costs per item. These, in turn, depend on the applications executing in the production area for operating the plant. Examples for this include the maintenance and tool costs. Manufacturing Excellence helps you to optimize the operating costs. A key performance indicator used here for the availability of machines and plants, their performance and their quality is the OEE (Overall Equipment Effectiveness). This ensures that the sources of the costs can be identified and suitable countermeasures can be introduced.

The benefits of SINUMERIK Manufacturing Excellence:

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



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Optimized product development with software for Product Lifecycle Management

The process of manufacturing industrial and consumer goods encompasses two worlds: The virtual world of work scheduling and the physical world of the production plant. By optimizing the interface between these two areas of the manufacturing process, it is possible to further increase efficiency in manufacturing.

Siemens accompanies the individual phases of Product Lifecycle Management (PLM) with a comprehensive portfolio of software solutions and services.

Optimized CAM output for SINUMERIK controls

CAM/CNC integration is an important part of optimization. NX, the CAD/CAM/CAE system for the complete modeling and manufacturing process, is an open, versatile 3D system with which the complete process chain can be optimized from the CAD model through to the finished product. It comprises development and construction as well as the generation of drawings, simulation and manufacturing.

With NX, you can rely on lean processes: Superfluous work, which imposes time and costs on entire development cycles, is avoided. NX reduces delays and downtimes during which the developer is searching for information, or waiting for test results or feedback.

With the combination of NX CAM with the embedded virtual NC kernel SINUMERIK VNCK (Virtual NC Kernel) of the SINUMERIK control, manufacturers can achieve maximum precision by checking their machining steps and machine operations with the help of 3D simulations.

The virtual machine during production and development

The virtual machine is a combination of software from Siemens PLM Software and Siemens Motion Control. A real machine tool is displayed as a 3D software simulation. The virtual NC kernel VNCK of the SINUMERIK control is used and the original user interface is integrated into the RealNC simulation system of Siemens PLM.

Teamcenter PLM software: Efficient linking of production planning and manufacturing

Linking the Siemens Motion Control Information System (MCIS) to Teamcenter PLM Software raises the linking of production planning and parts manufacturing to a new level. With Teamcenter and MCIS linking to parts production, Siemens offers a central information platform that synchronizes the data of the virtual and physical worlds.

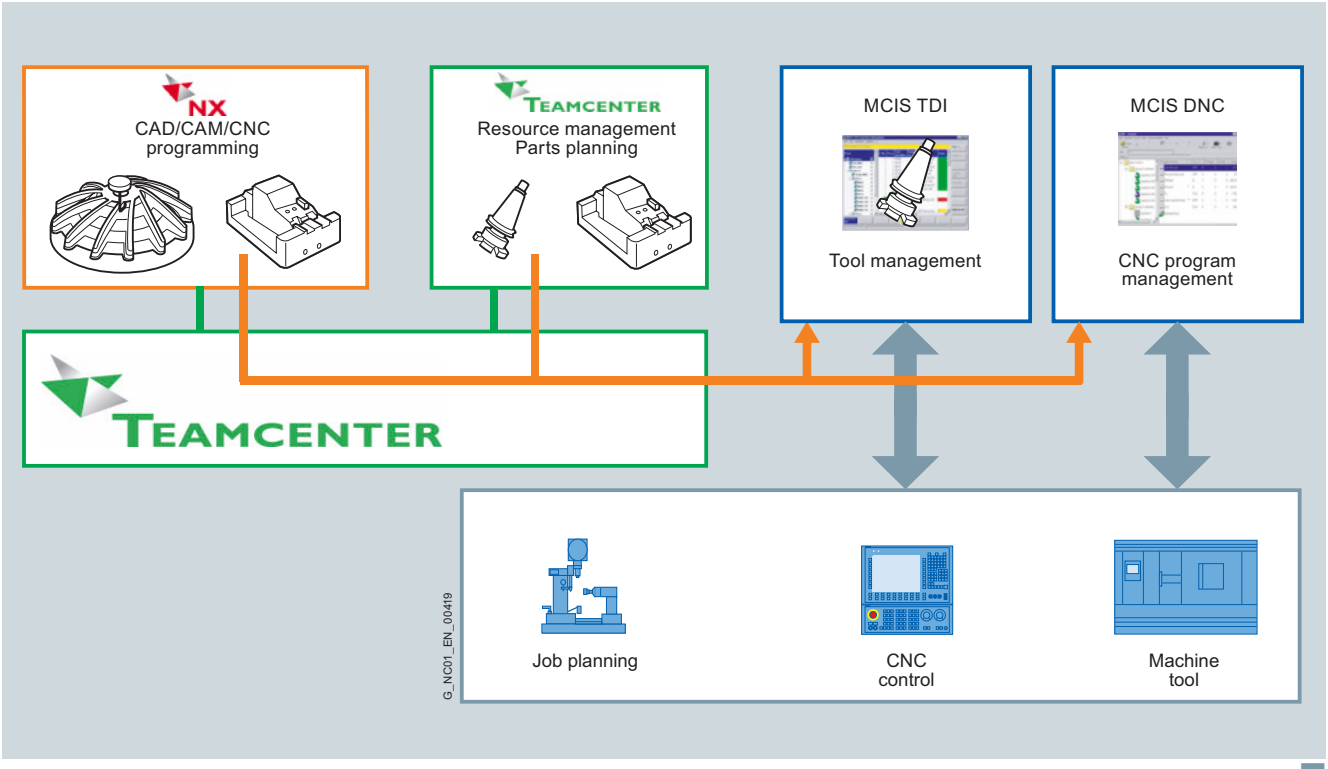
MCIS DNC (Direct Numerical Control)

MCIS DNC expands the standard DNC functionality with linking to Teamcenter. This link offers seamless management, control and safety for production data, because the CNC machines are directly connected to the information of production planning. Through direct CNC program transfer to the machine tool, the costs for management of the CNC data can be considerably reduced. The data is securely managed and costly data loss is avoided.

MCIS TDI (Tool Data Information)

Linking of the tool management system MCIS TDI to Teamcenter ensures that the tools that have been specified in production planning are the right tools that are used in manufacturing. Combining MCIS TDI and Teamcenter optimizes the utilization of machines and tools: It is ensured that the tools planned for a task are available and set up. The workpieces are then manufactured using the resources specified during planning and the tools and machines are optimally utilized.

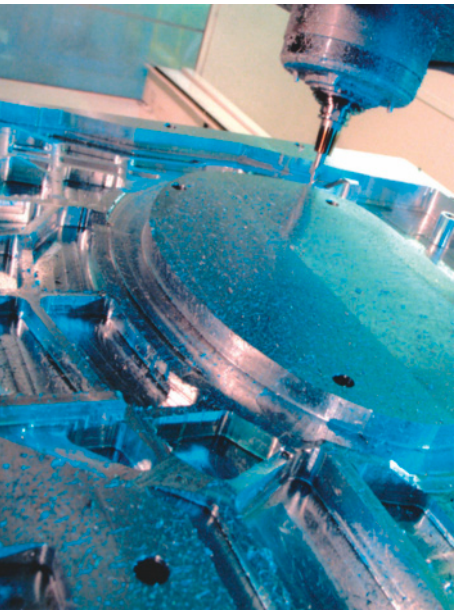
For more information on this topic, visit:
www.siemens.com/plm



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Overview of functions

2



2/2 **SINUMERIK CNCs**
2/2 Export control information
Standard/export versions

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2/14 Drives
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Part 5 **Ordering examples**

The most important functions of the SINUMERIK 802D sl, SINUMERIK 840Di sl and SINUMERIK 840D sl are listed in the Overview of functions.

Permits quick and selective access to individual functions.

The designation E in the name of the 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	Software version
SINUMERIK 802D sl	1.4 SP5
SINUMERIK 840Di sl	1.4 SP2
SINUMERIK 840D sl	2.6/1.5 SP1

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Export control information
Standard/export versions

Overview

As a consequence of the prevailing export restrictions applicable to the CNC software of numerical controls in relation to particular control functions in accordance with the European/German Export List (export list item 2D002), SINUMERIK 840Di sl and SINUMERIK 840D sl are available in two versions.

This applies to the CNC system software for SINUMERIK 840Di sl and SINUMERIK 840D sl.

The **standard versions** SINUMERIK 840Di sl and SINUMERIK 840D sl offer the full scope of control functions, but **require official approval** according to the export list item 2D002 when exported to countries outside the EU.

The **export versions** SINUMERIK 802D sl, SINUMERIK 840DiE sl and SINUMERIK 840DE sl have restricted functionality in accordance with the export list restrictions and therefore **do not require official approval** as a result of their type in accordance with EU or German law.

The approval status for the complete CNC system is correspondingly dependent on the hardware or software version used.

General note:

If any particular components require official re-export approval according to US law, this must be duly filed for. Information about official approval requirements for supplied components is given in the delivery documentation: Goods labeled here with "AL not equal to N" are subject to European or German export authorization if they are exported out of the EU. Goods labeled with "ECCN not equal to N" are subject to US re-export authorization. Even if goods are not labeled or labeled with "AL:N" or "ECCN:N", they may still be subject to export authorization depending on the final destination and end use of the goods.

If a purchase contract is concluded, it shall always be discharged by Siemens with the proviso that performance of the contract shall not be hindered by national or international foreign trade legislation regulations and that no embargoes and/or other sanctions have been applied.

Important export information

Export of standard versions of components or systems can be subject to a time-consuming official authorization process, so it is recommended that **the export version is used where** applicable.

"Information on List of Items (Auskunft zur Güterliste (AZG))" pertaining to the official export authorization process is available for each export version (e.g. Federal Office of Economics and Export Control (BAFA), Customs). You can obtain a copy of this list from your local Siemens sales office.

When the standard variant is used, it is important to note that official authorization is also required for the export of components subject to export approval within the framework of service provision, the supply of spare parts and for delivery of software updates and upgrades. This is especially relevant in cases where the control is exported after the machine manufacturer has installed it in a machine tool. The lengthy official approval procedure can severely restrict after-sales service.

When an application for an export permit for a system is submitted, we therefore recommend that spare parts supplies for any components requiring approval are included in the application as a matter of course to avoid future delays.

If the control is to be exported as an installed component in a machine tool, we recommend that machine manufacturers include any components requiring approval in the export permit application for the machine. If the machine itself does not require official export approval, but contains components which do, we recommend that an export permit for the replacement supply of such components is applied for in advance, in case it is necessary.

Spare parts supplies requiring official approval can then be exported quickly and easily by the machine manufacturer himself, or by Siemens if the manufacturer can make the original export permit available to Siemens.

Functional restrictions for export versions

The designation E in the name of the control indicates that it is the export variant, i.e. the relevant control software is classified as not requiring official approval (AL=N) with the functional restrictions specified in the table according to AL item 2D002.

For further details on restricted functionality for the export versions, see the Glossary on the CD-ROM for Catalog NC 61 or go to: www.siemens.com/industrymall

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Overview (continued)

Functional restrictions for export versions (continued)

Function	Order No.	SINUMERIK 840DiE sl	SINUMERIK 840DE sl
AXCO compensation of a forced mechanical coupling	6FC5800-0AM81-0YB0	–	–
Axial coupling in the machine coordinate system MCS coupling	6FC5800-0AM23-0YB0	–	–
CLC clearance control, 1D/3D in position control cycle	6FC5800-0AM40-0YB0	▦ 4)	▦ 4)
Crank interpolation CRIP	6FC5800-0AN04-0YB0	–	–
DOUBLETRANSMIT 2TRA transformation	6FC5800-0AM25-0YB0	–	–
Electronic gear EG	6FC5800-0AM22-0YB0	▦ 2)	▦ 2)
Electronic transfer	6FC5800-0AM35-0YB0	▦ 2)	▦ 2)
Electronic transfer CP	6FC5800-0AM76-0YB0	▦ 2)	▦ 2)
Generic coupling CP Basic	6FC5800-0AM72-0YB0	▦ 2)	▦ 2)
Generic coupling CP Comfort	6FC5800-0AM73-0YB0	▦ 2)	▦ 2)
Generic coupling CP Expert	6FC5800-0AM74-0YB0	▦ 2)	▦ 2)
Generic transformation	●	–	–
Handling package	6FC5800-0AS31-0YB0	–	–
Helical interpolation 2D+6	●	–	–
Linear interpolation axes	●	▦ 1)	▦ 1)
Machining package milling	6FC5800-0AM26-0YB0	–	–
Machining package 5 axes	6FC5800-0AM30-0YB0	–	–
Machining package 5 axes additional function 7th axis	6FC5800-0AS01-0YB0	–	–
Master value coupling and curve table interpolation LEAD	6FC5800-0AM20-0YB0	▦ 2)	▦ 2)
Multi-axis interpolation (> 4 interpolating axes)	6FC5800-0AM15-0YB0	–	–
PARACOP 3-axis transformation for parallel kinematics (first channel)	6FC5800-0AM44-0YB0	–	–
PROT collision protection for axes	6FC5800-0AN06-0YB0	–	–
RCTRA transformation package for handling	6FC5800-0AM31-0YB0	–	–
Sag compensation, multi-dimensional	6FC5800-0AM55-0YB0	▦ 5)	▦ 5)
SCIS transformation for pantograph kinematics 2 axes	6FC5800-0AM51-0YB0	–	–
SINUMERIK NCK Runtime OA	6FC5800-0AM04-0YB0	–	–
Space error compensation for kinematic transformations SEC	6FC5800-0AM57-0YB0	–	–
Synchronized actions stage 2	6FC5800-0AM36-0YB0	▦ 3)	▦ 3)
Technology package milling SINUMERIK MDynamics 5 axes	6FC5800-0AS33-0YB0	–	–
Tool orientation interpolation	●	–	–
Transformation TRIPOD HYBRID basis, 5 axes, THYK	6FC5800-0AN36-0YB0	–	–
VCS plus spatial compensation	6FC5800-0AN17-0YB0	–	–
VIBX vibration extinction	6FC5800-0AN11-0YB0	–	–

● Basic version
▦ Functional restrictions for export versions
– Not possible

1) The number of simultaneously interpolating axes is restricted to four.
2) The number of simultaneously traversing axes is restricted to four.
3) The number of simultaneously traversing axes is limited to four (path and positioning axes).
4) Clearance control 1D in the position-control cycle only, number of simultaneously interpolating axes restricted to four.
5) The correctable tolerance band is restricted to 1 mm (0.04 in)

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Control structure and configuration

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code
Control structure and configuration			
Structure:			
• Panel-based			
• PC-based			
• Drive-based			
SINUMERIK 840D sl:			
• NCU 710.2 with PLC 317-2DP		**6FC5371-0AA10-0AA1**	
• NCU 720.2 with PLC 317-2DP		**6FC5372-0AA00-0AA2**	
• NCU 720.2 PN with PLC 319-3PN/DP		**6FC5372-0AA01-0AA2**	
• NCU 730.2 with PLC 317-2DP		**6FC5373-0AA00-0AA2**	
• NCU 730.2 PN with PLC 319-3PN/DP		**6FC5373-0AA01-0AA2**	
• Seal for external cooling of NCUs		**6FC5348-0AA07-0AA0**	
• Numeric Control Extension NX10		**6SL3040-0NC00-0AA0**	
• Numeric Control Extension NX15		**6SL3040-0NB00-0AA0**	
• Maximum configuration NX10/NX15			
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
Software for SINUMERIK NCU 710.2/NCU 720.2/NCU 730.2:			
• CNC software 6-3 with HMI-Embedded, export version, on CF card, with license	See Basic components.	**6FC5840-1YG..-.YA0**	
• CNC software 6-3 with HMI-Embedded, on CF card, with license	See Basic components.	**6FC5840-1XG..-.YA0**	
• CNC software 31-5 with HMI-Embedded, export version, on CF card, with license	See Basic components.	**6FC5840-3YG..-.YA0**	
• CNC software 31-5 with HMI-Embedded, on CF card, with license	See Basic components.	**6FC5840-3XG..-.YA0**	
• CNC software 6-3/31-5 with HMI-Embedded, export version, on DVD-ROM, without license	See Basic components.	**6FC5840-3YC..-.YA8**	
• CNC software 6-3 with HMI-Embedded, export version, license		**6FC5840-1YF00-0YB0**	
• CNC software 31-5 with HMI-Embedded, export version, license		**6FC5840-3YF00-0YB0**	
• CNC software 6-3/31-5 with HMI-Embedded, on DVD-ROM, without license	See Basic components.	**6FC5840-3XC..-.YA8**	
• CNC software 6-3 with HMI-Embedded, license		**6FC5840-1XF00-0YB0**	
• CNC software 31-5 with HMI-Embedded, license		**6FC5840-3XF00-0YB0**	
• CNC software 6-3/31-5 with HMI-Embedded, export version, software update service, without license		**6FC5840-3YP00-0YL8**	
• CNC software 6-3/31-5 with HMI-Embedded, software update service, without license		**6FC5840-3XP00-0YL8**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Control structure and configuration										
●	●	–	–	–	–					
–	–	●	●	–	–					
–	–	–	–	●	●					
–	–	–	–	○	○	○		○	○	○
–	–	–	–	○	○	○		○	○	○
–	–	–	–	○	○	○		–	–	–
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–	–	–	–	○	○	○		–	–	–
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	3	3					
–	–	–	–	5	5					
–	–	–	–	○	–	–		●		
–	–	–	–	–	○	–		●		
–	–	–	–	○	–	–		●		
–	–	–	–	–	○	–		●		
–	–	–	–	○	–	–		●		
–	–	–	–	○	–	–		●		
–	–	–	–	○	–	–		●		
–	–	–	–	–	○	–		●		
–	–	–	–	–	○	–		●		
–	–	–	–	–	○	–		●		
–	–	–	–	○	–	–		●		
–	–	–	–	–	○	–		●		

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Control structure and configuration

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code
Control structure and configuration (continued)			
Software for SINUMERIK NCU 710.2/NCU 720.2/NCU 730.2 (continued):			
• CNC software 6-3 and ShopMill HMI, export version, on CF card with license	See Basic components.	**6FC5841-1YG..-.YA0**	
• CNC software 6-3 and ShopMill HMI, on CF card, with license	See Basic components.	**6FC5841-1XG..-.YA0**	
• CNC software 31-5 and ShopMill HMI, export version, on CF card, with license	See Basic components.	**6FC5841-3YG..-.YA0**	
• CNC software 31-5 and ShopMill HMI, on CF card, with license	See Basic components.	**6FC5841-3XG..-.YA0**	
• CNC software 6-3/31-5 and ShopMill HMI, export version, on DVD-ROM, without license	See Basic components.	**6FC5841-3YC..-.YA8**	
• CNC software 6-3 and ShopMill HMI, export version, license		**6FC5841-1YF00-0YB0**	
• CNC software 31-5 and ShopMill HMI, export version, license		**6FC5841-3YF00-0YB0**	
• CNC software 6-3/31-5 and ShopMill HMI, on DVD-ROM, without license	See Basic components.	**6FC5841-3XC..-.YA8**	
• CNC software 6-3 and ShopMill HMI, license		**6FC5841-1XF00-0YB0**	
• CNC software 31-5 and ShopMill HMI, license		**6FC5841-3XF00-0YB0**	
• CNC software 6-3/31-5 and ShopMill HMI, export version, software update service, without license		**6FC5841-3YP00-0YL8**	
• CNC software 6-3/31-5 and ShopMill HMI, software update service, without license		**6FC5841-3XP00-0YL8**	
• CNC software 6-3 and ShopTurn HMI, export version, on CF card, with license	See Basic components.	**6FC5842-1YG..-.YA0**	
• CNC software 6-3 and ShopTurn HMI, on CF card, with license	See Basic components.	**6FC5842-1XG..-.YA0**	
• CNC software 31-5 and ShopTurn HMI, export version, on CF card, with license	See Basic components.	**6FC5842-3YG..-.YA0**	
• CNC software 31-5 and ShopTurn HMI, on CF card, with license	See Basic components.	**6FC5842-3XG..-.YA0**	
• CNC software 6-3/31-5 and ShopTurn HMI, export version, on DVD-ROM, without license	See Basic components.	**6FC5842-3YC..-.YA8**	
• CNC software 6-3 and ShopTurn HMI, export version, license		**6FC5842-1YF00-0YB0**	
• CNC software 31-5 and ShopTurn HMI, export version, license		**6FC5842-3YF00-0YB0**	
• CNC software 6-3/31-5 and ShopTurn HMI, on DVD-ROM, without license	See Basic components.	**6FC5842-3XC..-.YA8**	
• CNC software 6-3 and ShopTurn HMI, license		**6FC5842-1XF00-0YB0**	
• CNC software 31-5 and ShopTurn HMI, license		**6FC5842-3XF00-0YB0**	
• CNC software 6-3/31-5 and ShopTurn HMI, export version, software update service, without license		**6FC5842-3YP00-0YL8**	
• CNC software 6-3/31-5 and ShopTurn HMI, software update service, without license		**6FC5842-3XP00-0YL8**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Control structure and configuration (continued)										
–	–	–	–	○	–	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	○	–	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	○	–	–		●	●	
–	–	–	–	○	–	–		●	●	
–	–	–	–	○	–	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	○	–	–		●	●	
–	–	–	–	–	○	–		●	●	
–	–	–	–	○	–	–		●		●
–	–	–	–	–	○	–		●		●
–	–	–	–	○	–	–		●		●
–	–	–	–	–	○	–		●		●
–	–	–	–	○	–	–		●		●
–	–	–	–	○	–	–		●		●
–	–	–	–	○	–	–		●		●
–	–	–	–	–	○	–		●		●
–	–	–	–	–	○	–		●		●
–	–	–	–	–	○	–		●		●
–	–	–	–	○	–	–		●		●
–	–	–	–	–	○	–		●		●

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Control structure and configuration

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Control structure and configuration (continued)			
Software for SINUMERIK NCU 710.2/NCU 720.2/ NCU 720.2 PN/ NCU 730.2/ NCU 730.2 PN:			
• CNC software 6-3 with SINUMERIK Operate, export version, on CF card, with license	See Basic components.	**6FC5850-1YG..-.YA0**	
• CNC software 31-5 with SINUMERIK Operate, export version, on CF card, with license	See Basic components.	**6FC5850-3YG..-.YA0**	
• CNC software 6-3 with SINUMERIK Operate, on CF card, with license	See Basic components.	**6FC5850-1XG..-.YA0**	
• CNC software 31-5 with SINUMERIK Operate, on CF card, with license	See Basic components.	**6FC5850-3XG..-.YA0**	
• CNC software 6-3/31-5 with SINUMERIK Operate, export version, on DVD-ROM, without license	See Basic components.	**6FC5850-3YC..-.YA8**	
• CNC software 6-3 with SINUMERIK Operate, export version, license		**6FC5850-1YF00-0YB0**	
• CNC software 31-5 with SINUMERIK Operate, export version, license		**6FC5850-3YF00-0YB0**	
• CNC software 6-3/31-5 with SINUMERIK Operate, on DVD-ROM, without license	See Basic components.	**6FC5850-3XC..-.YA8**	
• CNC software 6-3 with SINUMERIK Operate, license		**6FC5850-1XF00-0YB0**	
• CNC software 31-5 with SINUMERIK Operate, license		**6FC5850-3XF00-0YB0**	
• CNC software 6-3/31-5 with SINUMERIK Operate, export version, software update service, without license		**6FC5850-3YP00-0YL8**	
• CNC software 6-3/31-5 with SINUMERIK Operate, software update service, without license		**6FC5850-3XP00-0YL8**	
Data carrier for CNC software:			
• 1 GB CF card		**6FC5313-5AG00-0AA0**	
SINUMERIK 840Di sl/840DiE sl hardware with CNC software and licenses installed:			
• Current CNC software, export version, on hard disk of the SINUMERIK 840DiE sl (PCU 50.3-C 1.5 GHz/512 MB + MCI2 board, Windows XP ProEmbSys)	6 axes: L11 20 axes: L12	**6FC5220-0YA31-2AA0-Z L1■ + Q00 + R00**	
• Current CNC software, on hard disk of the SINUMERIK 840Di sl (PCU 50.3-C 1.5 GHz/512 MB + MCI2 board, Windows XP ProEmbSys)	6 axes: L11 20 axes: L12	**6FC5220-0XA31-2AA0-Z L1■ + Q00 + R00**	
• Current CNC software, export version, on hard disk of the SINUMERIK 840DiE sl (PCU 50.3-P 2.0 GHz/1 GB + MCI2 board, Windows XP ProEmbSys)	6 axes: L11 20 axes: L12	**6FC5220-0YA33-2AA0-Z L1■ + Q00 + R00**	
• Current CNC software, on hard disk of the SINUMERIK 840Di sl (PCU 50.3-P 2.0 GHz/1 GB + MCI2 board, Windows XP ProEmbSys)	6 axes: L11 20 axes: L12	**6FC5220-0XA33-2AA0-Z L1■ + Q00 + R00**	
• CNC software 6-3/20-5, export version, software update service, without license		**6FC5820-3YP00-0YL8**	
• CNC software 6-3/20-5, software update service, without license		**6FC5820-3XP00-0YL8**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Control structure and configuration (continued)										
–	–	–	–	○	–	●		–	–	–
–	–	–	–	○	–	●		–	–	–
–	–	–	–	–	○	●		–	–	–
–	–	–	–	–	○	●		–	–	–
–	–	–	–	○	–	●		–	–	–
–	–	–	–	○	–	●		–	–	–
–	–	–	–	○	–	●		–	–	–
–	–	–	–	–	○	●		–	–	–
–	–	–	–	–	○	●		–	–	–
–	–	–	–	–	○	●		–	–	–
–	–	–	–	○	–	●		–	–	–
–	–	–	–	–	○	●		–	–	–
○	○	–	–	○	○					
–	–	○	–	–	–	–	●			
–	–	–	○	–	–	–	●			
–	–	○	–	–	–	–	●			
–	–	–	○	–	–	–	●			
–	–	○	–	–	–	–	○			
–	–	–	○	–	–	–	○			

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Control structure and configuration

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Control structure and configuration (continued)			
SINUMERIK 840Di sl hardware with Windows operating system:			
• 840Di sl (PCU 50.3-C 1.5 GHz/512 MB + MCI2 board, Windows XP ProEmbSys)		**6FC5220-0AA31-2AA0**	
• 840Di sl (PCU 50.3-P 2.0 GHz/1 GB + MCI2 board, Windows XP ProEmbSys)		**6FC5220-0AA33-2AA0**	
MCI board extension slot version with cable distributor		**6FC5222-0AA00-0AA1** **6FX2006-1BA02**	
Software for SINUMERIK 840Di sl:			
• CNC software 6-3/20-5 and ShopMill HMI, ShopTurn HMI and HMI-Advanced, export version, on DVD-ROM, without license	Contains HMI-Advanced software version 1.4 SP1 and higher. See Basic components.	**6FC5820-3YC..-.YA8**	
• CNC software 6-3, export version, license		**6FC5820-1YP00-0YB0**	
• CNC software 20-5, export version, license		**6FC5820-3YP00-0YB0**	
• CNC software 6-3/20-5 and ShopMill HMI, ShopTurn HMI and HMI-Advanced, on DVD-ROM, without license	Contains HMI-Advanced software version 1.4 SP1 and higher. See Basic components.	**6FC5820-3XC..-.YA8**	
• CNC software 6-3, license		**6FC5820-1XP00-0YB0**	
• CNC software 20-5, license		**6FC5820-3XP00-0YB0**	
SINUMERIK 802D sl:			
• Version T/M value, export version		**6FC5370-0AA00-1AA0**	
• Version T/M plus, export version		**6FC5370-0AA00-2AA0**	
• Version T/M pro, export version		**6FC5370-0AA00-3AA0**	
• Version G/N plus, export version		**6FC5370-0AA00-2BA0**	
• Version G/N pro, export version		**6FC5370-0AA00-3BA0**	
Channels/mode groups (MG):			
• Maximum configuration			
CNC software 6-3			
CNC software 20-5/31-5			
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
• Mode group (MG), each additional		**6FC5800-0AC00-0YB0**	**C01 ... C09**
• Machining channel, each additional	Example: 4 additional machining channels: C14	**6FC5800-0AC10-0YB0**	**C11 ... C19**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Control structure and configuration (continued)										
–	–	○	○	–	–	–	○	–	◆	◆
–	–	○	○	–	–	–	○	–	◆	◆
–	–	○	○	–	–					
–	–	○	–	–	–	–			◆	◆
–	–	○	–	–	–	–			◆	◆
–	–	○	–	–	–	–			◆	◆
–	–	–	○	–	–	–			◆	◆
–	–	–	○	–	–	–			◆	◆
–	–	–	○	–	–	–			◆	◆
●	–	–	–	–	–					
●	–	–	–	–	–					
●	–	–	–	–	–					
–	●	–	–	–	–					
–	●	–	–	–	–					
● 1	● 1	● 1	● 1	● 1	● 1					
1	1					10	10	10	1	1
–	–	2	2	2	2					
–	–	10	10	10	10					
–	–	–	–	4	4					
–	–	–	–	10	10					
–	–	○	○	○	○	○	○	○	–	–
–	–	○	○	○	○	○	○	○	–	–

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Control structure and configuration

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Control structure and configuration (continued)			
CNC user memory (buffered) for programs and OEM cycles in MB	1) With value version: 512 KB With plus version: 1 MB		
CNC user memory for programs, OEM cycles and data, expansion by 2 MB in each case	Example: Expansion by 6 MB: D03	**6FC5800-0AD00-0YB0**	**D01 ... D06**
CNC user memory, maximum configuration	1) With value version: 512 KB With plus version: 1 MB 2) For NCU 710.2 max. 9 MB		
HMI user memory, additional on CF card of NCU	1) On external CF card on the front. 2) On external CF card in the PCU 50.3. 3) On CF card of NCU, not with HMI on the PCU 50.3.	**6FC5800-0AP12-0YB0**	**P12**
Axes/spindles or positioning axes/auxiliary spindle:	1) With value version: 3/1.		
CNC software 6-3			
CNC software 20-5/31-5			
• Maximum configuration of axes	1) With value version: 3/1. 2) Display: 3 geometry axes + 2 additional axes + 1 spindle. 3) Display: 3 geometry axes + 2 additional axes + 3 spindles.		
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
• Maximum configuration of spindles	1) With value version: 1.		
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
• Maximum configuration axes/spindles	1) With value version: 3/1.		
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
• Configuration per channel axes incl. spindles	1) With value version: 3/1.		
NCU 710.2			
NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN			
Axis/spindle, each additional	Example: 12 additional axes/spindles: A12	**6FC5800-0AA00-0YB0**	**A01 ... A26**
Positioning axis/auxiliary spindle, each additional		**6FC5800-0AB00-0YB0**	**B01 ... B26**
PLC-controlled axis	1) With plus and pro versions.		
PLC positioning axis via PROFIBUS DP			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Control structure and configuration (continued)										
● 3[1]	● 3[1]	● 5	● 5	● 3	● 3					
–	–	–	–	○	○					
3[1]	3[1]	5	5	15[2]	15[2]					
● 1)	● 1)	● 2)	● 2)	○ 3)	○ 3)	○ 3)	–	○	○ 3)	○ 3)
4/1 3/2[1]	4/1 3/2									
–	–	● 3	● 3	● 3	● 3					
–	–	● 5	● 5	● 5	● 5					
4/1 3/2[1]	4/1 3/2	20	20			31	31	31	12[2]	12[3]
–	–	–	–	6	6					
–	–	–	–	31	31					
2[1]	2	20	20			31	31	31	1	3+2C
–	–	–	–	6	6					
–	–	–	–	31	31					
4/1 3/2[1]	4/1 3/2	20	20			31	31	31	12	12
–	–	–	–	6	6					
–	–	–	–	31	31					
4/1 3/2[1]	4/1 3/2	12	12			12 12	12 12	12 12	12 1	12 3
–	–	–	–	6	6					
–	–	–	–	12	12					
–	–	○	○	○	○					
–	–	○	○	○	○					
1[1]	1[1]	●	●	●	●					
–	–	●	●	●	●					

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Drives

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. / Type (for complete Order No., see notes)	Order code
Drives			
SINAMICS S120 booksize compact format			
SINAMICS S120 booksize format, Motor Modules via DRIVE-CLiQ	See SINAMICS S120 drive system.		
SINAMICS S120 CU320 Control Unit via PROFIBUS (without CompactFlash card)	See SINAMICS S120 drive system.	**6SL3040-0MA00-0A..**	
SINAMICS S120 CU320 Control Unit with CBE20 via PROFINET (without CompactFlash card)	For positioning tasks via PLC. See SINAMICS S120 drive system.	**6SL3040-0MA00-0A..**	
CF card with current SINAMICS FW release			
• License for basic performance		**6SL3054-0AA00-1AA0**	
• License with Performance extension firmware option		**6SL3054-0AA01-1AA0**	
SINAMICS S120 closed-loop control CU310 DP	See SINAMICS S120 drive system. 1) For positioning tasks via PLC with blocksize Power Module.	**6SL3040-0LA00-0AA.**	
SINAMICS S120 closed-loop control CU310 PN	See SINAMICS S120 drive system. 1) For positioning tasks via PLC with blocksize Power Module.	**6SL3040-0LA01-0AA.**	
SINAMICS S120 Control Unit Adapter CUA31	See SINAMICS S120 drive system.	**6SL3040-0PA00-0A..**	
SINAMICS S120 Sensor Modules Cabinet			
• SINAMICS S120 SMC10	See SINAMICS S120 drive system. 1) No SINUMERIK Safety Integrated.	**6SL3055-0AA00-5AA.**	
• SINAMICS S120 SMC20	See SINAMICS S120 drive system.	**6SL3055-0AA00-5BA.**	
• SINAMICS S120 SMC30	See SINAMICS S120 drive system. 1) No SINUMERIK Safety Integrated.	**6SL3055-0AA00-5CA.**	
SINAMICS S120 Sensor Modules External			
• SINAMICS S120 SME20	See SINAMICS S120 drive system.	**6SL3055-0AA00-5EA.**	
• SINAMICS S120 SME25	See SINAMICS S120 drive system.	**6SL3055-0AA00-5HA.**	
• SINAMICS S120 SME120	See SINAMICS S120 drive system.	**6SL3055-0AA00-5JA.**	
• SINAMICS S120 SME125	See SINAMICS S120 drive system.	**6SL3055-0AA00-5KA.**	
SINAMICS S120 TB/TM Terminal Module			
• SINAMICS S120 TB30		**6SL3055-0AA00-2T..**	
• SINAMICS S120 TM31	See SINAMICS S120 drive system.	**6SL3055-0AA00-3A..**	
• SINAMICS S120 TM41	See SINAMICS S120 drive system. 1) SW version 1.5 HF5, SW version 2.5 HF2 and higher.	**6SL3055-0AA00-3P..**	
• SINAMICS S120 TM15	See SINAMICS S120 drive system.	**6SL3055-0AA00-3FA.**	
• SINAMICS S120 TM17		**6SL3055-0AA00-3HA.**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drives										
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				1)	1)					
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–	–	○	○	○	○					
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Drives

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drives (continued)			
SINAMICS S120 expansion modules			
• SINAMICS S120 VSM10	See SINAMICS S120 drive system.	**6SL3053-0AA00-3A..**	
• SINAMICS S120 DMC20	See SINAMICS S120 drive system.	**6SL3055-0AA00-6AA.**	
• SINAMICS S120 DME20	See SINAMICS S120 drive system.	**6SL3055-0AA00-6AB.**	
SINAMICS S120 booksize format Motor Modules, internal air cooling	See SINAMICS S120 drive system.	**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	See SINAMICS S120 drive system.	**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	See SINAMICS S120 drive system.	**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..**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drives (continued)										
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Drives

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drives (continued)			
SINAMICS S120 booksize format Active Line Modules, internal air cooling	See SINAMICS S120 drive system.	**6SL3130-7TE21-6A..** **6SL3130-7TE23-6A..** **6SL3130-7TE25-5A..** **6SL3130-7TE28-0A..** **6SL3130-7TE31-2A..**	
SINAMICS S120 booksize format Active Line Modules, external air cooling	See SINAMICS S120 drive system.	**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	See SINAMICS S120 drive system.	**6SL3136-7TE21-6A..** **6SL3136-7TE23-6A..** **6SL3136-7TE25-5A..** **6SL3136-7TE28-0A..** **6SL3136-7TE31-2A..**	
SINAMICS S120 booksize format Active Interface Modules	See SINAMICS S120 drive system.	**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	See SINAMICS S120 drive system.	**6SL3130-6AE15-0A..** **6SL3130-6AE21-0A..** **6SL3130-6TE21-6A..** **6SL3130-6TE23-6A..**	
SINAMICS S120 booksize format Smart Line Modules, external air cooling	See SINAMICS S120 drive system.	**6SL3131-6AE15-0A..** **6SL3131-6AE21-0A..**	
SINAMICS S120 booksize format Smart Line Modules, cold plate cooling	See SINAMICS S120 drive system.	**6SL3136-6AE15-0A..** **6SL3136-6AE21-0A..**	
SINAMICS S120 chassis format Motor Modules, internal air cooling (rated pulse frequency 2 kHz)	No SINUMERIK Safety Integrated. See SINAMICS S120 drive system.	**6SL3320-1TE32-1AA.** **6SL3320-1TE32-6AA.** **6SL3320-1TE33-1AA.** **6SL3320-1TE33-8AA.** **6SL3320-1TE35-0AA.**	
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)	No SINUMERIK Safety Integrated. See SINAMICS S120 drive system.	**6SL3330-7TE32-1AA.** **6SL3330-7TE32-6AA.** **6SL3330-7TE33-8AA.** **6SL3330-7TE35-0AA.**	
SINAMICS S120 chassis format Active Line Modules, internal air cooling (up to 500 kW)		**6SL3330-7TE36-1AA.** **6SL3330-7TE38-4AA.** **6SL3330-7TE41-0AA.** **6SL3330-7TE41-4AA.**	
SINAMICS S120 chassis format Active Interface Modules	See SINAMICS S120 drive system.	**6SL3300-7TE32-6AA.** **6SL3300-7TE33-8AA.** **6SL3300-7TE35-0AA.**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drives (continued)										
○	○	○	○	○	○					
○	○	○	○	○	○					
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–	–	○	○	○	○					

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Drives

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drives (continued)			
SINAMICS S120 blocksize format Power Modules 230 V 1 AC, internal air cooling	No SINUMERIK Safety Integrated.	**6SL3210-1SB10-9UA0** **6SL3210-1SB12-3UA0** **6SL3210-1SB13-9UA0** **6SL3210-1SB10-9AA0** **6SL3210-1SB12-3AA0** **6SL3210-1SB13-9AA0**	
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** **6SL3210-1SE16-0UA0** **6SL3210-1SE17-7UA0** **6SL3210-1SE21-0UA0** **6SL3210-1SE21-8UA0** **6SL3210-1SE22-5UA0** **6SL3210-1SE23-2UA0** **6SL3210-1SE23-8UA0** **6SL3210-1SE24-5UA0** **6SL3210-1SE26-0UA0** **6SL3210-1SE27-5UA0** **6SL3210-1SE31-0UA0** **6SL3210-1SE31-1UA0** **6SL3210-1SE31-5UA0** **6SL3210-1SE31-8UA0** **6SL3210-1SE11-3AA0** **6SL3210-1SE11-7AA0** **6SL3210-1SE12-2AA0** **6SL3210-1SE13-1AA0** **6SL3210-1SE14-1AA0** **6SL3210-1SE16-0AA0** **6SL3210-1SE17-7AA0** **6SL3210-1SE21-0AA0** **6SL3210-1SE21-8AA0** **6SL3210-1SE22-5AA0** **6SL3210-1SE23-2AA0** **6SL3210-1SE23-8AA0** **6SL3210-1SE24-5AA0** **6SL3210-1SE26-0AA0** **6SL3210-1SE27-5AA0** **6SL3210-1SE31-0AA0** **6SL3210-1SE31-1AA0** **6SL3210-1SE31-5AA0** **6SL3210-1SE31-8AA0**	
SINAMICS S120 chassis format Power Modules, 400 V 3 AC, internal air cooling		**6SL3310-1TE32-1AA0** **6SL3310-1TE32-6AA0** **6SL3310-1TE33-1AA0** **6SL3310-1TE33-8AA0** **6SL3310-1TE35-0AA0**	
Hydraulic axis (distributed) for connection as interpolating CNC axis	Coupled via PROFIBUS DP V2 with PROFIdrive V3.1, isochronous for electrical drives, e.g. IAC-R. No SINUMERIK Safety Integrated. 1) Not possible with NCU 720.2 PN/NCU 730.2 PN.		
SIMODRIVE 611 universal HRS	Operation in mixed mode with SINAMICS is not possible.	For further information, see the NC 60 Catalog.	
SIMODRIVE 611 universal E HRS via PROFIBUS	Operation in mixed mode with SINAMICS is not possible.	For further information, see the NC 60 Catalog.	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drives (continued)										
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○	○	○	○	○	○					
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–	–	○	○	○ 1)	○ 1)					
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–	–	●	●	–	–					

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Drives

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drives (continued)			
Synchronous motors			
• 1PH8	1) On request.		
• 1FT6	1) Not for new applications.		
• 1FT7	1) On request.		
• 1FK7			
• 1FN3			
• 1FN6			
• 1FW6			
• 1FE1			
• 2SP1			
Asynchronous motors			
• 1PH8	1) On request.		
• 1PH7			
• 1PH4			
• 1PH2			
SINAMICS S120 DRIVE-CLiQ on motor			
• Resolver			
• sin/cos 1 V_{pp} and EnDat			
Connectable measuring systems • Two measuring systems per axis			
• Absolute/incremental encoder installed in 1FT6/1FT7/1FK7/1PH7/1PH8	Integrated in motor via SINAMICS S120 Sensor Modules.		
• Resolver installed in 1FT6/1FK7/1PH7	Integrated in motor via SINAMICS S120 Sensor Modules.		
• Incremental rotary measuring systems with RS 422 (TTL)	Via SINAMICS S120 Sensor Modules SMC30. 1) For analog spindle, setpoint via MCPA. 2) For analog axes via ADI 4.		
• Linear scale LMS with sin/cos 1 V_{pp}	Via SINAMICS S120 Sensor Modules SMC20/SME20.		
• Rotary measuring systems with sin/cos 1 V_{pp}	Via SINAMICS S120 Sensor Modules SMC20/SME20.		
• Linear scale LMS with distance-coded reference marks	Via SINAMICS S120 Sensor Modules SMC20/SME20.		
• Rotary measuring systems with distance-coded reference marks	Via SINAMICS S120 Sensor Modules SMC20/SME20.		
• Linear scale LMS with EnDat 2.1	Via SINAMICS S120 Sensor Modules SMC20/SME25.		
• Rotary measuring systems with EnDat 2.1	Via SINAMICS S120 Sensor Modules SMC20/SME25.		
• Absolute encoder with SSI interface	For analog axes via ADI 4.		
• Resolver as external machine encoder	Via SINAMICS S120 Sensor Modules SMC10.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drives (continued)										
1)	1)	○	○	○	○					
○	○	○ 1)	○ 1)	○ 1)	○ 1)					
1)	1)	○	○	○	○					
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1)	1)	○	○	○	○					
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Drive functions

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drive functions			
Closed-loop control			
• Servo control			
• Vector control			
• Vector *V/f* control			
• Combination of servo/vector *V/f* on a Control Unit			
• Setting the pulse frequency grid in fine steps			
• Sine-wave filter			
• Units changeover US/SI			
• 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 asynchronous motors			
Modular machine concept (sub-topologies)			
• Parking axis/encoder			
Brakes			
• Braking signal, basic/extended			
• Armature short-circuit brake, internal/external			
• DC brake			
Voltage protection for 1FE1/2SP1 motors			
• Externally via VPM module	See Synchronous motors.		
• Internal Voltage Protection IVP in SINAMICS S120 Motor Module	See Synchronous motors.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drive functions										
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Drive functions

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Drive functions (continued)			
Full hub functionality DMC20 – Sensor Module Integrated with automatic commissioning behind hub module			
Motor/winding switchover	1) Not for Sensor Module Integrated.		
Suspended axis/electronic counterweight			
Dynamic energy management (DC link voltage management)			
Runtime meter			
I^2t monitoring for motors			
Changing reference parameters/scaling			
Automatic restart mechanism (servo/infeed)			
Technology function: friction characteristic curve			
Position tracking			
Drive Control Chart DCC			
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			
• Axes/spindles for current/speed controller cycle of 125 µs			
• Axis/spindles for current/speed controller cycle of 62.5 µs			
• Axes/spindles per NCU/NX for current/ speed controller cycle of 125 µs			
• Axes/spindles per NCU/NX for current/ speed controller cycle of 62.5 µs			
• Direct measuring systems per NCU/NX			
• Chassis Motor Modules			
Current/speed controller cycle			
• Minimum			
• Maximum			
PROFIBUS DP cycle (corresponds to FIPO cycle)			
• Minimum			
Maximum number			
• Measuring points per NCU/NX			
• Drive data sets			
• Motor data sets			
• Encoder data sets			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Drive functions (continued)										
–	–	●	●	●	●					
–	–	● 1)	● 1)	● 1)	● 1)					
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				31	31					
				11	11					
				6	6					
				2	2					
				3	3					
				2	2					
–	–			62.5 µs	62.5 µs					
–	–			250 µs	250 µs					
1.5 ms	1.5 ms			0.5 ms	0.5 ms					
				3	3					
				32	32					
				8	8					
				8	8					

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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Axis functions			
Traversing range ± 9 decades			
Rotary axis, continuous turning	1) With plus and pro versions.		
Velocity, max. 300 m/s (984 ft/s)			
Acceleration with jerk limitation			
Programmable acceleration			
Follow-up mode			
Measuring system 1 and 2, selectable			
Feedrate interpolation			
Separate path feed for corners and chamfers			
Travel to fixed stop	1) With plus and pro versions.		
Travel to fixed stop with Force Control		**6FC5800-0AM01-0YB0**	**M01**
Analog axis	With ADI 4.		
Setpoint exchange		**6FC5800-0AM05-0YB0**	**M05**
Tangential control		**6FC5800-0AM06-0YB0**	**M06**
Path switch signals/cam controller:	1) Path switch signals only.	**6FC5800-0AM07-0YB0**	**M07**
• Max. number of pairs			
Axis container	SW version 2.6 and higher within 31 axes.		
Advanced Position Control APC		**6FC5800-0AM13-0YB0**	**M13**
Spindle functions			
Analog spindle speed	1) With MCPA. 2) With ADI 4.		
Digital spindle speed			
Spindle speed, max. programmable value range: 10^6 ... 0.0001 (display: ±999999999.9999)			
5 gear stages			
Automatic gear stage selection			
Oriented spindle stop			
Spindle speed limitation (min./max.)			
Constant cutting rate			
Spindle control via PLC (positioning, oscillation)	1) With plus and pro versions.		
Changeover to axis mode	1) With plus and pro versions.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Axis functions										
●	●	●	●	●	●					
● 1)	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
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–	–	●	●	●	●					
●	●	●	●	●	●					
● 1)	●	●	●	●	●					
–	–	○	○	○	○					
–	–	●	●	●	●					
–	–	–	–	○	○					
–	–	○	○	○	○					
● 1)	● 1)	○	○	○	○					
8	8	16	16	16	16					
–	–	–	–	●	●					
–	–	–	–	○	○					
Spindle functions										
● 1)	● 1)	● 2)	● 2)	–	–					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
● 1)	●	●	●	●	●					
● 1)	●	●	●	●	●					

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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Spindle functions (continued)			
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			
Floating point accuracy (80 bit floating point accuracy)			
Linear interpolating axes	1) With value version: 3.		
• Maximum	1) With value version: 3.		
Circle via center point and end point			
Circle via interpolation point			
Helical interpolation	1) With value version: 2D+1.		
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	SW version 2.6 and higher in basic version.		
5-axis compressor	SW version 2.6 and higher in basic version.		
Spline interpolation (A, B and C splines)	SW version 2.6 and higher.	**6FC5800-0AS16-0YB0**	**S16**
Spline interpolation (A, B and C splines/compressor) for 3-axis machining	Up to SW version 2.5.	**6FC5800-0AM16-0YB0**	**M16**
Spline interpolation (A, B and C splines/compressor) for 5-axis machining	Up to SW version 2.5.	**6FC5800-0AM17-0YB0**	**M17**
Polynomial interpolation		**6FC5800-0AM18-0YB0**	**M18**
Involute interpolation		**6FC5800-0AM21-0YB0**	**M21**
Continue machining at the contour (retrace support)	Precondition: Loadable compile cycle and cross-mode actions M43.	**6FC5800-0AM24-0YB0**	**M24**
Crank interpolation CRIP	Precondition: Loadable compile cycle.	**6FC5800-0AN04-0YB0**	**–**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Spindle functions (continued)										
–	–	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
Interpolations										
●	●	●	●	●	●					
● 4[1]	● 4	● 4	● 4	● 4	● 4					
4[1]	4	4	12	4	12					
●	●	●	●	●	●					
●	●	●	●	●	●					
2D+2[1]	2D+2	2D+2	2D+6	2D+2	2D+6					
–	–	●	●	●	●					
–	–	●	●	●	●					
–	–	–	○	–	○					
–	–	○	○	○	○	○	○	–	–	–
●	–	–	–	●	●					
–	–	–	–	●	●					
●	–	○	○	○	○					
●	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	–	○	–	○	○	○	○	–	–

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Couplings

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Couplings			
Trailing axes TRAIL			
Synchronous spindle/multi-edge turning COUP		**6FC5800-0AM14-0YB0**	**M14**
Axial coupling in the machine coordinate system MCS coupling	Precondition: Loadable compile cycle.	**6FC5800-0AM23-0YB0**	**M23**
Master value coupling and curve table interpolation LEAD	1) With restricted functionality, see export versions.	**6FC5800-0AM20-0YB0**	**M20**
Electronic gear EG	1) With restricted functionality, see export versions.	**6FC5800-0AM22-0YB0**	**M22**
Pair of synchronized axes (gantry axes) Max. number		**6FC5800-0AM02-0YB0**	**M02**
Master/slave for drives		**6FC5800-0AM03-0YB0**	**M03**
Generic couplings CP 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		**6FC5800-0AM75-0YB0**	**M75**
Generic coupling Basic CP Basic • 4 axis pairs in simultaneous coupled motion and • 1 × synchronous spindle/multi-edge turning or master value coupling/curve table interpolation or axial coupling in the machine coordinate system	1) With restricted functionality, see export versions.	**6FC5800-0AM72-0YB0**	**M72**
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 and • 1 × electronic gear for 3 master axes (without curve table, without cascading)	1) With restricted functionality, see export versions.	**6FC5800-0AM73-0YB0**	**M73**
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 and • 8 × electronic gear for 3 master axes (with curve tables, with cascading) • 5 × electronic gear for 5 master axes (with curve tables, with cascading)	1) With restricted functionality, see export versions. 2) Precondition: NCU 720.2/NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN.	**6FC5800-0AM74-0YB0**	**M74**
AXCO compensation of a forced mechanical coupling	Precondition: Loadable compile cycle	**6FC5800-0AM81-0YB0**	–

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Couplings										
–	–	●	●	●	●					
–	–	○	○	○	○					
–	–	–	○	–	○					
–	–	○ 1)	○	○ 1)	○					
–	–	○ 1)	○	○ 1)	○					
○ 1	○ 1	○ 8	○ 8	○ 8	○ 8					
○	○	○	○	○	○					
–	–	●	●	●	●	●	●	●	–	–
–	–	○	○	○	○	○	○	○	–	–
–	–	○ 1)	○	○ 1)	○	○	○	○	–	–
–	–	○ 1)	○	○ 1)	○	○	○	○	–	–
–	–	○ 1)	○	○ 1)2)	○ 2)	○	○	○	–	–
–	–	–	○	–	○					

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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Transformations			
Cartesian point-to-point (PTP) travel			
TRANSMIT and peripheral surface transformation	1) With plus and pro versions.	**6FC5800-0AM27-0YB0**	**M27**
Inclined axis		**6FC5800-0AM28-0YB0**	**M28**
Concatenated transformations (inclined axis TRAANG after TRAORI/ cardan millhead/TRANSMIT/TRACYL)			
RCTRA transformation package for handling	Precondition: Loadable compile cycle.	**6FC5800-0AM31-0YB0**	**M31**
Generic transformation	Precondition: Machining package 5 axes or machining package milling.		
DOUBLETRANSMIT 2TRA transformation	Precondition: Loadable compile cycle.	**6FC5800-0AM25-0YB0**	**M25**
SCIS transformation for pantograph kinematics 2 axes	Precondition: Loadable compile cycle.	**6FC5800-0AM51-0YB0**	**–**
PARACOP 3-axis transformation for parallel kinematics (first channel)	Precondition: Loadable compile cycle.	**6FC5800-0AM44-0YB0**	**–**
Transformation TRIPOD HYBRID basis, 5 axes, THYK	Precondition: Loadable compile cycle.	**6FC5800-0AN36-0YB0**	**–**
Measuring functions/measuring cycles			
Measuring stage 1 2 probes (switching) with/without deletion of distance-to-go	See HMI software. 1) 1 probe. 2) With plus and pro versions only. 3) Precondition: MCI board extension.		
Measuring stage 2 Axial measuring, measuring from synchronized actions, cyclic measuring	1) Precondition: MCI board extension.	**6FC5800-0AM32-0YB0**	**M32**
Measuring cycles for drilling/milling and turning Calibrate workpiece probe, workpiece measurement, tool measurement	1) SW version 2.6 and higher.	**6FC5800-0AP28-0YB0**	**P28**
Measure kinematics (determine transformation data of rotary axis)		**6FC5800-0AP18-0YB0**	**P18**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Transformations										
–	●	●	●	●	●					
● 1)	–	○	○	○	○					
–	●	○	○	○	○					
–	–	●	●	●	●					
–	–	–	○	–	○					
–	–	–	●	–	●					
–	–	–	–	–	○					
–	–	–	–	–	○					
–	–	–	–	–	○					
–	–	–	○	–	○					
Measuring functions/measuring cycles										
● 1)2)	● 1)	● 3)	● 3)	●	●					
–	–	○ 1)	○ 1)	○	○					
–	–	○	○	○	○	○ 1)	○	○	○	○
–	–	○	○	○	○	○	○	○	○	○

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Technologies

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Technologies			
Punching/nibbling		**6FC5800-0AM33-0YB0**	**M33**
Oscillation functions block-related, modal and asynchronous		**6FC5800-0AM34-0YB0**	**M34**
More than one feed in block, e. g. for calipers			
Handwheel override			
Contour handwheel		**6FC5800-0AM08-0YB0**	**M08**
Electronic transfer Contains the option: Master value coupling LEAD	1) With restricted functionality, see export versions.	**6FC5800-0AM35-0YB0**	**M35**
Electronic transfer CP Contains the option: CP Comfort	1) With restricted functionality, see export versions.	**6FC5800-0AM76-0YB0**	**M76**
Machining package 5 axes Contains the option: Multi-axis interpolation		**6FC5800-0AM30-0YB0**	**M30**
Machining package milling Contains the options: Machining package 5 axes incl. multi-axis interpolation, spline interpolation (A, B and C splines/compressor for 5-axis machining and 3D tool radius compensation)		**6FC5800-0AM26-0YB0**	**M26**
Machining package 5 axes additional function 7th axis		**6FC5800-0AS01-0YB0**	**S01**
Technology package milling 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 surfaces transformation, measuring cycles, additional HMI memory on CF card	1) SW version 2.6 and higher.	**6FC5800-0AS32-0YB0**	**S32**
Technology package milling SINUMERIK MDynamics 5 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 surfaces transformation, measuring cycles, additional HMI user memory on CF card, machining package 5 axes, 3D tool radius compensation, measure kinematics	1) SW version 2.6 and higher.	**6FC5800-0AS33-0YB0**	**S33**
Handling package[1)] Contains the options: 3 additional axes, 3 additional channels, transformation package handling[2)], synchronous actions level 2	1) SW version 2.6 and higher. Tool offsets and spindles are not possible. 2) Precondition: Loadable compile cycle.	**6FC5800-0AS31-0YB0**	**S31**
Velocity adaptation VADA	Precondition: Loadable compile cycle.	**6FC5800-0AN05-0YB0**	**–**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
										Technologies
–	●	○	○	○	○					
–	●	○	○	○	○					
–	●	●	●	●	●					
–	●	●	●	●	●					
–	–	○	○	○	○					
–	–	○ 1)	○	○ 1)	○					
–	–	○ 1)	○	○ 1)	○					
–	–	–	○	–	○					
–	–	–	○	–	○					
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–	–	–	–	–	○ 1)	○	–	–	–	–
–	–	–	○	–	○			–	–	–
–	–	–	○	–	○					

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Motion-synchronous actions

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Motion-synchronous actions			
High-speed CNC inputs/outputs			
• Digital inputs on-board	1) Precondition: MCPA. 2) Precondition: MCI board extension.		
• Digital inputs or outputs on-board	1) Precondition: MCPA. 2) Precondition: MCI board extension.		
• 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 versions.		
Synchronized actions stage 2	1) With restricted functionality, see export versions.	**6FC5800-0AM36-0YB0**	**M36**
Positioning axes and spindles via synchronized actions (command axes)			
Analog value control in interpolation cycle (IPO cycle) (precondition: analog output)	1) Precondition: SIMATIC DP ET 200 analog module.		
Analog output, path-velocity-dependent Laser power control	1) Precondition: SIMATIC DP ET 200 analog module.	**6FC5800-0AM37-0YB0**	**M37**
Laser switching signal, high-speed, HSLC	Precondition: Loadable compile cycle.	**6FC5800-0AM38-0YB0**	**M38**
Clearance control:			
• 1D in interpolation cycle via synchronized actions			
• Clearance control 1D/3D in position control cycle CLC including in the interpolation cycle	Precondition: Loadable compile cycle 1) With restricted functionality, see export versions.	**6FC5800-0AM40-0YB0**	**M40**
• 1D/3D clearance control in position control cycle, free direction	Precondition: 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 subroutines ASUB:	High-speed CNC inputs/outputs required.		
• Interrupt routines with fast retraction from the contour		**6FC5800-0AM42-0YB0**	**M42**
Cross-mode actions (ASUBs and synchronized actions in all operating modes)		**6FC5800-0AM43-0YB0**	**M43**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Motion-synchronous actions										
8 1)	8 1)	4 2)	4 2)	4	4					
8 1)	8 1)	4 2)	4 2)	4	4					
–	–	○	○	○	○					
–	–	● 1)	●	● 1)	●					
–	–	○ 1)	○	○ 1)	○					
–	–	●	●	●	●					
–	–	● 1)	● 1)	●	●					
–	–	○ 1)	○ 1)	○	○					
–	–	○	○	○	○					
–	–	●	●	●	●					
–	–	○ 1)	○	○ 1)	○					
–	–	○	○	○	○					
–	–	–	–	○	○					
–	●	●	●	●	●					
–	–	●	●	●	●					
–	–	○	○	○	○					
–	–	○	○	○	○					

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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Open Architecture			
User interface expansion • Free screens			
SINUMERIK HMI programming package (OEM contract required)	See HMI software for CNC controls. 1) Precondition: PCU 50.3.	**6FC5253-0BX20-0AG0** **6FC5253-. BX20-. AG0** **6FC5253-0BX20-0AG1** **6FC5253-0BX20-0AG2** **6FC5253-. BX20-. AG3**	
SINUMERIK HMI configuring package WinCC flexible 2008 (OEM contract required)	See HMI software for CNC controls. 1) Precondition: PCU 50.3.	**6FC5253-0CX25-0AG0** **6FC5253-. CX25-. AG0** **6FC5253-0CX25-0AG1** **6FC5253-0CX25-0AG2** **6FC5253-. CX25-. AG3**	
SINUMERIK HMI copy license OA and Expand User Interface from the 21st screen		**6FC5800-0AP02-0YB0**	**P02**
SINUMERIK Operate programming package (OEM contract required)	See HMI software for CNC controls.	**6FC5861-1YC00-0YA0** **6FC5861-1YC..-.YA0** **6FC5861-1YP00-0YB0** **6FC5861-1YP00-0YL8** **6FC5861-1YC..-.YA8**	
SINUMERIK HMI copy license CE		**6FC5800-0AP03-0YB0**	**P03**
SINUMERIK Operate runtime license OA Programming		**6FC5800-0AP60-0YB0**	**P60**
SINUMERIK Operate runtime license OA Easy Screen		**6FC5800-0AP64-0YB0**	**P64**
OA package NCK (OEM contract required)	See Basic components.		
SINUMERIK NCK Runtime OA	See Basic components. 1) On request.	**6FC5800-0AM04-0YB0**	**M04**
CNC programming language			
Programming language (DIN 66025 and high-level language expansion)			
Main program call from main program and subroutine			
Subroutine levels/interrupt routines, max.	1) SW version 1.5/2.5 and higher.		
Number of subroutine passes ≤ 9999			
Number of levels for skip blocks (/0 to /...)			
Polar coordinates			
1/2/3-point contours	1) With value version.		
Dimensions metric/inch, changeover manually or via program			
Inverse time feedrate			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Open Architecture										
–	–	◇	◇	◇	◇	–	● 20	● 20	● 20	● 20
–	–	○	○	○ 1)	○ 1)	–	○	–	–	–
–	–	○	○	○ 1)	○ 1)	–	○	–	–	–
–	–	○	○	○	○	–	○	○	○	○
–	–	–	–	○	○	○	–	–	–	–
–	–	○	○	○	○					
–	–	–	–	○	○	○	–	–	–	–
–	–	–	–	○	○	○	–	–	–	–
–	–	–	–	–	○					
–	–	–	○ 1)	–	○					
CNC programming language										
●	●	●	●	●	●					
●	●	●	●	●	●					
8/0	8/0	11/4	11/4	16/2 1)	16/2 1)					
●	●	●	●	●	●					
1	1	8	8	8	8					
●	●	●	●	●	●					
● 1)	–	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					

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CNC programming language

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
CNC programming language (continued)			
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: ± 999999999.9999) INT -2^{31}... 2^{31} -1	1) With plus and pro versions.		
High-level CNC language with:			
• User variables, configurable			
• Predefined user variables (arithmetic parameters)			
• Predefined user variables (arithmetic parameters), configurable			
• Read/write system variables	1) Restricted scope.		
• Indirect programming			
• Program jumps and branches			
• Program coordination with WAIT, START, INIT			
• Arithmetic and trigonometric functions			
• Compare operations and logic operations			
• Macro technique			
• Control structures IF-ELSE-ENDIF			
• Control structures WHILE, FOR, REPEAT, LOOP			
• Commands to HMI			
• STRING functions			
Program functions:			
• Dynamic preprocessing memory (FIFO)			
• Look ahead			
• Frame concept			
• Inclined-surface machining with frames			
• Axis/spindle replacement			
• Geometry axes, switchable online in the CNC program			
• Program preprocessing	1) SW version 1.5/2.5 and higher in basic version.	**6FC5800-0AM00-0YB0**	**M00**
Online ISO dialect interpreter			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
CNC programming language (continued)										
●	●	●	●	●	●					
● 1)	●	●	●	●	●					
–	–	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
● 1)	● 1)	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
–	–	◆	◆	◇	◇	–	●	●	●	●
–	–	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
–	–	●	●	●	●					
–	–	●	●	●	●					
–	–	○	○	○ 1)	○ 1)					
●	–	●	●	●	●					

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CNC programming language

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
CNC programming language (continued)			
Program/workpiece management:			
• Part programs on NCU, max. number	In total max. 512 files per directory.		
• Workpieces on NCU, max. number	In total max. 256 directories.		
• Workpieces on hard disk, max. number	In total max. 100000 user files.		
• 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	1) On the front. 2) With PCU 50.3.		
• On integral hard disk of PCU 50.3			
• On USB storage medium, e. g. floppy disk drive, memory stick			
• On network drive	1) With pro version. 2) Precondition: Managing of network drives. 3) SW version 2.6 and higher in basic version.		
• Templates for workpieces, programs and INI files			
• Job lists			
Number of basic frames, max.			
Number of settable offsets, max.			
Zero/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	1) With PCU 50.3.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
CNC programming language (continued)										
99	99	500	500	500	500					
–	–	250	250	250	250	250	250	250	250	250
–	–	1000	1000	○	○	100000	1000		1000	1000
–	–	–	–	○	○					
● 1)	● 1)	◆ 2)	◆ 2)	◆ 2)	◆ 2)					
–	–	●	●	◇	◇	–	●	–	●	●
–	–	○	○	○	○	●	●	●	●	●
● 1)	● 1)	◇	◇	● 3)	● 3)	○ 2)	○ 2)	○ 2)	○ 2)	○ 2)
–	–	◆	◆	◇	◇	–	●	–	–	–
–	–	◆	◆	◇	◇	–	●	–	–	–
1	1	◆	◆	16	16	16	16	16	1	1
6	6	◆	◆	100	100	100	100	100	100	100
–	–	●	●	●	●					
●	●	◆	◆	◇	◇	–	●	●	●	●
–	–	●	●	●	●	●	●	●	●	●
–	–	◆	◆	●	●	●	●	●	●	●
–	–	◆	◆	●	●	●	●	●	●	●
–	–	◆	◆	◇	◇	●	●	–	● 1)	● 1)

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Programming support

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code
Programming support			
Program editor:			
• Text editor with editing functions: Marking, copying, deleting			
• Dual editor			
• Write protection for lines			
• Suppression of lines in the display			
• Machining step programming		**6FC5800-0AP04-0YB0**	**P04**
Multiple clamping of various workpieces	1) Precondition: P04	**6FC5800-0AP14-0YB0**	**P14**
ShopMill/ShopTurn			
• Machining step programming		**6FC5800-0AP17-0YB0**	**P17**
Programming support for geometry entries:			
• ProgramGUIDE (programming support for cycles, dynamic programming graphics, animated elements)	1) SW version 2.5 and higher.		
Geometry processor with programming graphics/ Free contour input (contour calculator)	1) With plus and pro versions.		
• Screens for 1/2/3-point contours (contour definition programming)			
Programming support for cycles:			
• Screens and stationary auxiliary displays	1) On request.		
• Dynamic programming graphics during programming			
• Programming support is expandable, e. g. customer cycles	1) On request. 2) With Expand User Interface, see HMI/MMC Commissioning Manual. 3) With SINUMERIK Operate runtime license OA Easy Screen.		
Process-oriented cycles for drilling/milling and turning	1) SW version 2.5 and higher.		
Pocket milling with free contour definition and islands			
Residual material detection and machining for contour pockets and cutting	1) Precondition: Machining step programming. 2) SW version 2.6 and higher.	**6FC5800-0AP13-0YB0**	**P13**
Access protection for cycles			
Cycle protection (OEM)	1) SW version 2.6 and higher.	**6FC5800-0AP54-0YB0**	**P54**
Programming and operator support for machines:			
• ShopTurn HMI			
• Manual machine (ShopTurn manual)		**6FC5800-0AP11-0YB0**	**P11**
• ShopMill HMI			
• ShopTurn HMI/ShopMill HMI for SINUMERIK 840Di sl incl. HMI-Advanced	1) Up to SW version 1.4.	**6FC5800-0AP15-0YB0**	**–**
CAD Reader for PC	See HMI software for CNC controls.	**6FC5260-0AY00-0AG1** **6FC5260-0AY00-0AG0** **6FC5260-.AY00-.AG0** **6FC5260-0AY00-0AG2** **6FC5260-.AY00-.AG8**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Programming support										
●	●	●	●	◇	◇	●	●	●	●	●
–	–	◆	◆	◇	◇	–	●	●	–	–
–	–	◆	◆	◇	◇	●	●	●	●	●
–	–	◆	◆	◇	◇	●	●	●	●	●
–	–	◇	◇	◇	◇	–	–	–	○	○
–	–	◇	◇	◇	◇	–	–	–	○ 1)	–
–	–	◇	◇	◇	◇	○	–	–	–	–
–	–	◆	◆	◇	◇	● 1)	–	–	–	–
● 1)	●	◆	◆	◇	◇	–	●	●	●	●
●	●	◆	◆	◇	◇	–	●	●	●	●
1)	1)	◆	◆	◇	◇	–	●	●	●	●
–	–	◇	◇	◇	◇	–	–	–	●	●
1)	1)	◆	◆	◇	◇	● 3)	● 2)	● 2)	● 2)	● 2)
●	–	◆	◆	◇	◇	● 1)	●	●	●	●
–	–	◆	◆	◇	◇	–	–	–	●	●
–	–	◇	◇	◇	◇	○ 2)	–	–	○ 1)	○ 1)
●	●	●	●	●	●	●	●	●	●	●
–	–	○	○	○ 1)	○ 1)	○	○	–	–	–
–	–	◇	◇	◇	◇	–	–	–	–	●
–	–	◇	◇	◇	◇	–	–	–	–	○
–	–	◇	◇	◇	◇	–	–	–	●	–
–	–	○ 1)	○ 1)	–	–					
–	–	○	○	○	○					

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Simulation

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code
Simulation			
Up to *n* channels can be simulated sequentially			
Several channels and programs can machine the same blank part in succession			
Simulation of program X, while program Y is being executed			
Quick view for mold-making programs	1) With PCU 50.3.		
Drilling/milling (tool carrier vertical to the workpiece):			
• Single-sided 2D view, dynamic			
• Simulation of milling multiple sides 2D dynamic, 3D static		**6FC5800-0AP21-0YB0**	**P21**
• ShopMill simultaneous recording Real-time simulation of current machining operation		**6FC5800-0AP23-0YB0**	**P23**
Turning (tool carrier vertical to the workpiece):			
• Traverse path simulation without model, broken-line graphics			
• Contour of blank part can be specified			
• Simulation in working plane G18			
• Simulation in working planes G17/G19			
• Full cut/partial cut with circumferential edges, front face and peripheral surfaces, milling and drilling operations			
• Counterspindle			
• 3D simulation of the finished part		**6FC5800-0AP20-0YB0**	**P20**
• ShopTurn simultaneous recording Real-time simulation of current machining operation		**6FC5800-0AP24-0YB0**	**P24**
Drilling/milling/turning (tool carrier vertical to the workpiece):			
• 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**
Grinding and nibbling: • Traverse path simulation without model (broken-line graphics)			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Simulation										
–	–	2	2	10	10	1	10	1	1	1
–	–	◆	◆	◇	◇	–	●	–	–	–
–	–	◆	◆	◇	◇	–	●	–	–	–
–	–	◇	◇	◇	◇	–	●	–	● 1)	–
●	–	–	–	–	–	–	–	–	–	–
–	–	◆	◆	◇	◇	–	●	○	●	–
–	–	◇	◇	◇	◇	–	–	–	○	–
●	–	◆	◆	◇	◇	–	●	●	–	–
–	–	◆	◆	◇	◇	–	●	–	–	●
–	–	◆	◆	◇	◇	–	●	●	–	●
–	–	◆	◆	◇	◇	–	●	–	–	●
–	–	◆	◆	◇	◇	–	●	–	–	●
–	–	◆	◆	◇	◇	–	●	–	–	●
–	–	◇	◇	◇	◇	–	–	–	–	○
–	–	◇	◇	◇	◇	–	–	–	–	○
–	–	◆	◆	◇	◇	○	–	–	–	–
–	–	◆	◆	◇	◇	●	–	–	–	–
–	–	◆	◆	◇	◇	○	–	–	–	–
–	●	–	–	–	–					

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Operating modes

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. / Type (for complete Order No., see notes)	Order code
Operating modes			
JOG:			
• Handwheel selection			
• Switchover: inch/metric			
• Manual measurement of zero/work offset			
• Manual measurement of tool offset			
• Automatic tool/workpiece measurement	1) Tool measuring only.		
• Dressing grinding wheels			
• Reference point approach automatic/via CNC program			
MDA:			
• Input in text editor			
• Save MDA program			
• Input screen forms for technology and positioning, cycle support			
Teach-in:			
• Teach positions in MDA buffer			
• Teach-in function handling			
Automatic:			
• Execution from storage medium on rear USB interface of TCU/PCU, e.g. card reader, memory stick			
• Execution of HMI memory on NCU's CF card	1) External CF card on the front. 2) On external CF card in PCU 50.3. 3) On CF card of NCU, not with HMI on PCU 50.3.	**6FC5800-0AP12-0YB0**	**P12**
• Execution from network drive	1) With pro version. 2) Precondition: Managing of network drives. 3) SW version 2.6 and higher.	**6FC5800-0AP01-0YB0**	**P01**
• Execution from hard disk	1) On PCU 50.3.		
• Program control			
• Program editing			
• Overstoring			
• DRF offset			
• Block search with/without calculation			
Repos (repositioning on the contour)			
• With operator command/semi-automatically			
• Program-controlled			
Preset			
Set actual value			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operating modes										
●	●	●	●	●	●	●	●	●		
●	●	◆	◆	●	●	●	●	●	–	–
●	●	◆	◆	●	●	●	●	●	●	●
●	–	◆	◆	◇	◇	●	●	●	●	●
●	–	◇	◇	◇	◇	●	–	–	●	●
● 1)	–	◆	◆	◆	◆	●	○	–	●	● 1)
–	●	–	–	–	–	–	–	–	–	–
●	●	●	●	●	●	●	●	●	●	●
●	●	◆	◆	●	●	●	●	●		
●	●	◆	◆	●	●	●	●	●	●	●
●	●	◆	◆	●	●	●	●	●	–	–
–	–	◆	◆	●	●	–	–	–	●	●
●	–	◆	◆	●	●	●	●	●	–	–
●	–	◆	◆	●	●	●	●	●	–	–
–	–	–	–	●	●	●	●	●	–	–
●	●	●	●	●	●	●	●	●	●	●
–	–	◆	◆	●	●	●	●	●	●	●
● 1)	● 1)	● 2)	● 2)	○ 3)	○ 3)	○ 3)	–	○	○ 3)	○ 3)
● 1)2)	● 1)2)	◆	◆	● 2)3)	● 2)3)	● 3)	○ 2)	○ 2)	○	○
–	–	◆	◆	◇	◇	● 1)	●	–	● 1)	● 1)
●	●	◆	◆	●	●	●	●	●	●	●
●	●	◆	◆	●	●	●	●	●	●	●
–	–	◆	◆	●	●	–	●	●	●	●
–	–	◆	◆	●	●	●	●	●	●	●
●	●	◆	◆	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●
–	–	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●
●	●	◆	◆	●	●	–	●	●	●	●
–	–	◆	◆	●	●	–	●	●	●	●

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Tools

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Tools			
Tool types:			
• Turning			
• Drilling/milling			
• Grinding			
• Nibbling			
• Groove sawing			
Tool radius compensations in plane:			
• With approach and retract strategies			
• With transition circle/ellipse on outer edges			
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-specific tool offset with grinding wheel surface speed			
Tool orientation interpolation	Precondition: Machining package 5 axes.		
Online tool length compensation			
Operation without tool 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	1) With value version: 32. With plus version: 64.		
Operation with tool management, up to 3 tool magazines (corresponding to one real magazine)	1) SW version 1.5/2.5 and higher.		
Operation with tool management with more than 3 magazines	1) SW version 1.5/2.5 and higher.	**6FC5800-0AM88-0YB0**	**M88**
• System displays in standard software			
• User-friendly commissioning via system displays	1) Precondition: PCU 50.3.		
• Tool list			
• Configurable tool lists	1) One configured list is possible.		
• Number of tools/cutting edges in tool list			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Tools										
●	–	◆	◆	●	●	●	●	●	–	●
●	–	◆	◆	●	●	●	●	●	●	●
–	●	◆	◆	●	●	–	●	●	–	–
–	●	◆	◆	●	●	–	●	●	–	–
–	–	◆	◆	●	●	–	●	●	–	–
–	–	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
–	–	○	○	○	○	○	○	○	○	–
●	●	●	●	●	●	●	●	●	●	●
–	–	●	●	●	●	●	●	●	●	–
●	●	●	●	●	●					
–	●	●	●	●	●	●	●	●	–	–
–	–	–	●	–	●					
–	–	–	–	●	●					
●	●	◆	◆	●	●	●	●	●	–	–
–	–	◆	◆	●	●	–	●	●	–	–
●	●	◆	◆	●	●	●	●	●	–	–
●	●	●	●	●	●	●	●	●	–	–
128 1)	128 1)	◆ 600/ 1500	◆ 600/ 1500	600/ 1500	600/ 1500				–	–
–	–	–	–	● 1)	● 1)					
–	–	–	–	○ 1)	○ 1)					
–	–	–	–	●	●	●	●	●	●	●
–	–	–	–	◆	◆	●	●	–	● 1)	● 1)
–	–	–	–	●	●	●	●	●	●	●
–	–	–	–	●	●	● 1)	●	–	● 1)	● 1)
–	–	◆ 600/ 1500	◆ 600/ 1500	600/ 1500	600/ 1500					

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Tools

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Tools (continued)			
Operation with tool management with more than 3 magazines (continued)			
• Unambiguous D number structure			
• Tool offset selection via T and D numbers			
• Editing of tool data			
• Editing of OA data	1) In configured list.		
• Magazine list			
• Configurable magazine list			
• Max. number of magazines			
• Magazine data			
• Vacant position search and positioning			
• Easy vacant position search using softkeys			
• Loading and unloading of tools			
• More than one loading and unloading point per magazine			
• Tool cabinet and tool catalog			
• Loading and unloading via code carrier system			
• Adapter data			
• Local compensations			
• Monitoring of tool life and workpiece count			
Operation with tool management:	1) Up to SW version 1.4. 2) Up to SW version 1.4./2.4	**6FC5800-0AM50-0YB0**	**M50**
• System displays in standard software			
• Comfortable commissioning via system displays	1) Precondition: PCU 50.3.		
• Tool list			
• Configurable tool lists	1) One configured list is possible.		
• Number of tools/cutting edges in tool list			
• Unambiguous D number structure			
• Tool offset selection via T and D numbers			
• Editing of tool data			
• Editing of OA data	1) In configured list.		
• Magazine list			
• Configurable magazine list			
• More than one magazine is possible			
• Magazine data			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Tools (continued)										
–	–	◆	◆	◆	◆	●	●	–	–	–
–	–	●	●	●	●					
–	–	◆	◆	●	●					
–	–	◆	◆	●	●	●	●	●	● 1)	● 1)
–	–	◆	◆	●	●	●	●	●	●	●
–	–	◆	◆	●	●	●	●	–	–	–
–	–	32	32	32	32					
–	–	◆	◆	●	●	●	●	○	●	●
–	–	◆	◆	●	●	●	●	○	●	●
–	–	◆	◆	●	●	●	●	–	–	–
–	–	◆	◆	●	●	●	●	○	●	●
–	–	◆	◆	●	●	●	●	–	–	–
–	–	◆	◆	●	●	–	●	–	–	–
–	–	◆	◆	●	●	–	●	–	–	–
–	–	◆	◆	●	●	–	●	–	–	–
–	–	◆	◆	●	●	–	●	–	–	–
●	●	◆	◆	●	●	●	●	●	●	●
–	–	◆ 1)	◆ 1)	○ 2)	○ 2)	○	○	○	●	●
–	–	◆	◆	○	○	○	○	○	●	●
–	–	◆	◆	○	○	–	○	–	● 1)	● 1)
–	–	○	○	○	○	○	○	○	●	●
–	–	○	○	○	○	○ 1)	○	–	● 1)	● 1)
–	–	◆ 600/ 1500	◆ 600/ 1500	600/ 1500	600/ 1500					
–	–	◆	◆	○	○	–	○	–	–	–
–	–	●	●	●	●	○	○	○	●	●
–	–	◆	◆	○	○	○	○	○	●	●
–	–	◆	◆	○	○	○	○	○	● 1)	● 1)
–	–	◆	◆	○	○	○	○	○	●	●
–	–	◆	◆	○	○	○	○	–	–	–
–	–	32	32	32	32	32	32	32	32	32
–	–	◆	◆	○	○	○	○	○	●	●

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Tools

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Tools (continued)			
Operation with tool management (continued):			
• Vacant position search and positioning			
• Easy vacant position search using softkeys			
• Loading and unloading of tools			
• More than one loading and unloading point per magazine			
• Tool cabinet and tool catalog			
• Loading and unloading via code carrier system			
• Adapter data			
• Local compensations			
• Monitoring of tool life and workpiece count			
TDI – Tool management functions for individual machines and networked machines:	See HMI software for CNC controls – MCIS software. 1) On PCU 50.3.		
• TDI IFC Tool management, version with network capability	On request. 1) On PCU 50.3.		
• TDI Overview Overview of actual tool data, local version	1) On PCU 50.3.	**6FC5800-0AP34-0YB0** **6FC6000-2EC00-0AA8** **6FC6000-2EC0. - . AA8**	**P34**
• TDI Toolhandling Tool handling, local version	1) On PCU 50.3.	**6FC5800-0AP35-0YB0** **6FC6000-2FC00-0AA8** **6FC6000-2FC0. - . AA8**	**P35**
• TDI Planning Tool planning, local version	1) On PCU 50.3.	**6FC5800-0AP36-0YB0** **6FC6000-2GC00-0AA8** **6FC6000-2GC0. - . AA8**	**P36**
• TDI Statistic Tool statistics, local version	1) On PCU 50.3.	**6FC5800-0AP51-0YB0** **6FC6000-2KC00-0AA8** **6FC6000-2KC0. - . AA8**	**P51**
• TDI Cell		**6FC6000-2BF00-0AB0** **6FC6000-2BC00-0AA0** **6FC6000-2BC0. - . AA0**	
• TDI Machine Tool management, local version	1) On PCU 50.3.	**6FC5800-0AP37-0YB0** **6FC6000-2AC00-0AA8** **6FC6000-2AC0. - . AA8**	**P37**
• TDI Toolplan Generation Tool plan generation, local version	1) On PCU 50.3.	**6FC5800-0AP38-0YB0** **6FC6000-2JC00-0AA8** **6FC6000-2JC0. - . AA8**	**P38**
• TDI Ident Connection Interfacing of tool identification systems	1) On PCU 50.3.	**6FC6000-2HF00-0AB0** **6FC6000-2HC00-0AA0** **6FC6000-2HC0. - . AA0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Tools (continued)										
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Communication/data management

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Communication/data management			
HMI user memory, additional on CF card of NCU	See Basic components. 1) On external CF card on the front. 2) On external CF card in PCU 50.3. 3) On CF card of NCU, not with HMI on PCU 50.3.	**6FC5800-0AP12-0YB0**	**P12**
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.		
Data on storage medium on front USB interface of operator panel, e. g. memory stick	1) One is possible per operator panel.		
Additional network drive management:			
• Via Ethernet, max. 4	1) With pro version. 2) SW version 2.6 and higher.	**6FC5800-0AP01-0YB0**	**P01**
• Via USB			
• Via CF card of the PCU			
Serial interface RS 232 C	1) On PCU 50.3.		
I/O interfacing via PROFIBUS DP			
Axis data output via PROFIBUS ADAS	Precondition: Loadable compile cycle.	**6FC5800-0AN07-0YB0**	**N07**
Data backup on hard disk	1) On PCU 50.3.		
Data backup with Ghost (Backup/Restore) on hard disk/network	1) On PCU 50.3.		
Data backup for NCU CF card (Backup/Restore) on memory stick or via network	1) With pro version.		
DNC – Direct Numeric Control:	See HMI software for CNC controls – MCIS software.		
• DNC Machine CNC program transfer	1) On PCU 50.3.	**6FC5800-0AP40-0YB0** **6FC6000-0AC00-0AA8** **6FC6000-0AC0.-.AA8** **6FC6000-0AC0.-.AE0** **6FC6000-0AC00-0AT7** **6FC6000-0AC0.-.AT7**	**P40**
• DNC Cell CNC program management		**6FC6000-0BF00-0AB0** **6FC6000-0BC00-0AA0** **6FC6000-0BC0.-.AA0** **6FC6000-0BC0.-.AE0**	
• DNC Plant CNC program management		**6FC6000-0CF00-0AB0** **6FC6000-0CC00-0AA0** **6FC6000-0CC0.-.AA0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Communication/data management										
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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Communication/data management (continued)			
DNC – Direct Numeric Control (continued):	See HMI software for CNC controls – MCIS software.		
• DNC HMI Additional PC user interface		**6FC6000-0DF00-0AB0**	
• DNC IFC SINUMERIK CNC program transfer via network on the control	1) On PCU 50.3.	**6FC5800-0AP41-0YB0**	**P41**
• DNC IFC Serial Connection for serial CNC	1) On PCU 50.3.	**6FC6000-0FF00-0AB0**	
• DNC IFC Dialog Option for serial CNC	1) On PCU 50.3.	**6FC6000-0GF00-0AB0**	
• DNC IFC Filesystem Connection for network-capable CNC machines	1) On PCU 50.3.	**6FC6000-0KF00-0AB0**	
• DNC Compare CNC program comparison	1) On PCU 50.3.	**6FC6000-0HF00-0AB0**	
RPC SINUMERIK:	See HMI software for CNC controls – MCIS software.		
• RPC SINUMERIK Data exchange between CNC and host computer (computer link)	1) On PCU 50.3.	**6FC5800-0AP50-0YB0** **6FC6000-7AC00-0AA8** **6FC6000-7AC0. - . AA8** **6FC6000-7AC0. - . AE0**	**P50**
ADDM – Automation Data Management:	See HMI software for CNC controls – MCIS software.		
• ADDM – Data Management Data management system	Precondition: SIMATIC STEP 7	**6BQ3030-1AA00-3AD0** **6BQ3030-1AA10-0AD0** **6BQ3030-1AA20-1AC0** **6BQ3030-1AA30-3AD0** **6BQ3030-1AA70-3AD0**	
• ADDM Agent Client for data backup	1) On PCU 50.3.	**6FC5800-0AP48-0YB0**	**P48**
Production data evaluation			
MDA – Machine Data Acquisition (machine and production data acquisition):	See HMI software for CNC controls – MCIS software.		
• MDA Cell Machine and production data management		**6FC6000-3BF00-0AB0** **6FC6000-3BC00-0AA0** **6FC6000-3BC0. - . AA0** **6FC6000-3BC0. - . AE0**	
• MDA IFC (interface client) Production data acquisition for network-capable controls	1) On PCU 50.3.	**6FC5800-0AP43-0YB0**	**P43**
• MDA Machine Production data acquisition, local version	1) On PCU 50.3.	**6FC5800-0AP42-0YB0** **6FC6000-3AC00-0AA8** **6FC6000-3AC0. - . AA8** **6FC6000-3AC0. - . AE0** **6FC6000-3AC00-0AT7** **6FC6000-3AC0. - . AT7**	**P42**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Communication/data management (continued)										
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Production data evaluation										
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Operation

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Operation			
Operator panels:			
• SINUMERIK 802D sl, 10.4" color			
Operator panel fronts:			
• OP 015, 15" color		**6FC5203-0AF03-0AA0**	
• OP 015A, 15" color		**6FC5203-0AF05-0AB0**	
• TP 015A, 15" color, touch		**6FC5203-0AF08-0AB2**	
• OP 012, 12.1" color		**6FC5203-0AF02-0AA1**	
• OP 010, 10.4" color		**6FC5203-0AF00-0AA1**	
• OP 010C, 10.4" color		**6FC5203-0AF01-0AA0**	
• OP 010S, 10.4" color		**6FC5203-0AF04-0AA0**	
Thin Client Unit for operator panel fronts:			
• TCU		**6FC5312-0DA00-0AA1**	
Operator panel fronts with integrated TCU:			
• OP 08T, 8" color		**6FC5203-0AF04-1BA0**	
• OP 015AT, 15" color		**6FC5203-0AF05-1AB0**	
• 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**	
Industrial PC for operator panel fronts:			
• PCU 50.3-C 1.5 GHz/512 MB, Windows XP ProEmbSys		**6FC5210-0DF31-2AA0**	
• PCU 50.3-P 2.0 GHz/1 GB, Windows XP ProEmbSys		**6FC5210-0DF33-2AA0**	
• Memory expansion 512 MB for PCU 50.3		**6ES7648-2AG30-0GA0**	
• Memory expansion 1 GB for PCU 50.3		**6ES7648-2AG40-0GA0**	
Mounting hardware for PCU/TCU:			
• Mounting bracket for PCU/TCU behind operator panel front		**6FC5248-0AF20-2AA0**	
• Upright mounting bracket for PCU in control cabinet		**6FC5248-0AF20-1AA0**	
• Flat mounting bracket for PCU in control cabinet		**6FC5248-0AF20-0AA0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation										
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Operation

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Operation (continued)			
Software for:	See HMI software for CNC controls.		
• SINUMERIK PCU 50.3 for machine operation with SINUMERIK Operate	HMI software for PC/PG can be ordered separately. See Operator components for CNC controls.	**6FC5860-1YF00-0YA0** **6FC5860-1YF2.-.YA0** **6FC5860-1YC00-0YA0** **6FC5860-1YC2.-.YA0** **6FC5860-1YC2.-.YA8** **6FC5860-1YP00-0YL8**	
• PC for machine operation with SINUMERIK Operate		**6FC5860-2YC00-0YA0** **6FC5860-2YC2.-.YA0** **6FC5860-2YC2.-.YA8** **6FC5860-2YF00-0YB0** **6FC5860-2YP00-0YL8**	
• SINUMERIK PCU 50.3 for machine operation with HMI Startup			
• SINUMERIK PCU 50.3 for machine operation with HMI-Advanced	HMI software for PC/PG can be ordered separately. See Operator components for CNC controls. 1) SW version 1.4 SP1 and higher incl. ShopMill HMI/ShopTurn HMI.	**6FC5253-7BX10-.AF0** **6FC5253-0BX10-0AF0** **6FC5253-7BX10-.AG0** **6FC5253-0BX10-0AG1** **6FC5253-0BX10-0AG2** **6FC5253-7BX10-.AG3**	
• PC for machine operation with HMI-Advanced	See HMI software for CNC controls.	**6FC5253-7BX40-.AG0** **6FC5253-0BX40-0AG1** **6FC5253-0BX40-0AG2** **6FC5253-7BX40-.AG3**	
• SINUMERIK PCU 50.3 for machine operation with ShopMill HMI	Only data carrier without license required. Precondition: CNC software with ShopMill HMI. See Basic components.	**6FC5841-3YC..-.YA8** **6FC5841-3XC..-.YA8**	
• SINUMERIK PCU 50.3 for machine operation with ShopTurn HMI	Only data carrier without license required. Precondition: CNC software with ShopTurn HMI. See Basic components.	**6FC5842-3YC..-.YA8** **6FC5842-3XC..-.YA8**	
• SINUMERIK 840Di sl for machine operation with ShopMill HMI or ShopTurn HMI	Only data carrier without license required. See Basic components.	**6FC5820-3YC..-.YA8** **6FC5820-3XC..-.YA8**	
Connection for:			
• Standard monitor (DVI), VGA via ext. adapter for PCU 50.3			
• SIMATIC OP 177B/TP 177B, OP 277/TP 277 and MP 277/MP 377	WinCC flexible is required for OA applications.		
• SIMATIC OP 170B/TP 170B and OP 270/TP 270 with 6"/10" display and MP 170/MP 270B/MP 370 with keys/touch	WinCC flexible is required for OA applications.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation (continued)										
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Operation

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Operation (continued)			
Software for:			
• SINUMERIK NCU 710.2/720.2/720.2 PN/730.2/730.2 PN for machine operation with HMI PRO sl RT	See HMI software for CNC controls.	**6FC5800-0AP47-0YB0** **6FC5867-3YC00-0YA8** **6FC5867-3YC2. -. YA8**	**P47**
• SIMATIC OP 177B/TP 177B/MP 277 operator panel for machine operation with HMI Lite CE	See HMI software for CNC controls.	**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. OP 010/OP 012			
- Up to 2 operator panel fronts, each with one TCU on an NCU 710.2			
- Up to 4 operator panel fronts, each with one TCU on an NCU 720.2/NCU720.2 PN/NCU 730.2/NCU 730.2 PN			
- Up to 4 operator panel fronts with one TCU each on a PCU 50.3 plus 1 additional operator panel front directly on the PCU 50.3	1) A number of proven configurations (see documentation for SINUMERIK 840Di sl).		
- From 2/4 operator panel fronts, as many operator panel fronts as required due to intelligent suppression	1) SW version 2.x and higher.		
• One or several TCUs which can be switched over via several NCUs and PCUs			
• One HMI-Advanced switchable via several NCUs			
• One integrated HMI and one external HMI-Advanced simultaneously on one NCU			
• Operator control without SINUMERIK operator panel		**6FC5800-0AP00-0YB0**	**P00**
• Operation via a VNC viewer			
Handheld units:			
• SINUMERIK HT 8 handheld terminal		**6FC5403-0AA20-0AA0**	
• SINUMERIK HT 8 handheld terminal (with handwheel)		**6FC5403-0AA20-1AA0**	
- Touch pen with holding loop		**6FC5348-0AA08-4AA0**	
- Wall holder for SINUMERIK HT 8 handheld terminal		**6AV6574-1AF04-4AA0**	
• SINUMERIK HT 2 handheld terminal		**6FC5303-0AA00-2AA0**	
- Magnetic clamp for SINUMERIK HT 2		**6FC5348-0AA08-0AA0**	
- Holder for SINUMERIK HT 2		**6FC5348-0AA08-1AA0**	
- Slide-in labels for inscribing (3 A4 sheets) for SINUMERIK HT 2		**6FC5348-0AA08-2AA0**	
• PN Basic connection module without emergency stop override, with switch, control cabinet mounting for SINUMERIK HT 8/HT 2		**6FC5303-0AA01-1AA0**	
• PN Basic connection box without emergency stop override, for SINUMERIK HT 8/HT 2		**6AV6671-5AE01-0AX0**	
• PN Plus connection box with emergency stop override, for SINUMERIK HT 8/HT 2		**6AV6671-5AE11-0AX0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation (continued)										
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Operation

● Basic version
○ Option
◇ Function is dependent on operating software
◆ Precondition: HMI-Advanced operating software
– Not possible

	Notes (footnotes are applicable line by line)	Order No. Type (for complete Order No., see notes)	Order code
Operation (continued)			
Handheld units (continued):			
• Handheld unit type B-MPI with coiled connecting cable		**6FX2007-1AE04**	
• Handheld unit type B-MPI with straight connecting cable		**6FX2007-1AE14**	
- Distributor		**6FX2006-1BH01**	
- Handwheel connection module for PROFIBUS	Not required for handwheel connection via machine control panel.	**6FC5303-0AA02-0AA0**	
• Mini handheld unit with coiled connecting cable		**6FX2007-1AD03**	
• Mini handheld unit with straight connecting 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:			
• MCP		**6FC5603-0AD00-0AA2**	
• MCP 802D sl		**6FC5303-0AF30-1AA0**	
- MCPA module for MCP 802D sl connection and with ±10 V interface		**6FC5312-0DA01-0AA0**	
• MCP 310 C PN		**6FC5303-0AF23-0AA1**	
• MCP 310 PN		**6FC5303-0AF23-1AA1**	
- Actuating element, 22 mm, 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 1x16G, T=24, cap, button, pointer, rapid traverse and spindle dials		**6FC5247-0AF12-1AA0**	
• MCP 483C PN - Cable set for additional control devices		**6FC5303-0AF22-0AA1** **6FC5247-0AA35-0AA0**	
• MCP 483 PN		**6FC5303-0AF22-1AA1**	
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 483 H for handheld unit		**6FC5303-1AF00-1AA1**	
• MPP 483 A 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**	
Electronic Key System EKS • Software option, delivery of a license	1) Not possible on PCU 50.3.	**6FC5800-0AP53-0YB0**	**P53**
Direct key module • Direct key module mounting kit		**6FC5247-0AF11-0AA0** **6FC5247-0AF30-0AA0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation (continued)										
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
○	○	○	○	○	○					
○	○	○	○	○	○					
○	○	○	○	○	○					
–	–	○	○	○	○					
○	○	–	–	–	–					
○	○	–	–	–	–					
○	○	–	–	–	–					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○	○ 1)	○	–	–	–
–	–	○	○	○	○					

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Operation

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Operation (continued)			
• Connection for electronic handwheels:	1) Precondition: MCI board extension. 2) Third handwheel can be operated as a contour handwheel.		
• With front panel 120 mm × 120 mm (4.72 × 4.72 in), 5 V DC		**6FC9320-5DB01**	
• With front panel 76.2 mm × 76.2 mm (3 × 3 in), 5 V DC		**6FC9320-5DC01**	
• With front panel 76.2 mm × 76.2 mm (3 × 3 in), 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 (8.2 ft) 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**	
Cable distributor	Not required for handwheel connection via machine control panel.	**6FX2006-1BA02**	
Connection for 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 keyboard		**6FC5247-0AA40-0AA0**	
Connection for memory/storage devices:			
• Floppy drive disk 3.5"/1.44 MB with USB connection		**6FC5235-0AA05-1AA2**	
• Card reader for CF/SD memory media, with USB connection		**6FC5335-0AA00-0AA0**	
• Industrial USB Hub 4	With PCU 50.3.	**6AV6671-3AH00-0AX0**	
• CompactFlash card 1 GB	1) Precondition: Card reader.	**6FC5313-5AG00-0AA0**	
• SIMATIC USB FlashDrive 2 GB	1) With pro version.	**6ES7648-0DC40-0AA0**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation (continued)										
2	2	2 1)	2 1)	2/3 2)	2/3 2)					
O	O	O	O	O	O					
O	O	O	O	O	O					
O	O	O	O	O	O					
O	O	O	O	O	O					
O	O	O	O	O	O					
O	O	O	O	O	O					
O	O	O	O	O	O					
–	–	O	O	O	O					
–	–	O	O	–	–					
O	O	–	–	–	–					
O	O	–	–	–	–					
–	–	O	O	O	O					
–	–	O	O	O	O					
–	–	O	O	O	O					
–	–	O	O	O	O					
–	–	O	O	O	O	O	O	O	O	O
–	–	O	O	O	O	O	O	O	O	O
–	–	O	O	O	O					
O	O	O	O	O	O	O 1)	O	O 1)	O 1)	O 1)
O 1)	O 1)	O	O	O	O	O	O	O	O	O

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Operation

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Operation (continued)			
Plain text display of user variables			
Multi-channel display			
2D representation of 3D protection areas/ work areas			
Actual-value system for workpiece			
Menu selection via the PLC	Not for two simultaneously active HMIs.		
CNC program messages			
Online help for programming, alarms and machine data (expandable)	1) With PCU 50.3.		
Screen blanking			
Access protection, 8 levels			
Operating software languages:			
• Chinese Simplified, English, French, German, Italian, Spanish	1) Other languages on request.		
• Language switchover online			
• Maximum configuration for installed languages	1) All available languages are supplied on-board. 2) Unrestricted with PCU 50.3.		
802D sl operating software languages Chinese Traditional, Czech, Dutch, Finnish, Hungarian, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Swedish, Turkish	Component of SINUMERIK 802D sl Toolbox.		
Language extensions for operating software HMI-Advanced, HMI-Embedded, ShopMill HMI, ShopTurn HMI on DVD-ROM, without license Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian1), Russian, Slovak1), Swedish, Turkish	See Basic components. 1) For HMI-Advanced only.	**6FC5253-7BX10-. XG8**	
Language extensions for operating software SINUMERIK Operate on DVD-ROM, without license Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/ Brazilian, Russian, Swedish, Turkish	See Basic components.	**6FC5860-0YC..-.YA8**	
Additional languages Software option for use of additional languages	1) Included on HMI Language extensions DVD-ROM; please enquire about available SW versions.	**6FC5800-0AN00-0YB0**	**N00**
Other languages	1) On request.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl								
						Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Operation (continued)										
–	–	◆	◆	●	●	●	●	●	●	●
–	–	◆	◆	◆	◆	–	–	–	●	–
–	–	◆	◆	●	●	–	–	–	●	●
–	–	●	●	●	●	–	–	●	●	●
–	–	◆	◆	◇	◇	–	●	●	●	●
●	●	◆	◆	●	●	●	●	●	●	●
●	●	◆	◆	◇	◇	–	●	–	● 1)	● 1)
–	–	●	●	●	●	–	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●
● 1)	● 1)	◆	◆	◇	◇	●	●	●	●	●
18	18	2	2	2	2	2	2	2	2	2
1)	1)	◆	◆	◇	◇	8 2)	2)	8	8	8
●	●	–	–	–	–					
–	–	○	○	○	○	–	○	○	○	○
–	–	○	○	○	○	○	–	–	–	–
–	–	◆	◆	◇	◇	○ 1)	○ 1)	○ 1)	○ 1)	○ 1)
1)	1)	◆	◆	◇	◇	1)	1)	1)	1)	1)

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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Monitoring functions			
Working area limitation			
Clamp protection for nibbling			
Limit switch monitoring Software and hardware limit switches			
Position monitoring			
Standstill (zero-speed) monitoring			
Clamping monitoring			
2D/3D protection zones			
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			
PROT collision protection for axes	Precondition: Loadable compile cycle.	**6FC5800-0AN06-0YB0**	**N06**
PROFIBUS tool and process monitoring	Precondition: Loadable compile cycle.	**6FC5800-0AM62-0YB0**	**M62**
Integrated tool monitoring and diagnostics			
• IMD light	Precondition: Loadable compile cycle.	**6FC5800-0AN12-0YB0**	**–**
• IMD base	Precondition: Loadable compile cycle.	**6FC5800-0AN13-0YB0**	**–**
Compensations			
Backlash compensation			
Lead screw error compensation			
Measuring system error compensation			
Feedforward control, velocity-dependent			
Electronic weight counterbalance	Function of SINAMICS S120.		
Temperature compensation			
Quadrant error compensation per operation			
Graphical monitoring of quadrant error compensation using the circularity test	1) Precondition: HMI-Advanced on PCU 50.3.		
Sag compensation, multi-dimensional	1) With restricted functionality, see export versions.	**6FC5800-0AM55-0YB0**	**M55**
Space error compensation (SEC) for kinematic transformations	Precondition: Loadable compile cycle.	**6FC5800-0AM57-0YB0**	**M57**
Space compensation: VCS plus (contains the option Measure kinematics)	Precondition: Loadable compile cycle.	**6FC5800-0AN17-0YB0**	**N17**
Vibration Extinction VIBX	Precondition: Loadable compile cycle.	**6FC5800-0AN11-0YB0**	**N11**

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Monitoring functions										
●	●	●	●	●	●					
–	●	–	–	–	–					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
●	●	●	●	●	●					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	●	●	●	●					
●	●	●	●	●	●					
–	–	–	○	–	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
Compensations										
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
●	●	●	●	●	●					
–	–	●	●	●	●					
–	–	●	●	●	●					
–	–	◆	◆	●	●					
–	–	◇	◇	◇	◇	–	●	○ 1)	○ 1)	○ 1)
○ 1)	○ 1)	○ 1)	○	○ 1)	○					
–	–	–	–	–	○					
–	–	–	–	–	○					
–	–	–	–	–	○					

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PLC

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
PLC			
SIMATIC S7-200 (integrated)			
SIMATIC S7-300 CPU 317-2 DP (integrated)			
• NCU 710.2/NCU 720.2/NCU 730.2			
SIMATIC S7-300 PLC 319-3PN/DP (integrated)			
• NCU 720.2 PN/NCU 730.2 PN			
Machining time, typically in ms/KI for bit operations	1 KI = 1024 instructions, corresponds to approx. 3 KB.		
• NCU 710.2/NCU 720.2/NCU 730.2			
• NCU 720.2 PN/NCU 730.2 PN			
Machining time, typically in ms/KI for word operations	1 KI = 1024 instructions, corresponds to approx. 3 KB.		
• NCU 710.2/NCU 720.2/NCU 730.2			
• NCU 720.2 PN/NCU 730.2 PN			
Ladder steps memory configuration	1) With value version: 4000.		
PLC user memory in KB, incl. basic PLC program	1) SW version 1.4 and higher.		
PLC user memory, maximum configuration in KB			
• NCU 710.2/NCU 720.2/NCU 730.2			
• NCU 720.2 PN/NCU 730.2 PN			
Expansion of the PLC user memory by 128 KB in each case	D11 to D12 only with SW version 1.4 and higher.	**6FC5800-0AD10-0YB0**	**D11 ... D12**
• NCU 710.2/NCU 720.2/NCU 730.2	D11 to D12 only with SW version 1.4 and higher.		**D11 ... D12**
• NCU 720.2 PN/NCU 730.2 PN			**D11 ... D18**
SIMATIC STEP 7 programming language:			
• LAD ladder diagram			
• FBD function block diagram			
• STL statement list			
PLC programming with HiGraph (add-on package for STEP 7)			
PLC programming tool, PLC program examples, standard machine data and alarm text editor on Toolbox			
PP 72/48 I/O module	1) No PROFIBUS certification.	**6FC5611-0CA01-0AA1**	
• PP 72/48 I/O module, max. number			
Analog Drive Interface for 4 axes ADI 4	No PROFIBUS certification. 1) Not possible with NCU 720.2 PN/ NCU 730.2 PN.	**6FC5211-0BA01-0AA4**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
										PLC
●	●	–	–	–	–					
–	–	●	●							
				●	●					
–	–	–	–							
				●	●					
0.1	0.1	0.03	0.03							
				0.03	0.03					
				0.01	0.01					
0.2	0.2	0.1	0.1							
				0.1	0.1					
				0.03	0.03					
6000 1)	6000	–	–	–	–					
–	–	● 128	● 128	● 512 1)	● 512 1)					
–	–	768	768							
				768	768					
				1536	1536					
–	–	○	○							
				○	○					
				○	○					
●	●	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
–	–	○	○	○	○					
●	●	–	–	–	–					
○	○	○ 1)	○ 1)	○ 1)	○ 1)					
3	3	125	125	125	125					
○	○	○	○	○ 1)	○ 1)					

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PLC

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
PLC (continued)			
Distributed I/O via PROFIBUS DP	See Catalog ST 70 or Siemens Industry Mall for further information.		
• Via integrated interface, data transfer rates up to 12 Mbit/s			
• Distributed DP slaves, max. number			
Distributed I/O via PROFINET	See Catalog ST 70 or Siemens Industry Mall for further information.		
• Component-based Automation			
- NCU 710.2/NCU 720.2/NCU 730.2			
- NCU 720.2 PN/NCU 730.2 PN			
• Distributed PN slaves, max. number			
- NCU 720.2 PN/NCU 730.2 PN			
Digital inputs, number in bytes	1) No. = Process image inputs.		
Digital outputs, number in bytes	1) No. = Process image outputs.		
I/O inputs, number in bytes	1) Logical address range inputs.		
I/O outputs, number in bytes	1) Logical address range outputs.		
Bit memories, number in bytes	1) With value version: 128.		
- NCU 710.2/NCU 720.2/NCU 730.2			
- NCU 720.2 PN/NCU 730.2 PN			
Timers, number	1) With value and plus versions: 40.		
- NCU 710.2/NCU 720.2/NCU 730.2			
- NCU 720.2 PN/NCU 730.2 PN			
Counters, number	1) With value and plus versions: 32.		
- NCU 710.2/NCU 720.2/NCU 730.2			
- NCU 720.2 PN/NCU 730.2 PN			
Subroutines			
FB, FC (largest number per type)			
DB, largest number			
- NCU 710.2/NCU 720.2/NCU 730.2			
- NCU 720.2 PN/NCU 730.2 PN			
Cyclic function block			
Time-controlled function blocks			
Equipment for PLC programming and program test with PG/PC			
User machine data for configuring the PLC user program			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
PLC (continued)										
●	●	●	●	●	●					
–	–	125	125	125	125					
–	–	○	○							
				–	–					
				●	●					
–	–	–	–							
				256	256					
216	216	256 1)	256 1)	256 1)	256 1)					
144	144	256 1)	256 1)	256 1)	256 1)					
–	–	8192 1)	8192 1)	4096	4096					
–	–	8192 1)	8192 1)	4096	4096					
384 1)	384	4096	4096							
				4096	4096					
				8192	8192					
64 1)	64 1)	512	512							
				512	512					
				2048	2048					
64 1)	64 1)	512	512							
				512	512					
				2048	2048					
64	64	–	–	–	–					
–	–	2048	2048	2048	2048					
–	–	2047	2047							
				2047	2047					
				4095	4095					
●	●	●	●	●	●					
–	–	●	●	●	●					
○	○	○	○	○	○					
●	●	–	–	–	–					

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Safety functions

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Safety functions			
SINUMERIK Safety Integrated Safety functions for personnel and machine protection	Preconditions: See Basic components.		
• Safe shutdown			
• SBR (safe braking ramp)			
• SH (safe standstill)			
• SBH (safe operation stop)			
• SG (safely reduced speed)			
• SE (safe software limit switch)			
• SN (safe software cams)			
• SGE/SGA (safety-related input/output signals)			
• SPL (safe programmable logic)			
• SBM (safe brake management)			
• Safety-related output $n < n_x$			
• Safety-oriented communication via standard bus (PROFIsafe with ET 200S, ET 200pro, ET 200eco)	See Catalog ST 70 or Siemens Industry Mall for further information.		
• Safe integration of sensors via DP ASi F-Link	See Catalog IK PI or Siemens Industry Mall for further information.		
Safety Integrated SI-Basic incl. 1 axis/spindle; up to 4 inputs and up to 4 outputs for safe programmable logic		**6FC5800-0AM63-0YB0**	**M63**
Safety Integrated SI-Comfort incl. 1 axis/spindle; up to 64 inputs and up to 64 outputs for safe programmable logic		**6FC5800-0AM64-0YB0**	**M64**
Safety Integrated SI axis/spindle extra for each additional axis/spindle	Example: 4 additional axes/ spindles: C74	**6FC5800-0AC70-0YB0**	**C71 ... C78**
Safety Integrated SI axis/spindle package additional 15 axes/spindles		**6FC5800-0AC60-0YB0**	**C61, C62**
Safety Integrated automated acceptance test with SinuCom NC SI	See HMI software for CNC controls – SinuCom.		
SINAMICS S120 Safety Integrated, drive-independent safety functions			
• SBC (Safe Brake Control)			
• STO (Safe Torque Off)			
• SS1 (Safe Stop 1)			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Safety functions										
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
–	–	–	–	○	○					
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Commissioning

● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Commissioning			
Commissioning software for drive system is integrated:			
• SINAMICS S120			
• SINAMICS S120 with CU320	With STARTER commissioning tool (included in scope of supply).		
Auto Servo Tuning AST Fully automatic speed and position controller optimization	1) SW version 2.6 and higher.		
Commissioning trace (drive optimization without an additional oscilloscope)	1) With PCU 50.3.		
Series commissioning via serial interface			
Standard commissioning via USB interface with memory medium, e. g. memory stick			
Standard commissioning of network drive	1) Precondition: Managing of network drives.		
Standard commissioning via programming of CF card offline or online	1) Precondition: Additional HMI user memory on CF card of the NCU.		
STARTER commissioning tool on PC/PG for SINAMICS S120	On Toolbox.		
Commissioning software on PC/PG for SINAMICS S120 (and SIMODRIVE 611 digital)	See HMI software for CNC controls – SinuCom.		
SINUMERIK 840Di/840Di sl Startup (SimoCom U and SinuCom NC)			
SINUMERIK 840Di sl Toolbox on hard disk of the PCU			
SINUMERIK 840Di sl/840D sl Toolbox on CNC system software DVD-ROM			
PLC example library (PLC templates)			

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Commissioning										
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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Commissioning (continued)			
SinuCom Commissioning/service tools for SINUMERIK 840Di sl/840D sl	See HMI software for CNC controls – SinuCom.	**6FC5250-0AY00-0AG1** **6FC5250-0AY00-0AG0** **6FC5250-7AY00-. AG0** **6FC5250-0AY00-0AG2** **6FC5250-7AY00-. AG3**	
• SinuCom NC Dialog-based parameterization of machine data, management of standard commissioning 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, deleting, inserting and changing standard commissioning files			
SinuCom Update Agent for series production and software upgrades	See HMI software for CNC controls – SinuCom Update Agent.	**6FC5862-2YC00-0YA0** **6FC5862-2YC..-.YA0**	
SinuCom UPExpert			
SinuCom UPShield			
SinuCom UPDiff			
SinuCom UPTopo			
SinuCom Protector			
STARTER commissioning tool for SINAMICS and MICROMASTER	1) On Toolbox. 2) For topology and diagnostics.	**6SL3072-0AA00-0AG0**	
Diagnostic functions			
Alarms and messages			
Action log for diagnostic purposes, can be activated	1) Logbook for alarms/keys.		
PLC status	1) Generally possible via STEP 7 on PG/PC.		
LAD display	1) Generally possible via STEP 7 on PG/PC.		
SIMATIC STEP 7 for SINUMERIK hardware for service functions	See HMI software for CNC controls – Tools. 1) With PCU 50.3.	**6FC5252-0AY00-0AG0** **6FC5252-0AY00-0AG1** **6FC5252-. AY01-. AG0**	
RCS 802 (Remote Control System) remote diagnostics, snap shot, license for PC	With pro version.	**6FC6000-6DA51-0AA0**	
• PLC remote diagnostics via modem	Programming tool and modem required. 1) With pro and plus versions.		
• Remote diagnostics via Ethernet on the control	RCS 802 and modem required. For pro version.		

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Commissioning (continued)										
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Diagnostic functions										
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● Basic version ○ Option ◇ Function is dependent on operating software ◆ Precondition: HMI-Advanced operating software – Not possible	Notes (footnotes are applicable line by line)	**Order No.** Type (for complete Order No., see notes)	**Order code**
Diagnostic functions (continued)			
RCS (Remote Control System) remote diagnostics:	See HMI software for CNC controls – MCIS software.		
• RCS Host Remote diagnostics software	1) With PCU 50.3.	**6FC5800-0AP30-0YB0**	**P30**
• RCS Viewer for PC/PG		**6FC6000-6DF00-0BB0** **6FC6000-6DC00-0BA0** **6FC6000-6DC0.-.BA0**	
• RCS Viewer Embedded for PC/PG		**6FC6000-6DF88-8BB0** **6FC6000-6DC80-0BA0** **6FC6000-6DC8.-.BA0**	
• RCS Commander for PC/PG Supports basic file transfer between PC/PG and CNCs	Preconditions for modem: RCS host for image transfer 1) SW version 2.6 and higher for NCU or SINUMERIK Operate for PCU.	**6FC5860-7YC00-0YA0** **6FC5860-7YC..-.YA0**	
Service and maintenance			
ePS Network Services: - Company Account and - Value Account are required for using the services	1) With PCU 50.3.	**6FC6001-0EE00-0CA1** **6FC6001-0EE00-0AF8**	
• ePS Diagnostic Services for diagnostic functions with machine faults and Workflow Services, remote operation and remote monitoring of machine controls	1) With PCU 50.3. 2) For Remote Access functionality HMI-Advanced is also necessary.	**6FC6001-0EE00-0DS0**	
• ePS Condition Monitoring Basic for condition-oriented maintenance	1) With PCU 50.3.	**6FC6001-0EE00-0MB0**	
• ePS Combi package Diagnostic Services and Condition Monitoring Basic	1) With PCU 50.3. 2) For Remote Access functionality HMI-Advanced is also necessary.	**6FC6001-0EE00-0KP0**	
TPM – Total Productive Maintenance Servicing and maintenance support:	See HMI software for CNC controls – MCIS software.		
• TPM Machine for SINUMERIK Maintenance management	1) With PCU 50.3.	**6FC5800-0AP32-0YB0** **6FC6000-1AC00-0AA8** **6FC6000-1AC0.-.AA8** **6FC6000-1AC0.-.AF0**	**P32**
• TPM Cell Maintenance management on PC		**6FC6000-1BF00-0AB0** **6FC6000-1BC00-0AA0** **6FC6000-1BC0.-.AA0**	
• TPM IFC for SINUMERIK Preventive maintenance for network-capable controls	1) With PCU 50.3.	**6FC5800-0AP46-0YB0**	**P46**
• TPM HMI Additional user interface for Windows-based PC		**6FC6000-1DF00-0AB0**	
• TPM demo version		**6FC6000-1AC00-0AT7**	

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SINUMERIK 802D sl		SINUMERIK 840Di sl/840D sl				Blank field: Function is not dependent on operating software				
802D sl T/M	802D sl G/N	840DiE sl	840Di sl	840DE sl	840D sl	SINUMERIK Operate	HMI-Advanced	HMI-Embedded	ShopMill HMI	ShopTurn HMI
Diagnostic functions (continued)										
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Service and maintenance										
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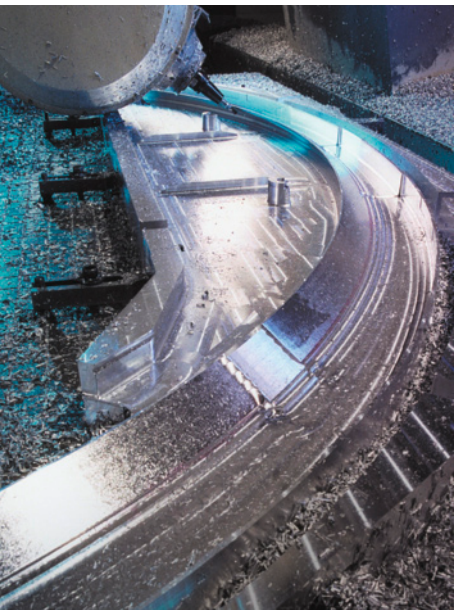
Overview of functions

Notes

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Operator components for CNC controls

3



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Introduction

3/4 **Operator panels**
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3/7 SINUMERIK OP 010C
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3/51 Industrial Ethernet switches – SCALANCE

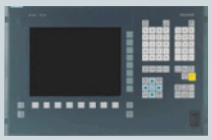
3/53 **Housing systems**
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Part 11 **CAD CREATOR**
Dimension drawing and 2D/3D CAD generator
www.siemens.com/cadcreator

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Introduction


SINUMERIK OP 08T


SINUMERIK OP 010


SINUMERIK OP 010S


SINUMERIK OP 010C


SINUMERIK OP 012


SINUMERIK OP 015


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


SINUMERIK TCU


SINUMERIK PCU 50.3

P_NC01_XX_00693c

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.

Thus the SINUMERIK operator panel fronts can be tailored to the individual user's requirements.

SINUMERIK PCUs

With the SINUMERIK PCUs and the SINUMERIK operator panel fronts, innovative operator panels can be created. The SINUMERIK PCUs are mounted on the rear of the SINUMERIK operator panel fronts, or they can be positioned at distances up to 100 m (328 ft) from the operator panel in the cabinet.

The powerful SINUMERIK PCUs contain 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 the 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 or various 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 low-profile and compact design
- Individual design of your user interface, using your expertise by means of openness in human-machine communication
- Distributed design due to physical separation of PCU and operator panel front

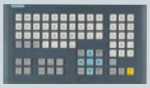
Application

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 on applications, refer to the section Operation in the Overview of functions.

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SINUMERIK KB 483C


SINUMERIK KB 310C


KBPC CG US
standard PC keyboard


Card reader
USB 2.0


SINUMERIK MCP 483C PN

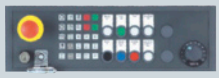

SINUMERIK MCP 310C PN


SINUMERIK HT 8


Handwheel


SINUMERIK MCP 483 PN


SINUMERIK MCP 310 PN


SINUMERIK MPP 483


SINUMERIK MPP 310 IEH


SINUMERIK HT 2


Mini
handheld unit

P_NC01_EN_00694d

Handheld units

The SINUMERIK handheld units are available with a variety of performance options. Ergonomic handheld units are also available. They can be used as mobile machine control panels or even 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 sophisticated design
- Machine-specific adaptations by means of variable labeling and control devices that can additionally be integrated

Keyboards

The keyboards allow convenient and user-friendly 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 operating components.

Benefits

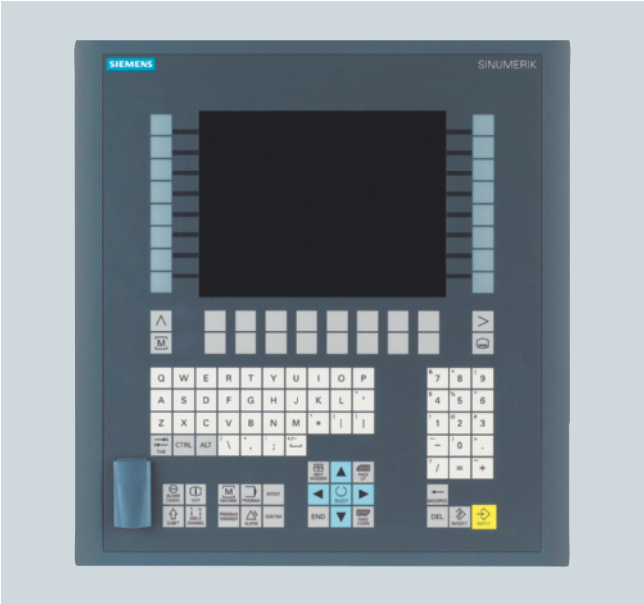
Optimized mounting of SINUMERIK CNCs with:

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

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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 clamps 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
- Simple installation
- Mixed operation with one operator panel front directly at the PCU is possible. Operation on an SINUMERIK OP 08T has the same authorization rights as operation 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 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

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

Technical specifications

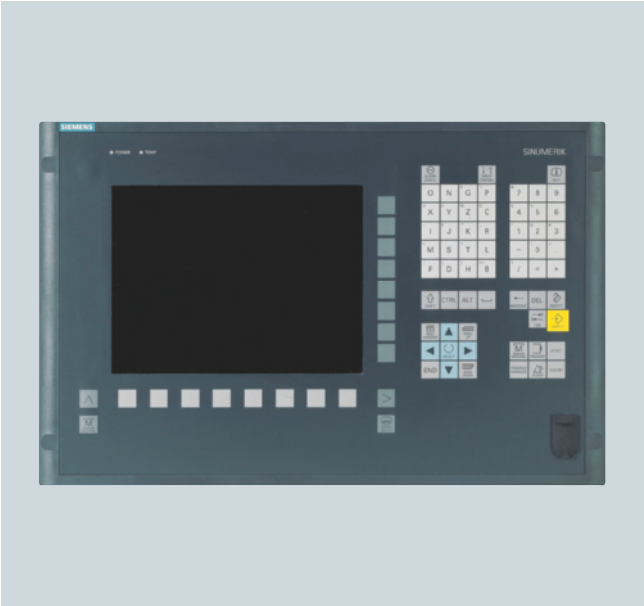
	6FC5203-0AF04-1BA0
Product name	SINUMERIK OP 08T operator panel front
Input voltage	24 V DC
Power consumption, max.	15 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage/Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage/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 × Height	285 mm × 304 mm (11.22 in × 11.97 in)
Weight, approx.	2.9 kg (6.39 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 08T operator panel front 19.1 cm/7.5" TFT (640 × 480) with membrane keys and integral TCU	**6FC5203-0AF04-1BA0**
Accessories	
Slide-in labels for inscribing 3 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 operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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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 clamps included in the scope of supply.

Benefits

- Low-cost operator control and monitoring thanks to 10" display with optimized keyboard

Integration

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

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

Technical specifications

	6FC5203-0AF00-0AA1
Product name	SINUMERIK OP 010 operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 (0.78 in)
• With PCU 50.3	108.2 mm (4.25 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11 lb)
Approvals, according to	cULus

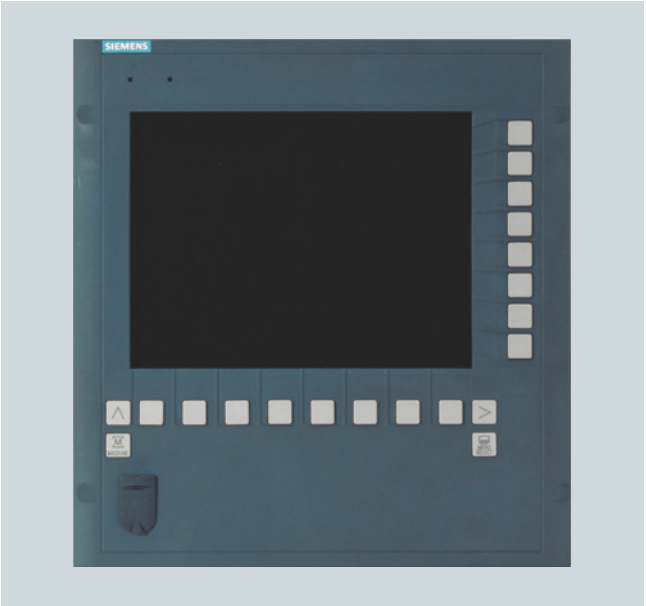
Selection and ordering data

Description	Order No.
SINUMERIK OP 010 operator panel front 26.4 cm/10.4" TFT (640 × 480) with membrane keys	**6FC5203-0AF00-0AA1**
Accessories	
Slide-in labels for inscribing 3 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**

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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 clamps 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 operator panel front OP 010S can be used for:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

Technical specifications

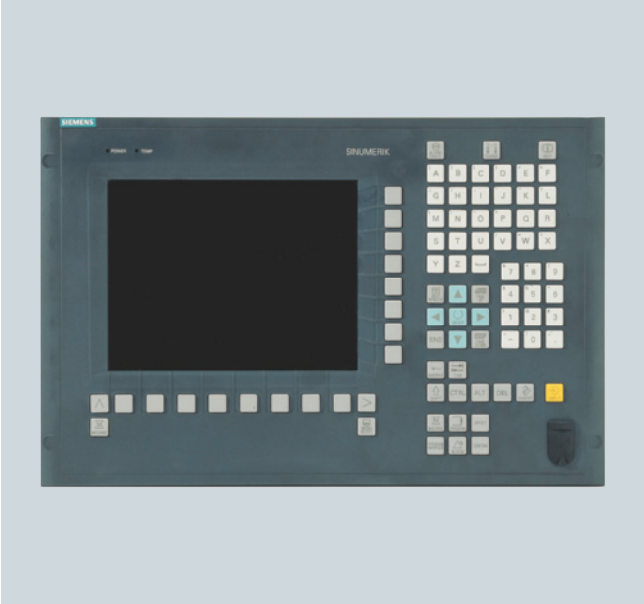
	6FC5203-0AF04-0AA0
Product name	SINUMERIK OP 010S operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 50.3	123.2 mm (4.85 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5.5 kg (12.1 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 010S operator panel front 26.4 cm/10.4" TFT (640 × 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**

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Overview



The SINUMERIK OP 010C operator panel front with 10.4" TFT color display with 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 clamps 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 operator panel front OP 010C can be used for:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

Technical specifications

	6FC5203-0AF01-0AA0
Product name	SINUMERIK OP 010C operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	16 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 50.3	108.2 mm (4.26 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11.0 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 010C operator panel front 26.4 cm/10.4" TFT (640 × 480) with mechanical keys	**6FC5203-0AF01-0AA0**
Accessories	
Square key cover, for inscribing 1 set comprising of: 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**

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SINUMERIK OP 012

Overview



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

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

Benefits

- User-friendly operator control and monitoring thanks to 12" display
- Easy operation thanks to integral keyboard and mouse

Integration

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

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

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

Technical specifications

	6FC5203-0AF02-0AA1
Product name	SINUMERIK OP 012 operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	21 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 (0.78 in)
• With PCU 50.3	108.2 mm (4.25 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	5 kg (11 lb)
Approvals, according to	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 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**

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Overview



The SINUMERIK OP 015 operator panel front with 15" TFT color display with 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 clamps 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 operator panel front OP 015 can be used for:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

Technical specifications

	6FC5203-0AF03-0AA0
Product name	SINUMERIK OP 015 operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	24 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 50.3	130.2 mm (5.13 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	7 kg (15.4 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 015 operator panel front 38.3 cm/15.1" 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**

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SINUMERIK OP 015A

Overview



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

The operator panel front is mounted from the rear using special clamps 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 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

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

Technical specifications

Product name	6FC5203-0AF05-0AB0 SINUMERIK OP 015A operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	25 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 - Rear	 0 … 45 °C (32 ... 113 °F) 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 50.3 - Clearance	127 mm (5.00 in) 10 mm (0.39 in)
Weight, approx.	8.4 kg (18.5 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 015A operator panel front 38.3 cm/15.1" TFT (1024 × 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/TP 015A	**6FC5247-0AF30-0AA0**
Accessories	
Slide-in labels for inscribing 3 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 operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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Overview



The SINUMERIK OP 015AT operator panel front with 15" TFT color display, 1024 × 768 pixels (XGA), supports the distributed installation of the operator panel front and control. The SINUMERIK OP 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 clamps supplied with the panel.

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
- Simple installation
- Mixed operation with one operator panel front directly at the PCU is possible. Operation on a SINUMERIK OP 015AT has the same authorization rights as operation 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 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

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

Technical specifications

Product name	6FC5203-0AF05-1AB0 SINUMERIK OP 015AT operator panel front
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage/Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage/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)
• Clearance	10 mm (0.39 in)
Weight, approx.	7.6 kg (16.8 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK OP 015AT operator panel front 38 cm/15" TFT (1024 × 768) with membrane keys and integral TCU	**6FC5203-0AF05-1AB0**
Accessories	
Slide-in labels for inscribing 3 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 operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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SINUMERIK TP 015A

Overview



The SINUMERIK TP 015A operator panel front with 15" TFT color display with 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 clamps 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 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

The optional SINUMERIK direct key module provides an additional connection of the 2 × 8 vertical softkeys as direct keys to the PROFIBUS DP, if no SINUMERIK 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.

Technical specifications

	6FC5203-0AF08-0AB2
Product name	SINUMERIK TP 015A operator panel front
Input voltage	Via PCU, TCU or video link receiver (5 V DC)
Power consumption, max.	25 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage/Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage/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 50.3	127 mm (5.00 in)
- Clearance	10 mm (0.39 in)
Weight, approx.	8.4 kg (18.5 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK TP 015A operator panel front 15" TFT (1024 × 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/TP 015A	**6FC5247-0AF30-0AA0**
Accessories	
Slide-in labels for inscribing 3 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 operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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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 clamps included in the scope of supply.

Benefits

- Flat operator panel through shallow installation depth
- Low power dissipation
- Simple 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 at the PCU is possible. Operation on a TP 015AT has the same authorization rights as operation 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 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321

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

Technical specifications

Product name	6FC5203-0AF08-1AB2 SINUMERIK TP 015AT operator panel front
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage/Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 80 % at 25 °C (77 °F)
Ambient temperature	
• Storage/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)
• Clearance	10 mm (0.39 in)
Weight, approx.	7.6 kg (16.8 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK TP 015AT operator panel front 15" TFT (1024 × 768) with membrane keys, touch screen and integral TCU	**6FC5203-0AF08-1AB2**
Accessories	
Slide-in labels for inscribing 3 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 operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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SINUMERIK direct key module

Overview



The SINUMERIK direct key module provides the capability of performing machine operations with the two rows of keys (on the left and the right of the screen) on the SINUMERIK OP 012/ OP 015A/TP 015A operator panel fronts.

Design

The SINUMERIK direct key module is fitted alongside the SINUMERIK PCU 50.3 on the SINUMERIK operator panel fronts OP 012/OP 015A/TP 015A. Cables and installation components for assembling the SINUMERIK PCU 50.3 with OP 012 are included in the scope of delivery.

For the combination SINUMERIK PCU 50.3 with OP 015A/TP 015A there is a separate mounting kit which, if required, must be ordered separately.

Integration

The SINUMERIK direct key module is suitable for connection to:

- SINUMERIK PCU 50.3 with the SINUMERIK operator panel fronts OP 012/OP 015A/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

	6FC5247-0AF11-0AA0
Product name	SINUMERIK direct key module for PROFIBUS DP
Input voltage	5 V DC
Power consumption, max.	0.75 W
Degree of protection according to EN 60529 (IEC 60529)	IP20
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	cULus

Selection and ordering data

Description	Order No.
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/TP 015A	**6FC5247-0AF30-0AA0**

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Overview



The high-performance SINUMERIK PCU 50.3 features onboard interfaces for communication via Ethernet, MPI and PROFIBUS DP, leaving the integrated slots free for other cards.

The SINUMERIK PCU 50.3 comes equipped with the Windows XP ProEmbSys operating system and, for backing up and restoring data, the Ghost data backup software.

The operating software can be ordered additionally.

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

- High performance and energy efficiency thanks to Intel Mobile processor technology
- Reliable operation due to monitoring of temperature, hard disk and fan
- Service-friendly thanks to the support of a USB boot device, for example, for booting USB flash drives, USB floppy or USB hard disks

Design

- Intel Mobile processor technology
  - PCU 50.3-C: Intel Celeron M Mobile processor 1.5 GHz/512 MB/1 MB L2 Cache/400 MHz FSB
  - PCU 50.3-P: Intel Pentium M Mobile processor 2.0 GHz/1 GB/2 MB L2 Cache/533 MHz FSB
- 40 GB replaceable hard disk with transport mechanism:
  12 GB for applications (HMI-Advanced, MCIS software) and data (part programs, documentation, other data)
  15 GB for local backups and software to be installed
- Max. memory configuration 2 GB incl. graphics memory on 2 memory module slots
- Integrated 2D/3D graphics; dynamic graphics memory (8 to 96 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 Mbit/s (RJ45)
  - 4 × USB 2.0
  - 1 × PROFIBUS/MPI interface
  - 1 × COM1 (RS 232 C)
- Expansion slots:
  - 2 × PCI (1 × 265 mm (10.43 in), 1 × 175 mm (6.89 in))
  - 1 × CompactFlash Card

Technical specifications

	6FC5210-0DF31-2AA0	6FC5210-0DF33-2AA0
Product name	SINUMERIK PCU 50.3-C	SINUMERIK PCU 50.3-P
Processor	Intel Celeron M	Intel Pentium M
RAM	512 MB SDRAM	1 GB SDRAM
Input voltage	24 V DC	
Power consumption, max.	190 W	
Mains buffering time	20 ms	
Degree of protection according to EN 60529 (IEC 60529)	IP20	
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative humidity		
• Storage/Transport	5 ... 95 % at 25 °C (77 °F)	
• Operation	10 ... 80 % at 25 °C (77 °F)	
Ambient temperature		
• Storage/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 (11.69 in)	
• Height	267 mm (10.51 in)	
• Depth	81.7 mm (3.22 in)	
Weight, approx.	6 kg (13.23 lb)	
Approvals, according to	cULus	

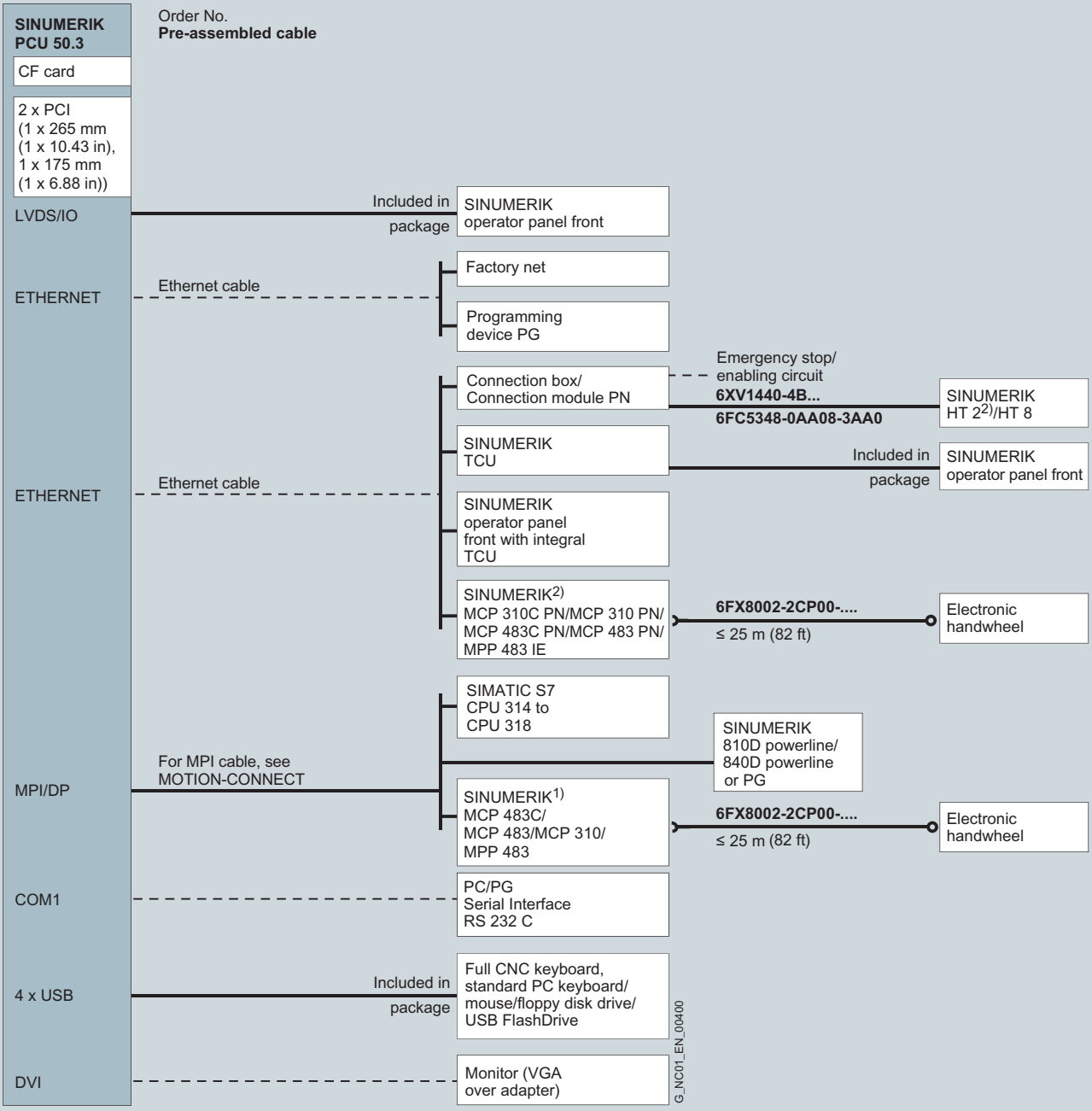
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SINUMERIK PCU 50.3

Integration

The SINUMERIK PCU 50.3 can be used for:

- SINUMERIK 840Di sl/840D sl
  (operating software HMI-Advanced version 7.1 or higher and
  operating software SINUMERIK Operate version 2.6 or higher)



1) For SINUMERIK 810D powerline/840D powerline.
2) For SINUMERIK 840Di sl/840D sl.

Connection overview for SINUMERIK PCU 50.3

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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Selection and ordering data

Description	Order No.
SINUMERIK PCU 50.3-C 1.5 GHz/1 × 512 MB, Windows XP ProEmbSys	**6FC5210-0DF31-2AA0**
SINUMERIK PCU 50.3-P 2.0 GHz/1 × 1 GB, Windows XP ProEmbSys	**6FC5210-0DF33-2AA0**
HMI-Advanced operating software On hard disk of the SINUMERIK PCU[1] Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license for current software version	**6FC5253-0BX10-0AF0**
• Single license for specific software version	**6FC5253-■BX10-■AF0**
SINUMERIK Operate operating software On hard disk of the SINUMERIK PCU[1] Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license for current software version	**6FC5860-1YF00-0YA0**
• Single license for specific software version	**6FC5860-1YF2■-■YA0**

Description	Order No.
Accessories	
Hard disk, 40 GB For SINUMERIK PCU 50.3 with support plate and damper (included in scope of supply of the SINUMERIK PCU 50.3)	**6FC5247-0AF08-4AA0**
Memory expansion For SINUMERIK PCU 50.3	
• 512 Mbyte	**6ES7648-2AG30-0GA0**
• 1 GB	**6ES7648-2AG40-0GA0**
Mounting bracket For SINUMERIK PCU, video link receiver or TCU behind operator panel front	**6FC5248-0AF20-2AA0**
1 GB CompactFlash Card Empty	**6FC5313-5AG00-0AA0**
SIMATIC PC USB FlashDrive[2] 2 GB, USB 2.0, metal enclosure, boot capability, incl. SIMATIC PC BIOS Manager	**6ES7648-0DC40-0AA0**
SINUMERIK Service Pack Recovery Media WIN XP ProEmbSys For SINUMERIK PCU with Windows XP ProEmbSys on DVD-ROM Contents: • Windows XP ProEmbSys incl. SP3 • Ghost system 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 (English/German)	**6FC5253-8CX10-6XU8**
PCI interface card 2 × COM, 2 × LPT For SINUMERIK PCU 50.3 (occupies 1 to 2 PCI expansion slots)	**6ES7648-2CA01-0AA0**

Example of specific HMI-Advanced software version, e.g. 7.5:
6FC5253-**7**....-**5**...

Example of specific software version 2.6 for SINUMERIK Operate operating software:
6FC5860-...**20**-**0**...

Note:
The SINUMERIK PCU 50.3 is delivered without mounting brackets. Please include the mounting brackets in the order.

[1] Please ensure that the order number for the software to be delivered on the hard disk directly follows the order number for the SINUMERIK PCU on the order form.

[2] Subject to export regulations AL:N and ECCN:EAR99H.

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SINUMERIK TCU

Overview



The SINUMERIK Thin Client Unit TCU for distributed installation permits physical separation of operator panel fronts and SINUMERIK PCU/NCU or SIMOTION P350-3. For this purpose, the operator interface is copied to one/several operator panel fronts with one SINUMERIK TCU each.

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 chained machines: more than 4 thin client units can be connected, if necessary

Design

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

- Graphics: 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/NCU/ SIMOTION P350-3 and operator panel front via Industrial Ethernet
- Easy installation and service-friendly layout thanks to the component structure
- Functionality of the SINUMERIK PCU/SIMOTION P350-3 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 used from all panel fronts. Operation on a Thin Client has the same authorization rights as operation on an operator panel front connected directly to the SINUMERIK PCU/SIMOTION P350-3. The operator panel in passive mode shows a darkened screen.

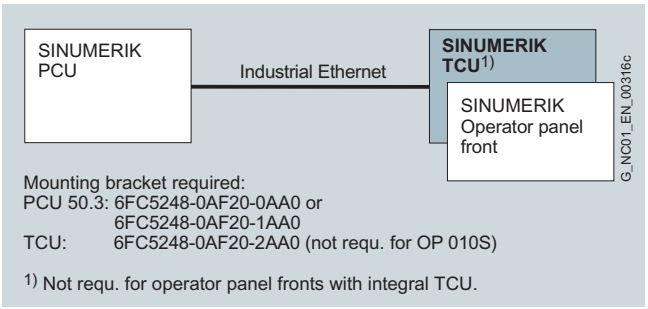
Function (continued)

- 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/SIMOTION P350-3 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:

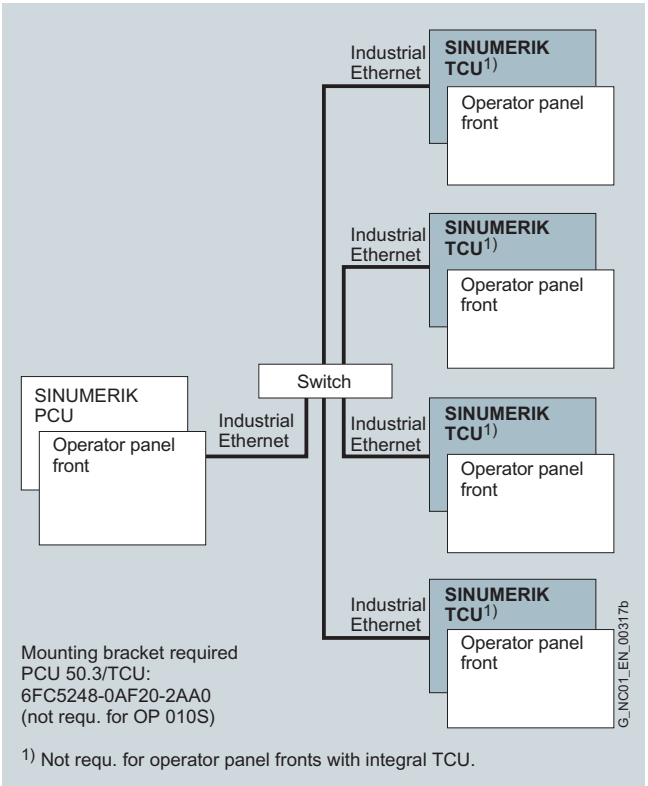
- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  Operator panel fronts OP 010/OP 010C/OP 010S/OP 012/ OP 015/OP 015A/TP 015A with TFT display on NCU 710.2/ NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3



Mounting bracket required:
PCU 50.3: 6FC5248-0AF20-0AA0 or
6FC5248-0AF20-1AA0
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



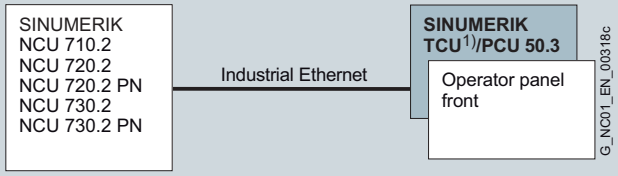
Mounting bracket required
PCU 50.3/TCU:
6FC5248-0AF20-2AA0
(not requ. for OP 010S)

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

Connection overview for SINUMERIK TCU with central OP on PCU

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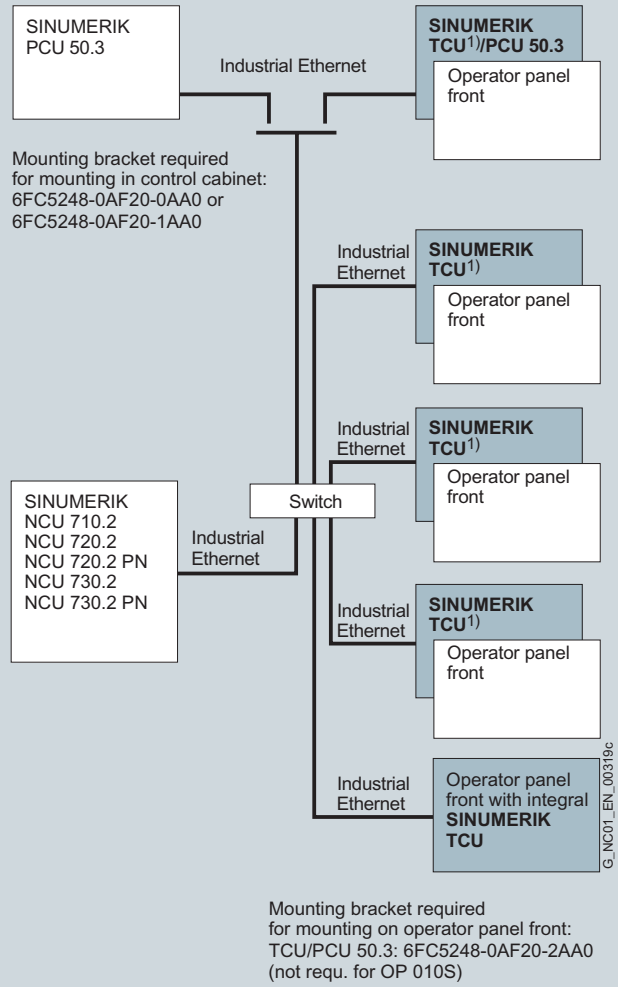
Integration (continued)



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

Mounting bracket required:
PCU 50.3: 6FC5248-0AF20-2AA0
(not requ. for OP 010S)

Connection overview for SINUMERIK TCU on NCU 710.2/NCU 720.2/ NCU 720.2 PN/NCU 730.2/NCU 730.2 PN



Mounting bracket required
for mounting on operator panel front:
TCU/PCU 50.3: 6FC5248-0AF20-2AA0
(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 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN

Technical specifications

	6FC5312-0DA00-0AA1
Product name	SINUMERIK Thin Client Unit TCU
Input voltage	24 V DC
Power consumption, max.	36 W
Degree of protection according to EN 60529 (IEC 60529)	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	cULus

Selection and ordering data

Description	Order No.
SINUMERIK Thin Client Unit TCU	**6FC5312-0DA00-0AA1**
Accessories	
Mounting bracket flat For SINUMERIK PCU with/without video link transmitter in control cabinet	**6FC5248-0AF20-0AA0**
Upright mounting bracket For SINUMERIK PCU 50.3 with/without video link transmitter in control cabinet	**6FC5248-0AF20-1AA0**
Mounting bracket For SINUMERIK PCU, video link receiver or SINUMERIK TCU behind operator panel front	**6FC5248-0AF20-2AA0**

Ordering data for the SCALANCE industrial switches and the Industrial Ethernet FC TP Standard/Trailing Cable can be found under 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

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SINUMERIK HT 2

Overview



The mobile SINUMERIK HT 2 handheld terminal is suitable for manually operating machine tools, e.g. for performing axis feed movements.

Benefits

- Mobility for operator control and monitoring
- 2 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 without an additional, manual actuating element/key switch
- Insertion and removal during operation without triggering of emergency stop for basic variants requires manual actuating element/key switch and terminating plug
- 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 storage by means of magnetic clamp or holder (accessory)
- 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. during setup procedures. It has been developed specifically with easy handling, ruggedness, and practical suitability in mind. The SINUMERIK HT 2 fits seamlessly into the operator component landscape.

Design

The SINUMERIK HT 2 is connected via the PN Basic/PN Plus connection box at any installation location in the plant, or to the PN Basic connection module for installation in 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 button
- 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 are proof of its practical suitability even when production conditions are hard. The key assignments match those on the earlier model of handheld unit, type B-MPI, making it easy to switch from one version to the next. The keys can be freely assigned and inscribed as required.

The PN Plus connection box provides hot swapping (insert or remove during operation).

Technical specifications

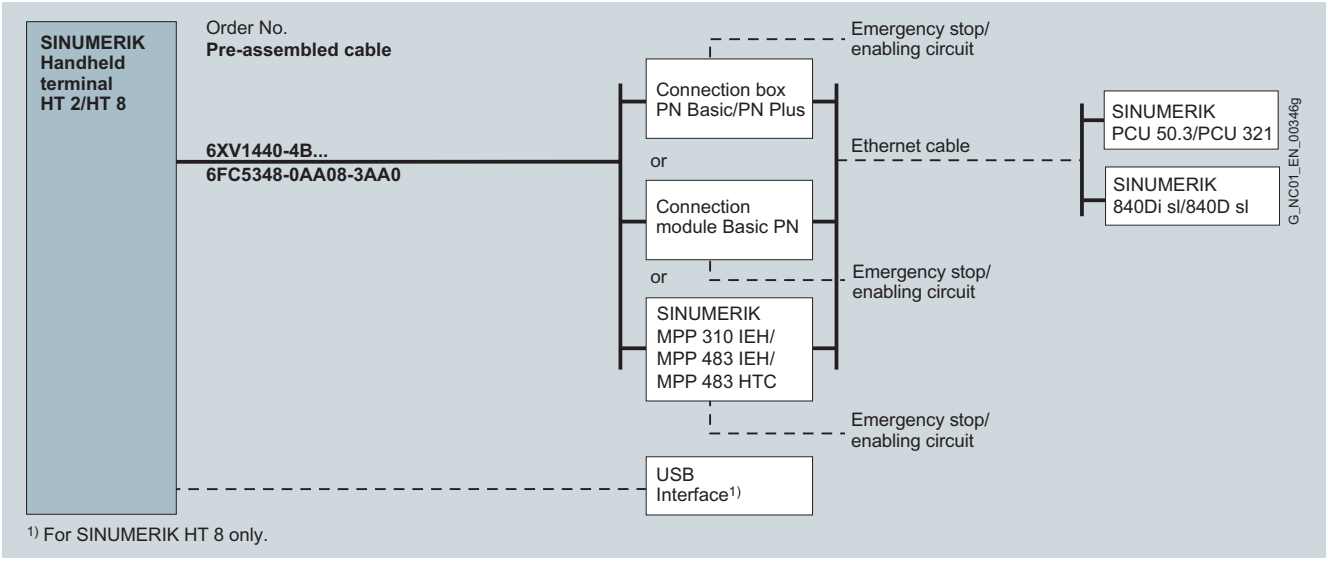
Product name	6FC5303-0AA00-2AA0 SINUMERIK HT 2 Handheld Terminal
Input voltage	24 V DC
Power consumption, max.	2.5 W
Degree of protection according to EN 60529 (IEC 60529)	IP65
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	cULus

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Integration

The SINUMERIK HT 2 handheld terminal can be used for:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321



1) For SINUMERIK HT 8 only.

Connection overview for SINUMERIK HT 2

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Selection and ordering data

Description	Order No.
SINUMERIK HT 2 handheld terminal	**6FC5303-0AA00-2AA0**
Accessories	
Connection box PN Basic IP65 degree of protection Without automatic emergency stop override for mounting in the system	**6AV6671-5AE01-0AX0**
Connection box PN Plus IP65 degree of protection 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 A4 sheets, for SINUMERIK HT 2	**6FC5348-0AA08-2AA0**
Key set For SINUMERIK HT 2	**6AV6574-1AG04-4AA0**

Description	Order No.
Accessories (continued)	
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**

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SINUMERIK HT 8

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 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
- Pixel-graphics 7.5" TFT color display
- Operation via touch screen, membrane keys and touch pen
- 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 without an additional, manual actuating element/key switch
- Insertion and removal during operation without triggering of emergency stop for basic variants requires manual actuating element/key switch and terminating plug
- Rugged, compact and ergonomically designed
- Easily replaceable signal cables, without special tools (accessories)

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 PN Plus connection box

Function

The SINUMERIK HT 8 operates according to the Thin Client principle. The operator software is 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.

The PN Plus connection box provides hot swapping (insert or remove during operation).

The operator interface can be customized if required (see HMI Open Architecture).

Technical specifications

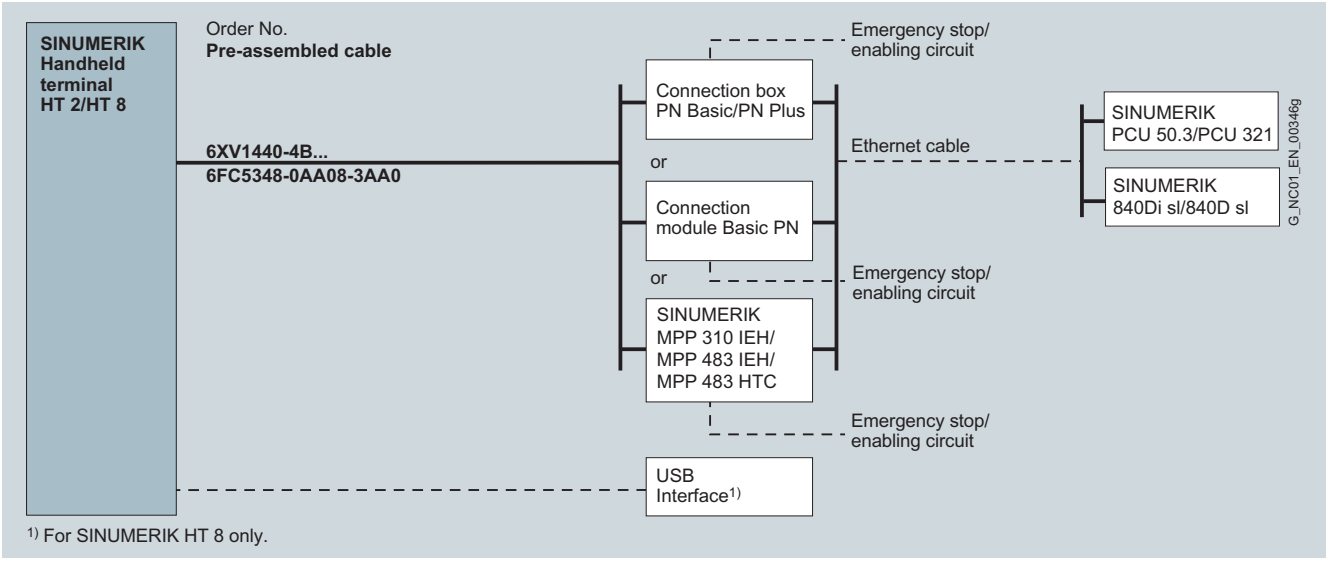
Product name	6FC5403-0AA20-0AA0 SINUMERIK HT 8 handheld terminal	6FC5403-0AA20-1AA0 SINUMERIK HT 8 handheld terminal with handwheel
Input voltage	24 V DC	
Power consumption, max.	15 W	
Degree of protection according to EN 60529 (IEC 60529)	IP65	
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative 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 … 45 °C (32 ... 113 °F)	
Dimensions		
• External diameter of enclosure	290 mm (11.42 in)	
• Height (including override rotary button)	126 mm (4.96 in)	
Weight, approx.	1.73 kg (3.81 lb)	
Approvals, according to	cULus	

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Integration

The SINUMERIK HT 8 handheld terminal can be used for:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN, SINUMERIK PCU 50.3
- SINUMERIK PCU 321



1) For SINUMERIK HT 8 only.

Connection overview for SINUMERIK HT 8

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Selection and ordering data

Description	Order No.
SINUMERIK HT 8 handheld terminal Based on the Thin Client principle Operating software in the SINUMERIK NCU/PCU	**6FC5403-0AA20-0AA0**
SINUMERIK HT 8 handheld terminal with handwheel Based on the Thin Client principle Operating software in the SINUMERIK NCU/PCU	**6FC5403-0AA20-1AA0**
Accessories	
Connection box PN Basic IP65 degree of protection Without automatic emergency stop override for mounting in the system	**6AV6671-5AE01-0AX0**
Connection box PN Plus IP65 degree of protection 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 with terminating plug	**6FC5303-0AA01-1AA0**

Description	Order No.
Accessories (continued)	
Wall holder For safe storage of the SINUMERIK HT 8, also suitable for stationary operation	**6AV6574-1AF04-4AA0**
Touch pen with holding loop For SINUMERIK HT 8	**6FC5348-0AA08-4AA0**
Protective film (2 units) For MP 277 and SINUMERIK HT 8	**6AV6671-5BC00-0AX0**
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**

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Handheld unit type B-MPI

Overview



The handheld unit type B-MPI is suitable for manually operating machine tools, such as axis feed movements. All keys are freely assignable, and the keyboard can be optionally labeled.

Design

The handheld unit features 2-channel emergency stop and enabling circuits. The enabling button is a 3-step enabling button. The handheld unit is available for 3-wire or 4-wire enabling.

The handheld unit type B-MPI is connected via a distributor box to the MPI line. The distributor box is designed for installation in a control cabinet or in a separate enclosure.

In the version with 4-wire connection of the enabling buttons, monitoring of the transverse short-circuit is possible in the enabling circuit. Due to the modified connector layout, these handheld units can be used only with the distributor box for this version. All handheld units are UL-certified for the US and Canada.

We can supply a holder for storing the handheld unit. The holder is manufactured from black polystyrene and can be fixed to a suitable base with 4 screws.

Integration

The handheld unit type B-MPI can be used for:

- SINUMERIK 840Di sl/840D sl

Technical specifications

	6FX2007-1AC04/-1AC14 6FX2007-1AE04/-1AE14
Product name	Handheld unit type B-MPI
Operating voltage, unregulated	24 V DC
Degree of protection according to EN 60529 (IEC 60529)	IP65
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F)
Ambient temperature	
• Storage/Transport	-20 ... +60 °C (-4 ... +140 °F)
• Operation	0 ... 45 °C (32 ... 113 °F)
Distance to NCU/PCU, max.	200 m (656 ft)
Dimensions	
• Length	252 mm (9.92 in)
• Width	114 mm (4.49 in)
• Height	110 mm (4.33 in)
Weight, approx. without connecting cable	1.2 kg (2.65 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
Handheld unit type B-MPI	
3-step enabling button incl. connecting cable with connector	
• 3-wire enabling	
- Coiled connecting cable Length: 1.5 m (4.92 ft); stretches to 3.5 m (11.5 ft)	**6FX2007-1AC04**
- Straight cable Length: 10 m (32.8 ft)	**6FX2007-1AC14**
• 4-wire enabling	
- Coiled connecting cable Length: 1.5 m (4.92 ft); stretches to 3.5 m (11.5 ft)	**6FX2007-1AE04**
- Straight cable Length: 10 m (32.8 ft)	**6FX2007-1AE14**
Accessories	
Distributor	
For handheld unit and handheld programming unit incl. shorting plug	
• 3-wire enabling	**6FX2006-1BC01**
• 4-wire enabling	**6FX2006-1BH01**
Holder made of polystyrene	**6FX2006-1HA00**
Extension cable	
Between handheld unit and distributor	
• 3-wire enabling	
- Length: 5 m (16.4 ft)	**6FX2002-1AB04-1AF0**
- Length: 10 m (32.8 ft)	**6FX2002-1AB04-1BA0**
- Length: 15 m (49.2 ft)	**6FX2002-1AB04-1BF0**
- Length: 0.5 m (19.7 in) with angled connector	**6FX2002-1AB14-1AA5**
• 4-wire enabling	
- Length: 5 m (16.4 ft)	**6FX2002-1AB84-1AF0**
- Length: 10 m (32.8 ft)	**6FX2002-1AB84-1BA0**
- Length: 15 m (49.2 ft)	**6FX2002-1AB84-1BF0**
- Length: 0.5 m (19.7 in) with angled connector	**6FX2002-1AB24-1AA5**

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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

Since coarse, medium and fine infeed can easily be graduated, the operator control concept offers fast, increment-precise positioning. The signals are guided in parallel (without MPI) to the CNC.

Design

In addition to the 2-channel emergency stop and acknowledgement keys, a rapid traverse key and two +/- keys as well as a handwheel to traverse the axes in jog mode are available. Emergency stop has a 4-wire connection. The 3-step acknowledgement key has a 3-wire connection. Up to 5 axes can be selected via a rotary switch. 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.

For the connection, the connection kit, which must be ordered separately, is required.

To change the cable outlet direction, we offer an angle socket for the connection kit. The angle socket allows the flange socket of the connection kit to be mounted 90° rotated. The angle socket can be used only in conjunction with the connection kit non-assembled.

The mini handheld unit can be fixed on metal surfaces by means of the integrated magnetic clamp. A holder is available as an option.

Integration

The mini handheld unit can be used for:

- SINUMERIK 840Di sl/840D sl

Technical specifications

Product name	6FX2007-1AD03/ 6FX2007-1AD13 Mini handheld unit with coiled connecting cable/ with straight connecting cable
Operating voltage	24 V DC
Handwheel	100 S/R, V_B = 5 V, RS 422
Degree of protection according to EN 60529 (IEC 60529)	IP65
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Ambient temperature	
• Storage/Transport	-20 … +60 °C (-4 … +140 °F)
• Operation	0 … 55 °C (32 … 131 °F)
Max. distance between handwheel and NCU, when handwheel is used	25 m (82.03 ft)
Dimensions	
• Length	180 mm (7.09 in)
• Height	70 mm (2.76 in)
• Width	90 mm (3.54 in)
Weight, approx. (without connecting cable)	0.5 kg (1.10 lb)
Approvals, according to	UL

Selection and ordering data

Description	Order No.
Mini handheld unit 3-step acknowledgement key incl. magnetic clamps and connecting cable with metal connector	
• Coiled connecting cable Length: 1.5 m (4.92 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 Version for metal connector, for connection to machine control panel without Industrial Ethernet, with terminating connector	**6FX2006-1BG03**
Connection kit for mini handheld unit, assembled Version for metal connector, for connection to machine control panel with Industrial Ethernet, with terminating connector	**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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Electronic handwheel

Overview

This encoder generates signals which correspond to the movements of the handwheel as it is turned. The axis selected via the control can be positioned paraxially. The handwheels are equipped with a magnetic latching mechanism that supports traversing with incremental accuracy.

The front panel can be removed. A version with 24 V DC and an HTL interface is available for connection to I/O modules.

The portable handwheel is connected via a flange socket using the coiled connecting cable. The enclosure is fitted with a magnetic clamp. A holder is available to provide a place to store the handwheel on non-metallic surfaces.



Technical specifications

	6FC9320-5DB01	6FC9320-5DC01/ 6FC9320-5DF01/ 6FC9320-5DM00	6FC9320-5DE02	6FC9320-5DH01
Product name	Electronic handwheel	Electronic handwheel	Portable electronic handwheel	Electronic handwheel
Rated voltage	5 V DC ± 5 %			10 ... 30 V DC
Rated current, max.	60 mA			15 mA
Interface	RS 422 (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	25 m (82.03 ft)		20 m (65.62 ft)	25 m (82.03 ft)
Degree of protection according to EN 60529 (IEC 60529)				
• Front	IP65			
• Rear	IP50			
Relative 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, RS 422	**6FC9320-5DB01**
• With front panel 76.2 mm × 76.2 mm (3 in × 3 in), with setting wheel 5 V DC, RS 422	**6FC9320-5DC01**
• Portable in housing, coiled cable 2.5 m (8.20 ft) with setting wheel 5 V DC, RS 422	**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, RS 422	**6FC9320-5DM00**
• Without front panel, without setting wheel, for installation 5 V DC, RS 422	**6FC9320-5DF01**
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**

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Handwheel connection module

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 override rotary switches and handwheels are provided, as well as a PROFIBUS DP interface for communication.

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

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
- 2 handwheels

Integration

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

- SINUMERIK 840Di sl/840D sl over PROFIBUS DP

Technical specifications

Product name	6FC5303-0AA02-0AA0 SINUMERIK handwheel connection module
Input voltage	24 V DC
Power consumption, max.	15.2 W
Degree of protection according to EN 60529 (IEC 60529)	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 … +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	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	cULus

Selection and ordering data

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

Example:
16G: latching at position 16
T = 24: 24 positions for 360°

[1)] For length code, see Connection system MOTION-CONNECT.

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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.

SINUMERIK MCP 310C PN has, apart from PROFINET functionality, also complete Industrial Ethernet functionality. The network technology can be switched 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 and function keys
  - 49 keys with LEDs
  - Direction keys for milling machines with rapid traverse override
  - 16 user-labled standard user 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

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 840Di sl
- SINUMERIK 840D sl

Technical specifications

	6FC5303-0AF23-0AA1
Product name	SINUMERIK MCP 310C PN machine control panel
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	-40 ... +70 °C (-40 ... +158 °F)
• Operation	
- Front	0 ... 45 °C (32 ... 113 °F)
- Rear	0 ... 55 °C (32 ... 131 °F)
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, accoording to	cULus

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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 of: 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**
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-pole screw terminal	**3SB3400-0A**
Key set (10 sets) For machine control panel	**6FC5148-0AA03-0AA0**
Spindle/rapid traverse override rotary switch 1 × 16G, T = 24, cap, button, pointer, and rapid traverse and spindle dials	**6FC5247-0AF12-1AA0**
Feed/rapid traverse override rotary switch 1 × 23G, T = 32, cap, button, pointer, and rapid traverse and feed dials	**6FC5247-0AF13-1AA0**
Cable set (60 units) For additional control devices of the machine control panels Length: 500 mm (19.69 in)	**6FC5247-0AA35-0AA0**
Signal cable for handwheel connection Length, max.: 25 m (82.03 ft)[1)]	**6FX8002-2CP00-….**
Set of clamps (9 units) For operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

Example:
16G: Latching at position 16
T = 24: 24 positions for 360°

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

SINUMERIK MCP 310 PN

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.

SINUMERIK MCP 310 PN has, apart from PROFINET functionality, also complete Industrial Ethernet functionality. The network technology can be switched using DIP switches.

Forty-nine 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/TP 015A.

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

Design

Control elements:

- Mode and function keys
  - 49 keys with LEDs
  - Direction keys for milling machines with rapid traverse override
  - 16 user-labeled standard user 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/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)

[1)] For length code, see Connection system MOTION-CONNECT.

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Integration

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

- SINUMERIK 840Di sl
- SINUMERIK 840D sl

Technical specifications

Product name	6FC5303-0AF23-1AA1 SINUMERIK MCP 310 PN machine control panel
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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)
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	cULus

Selection and ordering data

Description	Order No.
SINUMERIK MCP 310 PN machine control panel PROFINET/Industrial Ethernet Width 310 mm (12.2 in), with membrane keys	**6FC5303-0AF23-1AA1**
Accessories	
Slide-in labels for inscribing 3 A4 sheets	**6FC5248-0AF23-1AA0**
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-pole screw terminal	**3SB3400-0A**
Key switch with key For SINUMERIK MCP 6FC5303-0AF22-1AA1/ 6FC5303-0AF23-1AA1	**6FC5247-0AF02-0AA0**
Key set (10 sets) For machine control panel	**6FC5148-0AA03-0AA0**
Spindle/rapid traverse override rotary switch 1 × 16G, T = 24, cap, button, pointer, and rapid traverse and spindle dials	**6FC5247-0AF12-1AA0**
Feed/rapid traverse override rotary switch 1 × 23G, T = 32, cap, button, pointer, and rapid traverse and feed dials	**6FC5247-0AF13-1AA0**
Cable set (60 units) For additional control devices of the machine control panels Length: 500 mm (19.69 in)	**6FC5247-0AA35-0AA0**
Signal cable for handwheel connection Length, max.: 25 m (82.03 ft)[1)]	**6FX8002-2CP00-....**
Set of clamps (9 units) For operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

Example:
16G: Latching at position 16
T = 24: 24 positions for 360°

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

[1)] For length code, see Connection system MOTION-CONNECT.

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SINUMERIK MCP 483C PN

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.

SINUMERIK MCP 483C PN has, apart from PROFINET functionality, also complete Industrial Ethernet functionality. The network technology can be switched 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 and function keys
  - 50 keys with LEDs
  - Direction keys for milling machines with rapid traverse override (key covers on the direction keys for turning machines in the accessories pack supplied)
- Spindle control with spindle override (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

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 840Di sl
- SINUMERIK 840D sl

Technical specifications

	6FC5303-0AF22-0AA1
Product name	SINUMERIK MCP 483C PN machine control panel
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 85 % 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	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	cULus

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SINUMERIK MCP 483C PN

SINUMERIK MCP 483 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 of: 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**
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-pole screw terminal	**3SB3400-0A**
Key set (10 sets) For machine control panel	**6FC5148-0AA03-0AA0**
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	**6FC5247-0AF12-1AA0**
Feed/rapid traverse override rotary switch 1 × 23G, T = 32, cap, button, pointer, and rapid traverse and feed dials	**6FC5247-0AF13-1AA0**
Cable set (60 units) For additional control devices of the machine control panels Length: 500 mm (19.69 in)	**6FC5247-0AA35-0AA0**
Set of clamps (9 units) For operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

Example:
16G: Latching at position 16
T = 24: 24 positions for 360°

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

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.

SINUMERIK MCP 483 PN has, apart from PROFINET functionality, also complete Industrial Ethernet functionality. The network technology can be switched 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/TP 015A.

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

Design

Control elements:

- Mode and function keys
  - 50 keys with LEDs
  - Direction keys for milling machines with rapid traverse override
  - 17 user-labeled standard user keys
- Spindle control with spindle override (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

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SINUMERIK MCP 483 PN

Design (continued)

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/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 840Di sl
- SINUMERIK 840D sl

Technical specifications

Product name	6FC5303-0AF22-1AA1 SINUMERIK MCP 483 PN machine control panel
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage	5 ... 95 % at 25 °C (77 °F)
• Transport	5 ... 95 % at 25 °C (77 °F)
• Operation	5 ... 85 % 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	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	cULus

Selection and ordering data

Description	Order No.
SINUMERIK MCP 483 PN machine control panel PROFINET/Industrial Ethernet Width 19", with membrane keys, emergency stop 22 mm (0.87 in)	**6FC5303-0AF22-1AA1**
Accessories	
Slide-in labels for inscribing 3 A4 sheets	**6FC5248-0AF22-1AA1**
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-pole screw terminal	**3SB3400-0A**
Key switch with key For SINUMERIK MCP 6FC5303-0AF22-1AA1/ 6FC5303-0AF23-1AA1	**6FC5247-0AF02-0AA0**
Key set (10 sets) For machine control panel	**6FC5148-0AA03-0AA0**
Spindle/rapid traverse override rotary switch 1 × 16G, T = 24, cap, button, pointer, and rapid traverse and spindle dials	**6FC5247-0AF12-1AA0**
Feed/rapid traverse override rotary switch 1 × 23G, T = 32, cap, button, pointer, and rapid traverse and feed dials	**6FC5247-0AF13-1AA0**
Cable set (60 units) For additional control devices of the machine control panels Length: 500 mm (19.69 in)	**6FC5247-0AA35-0AA0**
Signal cable for handwheel connection Length, max.: 25 m (82.03 ft)[1)]	**6FX8002-2CP00-....**
Set of clamps (9 units) For operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

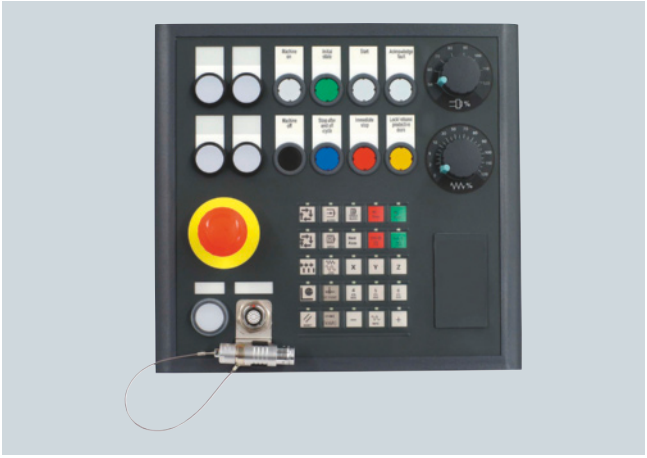
Example:
16G: Latching at position 16
T = 24: 24 positions for 360°

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

[1)] For length code, see Connection system MOTION-CONNECT.

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Overview



As well as the SINUMERIK MPP 483 IEH, the SINUMERIK Machine Push Button Panel MPP 310 IEH (Machine Push Button Panel, width 310 mm, for Industrial Ethernet with port for Handheld Terminal) offers 8 large long-stroke keys for easy machine operation, and 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 the use with various machines, wherever maximum ergonomics and operation flexibility are required.

An 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 rate 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 840Di sl
- SINUMERIK 840D sl

Technical specifications

	6FC5303-1AF20-8AA1
Product name	SINUMERIK MPP 310 IEH Machine Push Button Panel
Input voltage	24 V DC
Power consumption, max.	25 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	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	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**

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

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SINUMERIK MPP 483

Overview



The SINUMERIK MPP 483 (Machine Push Button Panel, width 483 mm) is available as an expansion to SINUMERIK and PLC-controlled machines. Its modular design and ergonomically arranged control elements permit user-friendly and easy operator control.

The SINUMERIK MPP 483 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 is suitable for use with many different types of machine wherever ergonomics and operating flexibility are priorities. An 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 Machine Push Button Panel offers, for example:

- Emergency stop button (4-wire), latching, tamper-proof
- 8 equipped 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, incl. ribbon cable
- Feed rate override
- Interfaces for 2 handwheels when connected via PROFIBUS DP (function depends on CNC software)
- Communication via MPI/PROFIBUS DP

Expansion facilities:

- 2 spare slots (d = 22.5 mm/0.89 in)
- Spindle override
- Individual adaptation of long-stroke key colors and labeling

Other standard versions:

- SINUMERIK MPP 483 A for mounting applications, without override and with user-assignable and inscribable slide-in labels. Only the 4 keys for mode selection are inscribed.
- SINUMERIK MPP 483 H with port for an external handheld unit. SINUMERIK HT 6 handheld terminal or handheld unit type B-MPI with 2-channel enabling can be connected.
- SINUMERIK MPP 483 HTC with port for a SINUMERIK HT 2/HT 8 handheld terminal

Special versions:

- SINUMERIK MPP 483 S: Special versions are possible comprising different configuration types with various control elements and options, for example with the EKS identification system from Euchner.
- SINUMERIK MPP 483 L: This special version is characterized by a higher masking frame (244 mm/9.61 in) that offers additional mounting space like an integrated expansion frame.

Integration

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

- SINUMERIK 840Di sl/840D sl over PROFIBUS DP

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Technical specifications

Product name	6FC5303-1AF00-0AA1 SINUMERIK MPP 483 Machine Push Button Panel	6FC5303-1AF00-1AA1 SINUMERIK MPP 483 H Machine Push Button Panel	6FC5303-1AF01-0AA1 SINUMERIK MPP 483 A Machine Push Button Panel	6FC5303-1AF00-8AA1 SINUMERIK MPP 483 HTC Machine Push Button Panel
Input voltage	24 V DC			
Power consumption, max.	21 W	35 W	21 W	35 W
Degree of protection according to EN 60529 (IEC 60529)				
• Front	IP54			
• Rear	IP10A			
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).			
Relative 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 (6.10 in)			
• Depth	140 mm (5.51 in) (105 mm (4.13 in) when a PROFIBUS adapter is used)			
Panel cutout				
• Width	451 mm (17.76 in)			
• Height	138 mm (5.43 in)			
Weight, approx.	3 kg (6.62 lb)			
Approvals, according to	cULus			

Selection and ordering data

Description	Order No.
SINUMERIK MPP 483 Machine Push Button Panel	**6FC5303-1AF00-0AA1**
SINUMERIK MPP 483 H Machine Push Button Panel With port for SINUMERIK HT 6 or handheld unit with 4-wire enabling	**6FC5303-1AF00-1AA1**
SINUMERIK MPP 483 A Machine Push Button Panel Without override	**6FC5303-1AF01-0AA1**
SINUMERIK MPP 483 HTC Machine Push Button Panel With port for SINUMERIK HT 2/HT 8 with feed rate override via MPI/PROFIBUS DP	**6FC5303-1AF00-8AA1**

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SINUMERIK MPP 483 IE

Overview



The SINUMERIK MPP 483 IE (Machine Push Button Panel, width 483 mm (19.0 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. An 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 equipped 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, incl. ribbon cable
- Feed rate 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 port 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 version Large is characterized by a higher masking frame (244 mm/9.61 in) that offers additional mounting space like an integrated expansion frame.

Integration

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

- SINUMERIK 840Di sl
- SINUMERIK 840D sl

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Technical specifications

Product name	6FC5303-1AF10-0AA0 SINUMERIK MPP 483 IE Machine Push Button Panel	6FC5303-1AF10-8AA0 SINUMERIK MPP 483 IEH Machine Push Button Panel
Input voltage	24 V DC	
Power consumption, max.	21 W	35 W
Degree of protection according to EN 60529 (IEC 60529)		
• Front	IP54	
• Rear	IP10A	
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative 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 - Rear	 0 … 45 °C (32 ... 113 °F) 0 … 55 °C (32 ... 131 °F)	
Dimensions		
• Width	483 mm (19.02 in)	
• Height	155 mm (6.10 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	cULus	

Selection and ordering data

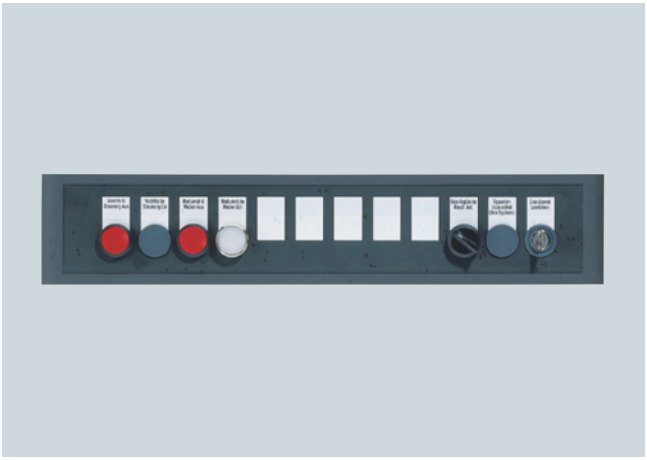
Description	Order No.
SINUMERIK MPP 483 IE **Machine Push Button Panel**	**6FC5303-1AF10-0AA0**
SINUMERIK MPP 483 IEH **Machine Push Button Panel** With port for SINUMERIK HT 2/HT 8	**6FC5303-1AF10-8AA0**

Ordering data for Ethernet or PROFINET can be found under Industrial Ethernet switches – SCALANCE.

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SINUMERIK expansion panel

Overview



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

The expansion panel provides rounded edges for a uniform design with 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 expansion of control elements, see also special versions of MPP 483/MPP 483 IE.

Technical specifications

	6FC5247-0AA43-1AA0
Product name	SINUMERIK expansion panel for MCP 483/MPP 483
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)

Selection and ordering data

Description	Order No.
SINUMERIK expansion panel for MCP 483/MPP 483 Width 19" with 12 slots for 22 mm (0.87 in) control elements, not equipped Mounted using clamps	**6FC5247-0AA43-1AA0**
Accessories	
Set of clamps (9 units) For operating components with 2.5 mm (0.10 in) profile Length: 20 mm (0.79 in)	**6FC5248-0AF14-0AA0**

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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. Your benefit: 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 control devices in plastic and metal for the world market
- Rugged metal control devices: IP67 degree of protection/NEMA 4
- Cost-effective and uniquely identifiable with integral super-bright LED
- Various connection possibilities: screw-type, solder pin or spring-loaded terminals

More information

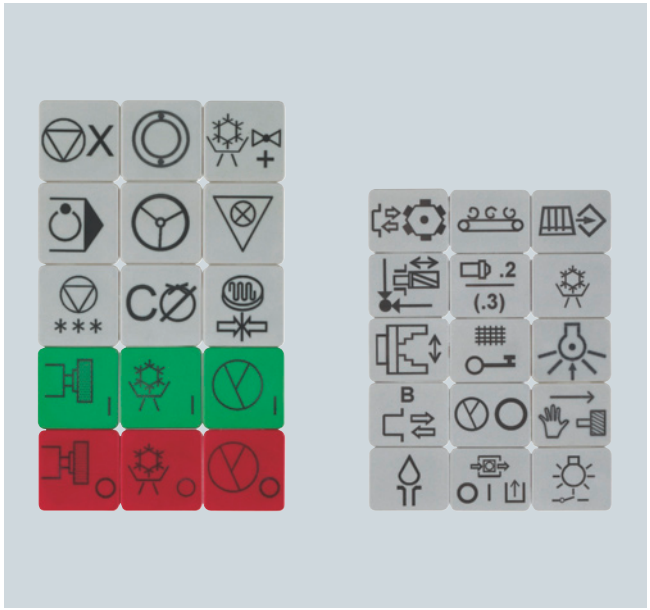
For further information, please contact:

Technical Assistance

Phone: +49 911 895 5900
Fax: +49 911 895 5907
E-mail: technical-assistance@siemens.com
Internet: www.siemens.com/automation/cd

Laser inscription

Overview



High-quality, individual inscription of the mechanical keys on SINUMERIK machine control panels with special symbols 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 laser inscribed products is significantly higher than 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 of the specified companies:

LASERline Teschauer GmbH

Contact: Dipl.-Ing. Margitta Teschauer

Max-Planck-Straße 22b
09114 CHEMNITZ, Germany

Phone: +49 371 3301057
Fax: +49 371 3301058
E-mail: laserline@teschauer.de
Internet: www.teschauer.de

CoReKu

Contact: Mr. Bernhard Krompholz

Im Grünen Winkel 3A
09337 CALLENBERG OT Langenchursdorf, Germany

Phone: +49 37608 128-0
Fax: +49 37608 128-20
E-mail: kontakt@coreku.de
Internet: www.coreku.de

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KBPC CG US standard PC keyboard

Overview



Programs and texts can be edited easily with the compact SINUMERIK 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 840Di sl/840D sl

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

Technical specifications

	6FC5203-0AC01-3AA0
Product name	SINUMERIK KBPC CG US standard PC keyboard
Input voltage	5.25 V DC
Power consumption, max.	0.1 W
Degree of protection according to EN 60529 (IEC 60529)	IP20
Humidity rating based on 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)

Selection and ordering data

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

Keyboard tray

Overview



This extremely stable 19" keyboard tray in anthracite facilitates your work when using a standard external keyboard with an operator panel.

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

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

Technical specifications

	6FC5247-0AA40-0AA0
Product name	Keyboard tray
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 For keyboard, incl. 2 collar screws	**6FC5247-0AA40-0AA0**

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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 keyboard.

Design

Control elements:

- Standard/US QWERTY layout
- 75 mechanical keys
- Alpha block with special characters
- Numeric block with special characters
- Cursor block
- 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 can be used for:

- SINUMERIK 840Di sl/840D sl

Technical specifications

	6FC5203-0AF21-0AA1
Product name	SINUMERIK KB 310C full CNC keyboard
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 (6.10 in)
• Tolerance	+ 1 mm (0.04 in)
Weight, approx.	0.9 kg (1.98 lb)
Approvals, according to	cULus

Selection and ordering data

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

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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 keyboard.

Design

Control elements:

- Standard/US QWERTY layout
- 78 mechanical keys
- Alpha block with special characters
- Numeric block with special characters
- Cursor block
- 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 can be used for:

- SINUMERIK 840Di sl/840D sl

Technical specifications

	6FC5203-0AF20-0AA1
Product name	SINUMERIK KB 483C full CNC keyboard
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	cULus

Selection and ordering data

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

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Dyna Systems full CNC keyboard

Overview



The full CNC membrane keyboards from Dyna Systems 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 block
- CNC function keys with hotkeys for fast selection of the control area

Interface:

- USB 1.1

Integration

Membrane keyboards can be used for:

- SINUMERIK 840Di sl/840D sl

Technical specifications

Product name	Dyna Systems full CNC membrane keyboard
Input voltage	5.25 V DC
Power consumption, max.	0.4 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP65
• Rear	IP00
Humidity rating based on 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 (12.20 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

Dyna Systems GmbH is known for developing innovative, customized control systems. We are experts in solving human-machine communication problems. Are you looking for solutions? We can help!

Dyna Systems GmbH

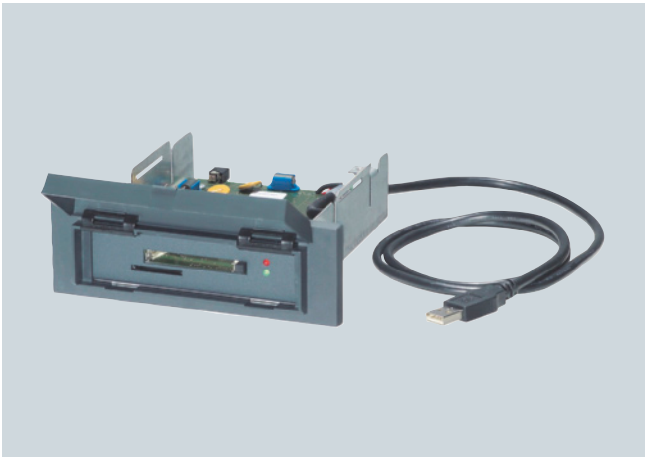
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SINUMERIK card reader USB 2.0

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 provided for archiving and exchange of user data.

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

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

Integration

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

- SINUMERIK PCU 50.3
- SINUMERIK TCU (CF cards only)

Technical specifications

Product name	6FC5335-0AA00-0AA0 SINUMERIK card reader USB 2.0 for CF/SD/MMC memory media
Degree of protection	
• Front	IP54
• Rear	IP00
Relative 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	cULus

Selection and ordering data

Description	Order No.
SINUMERIK card reader USB 2.0 For memory media CF/SD/MMC Incl. connecting cable Length: 1 m (3.28 ft)	**6FC5335-0AA00-0AA0**
Accessories	
1 GB CompactFlash Card Empty	**6FC5313-5AG00-0AA0**
Cover For SINUMERIK floppy disk drive and card reader with masking frame, cover, and bearing bracket	**6FC5247-0AA20-0AA0**

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Overview



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

Integration

The CompactFlash Card is suitable for:

- SINUMERIK 802D sl:
  Additional memory for user data
- SINUMERIK 840Di sl:
  Additional memory for user data
- SINUMERIK 840D sl:
  - For the CNC software of the NCU 710.2/NCU 720.2/NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN
  - Additional memory for user data in the SINUMERIK PCU 50.3

Technical specifications

Product name	6FC5313-5AG00-0AA0 SIMOTION/SINUMERIK 1 GB CompactFlash Card
Degree of protection according to EN 60529 (IEC 60529)	IP20
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage	9 ... 95 %
• Transport	8 ... 95 %
• Operation	8 ... 95 %
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)

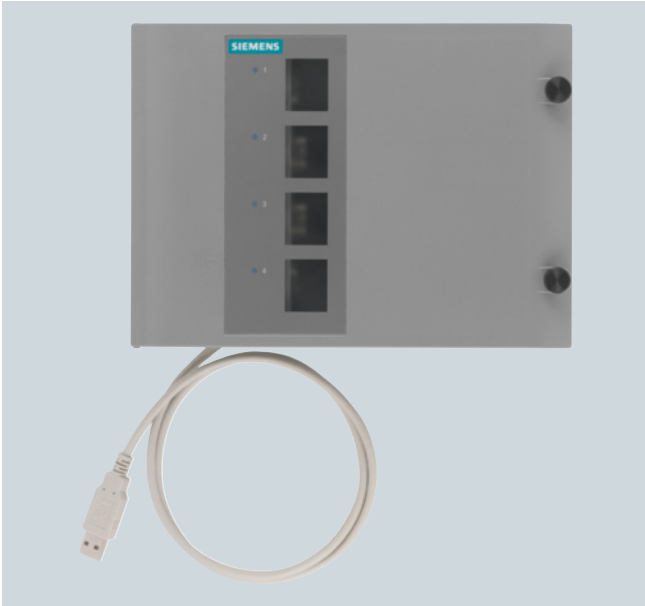
Selection and ordering data

Description	Order No.
1 GB CompactFlash Card Empty	**6FC5313-5AG00-0AA0**

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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 50.3.

USB peripherals can be connected to the operator component and operated via the 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 DIN rail

Integration

The Industrial USB Hub 4 is suitable for connection to:

- SINUMERIK PCU 50.3

Technical specifications

	6AV6671-3AH00-0AX0
Product name	Industrial USB Hub 4
Supply voltage	24 V DC
• Permitted range	+20.4 ... +28.8 V DC
Ports	4 acc. to USB; 500 mA each
Degree of protection according to 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)
Installation cut-out	
• Width	182 mm (7.17 in)
• Height	138 mm (5.43 in)
Weight, approx.	0.5 kg (1.10 lb)

Selection and ordering data

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

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SIMATIC PC USB FlashDrive

Overview



The SIMATIC PC 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 2 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 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
- Automation License Manager V2.0 can be installed.

Application

The SIMATIC PC 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, or it can be used as boot medium, e.g. for SIMATIC PC BIOS Manager, SIMATIC PC Image Creator, or SINUMERIK PCU.

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

Function

- Formatted for boot capability including 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 2 GB
- Simple installation – plug & play, no drivers necessary (except for Windows 98SE)
- 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 PC USB FlashDrive is suitable for:

- SIMATIC PC/PG
- SINUMERIK PCU 50.3

Recommended operating systems:

- Windows 2000/XP

Technical specifications

	6ES7648-0DC40-0AA0
Product name	SIMATIC PC USB FlashDrive
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)

Selection and ordering data

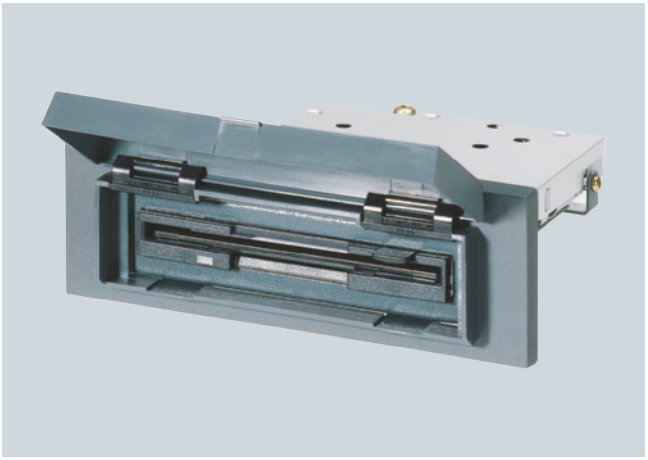
Description	Order No.
SIMATIC PC USB FlashDrive[1)] 2 GB, USB 2.0, metal enclosure, boot capability, incl. SIMATIC PC BIOS Manager	**6ES7648-0DC40-0AA0**

[1)] Subject to export regulations AL: N and ECCN: EAR99H

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SINUMERIK 3.5" floppy disk drive, USB 1.1

Overview



The SINUMERIK 3.5" floppy disk drive, USB 1.1 is suitable for archiving user data and can be installed in front panels. The connection is made via the USB interface.

Function

The SINUMERIK 3.5" floppy disk drive, USB 1.1 is designed for the transfer of user data. Installation in front panels makes it possible to transfer data without opening the control cabinet door. High density (1.2/1.44 MB) 3.5" floppy disks can be used for storing user data.

Integration

The SINUMERIK floppy disk drive, USB 1.1 is suitable for connecting to:

- SINUMERIK PCU 50.3
- SINUMERIK TCU

Technical specifications

	6FC5235-0AA05-1AA2
Product name	SINUMERIK 3.5" floppy disk drive, USB 1.1
Input voltage	5.25 V DC
Power consumption, max.	2.5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• Storage	5 ... 90 %
• Transport	5 ... 95 %
• Operation	20 ... 80 %
Ambient temperature	
• Storage	-20 … +60 °C (-4 ... +140 °F)
• Transport	-40 … +65 °C (-40 … +158 °F)
• Operation	4 … 50 °C (39.2 ... 122 °F)
Distance to PCU/TCU	5 m (16.41 ft)
Dimensions	
• Width	145 mm (5.71 in)
• Height	50 mm (1.97 in)
• Depth	161 mm (6.34 in)
Weight, approx.	0.32 kg (0.71 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
SINUMERIK 3.5" floppy disk drive, USB 1.1 Incl. connecting cable Length: 1 m (3.28 ft)	**6FC5235-0AA05-1AA2**
Accessories	
Cover For SINUMERIK floppy disk drive and card reader with masking frame, cover, and bearing bracket	**6FC5247-0AA20-0AA0**

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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 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, especially 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 equipment 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 at 230 V AC.

Selection and ordering data

Description	Order No.
Industrial Ethernet Switch SCALANCE XB005 unmanaged With 5 × 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 × 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 × 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 × 10/100 Mbit/s RJ45 ports for configuring line, 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 housing and integrated insulation displacement contacts; with 180° cable outlet	**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. quantity 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. quantity 1000 m (3281 ft), minimum order quantity 20 m (65.62 ft)	**6XV1840-3AH10**

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 in the Siemens Industry Mall.

www.siemens.com/industrymall

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Technical specifications

	6GK5005-0BA00-1AB2	6GK5005-0BA00-1AA3	6GK5108-0BA00-2AA3	6GK5208-0BA10-2AA3	6GK5208-0HA00-2AA6
Product name	SCALANCE XB005	SCALANCE X005	SCALANCE X108	SCALANCE X208	SCALANCE X208PRO
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 voltage supply	–	–	1	1	1
• Voltage supply	1	1	1	1	1
Design of electrical connection					
• Signaling contact	–	–	2-pin terminal block		5-pin M12 interface
• Network components or terminals	RJ45 port	RJ45 socket (10/100 Mbit/s; TP)			4-pin M12 sockets (10/100 Mbit/s; D-coded)
• Voltage supply	3-pin terminal block	2-pin terminal block	4-pin terminal block		4-pin M12 interface
Design of the swap medium C-Plug	–	No	No	Yes	Yes
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
Ambient temperature					
• Storage	-40 … +80 °C (-40 ... +176 °F)			-40 °C … +70 °C (-40 ... +158 °C)	-40 °C … +80 °C (-40 ... +176 °C)
• Transport	-40 … +80 °C (-40 ... +176 °F)			-40 °C … +70 °C (-40 ... +158 °C)	-40 °C … +80 °C (-40 ... +176 °C)
• Operation	-10 °C … +60 °C (14 ... 140 °F)	0 °C … 65 °C (32 ... 149 °F)	-20 °C … +70 °C (-4 ... +158 °C)	-20 °C … +60 °C (-4 ... +140 °C)	-20 °C … +70 °C (-4 ... +158 °C)
Relative 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)
Type of mounting	DIN rail	DIN rail, S7-300 mounting rail, wall mounting			
Degree of protection	IP20	IP30	IP30	IP30	IP65
Approvals, according to	CSA, UL				

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Overview



Rittal command panel systems are manufactured with exact dimensions for any combination of SINUMERIK operator components and are ready for installation. Optimum installation of the operator components is assured thanks to the customized dimensions. 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 of 155 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/150 mm (1.97 in/3.94 in/5.91 in)
- 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 can be set to any value between 80° and 155°
- Continuous T slot for flexible internal design
- Rear panel screwed or hinged

Overview (continued)

Rittal Comfort Panel – Functional and safe

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 of 74 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 can be set to any value between 88° and 136°, with toothed wheel adjustable in increments of 8°; can be tilted upwards after use to save space where necessary
- 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/configurators

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

You will find comprehensive information in the Rittal Manual and News 2009. These can be ordered direct from Rittal, or you can contact your Rittal technical consultant.

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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 CNC full 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

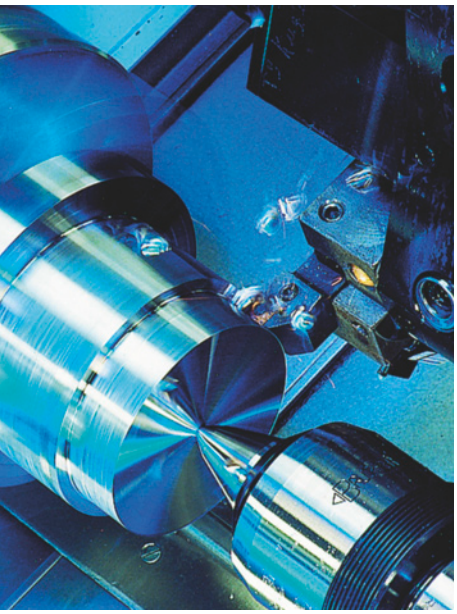
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HMI software for CNC controls

4



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4/34 TDI Ident Connection

4/35 MDA – Machine Data Acquisition
4/36 MDA Cell
4/38 MDA IFC
4/38 MDA Machine

4/40 RPC – Remote Procedure Call (computer coupling)

4/41 TPM – Total Productive Maintenance

4/42 RCS – Remote Control System
4/43 RCS Host/RCS Viewer
4/44 RCS Host/RCS Viewer Embedded
4/45 RCS Commander

4/46 ADDM – Data Management

Part 11 ePS Network Services

4/48 Tools
4/48 SIMATIC STEP 7 for SINUMERIK hardware
4/48 SinuCom
4/50 SinuCom Update Agent

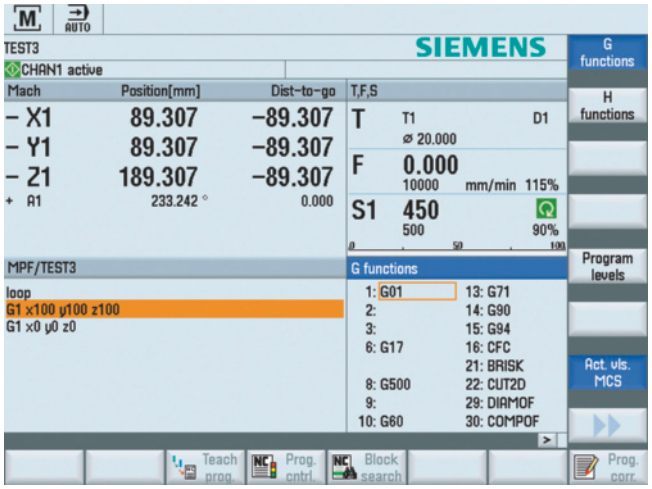
Part 11 SINUMERIK Solution Partners

The software options with order numbers 6FC5800-0A...-0YB0 can also be ordered in combination with the CNC software using order codes.

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SINUMERIK Operate operating software

Overview



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

- Machine operation
- Programming
- Diagnostics
- Commissioning

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 with Animated Elements. The integrated powerful 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.

The user interface can be modified or redesigned easily.

Benefits

- Clear structures:
  - Clearly divided operating areas with horizontal and vertical softkeys
  - Only a few keystrokes take the user to any screen forms for operator control and programming
- Always helpful:
  - Cursor texts are shown for every text box of the screen forms
  - Animated Elements
  - Further integrated auxiliary information
- Open for:
  - Customer-defined screens
  - Own operating philosophies and concepts

Function

- Modern text editor with many helpful functions
  - Very fast creation of flexible part programs
- 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 machining step programming with ShopMill/ShopTurn (option)
- Support of swivel heads and swivel tables
- 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 a tool magazine
  - More than 3 tool magazine tables (option)
- Access to external programs through
  - Network drives
  - USB and COM interfaces
- Integrated configuration for user-defined screens with SINUMERIK Operate Easy Screen (option)
- Implementation of own operating philosophies and concepts with
  - SINUMERIK Operate programming package
  - Software library Qt
  - Microsoft development tool Visual Studio 2008 (C++)
- Support of the entire workflow
  - Setting up tools
  - Setting up, programming, simulating, and positioning of workpieces
  - Monitoring of machining

Integration

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

- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN

The separate SINUMERIK Operate operating software can be used with:

- SINUMERIK PCU 50.3
- PC with Windows XP operating system

For ordering data of the basic components, see SINUMERIK 840D sl and SINUMERIK PCU 50.3.

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Selection and ordering data

Description	Order No.
SINUMERIK Operate operating software For SINUMERIK PCU 50.3 Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5860-1YF00-0YB0**
• Single license on DVD-ROM for current software version	**6FC5860-1YC00-0YA0**
• Single license on DVD-ROM for specific software version	**6FC5860-1YC2■-■YA0**
• Without license on DVD-ROM Specific software version	**6FC5860-1YC2■-■YA8**
• Software update service	**6FC5860-1YP00-0YL8**
SINUMERIK Operate operating software For PC with Windows XP Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5860-2YF00-0YB0**
• Single license on DVD-ROM for current software version	**6FC5860-2YC00-0YA0**
• Single license on DVD-ROM for specific software version	**6FC5860-2YC2■-■YA0**
• Without license on DVD-ROM Specific software version	**6FC5860-2YC2■-■YA8**
• Software update service	**6FC5860-2YP00-0YL8**
Language extensions[1)] On DVD-ROM Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Slovak, Swedish, Turkish	**6FC5860-0YC■■-■YA8**
• Without license Specific software version	
Additional languages Use of language extensions Software option	**6FC5800-0AN00-0YB0**
• Single license without data carrier	

Example of specific software version, e.g. 2.6:
6FC5860-3YG2**0**-**2**YA0

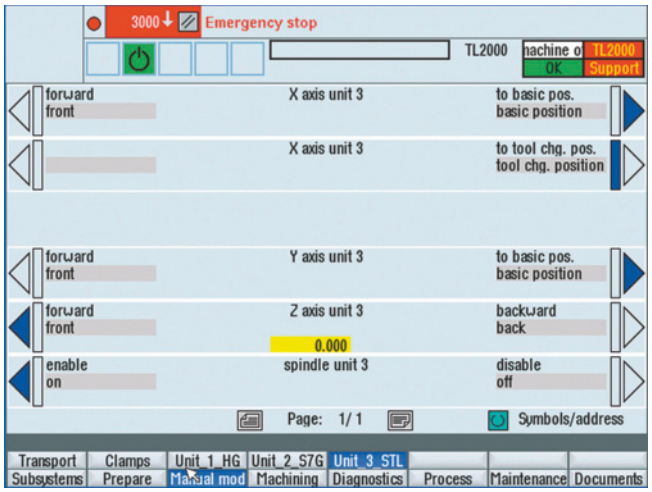
Description	Order No.
HMI user memory Additional on CF card of NCU Software option	**6FC5800-0AP12-0YB0**
• Single license without data carrier	
Residual material detection and machining for contour pockets and cutting Software option	**6FC5800-0AP13-0YB0**
• Single license without data carrier	
ShopMill/ShopTurn Machining step programming Software option	**6FC5800-0AP17-0YB0**
• Single license without data carrier	
Simultaneous recording of current machining Real-time simulation of current machining Software option	**6FC5800-0AP22-0YB0**
• Single license without data carrier	
3D simulation 1 Machined part simulation Software option	**6FC5800-0AP25-0YB0**
• Single license without data carrier	
SINUMERIK Operate runtime license OA Easy Screen Configuration for user-defined screens Software option	**6FC5800-0AP64-0YB0**
• Single license without data carrier	
SINUMERIK Operate runtime license OA programming Software option	**6FC5800-0AP60-0YB0**
• Single license without data carrier	
Operator control without SINUMERIK operator panel Software option	**6FC5800-0AP00-0YB0**
• Single license without data carrier	

[1)] Please inquire about available software versions.

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TRANSLINE HMI for SINUMERIK 840D sl

Overview



TRANSLINE HMI for SINUMERIK 840D sl is the machine user interface for operator control and monitoring tasks in large-scale production, for example in transfer lines, machining centers, and assembly lines. TRANSLINE HMI standardizes the operation of machines with diverse tasks and technologies by means of operator screen forms and a parameterizable navigation menu.

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

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

Prepared diagnostics functions support rapid fault 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.

HMI PRO sl RT can run on the embedded platform on SINUMERIK 840D sl and SINUMERIK PCU 50.3/PCU 321. HMI Lite CE is available for the Windows CE-based SIMATIC Panels MP277 (10"), OP/TP 277 (6") and OP/TP 177B.

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 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 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 CE

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

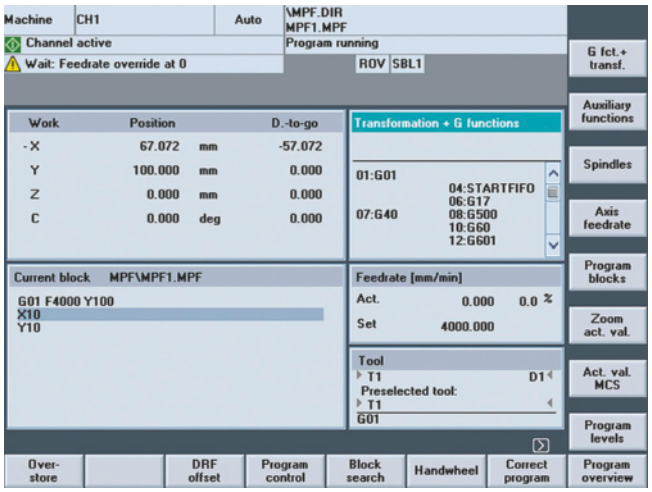
Selection and ordering data

Description	Order No.
HMI PRO sl RT	
For SINUMERIK 840D sl and SINUMERIK PCU 50.3/PCU 321	
Runtime software including configuration software Languages: English, German	
• Single license without data carrier	**6FC5800-0AP47-0YB0**
• Without license on CD-ROM Current software version	**6FC5867-3YC00-0YA8**
• Without license on CD-ROM Specific software version	**6FC5867-3YC2■-■YA8**
HMI Lite CE	
Runtime software Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license for current software version	**6FC5263-0PY11-0AG0**
• Single license for specific software version	**6FC5263-■PY11-■AG0**
• Single license without data carrier	**6FC5263-0PY11-0AG1**

Example of a specific software version, e.g. HMI PRO sl RT 2.5: 6FC5867-3YC22-5YA8

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Overview



The HMI-Advanced software is a technology-independent, multi-channel operating software for machine tools. The software supports convenient and complete window-oriented operation of machines.

The text editor provides easy-to-use, screen form-based support. The powerful contour calculator enables programming and graphic display of complex workpiece contours. Part programs can be rapidly checked using the integral 2D/3D simulation for turning and milling.

Function

You can modify or redesign the graphical user interface easily:

Using the integral editor, the graphical user interface can be extended in the basic version by up to 20 screens via predefined softkeys.

Using these softkeys, it is possible to import machine-specific screen forms, screens or function trees. Programming support, such as cycle support, can be modified or extended with the Expand User Interface function. Configuring takes place using simple text files.

Using the SINUMERIK HMI configuration package WinCC flexible 2008, you can configure screens graphically, quickly and easily.

The SINUMERIK HMI programming package (with extensive online documentation) enables you to develop your own operating philosophies and concepts using the Microsoft Visual Studio 6 development tool or Visual C++ and the HMI basic software. In order to use one or more of these options, it is necessary to have the SINUMERIK HMI copy license OA option for each SINUMERIK PCU. When using the integral editor, this is only necessary from the 21st screen onwards.

Integration

The SINUMERIK software HMI-Advanced can be used with:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN
  with SINUMERIK PCU 50.3

Preconditions for HMI-Advanced on PC/PG:

- IBM-compatible PC, Pentium 1.2 GHz or better
- RAM: at least 512 MB
- Windows XP operating system
- Industrial Ethernet

Selection and ordering data

Description	Order No.
HMI-Advanced	
Incl. technology cycles for drilling, milling and turning and the commissioning tool for SINAMICS S120[1] and SIMODRIVE 611 digital	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
For SINUMERIK PCU 50.3	
• Single license without data carrier	**6FC5253-0BX10-0AG1**
• Single license on DVD-ROM for specific software version	**6FC5253-7BX10-■AG0**
• Software update service	**6FC5253-0BX10-0AG2**
• Update on order of specific software version	**6FC5253-7BX10-■AG3**
For PC/PG	
• Single license without data carrier	**6FC5253-0BX40-0AG1**
• Single license on DVD-ROM for specific software version	**6FC5253-7BX40-■AG0**
• Software update service	**6FC5253-0BX40-0AG2**
• Update on order of specific software version	**6FC5253-7BX40-■AG3**
Language extensions[2]	
On DVD-ROM	
Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Slovak, Swedish, Turkish	
• Without license Specific software version	**6FC5253-7BX10-■XG8**
Additional languages	**6FC5800-0AN00-0YB0**
Use of language extensions Software option	
• Single license without data carrier	
Managing of up to 4 additional network drives	**6FC5800-0AP01-0YB0**
Via Ethernet Software option	
• Single license without data carrier	
SINUMERIK HMI copy license OA and Expand User Interface from the 21st screen	**6FC5800-0AP02-0YB0**
Software option	
• Single license without data carrier	

Example of specific software version, e.g. 7.5:
6FC5253-**7**....-**5**...

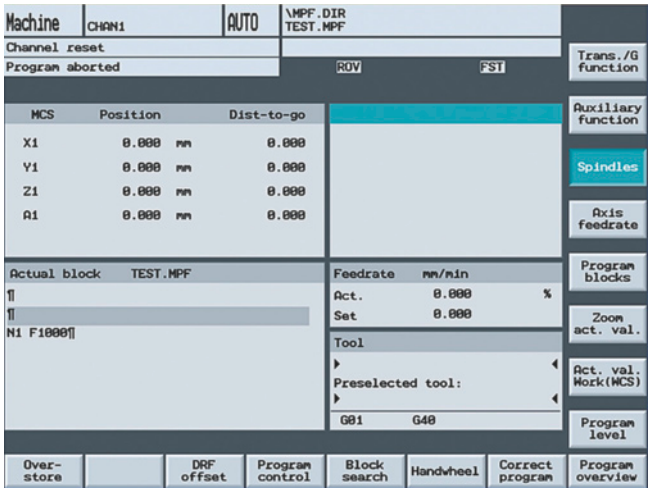
[1] HMI-Advanced SW Version 7.1 and higher.

[2] Please inquire about available software versions.

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HMI-Embedded

Overview



The HMI-Embedded software is technology-independent, multi-channel operating software for machine tools and executes on an embedded operating system. The software supports convenient and complete window-oriented operation of machines.

The generation of part programs is assisted by a text editor which provides easy-to-use, screen form-based support. The powerful contour calculator enables programming and graphic display of complex workpiece contours.

Function

Part programs can be rapidly checked using the 2D simulation for turning. An easy-to-use milling simulation is optionally available.

The graphical user interface can be expanded in the basic version by up to 20 screens via predefined softkeys without additional software.

Using these softkeys, it is possible to import machine-specific screen forms, screens or function trees. Programming support, such as cycle support, can be modified or extended with the Expand User Interface function. Configuring takes place using simple text files.

The user interface can be expanded by more than 20 screens using the integral editor at specific predefined softkeys with a SINUMERIK HMI copy license OA (option).

The HMI-Embedded software is an integral part of the CNC software for NCU 710.2/NCU 720.2/NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN.

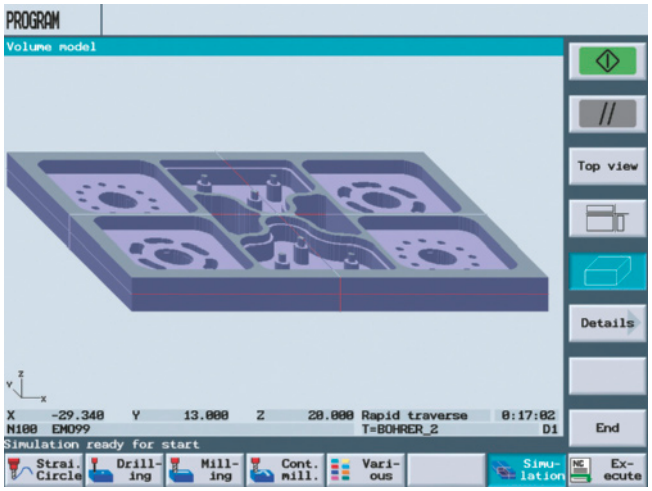
Selection and ordering data

Description	Order No.
Simulation of milling multiple sides 2D dynamic, 3D static Software option • Single license without data carrier	**6FC5800-0AP21-0YB0**
SINUMERIK HMI copy license OA and Expand User Interface from the 21st screen Software option • Single license without data carrier	**6FC5800-0AP02-0YB0**
Language extensions[1)] On DVD-ROM Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Swedish, Turkish • Without license Specific software version	**6FC5253-7BX10-■XG8**
Additional languages Use of language extensions Software option • Single license without data carrier	**6FC5800-0AN00-0YB0**
Managing of up to 4 additional network drives Via Ethernet Software option • Single license without data carrier	**6FC5800-0AP01-0YB0**

1) Please inquire about available software versions.

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Overview



ShopMill is an operating and programming software for milling machines. It permits user-friendly operation of the machine and simple programming of workpieces.

ShopMill includes a complete CNC solution for milling in the workshop area.

ShopMill can be used on single-channel versions of vertical or universal milling machines with up to 12 axes (including rotary axes and spindles). Of the 12 axes, 3 linear and 2 rotary axes plus 1 spindle can be displayed simultaneously. In addition to an extensive cycle package, ShopMill offers a host of practice-oriented setup functions, e.g. workpiece or tool measurement, and functions for data handling.

ShopMill features a transparent, user-friendly tool management function. To use this function, it must be integrated into the PLC program of the machine.

ShopMill supports 3 different programming methods:

- Import G code programs that are generated externally, e.g., mold-making programs, from CAD/CAM systems.
- G code programs that can be created directly at the machine. In G code programming, all technology cycles can be used.
- Machining step programs that are created directly on the machine (available as an option).
  The workpiece can be programmed easily because programming is graphically supported and no knowledge of G codes is required. ShopMill displays the program as a clear, understandable work plan and presents the individual cycles and contour elements in a dynamic graphical display.

With the SINUMERIK PCU 50.3, the HMI-Advanced areas Utilities, Parameters, Diagnostics and Startup are permanently integrated into ShopMill. The solutions for Open Architecture or Solution Partner applications can, therefore, be used from ShopMill.

A PC version of ShopMill (for training purposes, for example) is available (see SinuTrain).

Benefits

- Clear program presentation in the machining step program (option)
- Dynamic input graphics for contour elements and cycles
- Adaptation of the traversing paths of the tool while taking into account the workpiece contour and obstacles
- High-performance contour calculator for the input of a free contour
- Support of swivel heads and swivel tables
- Individual cycles and user screens can be integrated.

Function

- Machining step programming (option)
- ShopMill tool management
- Simultaneous recording (option)
- Residual material recognition and machining for contour pockets (option)
- 3D graphics of the finished part
- Multiple clamping of identical workpieces with optimization of the tool sequence
- Multiple clamping of different workpieces with optimization of the tool sequence (option)
- A swivel cycle supports multiface machining and machining of sloping surfaces independently of the machine kinematics (swivel table/swivel head).
- Shopfloor-oriented cycles for milling, drilling, and measuring
- Access to external programs through network interfacing or CF card (option)

Integration

The SINUMERIK software ShopMill can be used with:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN with SINUMERIK PCU 50.3
- SINUMERIK operator panel fronts:
  OP 08T/OP 010/OP 010C/OP 010S/OP 012/
  OP 015/OP 015A/OP 015AT

The ShopMill software is an integral part of the CNC software 1.x for NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/ NCU 730.2 PN. ShopMill for SINUMERIK PCU 50.3 is supplied on the DVD-ROM of the corresponding CNC software. For ordering data, see SINUMERIK 840Di sl/840D sl.

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ShopMill

ShopTurn

Selection and ordering data

Description	Order No.
Machining step programming Software option • Single license without data carrier	**6FC5800-0AP04-0YB0**
Residual material detection and machining for contour pockets and cutting Software option • Single license without data carrier	**6FC5800-0AP13-0YB0**
Multiple clamping of various workpieces Software option • Single license without data carrier	**6FC5800-0AP14-0YB0**
ShopMill simultaneous recording Real-time simulation of current machining Software option • Single license without data carrier	**6FC5800-0AP23-0YB0**
Language extensions[1)] On DVD-ROM Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Swedish, Turkish • Without license Specific software version	**6FC5253-7BX10-■XG8**
Additional languages Use of language extensions Software option • Single license without data carrier	**6FC5800-0AN00-0YB0**

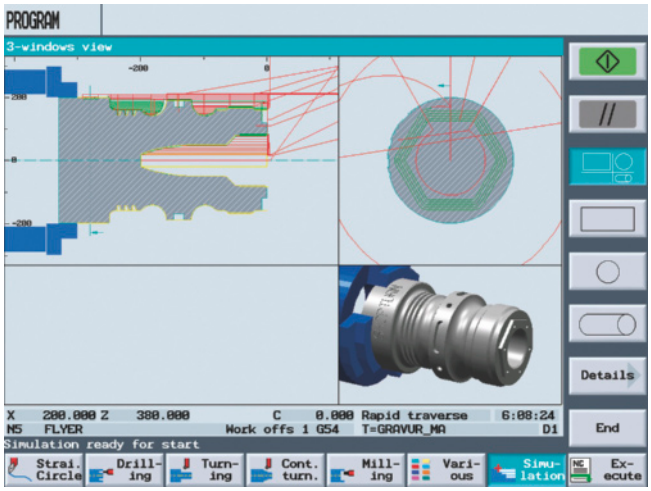
Example of specific software version, e.g. 7.5:
6FC5253-**7**....-**5**...

More information

Additional information is available in the Internet under:

www.siemens.com/jobshop

Overview



ShopTurn is an operating and programming software for single-slide turning machines. It permits user-friendly operation of the machine and simple programming of workpieces.

ShopTurn includes a complete CNC control solution for turning in the workshop area.

In addition to an extensive cycle package, ShopTurn offers a host of practice-oriented setup functions, e.g. workpiece or tool measurement, and functions for data handling.

ShopTurn can be used on single-channel versions of single-slide turning machines with up to 12 axes (including rotary axes and spindles). Of the 12 axes, 6 axes plus 1 spindle can be displayed simultaneously. ShopTurn also supports machine extensions with C axes, Y axis, counterspindle and swivel-mounted B axis.

ShopTurn features a transparent, user-friendly tool management function. To use this function, it must be integrated into the PLC program of the machine.

ShopTurn supports 3 different programming methods:

- Import G code programs that are generated externally, e.g. from CAD/CAM systems
- G code programs that can be created directly at the machine. In G code programming, all technology cycles can be used.
- Machining step programs that are created directly on the machine (available as an option)
  The workpiece can be programmed easily because programming is graphically supported and no knowledge of G codes is required. ShopTurn displays the program as a clear, understandable work plan and presents the individual cycles and contour elements in a dynamic graphic.

The Manual machine function provides operating functions such as turning with an intermediate switch. Individual machining cycles can be executed directly without the need to create a CNC program. This can be used to operate cycle-controlled turning machines with machining in front of the center of rotation.

With the SINUMERIK PCU 50.3, the HMI-Advanced areas Utilities, Parameters, Diagnostics and Startup are permanently integrated into ShopTurn. The solutions for Open Architecture or Solution Partner applications can, therefore, be used from ShopTurn.

A PC version of ShopTurn, e.g. for training purposes, is available (see SinuTrain).

1) Please inquire about available software versions.

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Benefits

- Clear program presentation in the machining step program (option)
- Easy operation for manual turning functions
- Dynamic input graphics for contour elements and cycles
- High-performance contour calculator for the input of a free contour
- Automatic generation of the approach and departure movements depending on the tool position and the type of machining
- Individual cycles and user screens can be integrated

Function

- Machining step programming (option)
- Manual machine (option)
- ShopTurn tool management
- Simultaneous recording (option)
- Residual material detection and machining for contour pockets and cutting (option)
- 3D simulation of the finished part (option)
- Travel to fixed stop (option) when using the counterspindle
- Synchronous spindle (option) when using the counterspindle
- Transmit and peripheral surface transformation (option) when using driven tools
- Access to external programs through network interfacing or CF card (option)

Integration

The SINUMERIK software ShopTurn can be used with:

- SINUMERIK 840Di sl
- SINUMERIK 840D sl:
  NCU 710.2/NCU 720.2/NCU 720.2 PN/
  NCU 730.2/NCU 730.2 PN
  with SINUMERIK PCU 50.3
- SINUMERIK operator panel fronts:
  OP 08T/OP 010/OP 010C/OP 010S/OP 012/
  OP 015/OP 015A/OP 015AT

The ShopTurn software is an integral part of the CNC software 1.x for NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/ NCU 730.2 PN. ShopTurn for SINUMERIK PCU 50.3 is supplied on the DVD-ROM of the corresponding CNC software. For ordering data, see SINUMERIK 840Di sl/840D sl.

More information

Additional information is available in the Internet under:

www.siemens.com/jobshop

Selection and ordering data

Description	Order No.
Machining step programming Software option • Single license without data carrier	**6FC5800-0AP04-0YB0**
Manual machine ShopTurn manual Software option • Single license without data carrier	**6FC5800-0AP11-0YB0**
Residual material detection and machining for contour pockets and cutting Software option • Single license without data carrier	**6FC5800-0AP13-0YB0**
3D simulation of the finished part Software option • Single license without data carrier	**6FC5800-0AP20-0YB0**
ShopTurn simultaneous recording Real-time simulation of current machining Software option • Single license without data carrier	**6FC5800-0AP24-0YB0**
Traversing to fixed stop with Force Control Use of counterspindle Software option • Single license without data carrier	**6FC5800-0AM01-0YB0**
Synchronous spindle/ multi-edge turning COUP Use of counterspindle Software option • Single license without data carrier	**6FC5800-0AM14-0YB0**
Transmit and peripheral surface transformation Use of driven tools Software option • Single license without data carrier	**6FC5800-0AM27-0YB0**
Language extensions[1] On DVD-ROM Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Swedish, Turkish • Without license Specific software version	**6FC5253-7BX10-■XG8**
Additional languages Use of language extensions Software option • Single license without data carrier	**6FC5800-0AN00-0YB0**

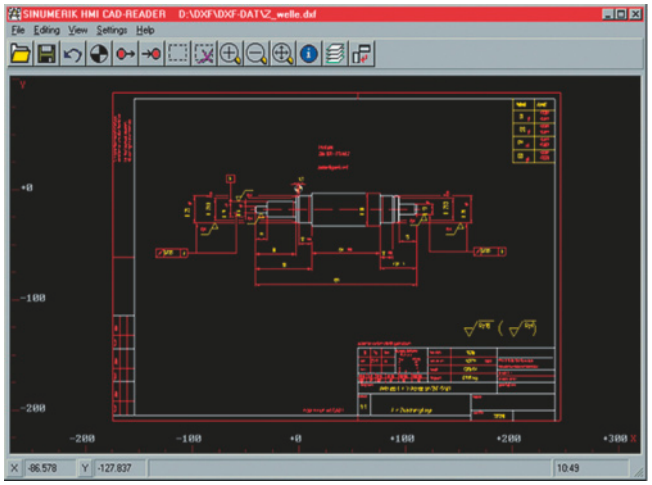
Example of specific software version, e.g. 7.5:
6FC5253-**7**....-**5**...

[1] Please inquire about available software versions.

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CAD Reader

Overview



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

Function

- Importing of DXF files
- Suppressing of graphic layers
- Automatic contour tracing
- Any workpiece zero per extracted contour/drilling pattern
- Several contours/drilling patterns can be extracted simultaneously
- 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 with:

- SINUMERIK 840Di sl/840D sl

Preconditions:

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

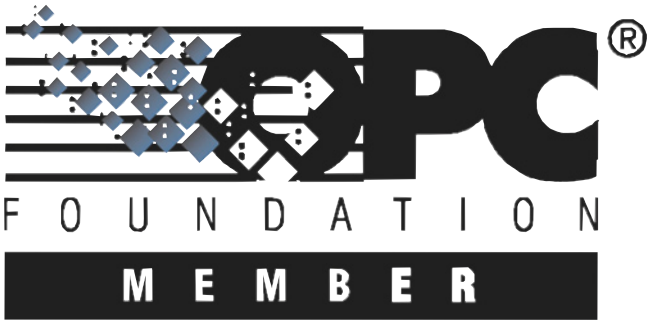
Selection and ordering data

Description	Order No.
CAD Reader for PC	
Including documentation	
Languages: English, German	
• Single license without data carrier	**6FC5260-0AY00-0AG1**
• Single license with CD-ROM for current software version	**6FC5260-0AY00-0AG0**
• Single license with CD-ROM for specific software version	**6FC5260-■AY00-■AG0**
• Software update service	**6FC5260-0AY00-0AG2**
• ServicePack on order of specific software version	**6FC5260-■AY00-■AG8**

Example of specific software version, e.g. 6.2:
6FC5260-**6**....-**2**...

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Overview



HMI openness provides OEMs with the option of achieving their own look and for implementing their own operating and display functions.

This openness is available in combination with the SINUMERIK HMI programming package and the SINUMERIK HMI configuring package.

Application

	SINUMERIK Operate user interface	Preconditions
SINUMERIK Operate programming package	SINUMERIK Operate NCU 710.2/ NCU 720.2/ NCU 720.2 PN NCU 730.2/ NCU 730.2 PN PCU 50.3	SINUMERIK Operate runtime license OA programming
SINUMERIK Operate Easy Screen		SINUMERIK Operate runtime license OA Easy Screen

	SINUMERIK HMI user interface	Preconditions
SINUMERIK HMI programming package V7.x	HMI-Advanced	SINUMERIK HMI copy license OA
SINUMERIK HMI configuring package WinCC flexible 2008	HMI-Advanced	SINUMERIK HMI copy license OA
SINUMERIK HMI expanded user interface	HMI-Advanced HMI-Embedded	SINUMERIK HMI copy license OA

One SINUMERIK HMI copy license CE is required per control in order to use OEM applications on the SIMATIC CE Panels.

Always subject to conclusion of an OEM contract.

Function

SINUMERIK HMI programming package/ SINUMERIK Operate programming package

The SINUMERIK HMI programming package enables the development of high-level language applications based on the Visual Basic and Visual C++ programming languages in HMI-Advanced with the SINUMERIK PCU 50.3.

The SINUMERIK Operate programming package allows high-level language applications to be developed in the programming language C++ for the SINUMERIK Operate user interface.

Benefits

- Integration of user interfaces in HMI-Advanced with the SINUMERIK PCU 50.3
- Integration of user interfaces in the CNC software with SINUMERIK Operate for NCU with NCU 710.2/NCU 720.2/NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN
- User interfaces for stand-alone execution (without HMI-Advanced)
- Supports Microsoft COM and OPC interfaces (only in conjunction with HMI-Advanced)

Note
To develop your own applications, you need to run the software version of the SINUMERIK HMI programming package that matches the HMI-Advanced or SINUMERIK Operate on the target hardware.

Example: HMI-Advanced V7.5.x requires the SINUMERIK HMI programming package V7.5.

SINUMERIK HMI configuring package

With the SINUMERIK HMI configuring package, 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 then possible to generate user interfaces, which can be integrated into HMI-Advanced, or which can be used autonomously, i.e., executed without HMI-Advanced, and which use the communications interfaces of the SINUMERIK.

The graphics-supported engineering tool SIMATIC WinCC 2008 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 to integrate user interfaces in HMI-Advanced with SINUMERIK PCU 50.3.

Benefits

- Integration of user interfaces in HMI-Advanced with the SINUMERIK PCU 50.3
- User interfaces for stand-alone execution (without HMI-Advanced)
- Integration of user interfaces in SIMATIC HMI Panels of the 170 or 270 series and the MP 370 on a SINUMERIK control

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

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HMI Open Architecture

Function (continued)

SINUMERIK HMI copy license OA

The SINUMERIK HMI copy license OA permits execution of the user's own HMI Open Architecture applications on the SINUMERIK PCU 50.3 or on a PC/PG on the SINUMERIK control that were created using the

- SINUMERIK HMI programming package or
- SINUMERIK HMI configuring package WinCC flexible 2008 or
- Expand User Interface > 20 configured screens (integrated into HMI-Advanced and HMI-Embedded) or
- OPC (OLE for Process Control) openness to higher-level systems thanks to standardized OPC interface

An expansion of the TRANSLINE HMI PRO user interface with individual applications that have been created with WinCC flexible also requires the SINUMERIK HMI copy license OA on the SINUMERIK control.

SINUMERIK Operate runtime license OA programming

HMI Open Architecture applications that have been created with the SINUMERIK Operate programming package itself can run on the NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN with the SINUMERIK Operate runtime license OA programming.

SINUMERIK HMI copy license CE

The SINUMERIK HMI copy license CE allows users to run their own HMI Open Architecture 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 copy license CE 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. apply tool, CNC start/stop and other PI utilities
- Alarms and messages in plain text

The SIMATIC panels below can be connected via PROFIBUS or Ethernet depending on which interface is provided on the panel:

- 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 Operate runtime license OA Easy Screen

The software SINUMERIK Operate runtime license OA Easy Screen permits the integrated configuration for user-created HMI Open Architecture applications on the NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN and SINUMERIK PCU 50.3. With the software SINUMERIK Operate runtime license OA Easy Screen, expansions in the operating areas (e.g. machine, parameters) can be implemented as a complete operating area for cycle support (ProgramGUIDE).

Integration

Preconditions:

- SINUMERIK 840Di sl/840D sl
- SINUMERIK PCU 50.3 in conjunction with HMI-Advanced/ SINUMERIK Operate operating software, or NCU/TCU in conjunction with HMI-Embedded or SINUMERIK Operate operating software
- SINUMERIK operator panels:
  OP 010/OP 010S/OP 010C/OP 012/
  OP 015/OP 015A/OP 015AT/TP 015A/TP 015AT
- SIMATIC CE panels:
  OP 170B/OP 177B/TP 170B/TP 177B/Mobile Panel 170/
  Mobile Panel 177/Mobile Panel 277/MP 277/MP 370/MP 377
- Programming of SINUMERIK user interfaces
  - SINUMERIK HMI programming package (for HMI-Advanced) or
  - SINUMERIK Operate programming package
  - License code for Qt from Nokia Trolltech (for SINUMERIK Operate programming package only)
- Configuring of SINUMERIK user interfaces
  - SINUMERIK HMI configuring package WinCC flexible 2008
  - SIMATIC WinCC flexible 2008 Advanced
- One SINUMERIK HMI copy license OA is required per CNC in order to use supplementary software in HMI-Advanced on the SINUMERIK PCU 50.3.
- One SINUMERIK Operate runtime license OA programming is required per CNC in order to use supplementary programmed software and SINUMERIK Operate on the SINUMERIK PCU 50.3.
- One SINUMERIK Operate runtime license OA programming or SINUMERIK Operate runtime license OA Easy Screen is required per NCU in order to use supplementary software on the NCU.
- One SINUMERIK HMI copy license CE is required in order to use OEM applications on the SIMATIC CE panels.

Always subject to conclusion of an OEM contract.

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Selection and ordering data

Engineering system – SINUMERIK Operate

Description	Order No.
SINUMERIK Operate programming package	
Runtime system languages: Chinese Simplified, English, French, German, Italian, Spanish	
Engineering system languages: English, German	
• 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**
• Upgrade for specific software version	**6FC5861-1YC■■-■YA8**
Qt license code	**Nokia-Trolltech**
For SINUMERIK Operate programming package	

Example of specific software version, e.g. 2.5:
6FC5861-1YC**20**-**2**...

Engineering system – HMI-Advanced

Description	Order No.
SINUMERIK HMI programming package	
Incl. HMI-Advanced operating software for PC/PG for SINUMERIK 810D/840D/ 840Di sl/840D sl	
Runtime system languages: Chinese Simplified, English, French, German, Italian, Spanish	
Engineering system languages: English, German	
• Single license on DVD-ROM for current software version incl. Automation Value Card with 400 credits	**6FC5253-0BX20-0AG0**
• Single license on DVD-ROM for specific software version incl. Automation Value Card with 400 credits	**6FC5253-■BX20-■AG0**
• Single license without data carrier	**6FC5253-0BX20-0AG1**
• Software update service	**6FC5253-0BX20-0AG2**
• Upgrade for specific software version	**6FC5253-■BX20-■AG3**

Example of specific software version, e.g. 7.6:
6FC5253-**7**BX20-**6**...

Engineering system – HMI-Advanced

Description	Order No.
SINUMERIK HMI configuring package WinCC flexible 2008	
Incl. HMI-Advanced operating software for PC/PG for SINUMERIK 810D/840D/ 840Di sl/840D sl	
Runtime system languages: supports all HMI runtime system languages	
Engineering system languages: English, French, German, Italian, Spanish	
• Single license on CD-ROM for current software version incl. Automation Value Card with 400 credits	**6FC5253-0CX25-0AG0**
• Single license on CD-ROM for specific software version incl. Automation Value Card with 400 credits	**6FC5253-■CX25-■AG0**
• Single license without data carrier	**6FC5253-0CX25-0AG1**
• Software update service	**6FC5253-0CX25-0AG2**
• Upgrade for specific software version	**6FC5253-■CX25-■AG3**
Visualization systems	
SIMATIC WinCC flexible 2008 Compact	**6AV6611-0AA51-3CA5**
Engineering software on DVD-ROM	
• Floating license	
SIMATIC WinCC flexible 2008 Standard	**6AV6612-0AA51-3CA5**
Engineering software on DVD-ROM	
• Floating license	
SIMATIC WinCC flexible 2008 Advanced	**6AV6613-0AA51-3CA5**
Engineering software on DVD-ROM	
• Floating license	

Example of specific software version, e.g. 1.3:
6FC5253-**1**CX25-**3**...

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HMI Open Architecture

Selection and ordering data (continued)

Runtime licenses/Copy licenses

Description	Order No.
SINUMERIK Operate runtime license OA programming For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software) • Single license without data carrier	**6FC5800-0AP60-0YB0**
SINUMERIK HMI copy license OA and Expand User Interface from the 21st screen For SINUMERIK 840Di sl/840D sl Software option (in conjunction with HMI-Advanced and HMI-Embedded operating software) • Single license without data carrier	**6FC5800-0AP02-0YB0**
SINUMERIK Operate runtime license OA Easy Screen For SINUMERIK 840D sl Software option (in conjunction with SINUMERIK Operate operating software from the 6th screen) • Single license without data carrier	**6FC5800-0AP64-0YB0**
SINUMERIK HMI copy license CE For SINUMERIK 840Di sl/840D sl Software option • 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 location
Dept. RD I IA&DT SDW ES1
Competence Center Stuttgart

Fax: +49 711 137-2838
E-mail: info.mc-hmi-oa.rd@siemens.com

You can obtain the Qt license code directly from:

Nokia-Trolltech

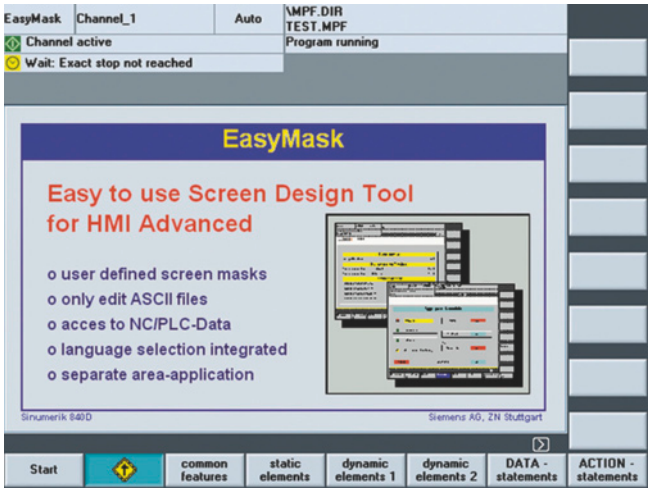
Contact: Carsten Lehbring

Phone: +47 21 60 48 46
Fax: +47 21 60 48 01
E-mail: sinumerik@trolltech.com

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EasyMask

Overview



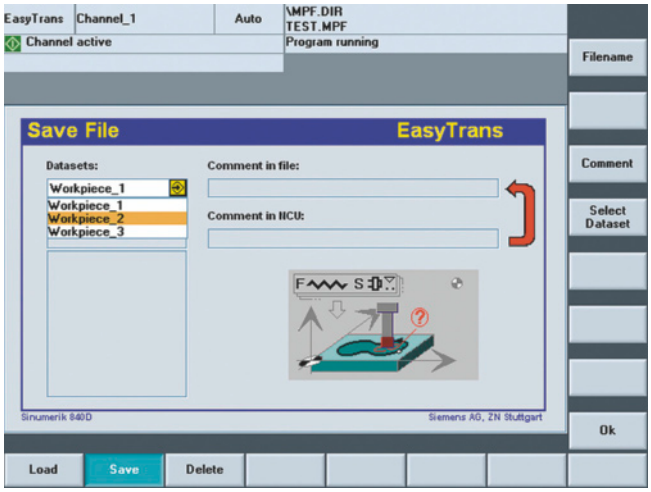
EasyMask is a simple configuring tool for generating operating screens. EasyMask is configured using inputs in INI and text files entered with an ASCII editor. This permits you to easily generate your own operating screens.

Selection and ordering data

Description	Order No.
EasyMask	
Configuration tool for creating operating screens for HMI-Advanced 7.x operating software	
• Single license without data carrier	**6FC5263-0AY00-0AB1**
• Single license with floppy disk	**6FC5263-7AY00-0AB0**

EasyTrans

Overview



EasyTrans is a simple tool for administration of data blocks. Various parameter areas (R parameters, PLC data blocks and PLC bit memories) can be saved in a backup file on the HMI, and downloaded back into the control. EasyTrans can create, read and delete several backup files in a directory. It is configured using entries in an INI file.

Selection and ordering data

Description	Order No.
EasyTrans	
Tool for managing data blocks for HMI-Advanced 7.x operating software	
• Single license without data carrier	**6FC5263-0AY10-0AB1**
• Single license with floppy disk	**6FC5263-7AY10-0AB0**

More information

You can obtain further information on EasyMask and EasyTrans from:

Siemens AG
Industry Sector

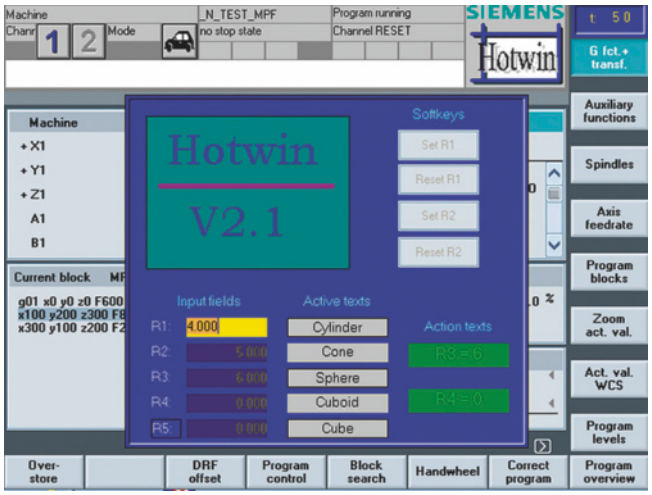
Stuttgart location
Dept. RD I IA&DT SDW ES1
Competence Center Stuttgart

Fax: +49 711 137-2838
E-mail: info.mc-hmi-oa.rd@siemens.com

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HotWin

Overview



HotWin is an application which enables the user to configure up to 32 input/output windows on the user interface. These windows can be activated via the PLC or using NCK signals (signal 0: window cannot be seen, signal 1: window can be seen).

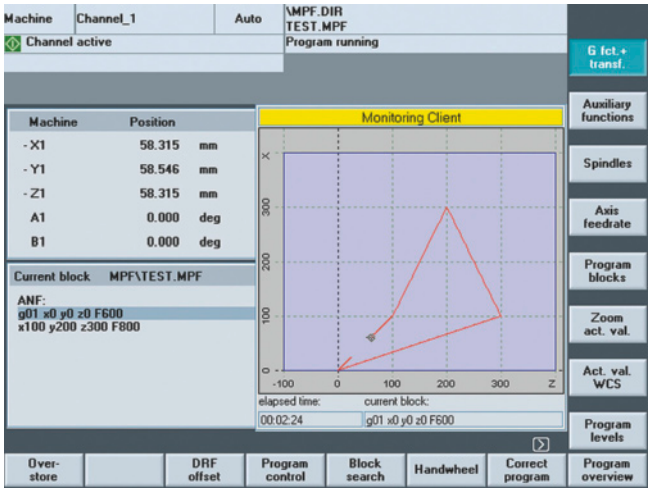
The contents of the windows can be configured in EasyMask syntax.

Selection and ordering data

Description	Order No.
HotWin	
Configuration of up to 32 input/output windows on the user interface for HMI-Advanced 7.x operating software	
• Single license without data carrier	**6FC5263-0AY20-0AB1**
• Single license with floppy disk	**6FC5263-7AY20-0AB0**

EasyMon

Overview



EasyMon is an application which facilitates online monitoring of traverse paths (tool center point) at a selected level on the user interface.

The display is also active during program testing (PRT). The monitoring window is configured using parameterization displays.

Selection and ordering data

Description	Order No.
EasyMon	
Online monitoring of the traverse paths for HMI-Advanced 7.x operating software	
• Single license without data carrier	**6FC5263-0AY30-0AG1**
• Single license with CD-ROM	**6FC5263-7AY30-0AG0**

More information

You can obtain further information on HotWin and EasyMon from:

Siemens AG
Industry Sector

Stuttgart location
Dept. RD I IA&DT SDW ES1
Competence Center Stuttgart

Fax: +49 711 137-2838
E-mail: info.mc-hmi-oa.rd@siemens.com

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Overview

Motion Control Information System MCIS – the key to higher productivity

With the Motion Control Information System MCIS, the productivity and reliability of machine tools is increased due to perfect integration of the machines into the process chain.

MCIS offers a wide range of powerful software modules for production machines.

- CNC program management DNC
- Tool management TDI
- Machine data management MDA/PMT/PDA
- Computer coupling RPC
- Maintenance management TPM
- Remote diagnostics RCS
- Data backup and archiving ADDM

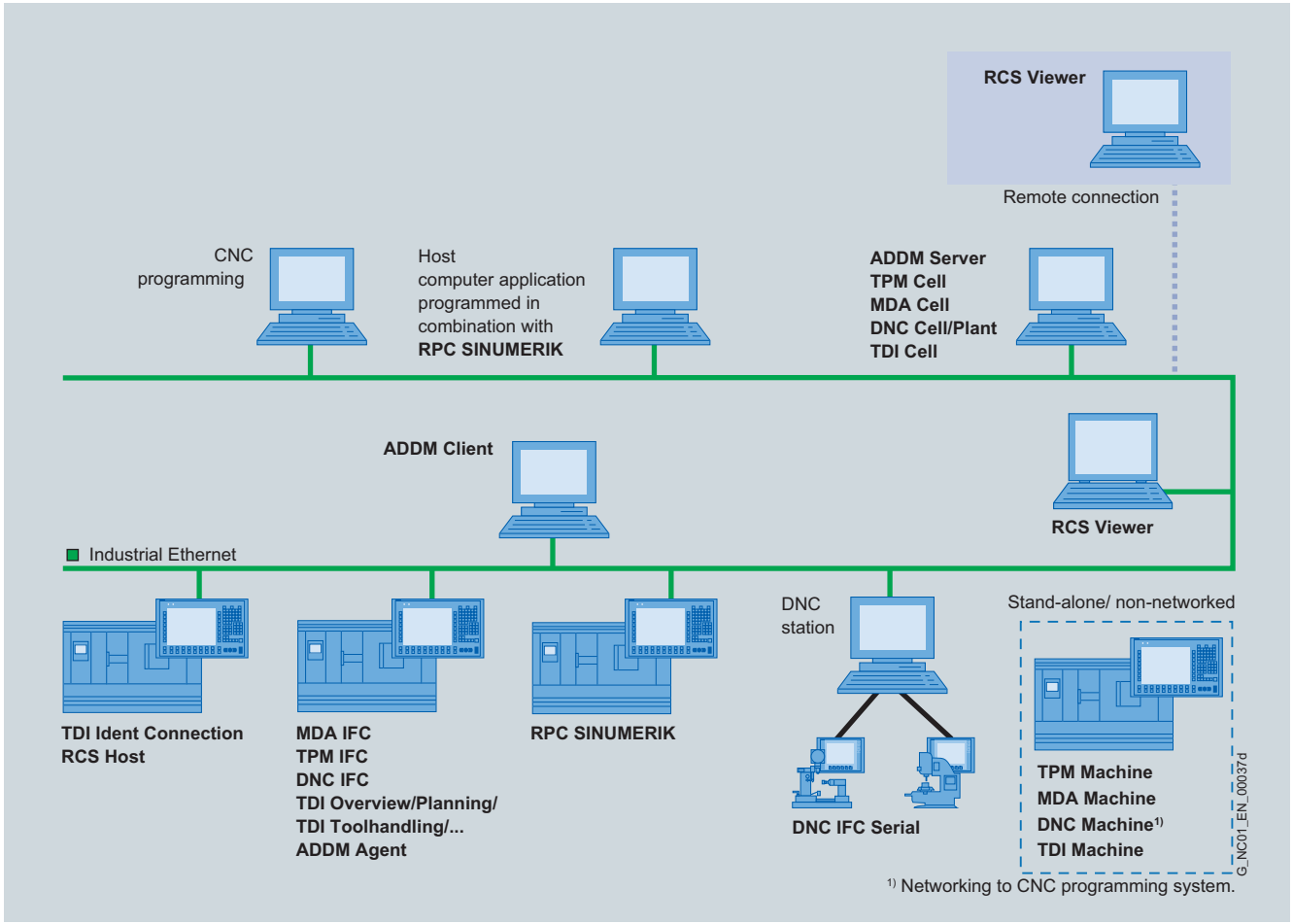
For your production, this means:

- Smooth coordination of planning, disposal, and execution
- Shorter setup times and enhanced efficiency
- Reduced machine downtimes
- Simplified fault analyses



Integration

MCIS provides for optimal integration of machines into your EDP environment.



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DNC – Direct Numeric Control

Overview

CNC program management DNC

The CNC program management DNC supports handling of the CNC programs and reduces the costs for CNC data organization.

As a result of the convenient electronic CNC program management and archiving, the CNC programs are always available in their latest version for the machines of the complete production area. This is particularly relevant in production areas with a high degree of flexibility and variation and where CNC data frequently change, for example in machining centers, special machines and flexible production lines.

The CNC program management DNC consists of software modules which can be applied depending on the functional requirements.

DNC Machine

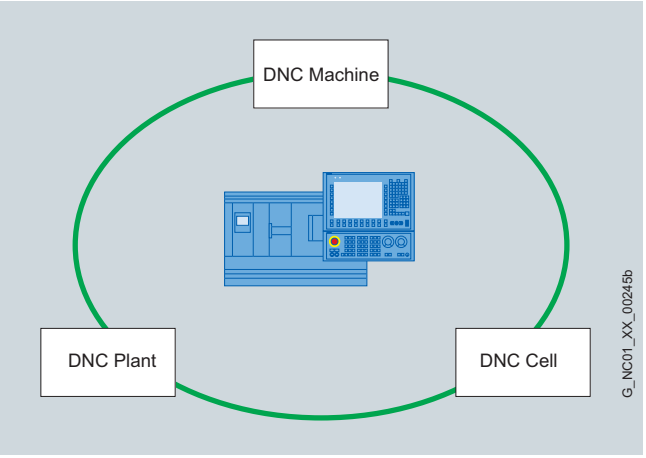
DNC Machine is the software module for CNC program transfer between the SINUMERIK control and an CNC programming workstation over the network file system.

DNC Cell

DNC Cell is the software module as a single-user solution for DNC networking of a small production area.

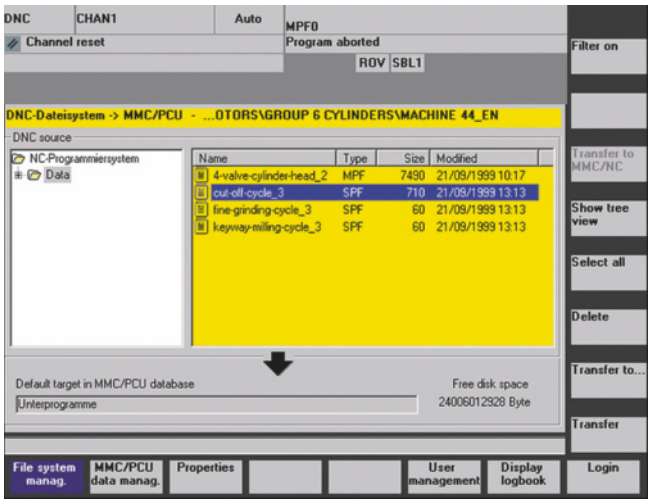
DNC Plant

DNC Plant is the software module as a multi-user solution for DNC networking throughout a factory.



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Overview



DNC Machine is used to connect the SINUMERIK controls over the standard Ethernet network to a file system, for example to transfer CNC programs between the CNC programming system and the CNC machine.

Benefits

- Cost reduction in CNC data management
- Increase in machine operating times thanks to shorter set-up times
- Fast, reliable provision of program
- The latest CNC programs are always available for the SINUMERIK control
- Simple integration of the SINUMERIK control into a standard Ethernet network
- CNC program input by the programmer and automatic transfer to the SINUMERIK control mean that handling of the program on the machine by the operator is unnecessary.

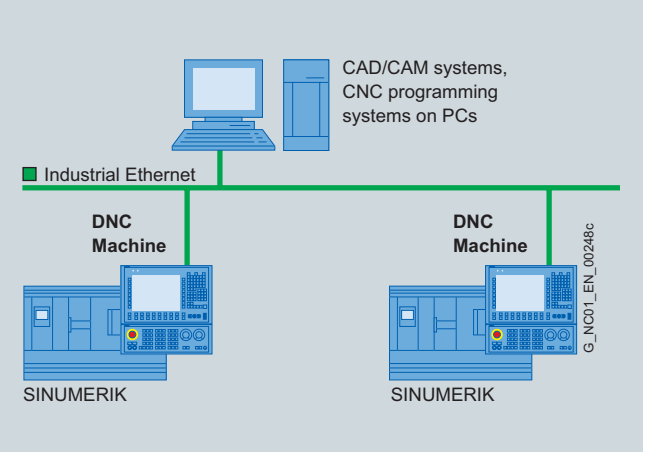
Function

- Operator interface for CNC program transfer/uploading on the SINUMERIK operator panel
- Fixed definition, or free navigation in Windows or UNIX network directories in which the CNC programs have been saved by the programmer
- View of CNC programs available for the machine in the network directory. Filters are possible.
- Selection and transmission of single or several CNC data/files and workpiece directories
- Automatic CNC program importing from a network directory
- Direct loading of CNC programs into the CNC
- Utilization of Windows administration information (file name, file length, generation/modification date)
- Logbook of CNC program transfers
- Deletion of CNC data in the network directory and in the SINUMERIK control
- Key switch-dependent function privileges on the SINUMERIK control

Integration

Preconditions:

- SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3
- For connecting to a UNIX file system, network software is also required on the SINUMERIK.



Selection and ordering data

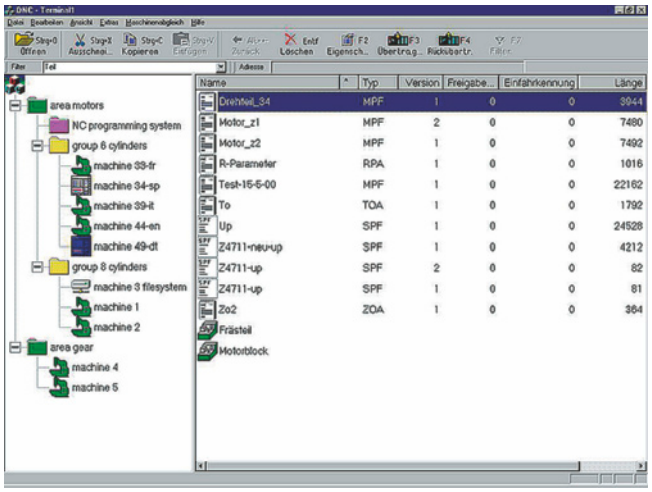
Description	Order No.
DNC Machine	
CNC program transfer for SINUMERIK 840Di sl/840D sl Software option	
Languages: Chinese Simplified, English, French, German, Italian, Korean, Russian	
• Single license without data carrier	**6FC5800-0AP40-0YB0**
• CD-ROM without license for current software version	**6FC6000-0AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-0AC0■-■AA8**
• Upgrade with CD-ROM of a specific software version	**6FC6000-0AC0■-■AE0**
• Trial license Single license for current software version	**6FC6000-0AC00-0AT7**
• Trial license Single license for specific software version	**6FC6000-0AC0■-■AT7**

Example of a specific software version, e.g., 2.00: 6FC6000-0AC02-0A..

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DNC – Direct Numeric Control
DNC Cell/DNC Plant

Overview



DNC Cell/DNC Plant supports handling of the CNC programs. DNC Cell/DNC Plant is software for user-friendly management, archiving and transfer of CNC programs, and can be used to network small and complex CNC production areas with DNC Cell or DNC Plant.

As a result of the convenient electronic CNC program management and archiving, the CNC programs are always available in their latest version for the CNC machines of the complete production area. This is particularly relevant in production areas with a high degree of flexibility and variation and where CNC data frequently change, for example in machining centers, special machines and flexible production lines.

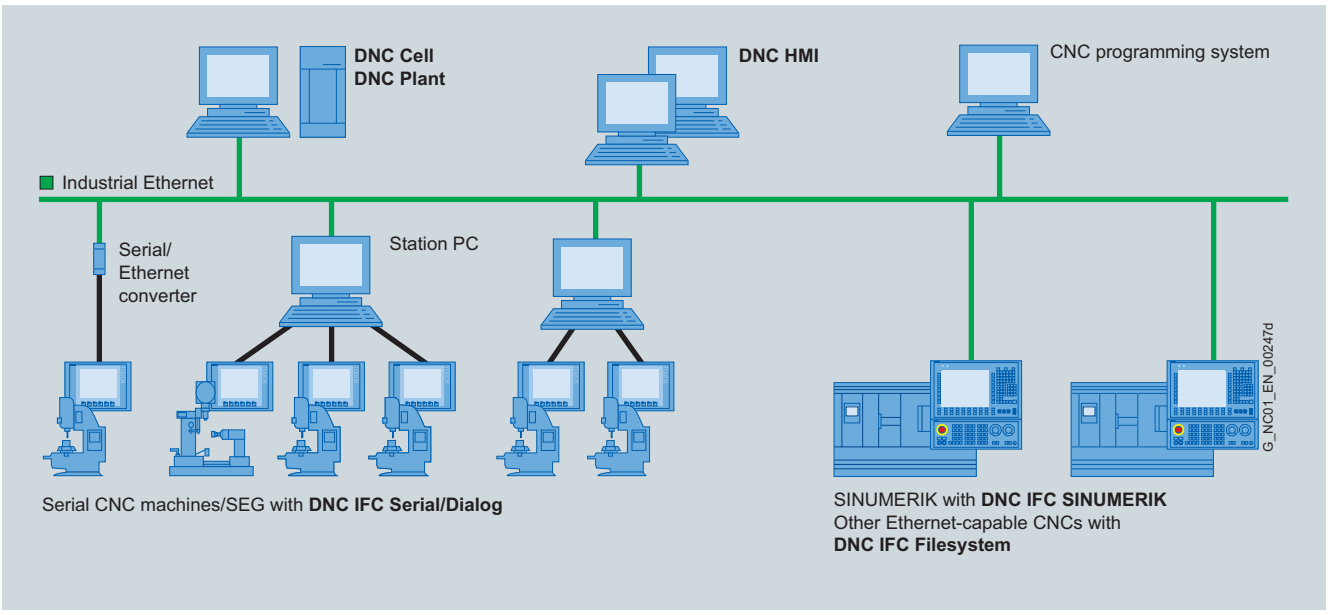
Benefits

- Cost reduction in CNC data management
  - Convenient, central CNC program management with provision of the CNC programs
  - Low management overhead and simple handling mean that a floppy disk drive for archiving of CNC data is unnecessary
- Increase in machine operating times and reduction in setup times through reliable and fast provision of CNC program
- No DNC terminals are required on the machine because the CNC program is requested directly on the CNC operator panel
- Cost-effective and reliable electronic data archiving
- Automatic CNC data archiving of the SINUMERIK control
- Simple integration of many different types and generations of CNC controls
- Direct connection of SINUMERIK PCU 50.3 with Windows via standard Industrial Ethernet network

Integration

Preconditions for DNC Cell/DNC Plant:

- Standard/server PC as required
  - At least Pentium IV 1 GB RAM
  - Hard disks depending on data volume of CNC programs (at least 1 GB free), e.g. 3 × 36 GB RAID 5 for DNC Plant
- Operating system
  - Windows 2003 Server (additional client access licenses[1])
  - Windows XP Professional/Windows Vista
- The database is dependent on the size of the plant: MSDE (included in scope of delivery of DNC Cell, no license required) or ORACLE, SQL server for DNC Plant
- Internet Explorer, version 5.0 and higher



[1] Client access licenses required for each DNC IFC SINUMERIK/DNC IFC Filesystem and each additional connected computer.

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Design

DNC Cell – the solution for one work station

One PC (a work station) can be connected to DNC Cell. The management functions can only be operated from this PC.

Using the DNC IFC Serial interface client (per CNC), up to 16 CNC machines with a serial interface can be connected to DNC Cell. DNC Cell already contains a DNC IFC Serial interface module.

Up to 16 further Ethernet-capable CNC machines with DNC IFC SINUMERIK or DNC IFC Filesystem modules can also be integrated.

DNC Plant – the solution for networking large production plants

Several hundred CNC machines can be connected to DNC Plant. The CNC data are managed on a powerful central server.

The DNC HMI (Human Machine Interface) software module can be used to install further terminals (multi-user system) on Windows PCs for management and handling of the CNC programs. For example, several CNC programmers or machine setters can work with the CNC program management using PCs in the office or production area.

The interface client DNC IFC SINUMERIK (per SINUMERIK) is used to integrate the SINUMERIK controls into DNC Plant via the Ethernet network. In addition, any Ethernet-capable CNC machines can be supplied with CNC programs using DNC IFC Filesystem modules.

CNC machines with serial interfaces (without special protocol) are integrated using station PCs. Up to 16 serial CNCs can be connected to one station PC. One DNC IFC Serial interface client license is required for each connected CNC. The station PC is a work station in production. It does not require a separate license. Several station PCs can be operated on one DNC Plant system.

Function

- Software for central management and transfer of CNC programs on a standard PC (work station)
- Connection of CNCs or tool setting stations via serial interfaces using DNC IFC Serial
- Integration of additional CNC machines over an Ethernet network
  - SINUMERIK control via standard Ethernet network with DNC IFC SINUMERIK
  - Ethernet-capable CNC machines that can be supplied with CNC programs through a network filesystem (see DNC IFC Filesystem)
- Connection of CNC programming systems via standard network, e.g., via Ethernet, Novell or token ring
- Automatic data import from CNC programming system
- Shopfloor-oriented CNC program archiving structures with DNC Explorer
- Program override through operator inputs on the station PC/DNC HMI (DNC Plant)
- User management with user-dependent functions such as display, edit, copy, delete, enable CNC programs
- Program transfer through operator inputs on the DNC Cell/DNC Plant PC
- Program transfer directly on the CNC operator panel with DNC IFC Dialog
- Automatic data archiving of the SINUMERIK control
- CNC program comparison/machine adaptation between the SINUMERIK control and DNC Cell using DNC Compare
- GUI for parameterization of interface parameters
- Scalable system configuration from small, local DNC systems (DNC Cell) up to the factory-wide multi-user system (DNC Plant)
- Networking of heterogeneous CNC machinery of very different generations and controls as an integrated system from the production planning department to the production shop

Selection and ordering data

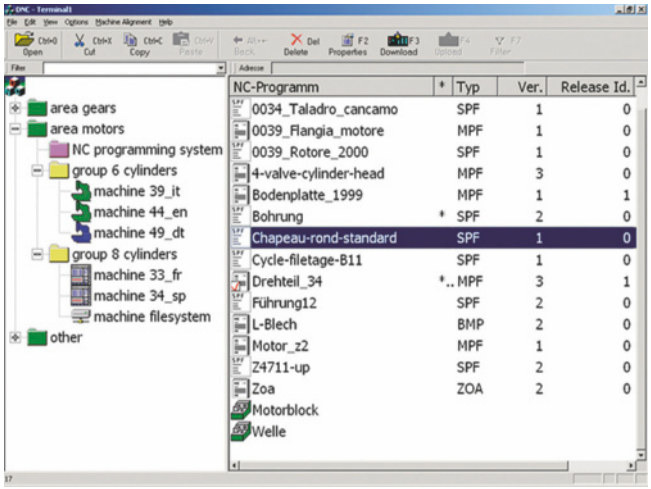
Description	Order No.
DNC Cell	
CNC program management Software package	
Languages: English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC6000-0BF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-0BC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-0BC0■-■AA0**
• Upgrade with CD-ROM of specific software version	**6FC6000-0BC0■-■AE0**
DNC Plant	
CNC program management Software package	
Languages: English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC6000-0CF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-0CC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-0CC0■-■AA0**

Example of a specific software version, e.g.: 2.1:
6FC6000-0CC0**2**-**1**AA0

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DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC HMI

Overview



DNC HMI can be used to add operator stations to DNC Plant on which, e.g., the CNC programmers can carry out the administration of their CNC programs.

Function

- DNC HMI extends DNC Plant by terminals, e.g. as workstation for CNC programmers, administrators, machine setters in the production area
- All management and administration functions can be executed on DNC HMI depending on the access privileges
- DNC Plant already contains a user interface DNC HMI.

A DNC HMI license is required for each further user interface.

Integration

Preconditions:

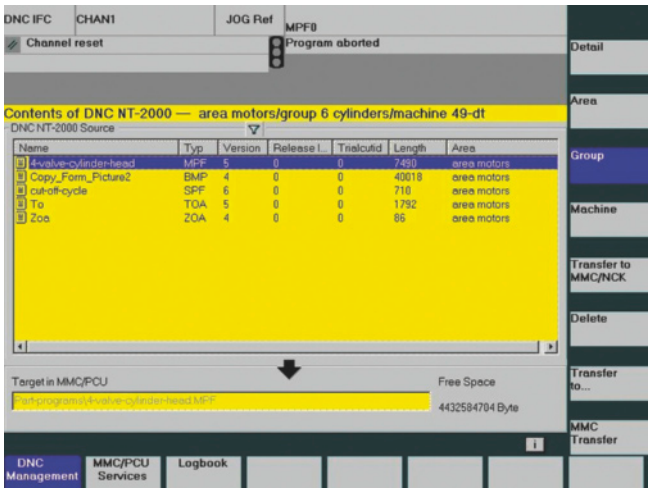
- Standard PC
  - At least Pentium IV 1 GB RAM
- Operating system
  - Windows 2003 Server
  - Windows XP Professional
  - Windows Vista
- Internet Explorer, version 5.0 and higher

Selection and ordering data

Description	Order No.
DNC HMI Additional PC user interface • Single license without data carrier	**6FC6000-0DF00-0AB0**

DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC IFC SINUMERIK

Overview



The interface client DNC IFC SINUMERIK is used to connect the SINUMERIK control to DNC Cell or DNC Plant, and provides the machine operator with an operator interface for transfer of CNC programs.

Function

- Summary of the CNC data/programs available for the SINUMERIK control in the database of DNC Cell/DNC Plant
- Display of management information for the CNC program
- Display of graphics on the SINUMERIK
- Selection and transfer of one or more (multiple selection) CNC data/files to the SINUMERIK control by means of operations on the SINUMERIK
- Selection and uploading of one or more (multiple selection) CNC data/files to the DNC archive DNC Cell/DNC Plant by means of operations on the SINUMERIK
- Key switch-dependent functions

One DNC IFC SINUMERIK license is required for each SINUMERIK control to be connected.

Integration

Preconditions:

- SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3 and HMI-Advanced

Selection and ordering data

Description	Order No.
DNC IFC SINUMERIK CNC program transfer via network on the control for SINUMERIK 840Di sl/840D sl Software option • Single license with CD-ROM of current software version	**6FC5800-0AP41-0YB0**

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DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC IFC Serial

Overview

The interface client DNC IFC Serial is used to connect CNC machines with a serial interface to DNC Cell or DNC Plant.

Function

- Software module for connection of serial CNC machines (punched-tape format) to DNC Cell/DNC Plant (per serial CNC)
- Machine connections
  - DNC Cell: max. 16 to DNC Cell PC
  - DNC Plant: Max. 16 per station PC/DNC Plant PC (direct serial)
    More than 16 machines can be connected to the station PC or DNC Plant PC through interface converters ("ComServer").
- Program transfer through operation on DNC Cell/DNC Plant PC or on the station PC of DNC Plant (see DNC Plant)
- Program transfer directly on the CNC control panel with DNC IFC Dialog (see DNC IFC Dialog)
- Reloading mode possible

Integration

Preconditions:

- Control with serial interface without special protocol (punched-tape format)

Selection and ordering data

Description	Order No.
DNC IFC Serial Connection for serial CNC, per serial CNC Software option • Single license without data carrier	**6FC6000-0FF00-0AB0**

DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC IFC Dialog

Overview

DNC IFC Dialog is a functional expansion of DNC IFC Serial.

DNC IFC Dialog means that DNC input terminals are superfluous for transfer of CNC programs since the transfer is carried out directly on the operator panel of the serial CNC machine.

Function

- DNC IFC Dialog (optional per serial CNC) can be used to transfer programs directly on the CNC control panel of serial CNC machines
- Connection of many different types of serial CNC machine, without special transmission protocol

Integration

Preconditions:

- Control with serial interface without special protocol (punched-tape format)
- It must be possible to save at least two CNC programs on the control
- An CNC program editor must be available with which a pseudo program can be generated
- The alphanumeric characters of the required CNC program name must be available on the machine's operator panel

Selection and ordering data

Description	Order No.
DNC IFC Dialog Optional, per serial CNC Software option • Single license without data carrier	**6FC6000-0GF00-0AB0**

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DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC IFC Filesystem

Overview

The interface client DNC IFC Filesystem is used to connect Ethernet-capable CNC machines (e.g., non-Siemens controls) to DNC Cell or DNC Plant.

Function

- Software module for connection of Ethernet-capable CNC machines to DNC Cell/DNC Plant (per Ethernet-capable CNC)
- Machine connections
  - DNC Cell: max. 16 to DNC Cell PC (incl. DNC IFC SINUMERIK)
  - DNC Plant: no limitation
- Program transfer via operation on DNC Cell/DNC Plant PC or on the DNC Plant station PC

Integration

Preconditions:

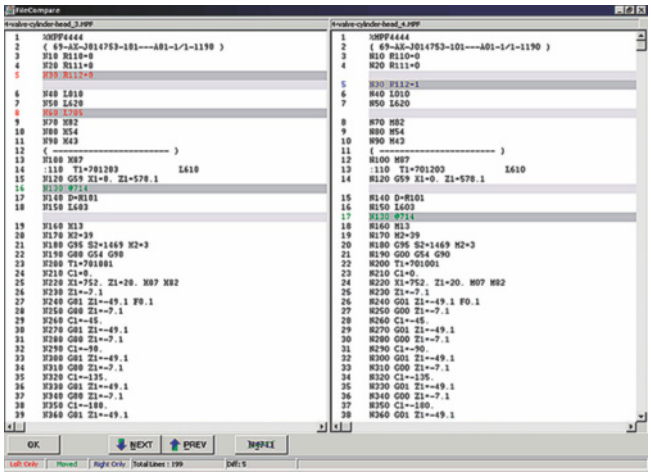
- Control with the capability of transferring CNC programs in a file system

Selection and ordering data

Description	Order No.
DNC IFC Filesystem Connection for network-capable CNC machines, for each Ethernet-capable CNC software option • Single license without data carrier	**6FC6000-0KF00-0AB0**

DNC – Direct Numeric Control
DNC Cell/DNC Plant – DNC Compare

Overview



DNC Compare is a supplementary function for DNC Cell/ DNC Plant which enables

- Comparison of different CNC programs
- Comparison/adaptation of CNC programs between the DNC Cell/Plant archive and the SINUMERIK

Benefits

- Instrument for quality assurance
- Fast, simple analysis of optimized CNC programs, e.g., by comparing with the original program
- Avoidance of faulty machining operations through fast checking of non-released CNC programs on the SINUMERIK

Function

- Individual comparison of CNC program
  This function is used, e.g., to compare two different program versions. The differences are displayed color-coded.
- CNC program comparison list
  This function can be used to check whether the CNC programs present in the CNC machine (SINUMERIK) are also present on the DNC computer. This is displayed in the form of a comparison/difference list.

Integration

Preconditions:

- The DNC IFC SINUMERIK software module is required on the SINUMERIK.

The CNC program comparison list is only possible for:

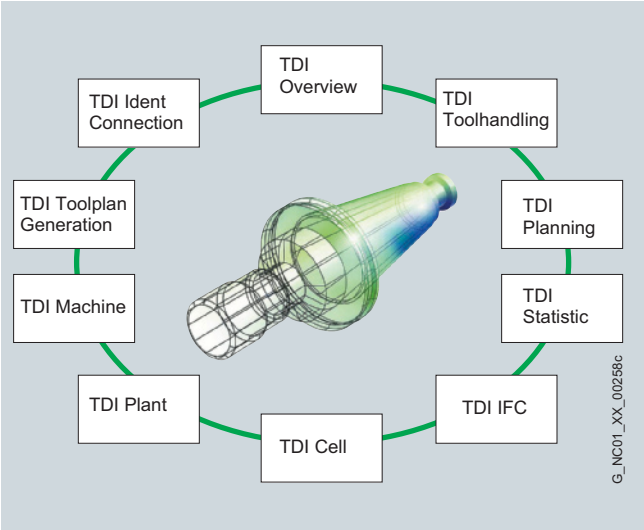
- SINUMERIK 840Di sl/840D sl

Selection and ordering data

Description	Order No.
DNC Compare CNC program comparison Software option • Single license without data carrier	**6FC6000-0HF00-0AB0**

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Overview



Tool Data Information is one of the central tasks in CNC production. Requirements are:

- Smooth toolhandling processes
- Cost control
- Cost savings

This is where Tool Data Information MCIS TDI plays an important role. It makes this potential for rationalization transparent and provides functions that help attain the potential savings revealed.

MCIS TDI 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
- SINUMERIK 840Di sl/840D sl highly-automated CNCs
- SIMATIC S7-based controls
- Integration of tool setting stations or cross-factory tool management systems

Benefits

With TDI Tool Data Information you always have the right tool data at the right place at the right time.

- Transparency of the tool cycle permits savings in tool costs.
- Modularity of the TDI modules permits optimized customer-oriented and demand-oriented application
- Scalable use from a single machine up to complete machinery

Function

TDI is a modular system from which the user can combine the right modules for each degree of automation.

All TDI modules are designed such that they can operate both 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.

As the system has been designed consistently as a client-server solution and uses the latest communication mechanisms based on HTTP/XML, 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 UIs of the MCIS TDI modules are designed such that they execute and can be operated on a SINUMERIK platform (function keys) as well as on a PC platform (pull-down menus) and in the TRANSLINE HMI PRO environment.

The MCIS TDI modules can be optionally combined in various stages. This provides operators with optimum solutions for their requirements.

The functionality can be extended by TDI Interface Client (IFC) for interfacing with other systems, e.g., PDA.

The following functions are available:

TDI Overview

Availability of actual tool data throughout the network

TDI Toolhandling

Operator-prompted loading and unloading with TO data import from the tool setting station

TDI Planning

Planning of tool demand based on current magazine loading

TDI Statistic

Statistical evaluations of tool use

TDI IFC

Interface client for connecting external tool management systems.

TDI Cell

All available functions combined on a single server and network-wide operation of client-based interfaces for small production areas

TDI Plant

All available functions combined on a single server and network-wide operation of client-based user interfaces for large production areas

TDI Machine

Stand-alone non-network-compatible function package for tool planning and connection to tool setting stations

TDI Toolplan Generation

Auxiliary module for creating tool plans based on CNC program simulation.

TDI Ident Connection

Stand-alone module for connecting tool identification systems

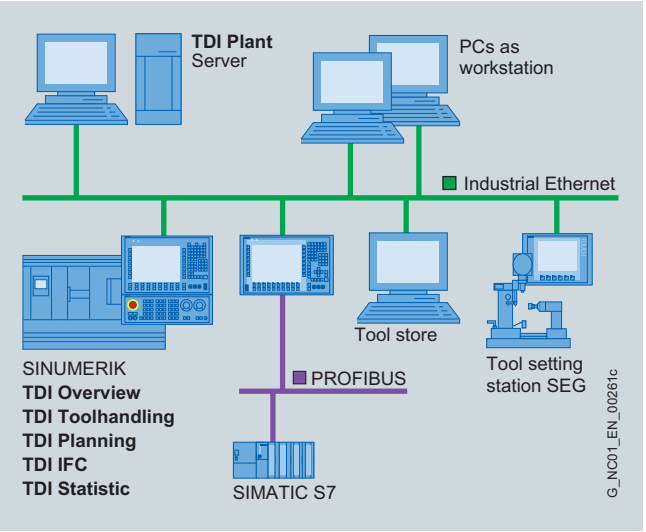
© Siemens AG 2010

TDI – Tool Data Information

Integration

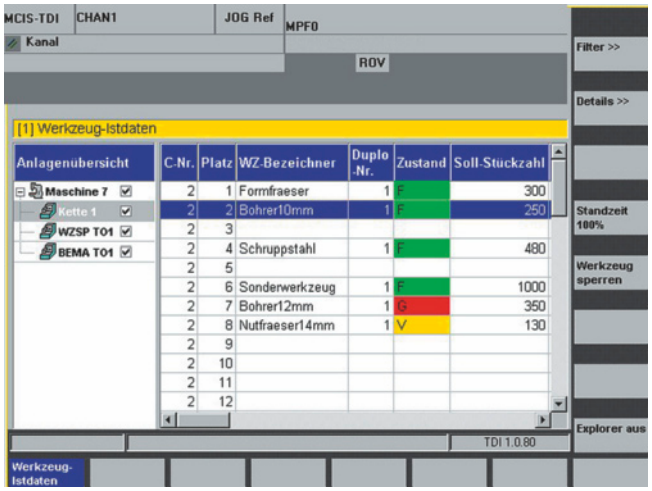
Preconditions for TDI modules:

- With SINUMERIK controls, it is assumed that the standard tool management option is installed. SINUMERIK controls without standard or machine OEM-specific tool management can be configured as SIMATIC S7-based machines or must be connected specifically 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 by TDI, a TDI Toolhandling user interface for loading and unloading the tools must be assigned to the respective storage location, e.g. a Windows PC integrated in the network.
- PC hardware at least Pentium IV 1 GB RAM
- Windows XP operating system
- Server hardware at least Pentium IV 1 GB RAM, hard disks depending on additional MCIS packages and customer requirements, e.g. 3 × 36 GB (Raid 5),
  Windows XP Professional, client access licenses, DAT tape drive for data backup, server database Oracle or SQL Server
- SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3



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Overview



TDI Overview provides a clear overview of the actual tool data of the connected units and tool magazines.

Benefits

- Specific reduction of tool inventory using current information on the tool situation
- Increase in machine operating times through early recognition of tool bottlenecks
- Reduction in processing times through network-wide availability of tool data, e.g.: CNC program generation
- Specific tool searching using many different filters
- Easy modification of tool data, e.g., increase service life, tool disabling, adaptation of cutting edge data

Function

- Selection of plant components using an Explorer structure
- Management and display of tools from tool storage locations present in a plant such as tool cabinets, tool transportation units, tool stores
- Convenient filter settings such as:
  - Disabled/worn tools
  - Tools in the prewarning limit
  - Tool service life from ... to ...
  - Only occupied or empty locations
- Set the service life of selected tools to 100 % again using function key
- Disable a selected tool using function key
- Columns can be combined as required, thus the table layout can be adapted and stored online
- Display of all detailed data of a selected tool with the option to modify cutting edge data

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

Description	Order No.
TDI Overview	
Overview of actual tool data, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP34-0YB0**
• CD-ROM without license for current software version	**6FC6000-2EC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2EC0■-■AA8**

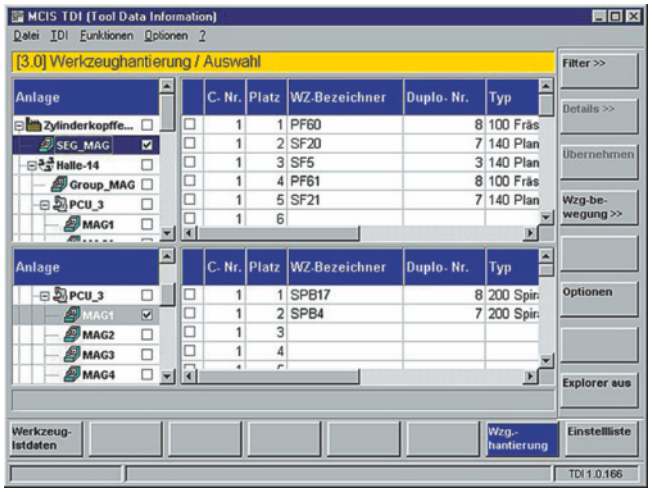
Example of a specific software version, e.g. 2.1:
6FC6000-2EC0**2**-**1**A..

4

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TDI – Tool Data Information
TDI Toolhandling

Overview



With the user-friendly dialog prompting of TDI Toolhandling, the user can import, buffer, or forward tool data over the network when loading and unloading.

Any containers within a plant can be involved in the processes. The objective is to obtain a closed tool data circuit.

Benefits

- Minimization of faults when entering tool data through data acquisition from the system
- No loss of tool data if the tools are no longer or not yet in the machine
- Use of low-cost tool identification systems (barcode, read only), since tool data are obtained via the network
- Fast tool loading on the machine through provision of consignment lists
- Clear representation of tool movements through function-based screen with origin and destination

Function

- Data simulation of all tool movements in a plant or on a single machine
- Initialization of loading and unloading processes with direct assignment of location or automatic searching for empty location
- Generation of consignment lists with loading and unloading processes and their automatic execution
- Display of tool movements with origin and destination
- Management of external tool stores with or without location management
- Connection of tool setting stations via a defined standard interface with importing of TO data directly into the tool management option of the control

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

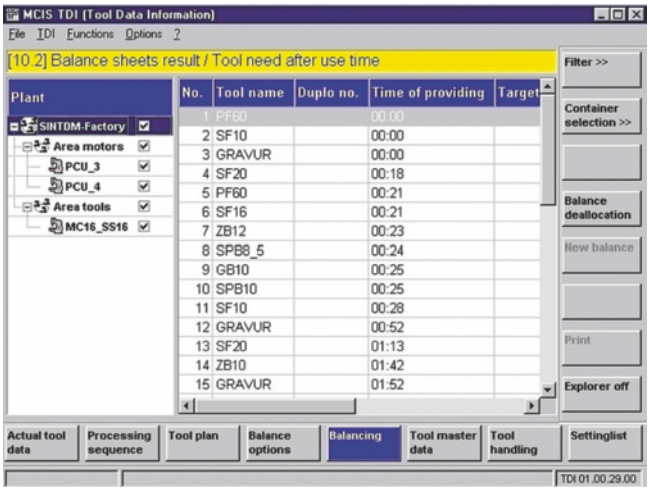
Selection and ordering data

Description	Order No.
TDI Toolhandling	
Tool handling, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP35-0YB0**
• CD-ROM without license for current software version	**6FC6000-2FC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2FC0■-■AA8**

Example of a specific software version, e.g. 2.1:
6FC6000-2FC02-1A..

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Overview



The provision of tools for the next production period is of major importance to ensure optimum utilization of machine capacity. TDI Planning can be used to ensure that the required tools are provided at the right time. TDI Planning generates the tool requirements for the next production period based on the current tool inventory on the machine.

Benefits

- Minimization of machine downtimes through foresighted provision of tools
- Fast response to a new production situation as result of planning possibilities on the machine and control system
- Minimum magazine loading as result of information on which tools are no longer required

Function

- Gross tool requirement
  Display of total tool requirement including replacement tools for the selected machining sequence
- Net tool requirement
  Display of total tool requirement for the selected machining sequence, where the tools in the magazines are taken into account. The net requirement results from comparison of the gross tool requirements with the current magazine loading.
- Unloading list
  The unloading list contains magazine tools which are not required in the net requirement, as well as disabled tools.

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

Description	Order No.
TDI Planning	
Tool planning, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP36-0YB0**
• CD-ROM without license for current software version	**6FC6000-2GC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2GC0■-■AA8**

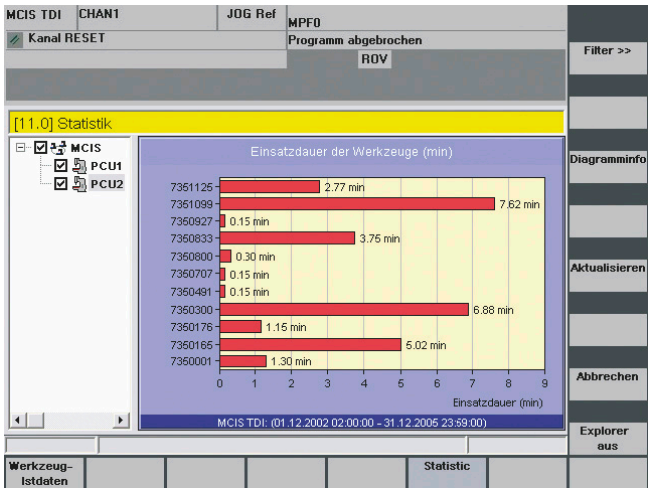
Example of a specific software version, e.g. 2.1:
6FC6000-2GC02-1A..

4

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TDI – Tool Data Information
TDI Statistic

Overview



TDI Statistic provides informative diagrams of recorded tool events. These tool events are presented on the basis of the following evaluations:

- Frequency of application of tools
- Duration of service of tools
- Tool failure in the spindle
- Program standstill due to missing tools
- Event list for all tools

Benefits

- Very user-friendly thanks to visualization of tool requirements
- The tool process on the machine is transparent
- Database for analysis and optimization

Function

By means of the TDI Statistic software module, recorded machine events can be displayed in diagrams or tables. The machines to be monitored can be selected from a plant hierarchy display in a tree structure. A filter mask allows diagrams of a specific type to be displayed for selection, special event filters to be used and the time period for monitoring to be defined.

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

Description	Order No.
TDI Statistic	
Tool statistics, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP51-0YB0**
• CD-ROM without license for current software version	**6FC6000-2KC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2KC0■-■AA8**

Example of a specific software version, e.g. 2.1: 6FC6000-2KC02-1A..

TDI – Tool Data Information
TDI IFC

Overview

TDI IFC is used for importing and exporting tool data with external systems for further processing purposes. Depending on requirements, this interface can be parameterized specifically to the project.

Benefits

- Closed tool data cycle in production prevents faulty inputs by operator.

Function

TDI IFC can have different designs. A TDI IFC TDM is available, which is an interface between TDI and TDM from TDM Systems. The following data can be transferred via this interface:

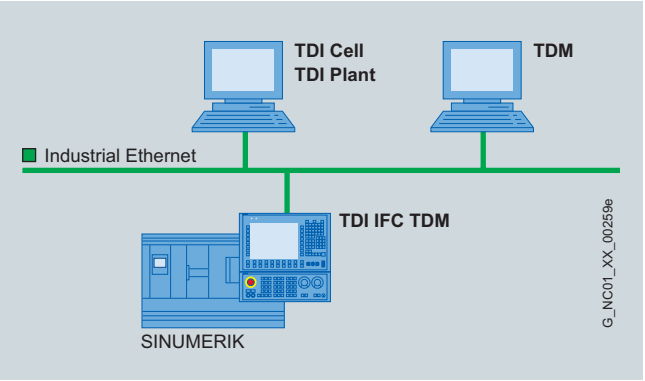
- Tool master data
- Tool plans
- Planning results
- TO data

Further TDI IFC designs must be clarified specifically to the project.

Integration

Each interface must be clarified specifically to the project.

For preconditions for TDI modules, please see TDI – Tool Data Information.

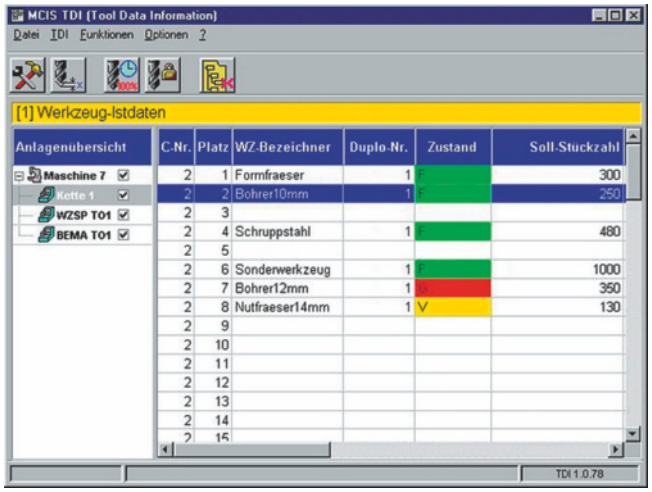


More information

For further details, please contact our representative in your local Siemens Regional Office.

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Overview



You can use TDI Cell/TDI Plant to make TDI functions installed on individual machines available on a network-wide basis.

Up to 16 CNC machines can be interconnected to form an information network using TDI Cell. TDI Cell can be installed on a host computer or a master control under Windows XP.

TDI Plant permits factory-wide networking of the CNCs and further tool-specific system components. More than 16 CNC machines can be interconnected to form an information network using TDI Plant. Purchase of TDI Plant is project-specific and is offered in line with customer requests.

Benefits

- Network-wide availability of all tool information
- Tool data at the right location and at the right time
- Plant-wide transparency of tool usage
- Closed tool data cycle in a complete production sequence
- Reduction of tool organization costs thanks to central data management

Function

If a TDI Cell/TDI Plant configuration has been generated, it is possible to centrally display and manage tool data for all connected controls on the host computer/master control:

- Central management of tool master data, tool plans and tool requests for all connected CNCs
- Calling of all actual tool data of the connected units
- Planning sessions can be held for all connected units
- Data can be transferred from and to higher-level tool management systems or production planning systems (MCIS PDA)
- Design of a plant configuration with up to 4 levels (groups, units, machine magazines)

TDI Cell

- Connection of up to 16 CNC machines

TDI Plant

- Additional operation/management workstations with TDI HMI
- Connection of up to 200 CNC machines or amalgamation of several TDI Cells

Integration

The following plant components can be connected in TDI Cell/TDI Plant:

- SINUMERIK control (the integration is carried out project-specifically if standard tool management is not present or if customized tool management exists)
- SIMATIC S7 with DB59 via OPC server
- Non-Siemens controls via OPC server (project-specific adaptation necessary)
- PC-based control systems, e.g., MCIS PDA or TDM from TDM Systems
- External tool store, e.g., preset tools or used tools without machine assignment

Precondition with TDI Plant:
Server is offered as a project-specific product

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

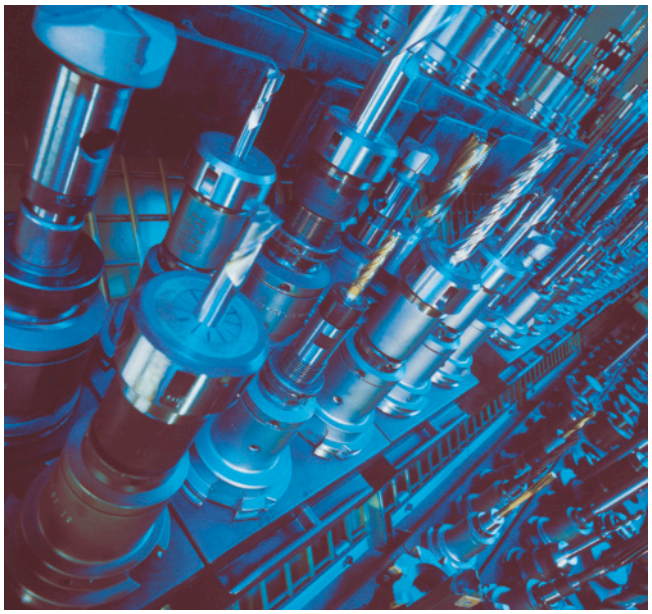
Description	Order No.
TDI Cell	
Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC6000-2BF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-2BC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-2BC0■-■AA0**

Example of a specific software version, e.g. 2.1:
6FC6000-2BC0**2-1**A..

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TDI – Tool Data Information
TDI Machine

Overview



With TDI Machine, tool management is possible implemented in single CNC machines.

TDI Machine is a function package with the tool management functions which are mostly used for single machines.
TDI Machine offers operators direct support for provision of tools at the right time and when loading/unloading tools.

Benefits

- Very user-friendly thanks to visualization of tool requirements
- Numerous filter functions for application-specific generation of result lists
- Operator-prompted loading and unloading of individual tools in parallel with machining time together with the SINUMERIK standard tool management option
- Simple interfacing of a tool setting station via Ethernet for importing of tool correction data

Function

The following functions help the operator to keep control of the tool situation on the machine:

- Determination of actual tool requirements for next production period by comparison with the actual state of the tool in the magazine
- Communication with further systems relevant to the tool cycle, such as host tool management systems, production planning and tool setting

Machine downtimes are then minimized, and short setup times are achieved.

The following functions are offered:

- Gross tool requirement
  Display of total tool requirement including replacement tools for the selected machining sequence

Function (continued)

- Net tool requirement
  Display of total tool requirement including replacement tools for the selected machining sequence, where the tools in the magazines and their remaining service life are taken into account. The net requirement therefore results from comparison of the gross tool requirements with the current magazine loading.
- Unloading list
  The unloading list contains magazine tools which are not required in the net requirement, as well as disabled tools.
- Loading list
  The list of tools to be loaded can be transferred from the TDI Machine into the tool list of the NCK. The loading procedure itself is carried out by the loading functions of the tool management option.
- Communication with tool setting stations
  TDI Machine is able to exchange all relevant data with tool setting stations via TCP/IP
  - Transfer of tool requirement to tool setting stations
  - Importing of TO data of tool setting stations and transfer of data to tool list of standard tool management option.
- Coupling to tool management systems
  If tool management systems (e.g. from TDM Systems) are present, a project-specific coupling can be installed.
  - Importing of current tool master data and tool plans for determination of tool requirement
  - Transfer of determined tool requirement
  - Importing of TO data, and transfer of data to the tool list of the standard tool management option.

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

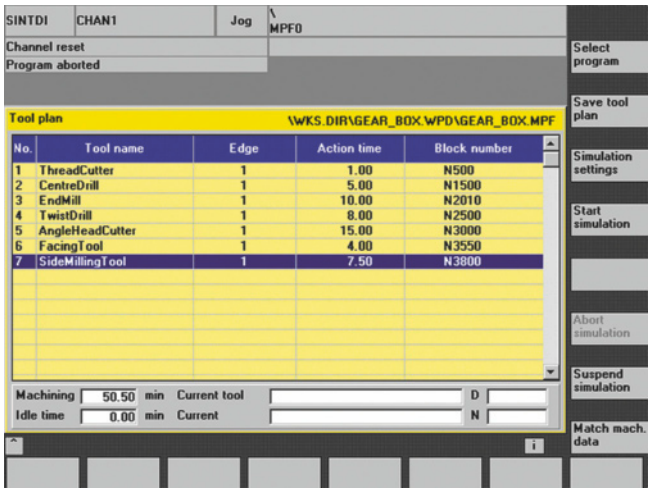
Selection and ordering data

Description	Order No.
TDI Machine	
Tool management, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP37-0YB0**
• CD-ROM without license for current software version	**6FC6000-2AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2AC0■-■AA8**

Example of a specific software version, e.g. 2.1:
6FC6000-2AC02-1A..

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Overview



TDI Toolplan Generation permits you to generate the associated tool plans on the SINUMERIK using simulation of CNC programs.

Benefits

- Autonomous generation of tool plans
- Tool plans are always up-to-date since they are generated on the basis of the CNC programs actually used on the machine

Function

Tool plans are required for tool planning TDI Planning/ TDI Machine. If these tool plans are not provided by a CNC programming system, the machine operator can use TDI Toolplan Generation to independently generate the tool plans based on the existing CNC programs.

These tool plans can be saved in the CNC data management option. TDI Planning and TDI Machine have access to this during the planning session.

CNC programs from which tool plans are created must execute with the standard CNC program simulation of the SINUMERIK control.

Integration

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

Description	Order No.
TDI Toolplan Generation	
Tool plan generation, local version Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP38-0YB0**
• CD-ROM without license for current software version	**6FC6000-2JC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-2JC0■-■AA8**

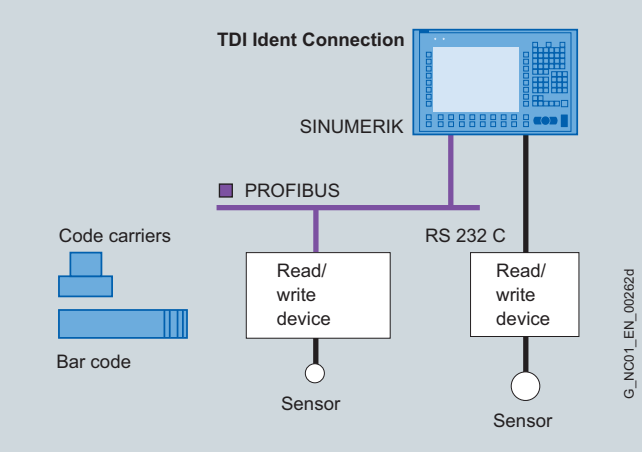
Example of a specific software version, e.g. 2.1:
6FC6000-2JC02-1A..

4

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TDI – Tool Data Information
TDI Ident Connection

Overview



TDI Ident Connection is a software module for the SINUMERIK with which tools with identification systems can be conveniently loaded or unloaded using the PLC or the operator interface of the standard tool management option. The tool data can be uploaded or downloaded for the control using the tool cabinet, code carrier or host computer.

Benefits

- Connection of many different 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 through carrying of data on tool

Function

- The following data carriers are supported depending on the type of connection:
  - Connection via PROFIBUS/PLC: Balluff, Bilz, MOBY, barcode
  - Connection via RS 232 C 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 bar code
- Interface for loading/uploading tool data for a production host computer following successful identification of the tool with code carrier (MCIS RPC coupling software to host computer)
- PLC interface for starting the write/read procedure, e.g. via OP 177B, pushbutton or limit switch, e.g. automatic execution of loading/unloading points with reading/writing on code carrier
- Tool management (option)

Integration

Preconditions:

- SINUMERIK 840Di sl
- Tool management option

For preconditions for TDI modules, please see TDI – Tool Data Information.

Selection and ordering data

Description	Order No.
TDI Ident Connection	
Connection of tool identification systems Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC6000-2HF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-2HC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-2HC0■-■AA0**

Example of a specific software version, e.g., 1.1: 6FC6000-2HC0**1**-**1**A..

More information

For further information about the hardware for the MOBY tool information system, please refer to RFID Systems at:

www.siemens.com/simatic-sensors

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Overview

Machine data management MDA

The Motion Control Information System MCIS MDA function package acquires machine data and machine status as well as type-specific piece counts automatically or manually. What is more, its diverse functions allow precise evaluations and analyses to be performed. As a result, machine performance can be verified through objectively established key figures. System parameters such as cycle times and utilization ratio can be monitored. Improved transparency leads to early recognition of opportunities for improvement.

The positive detection and representation of faults simplifies service, maintenance and repairs. The degree of utilization and machine availability are increased considerably.

MDA Cell

MDA Cell is the software module that provides a single-workstation solution for machine data acquisition and analysis of a small manufacturing area. MDA Cell can be expanded on a project-specific basis to the plant-wide MDA Plant solution.

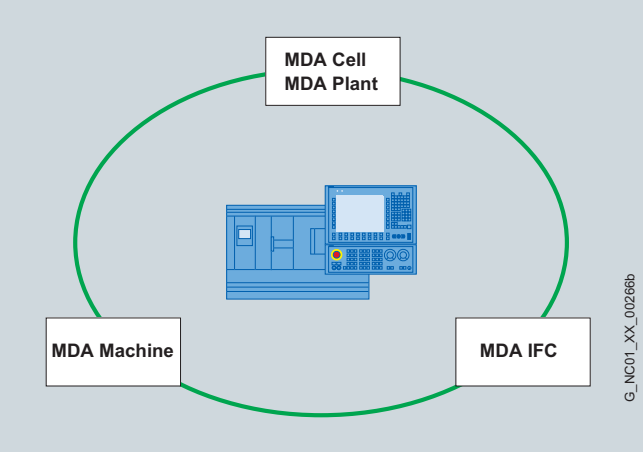
MDA IFC

MDA IFC is the software module for SINUMERIK for local acquisition of information on the machine (such as status, piece counts, alarms, and messages). Analysis and visualization is performed on the server side in the MDA Cell or MDA Plant modules.

MDA Machine

MDA Machine is the software module for SINUMERIK for local acquisition and evaluation of information on the machine (such as status, piece counts, alarms, and messages).

Integration



More information

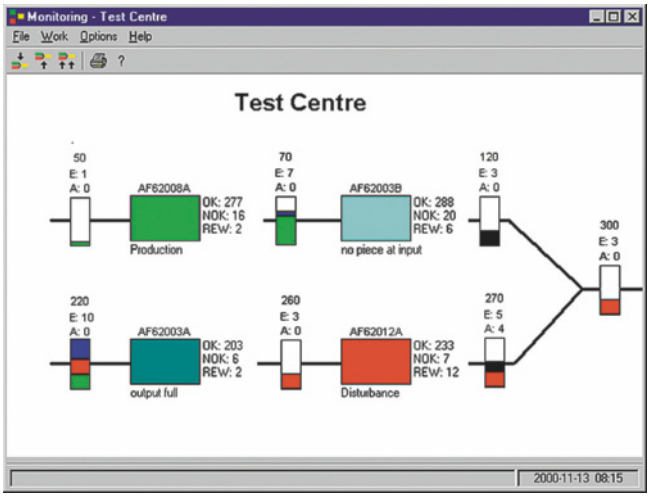
Additional information is available in the Internet under:

www.siemens.com/automation/support

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MDA – Machine Data Acquisition
MDA Cell

Overview



MDA Cell is used to collect, analyze and store machine data from small manufacturing areas with up to 16 machines on a central server. MDA IFC is used on each machine to acquire data at the machine level.

The analyses are performed at a workstation, whereby comparative analyses of "analysis groups" are possible.

As a result, system operators benefit from substantially improved transparency in their production. Improved transparency leads to earlier recognition of opportunities for improvement.

Benefits

Objectively established key figures are useful for verifying machine performance and for monitoring and archiving system parameters such as cycle times and utilization ratios.

Such key figures (Key Performance Indicators) include:

- The OEE key figure (Overall Equipment Effectiveness)
- Utilization
- Availability
- Level of performance
- Quality level

These figures are useful in formulating corrective measures sooner and in eliminating faults in accordance with their importance. The positive detection and analysis of faults simplify service and repairs or maintenance. You benefit from a significant increase in productivity.

The value of the inherent functionality of this approach increases with the number of the machines that are monitored in this manner. A further gain in convenience and transparency is achieved through comparative assessments of freely definable machines on an analysis workstation.

Function

- Software for evaluating and archiving of machine data on a standard PC (workstation)
- Connection of up to 16 machines/equipment units with MDA IFC (per machine/equipment unit)
- Single-stage system image
- Subsequent status correction after acquisition and transfer of data from MDA IFC
- Comparative analyses can also be obtained via the lower-level machines/equipment units ("self-definable analysis groups"):
  - Workpiece counter (machine-specific and part-specific)
  - Current states
  - Fault analysis
  - Status analysis
  - Shift/daily/weekly/monthly total
  - Logbook, (Prio) protocol
  - Availability/capacity utilization
  - History of availability/capacity utilization
  - OEE indicators
  - Alarm statistics, alarm log, current alarms (with SINUMERIK only)
- Export function to Excel, print-out of tables, hardcopy

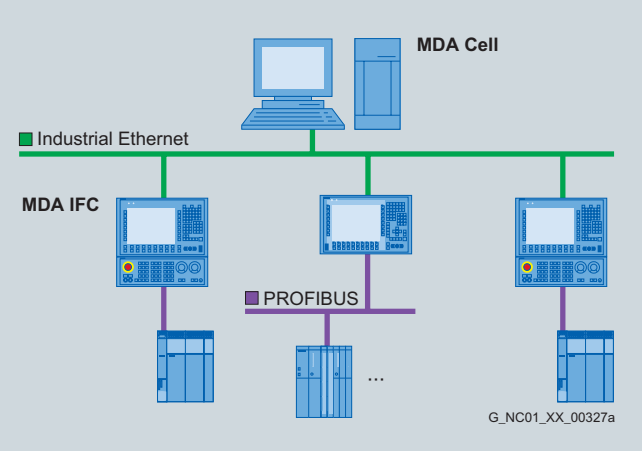
MDA Cell is a solution with a single PC (workstation). The functions can only be operated from this PC.

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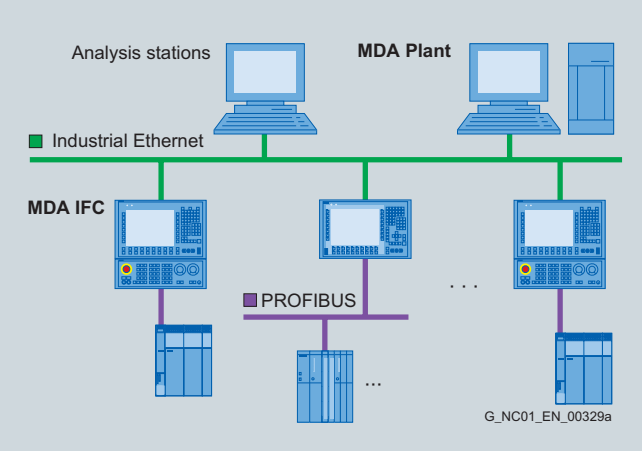
Integration

Preconditions:

- Standard PC as required
  - At least Pentium IV 1 GB RAM
  - Hard disks depending on data volume, at least 1 GB free
- Operating system
  - Windows 2000 Professional/Server (in the case of Server, additional client access licenses[1])
  - Windows XP Professional
  - Windows Vista
  - Windows 2003 Server (plus client access licenses[1])



For each operator panel, up to 8 equipment units (MDA IFC licenses) can be acquired. For each MDA Cell, a total of 16 machines/equipment units can be evaluated. For solutions with several analysis workstations or if you are connecting more than 16 machines/equipment units, please ask about MDA Plant, our expanded, project-specific solution. This solution also supports additional analyses, e.g. cycle times. With MDA Plant, it is also possible to integrate MES/ERP systems. For each MDA Plant, 50 to 70 machines/equipment units can be evaluated. For each operator panel: n × MDA IFC (n ≤ 8).



Selection and ordering data

Description	Order No.
MDA Cell	
Support for machine and production data management Software package	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC6000-3BF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-3BC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-3BC0■-■AA0**
• Upgrade with CD-ROM of specific software version	**6FC6000-3BC0■-■AE0**

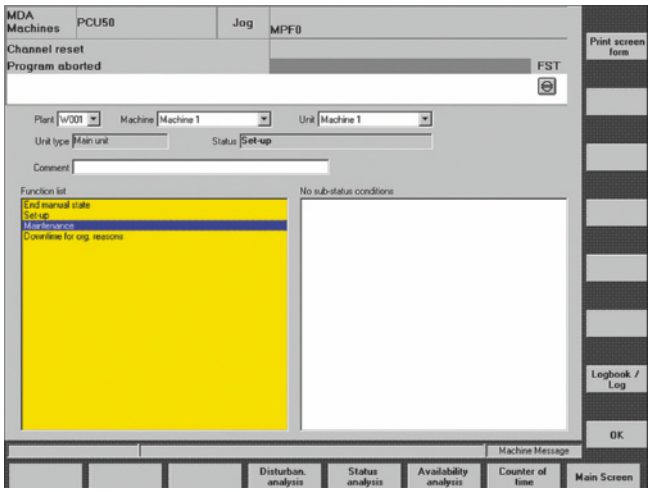
Example of specific software version, e.g., 2.2:
6FC6000-3BC0**2**-**2**A..

[1] Client access licenses required for each operator panel networked via Ethernet.

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MDA – Machine Data Acquisition
MDA IFC

Overview



The MDA IFC Interface Client is used to interconnect the SINUMERIK control or an OPC-compatible control (e.g., SIMATIC S7) with MDA Cell or with MDA Plant, the expanded project solution.

This interface ensures reliable transmission and buffer storage in the event of network disruptions.

Function

- Automatic acquisition of machine data from the open interface via the DB13/DB14 standard data blocks of the PLC. Alternatively, 5 fixed states can be acquired via the plug-and-play interface.
  - Machine states, processing results via DB
  - Total piece counts DB
  - Types of pieces, piece type-specific piece counts via DB
  - Cycle times via DB
  - Alarms and messages (only with SINUMERIK)
- Manual status entry, fault explanation by the operator
- Automatic buffer storage of the acquired data on the hard drive of SINUMERIK. In the event of a network failure, these data are then automatically tracked by MDA Cell/MDA Plant.

One MDA IFC license is required for each connected SINUMERIK or OPC control.

Integration

Preconditions:

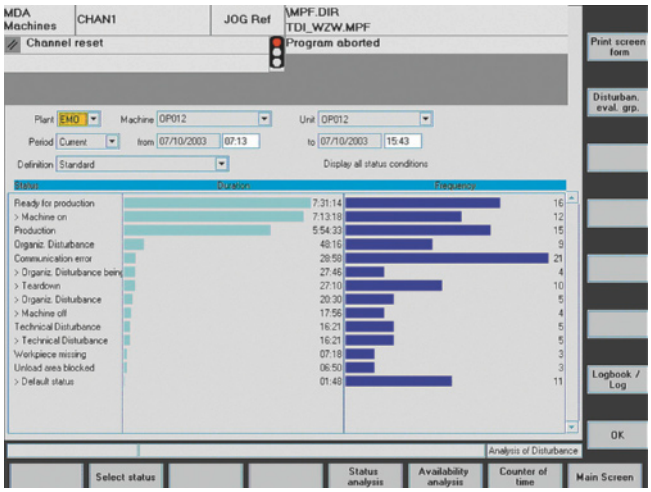
See MDA Machine and MDA Cell.

Selection and ordering data

Description	Order No.
MDA IFC Production data acquisition for network-capable controls for SINUMERIK 840Di sl/840D sl Software option Languages: Chinese Simplified, English, French, German, Italian, Spanish • Single license without data carrier	**6FC5800-0AP43-0YB0**

MDA – Machine Data Acquisition
MDA Machine

Overview



MDA Machine software permits acquisition and evaluation of data on the machine, e.g.:

- States
- Quantities
- Alarms, and messages

Benefits

- Up-to-date machine data allow swift responses
- Greater transparency at the machine and in the production process leads to earlier recognition of possible improvements
- Targeted actions increase machine utilization times
- Verification of machine performance through objectively established indicators and performance data
  - OEE number
  - Availability
  - Capacity utilization
  - Performance
  - Quality

Function

- Automatic acquisition of machine data from the open interface in DB13/DB14 standard data blocks of the PLC. Alternatively, fixed states can be acquired via the plug-and-play interface:
  - Machine states, processing results via DB
  - Total piece counts DB
  - Types of pieces, piece type-specific piece counts via DB
  - Cycle times via DB
  - Alarms and messages (only with SINUMERIK)
- Manual status entry, fault explanation by the operator
- Automatic buffer storage of the acquired data on the hard drive of SINUMERIK. In the event of a network failure, these data are then automatically tracked by MDA Cell/MDA Plant.
- Export function to Excel, print-out of tables, hardcopy

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Function (continued)

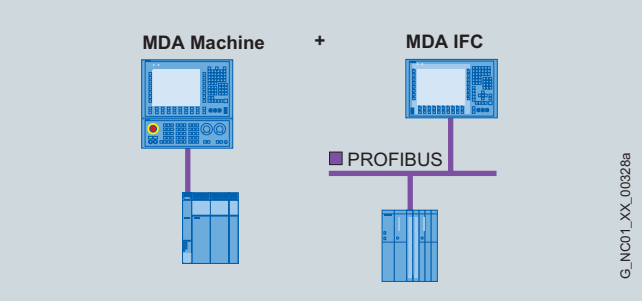
- Analyses:
  - Workpiece counter (machine-specific and part-specific)
  - Current states
  - Fault analysis
  - Status analysis
  - Shift/daily/weekly/monthly total
  - Logbook, (Prio) protocol
  - Availability/capacity utilization
  - History of availability/capacity utilization
  - Key performance indicators (capacity utilization, availability)
  - Alarm statistics, alarm log, current alarms (with SINUMERIK only)

One MDA Machine license is required for each connected SINUMERIK or OPC control.

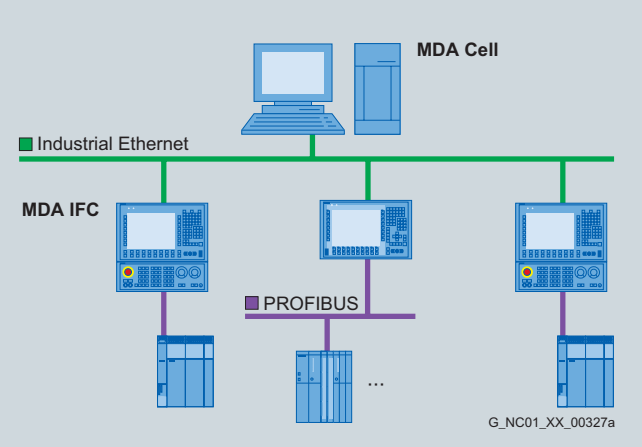
Integration

Preconditions:

- SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3 and HMI-Advanced



If several equipment units are to be operated and analyzed on one machine, additional MDA IFC licenses must be obtained. For each operator panel, up to 8 equipment units can be evaluated: 1 MDA Machine license and up to 7 additional MDA IFC licenses.



The system can be expanded with MDA Cell. For each MDA Cell, a total of 16 machines/equipment units can be evaluated.

Selection and ordering data

Description	Order No.
MDA Machine	
Operating data acquisition, local version for SINUMERIK 840Di sl/840D sl Software option	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
• Single license without data carrier	**6FC5800-0AP42-0YB0**
• CD-ROM without license for current software version	**6FC6000-3AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-3AC0■-■AA8**
• Upgrade with CD-ROM of specific software version	**6FC6000-3AC0■-■AE0**
• Trial license Single license for current software version	**6FC6000-3AC00-0AT7**
• Trial license Single license for specific software version	**6FC6000-3AC0■-■AT7**

Example of specific software version, e.g. 2.2: 6FC6000-3AC02-2A..

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RPC – Remote Procedure Call (computer coupling)

Overview

RPC SINUMERIK software is used to integrate SINUMERIK controls into a customer's production network. All essential machine data (such as states, piece counts, alarms, messages, CNC programs, machine tool downtimes) can be exchanged via RPC SINUMERIK between a control system and a CNC control.

Benefits

- Simple integration of the control with customer/project applications through a defined Ethernet/TCP-IP-based interface
- Simple configuring on the PLC of the data to be transmitted
- Use of MCIS RPC as a tool for implementing productivity-boosting measures:
  - Increased level of machine utilization through production planning and control
  - Reduction in machine downtime through transfer 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
  - Start-up, maintenance

Function

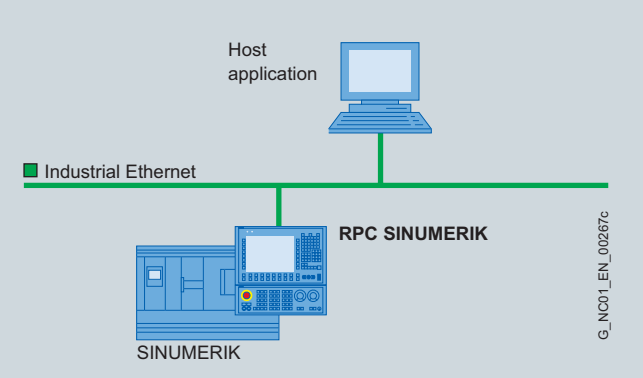
- Defined, open communication interface for exchanging essential SINUMERIK control data
- Data transmission can be initiated by the host computer and/or by the SINUMERIK control
- The host application is created by the user in the RPC environment (interfaces, examples). This can be performed by the end user or a software firm, or ordered from Siemens.
- The original equipment manufacturer (OEM) prepares the control:
  - Installs RPC on the control
  - Supplies the data interface in the PLC (DB12)
- The following data can be exchanged:
  - CNC programs, tool data
  - Machine status data
  - Messages
  - Data for the production dialog
  - Mode switching, synchronization
  - Transport requests
  - Configurable data from PLC or CNC

Even without its own user interface, RPC SINUMERIK can also run with additional languages (e.g., Chinese Simplified, Korean, Russian). The tools supplied with RPC continue to be available in English/German.

Integration

Preconditions:

- SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3 and HMI-Advanced (max. 4 NCUs)
- Computer-controlled loading and unloading of tools requires MCIS TDI Toolhandling.



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

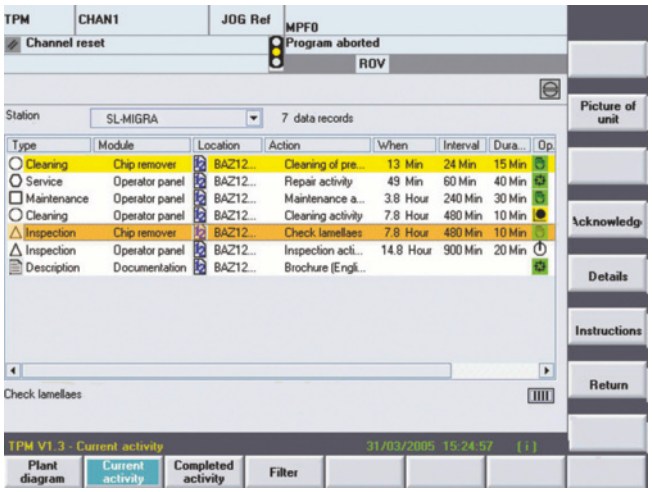
Selection and ordering data

Description	Order No.
RPC SINUMERIK	
Data exchange between CNC and host computer Computer coupling for SINUMERIK 840Di sl/840D sl Software package	
Languages: English, German	
• Single license without data carrier	**6FC5800-0AP50-0YB0**
• CD-ROM without license for current software version	**6FC6000-7AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-7AC0■-■AA8**
• Upgrade with CD-ROM of specific software version	**6FC6000-7AC0■-■AE0**

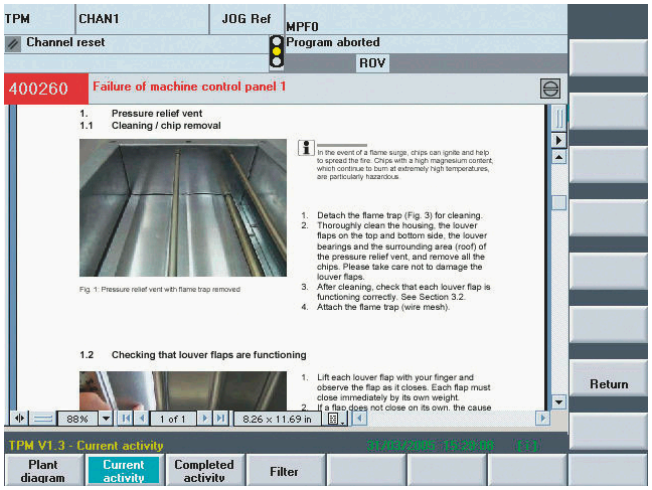
Example of a specific software version, e.g. 2.1:
6FC6000-7AC0**2-1**A..

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Overview



MCIS TPM provides support for cleaning, inspection, maintenance, and/or repair operations which have to be carried out on machines and plants. MCIS TPM can be used on all standard PCs, single or series machines, e.g., machining centers, as well as in transfer lines and flexible production lines. The maintenance measures to be taken can be defined and administered by either the user or machine manufacturer.



Benefits

- MCIS TPM is a maintenance standard integrated into the CNC.
- Increased incorporation of machine operators into maintenance operations for machines and plants, thus reduced workload for maintenance departments with simple routine operations
- The machine operator becomes aware of the maintenance requirements of the machine
- Overview of all networked machines on a central PC in the supervisors office
- Reduction in paper documentation (paperless production) by including electronic documents and pictures on the machine

Benefits (continued)

- Maintenance instructions integrated onto the control
- Optimization of total plant efficiency by striving for zero defect and zero breakdown production
- Single mode or networking with central database
- Maintenance measures can be coupled with PLC states or time intervals (e.g., filter change every 12 months or regularly after every 5000 hours of operation)

Function

The traffic light symbol of the software module TPM (Total Productive Maintenance) reminds the operator of the machine or the maintenance engineer in the workshop in advance to perform or plan the necessary maintenance work. After being prompted by the traffic light symbol, the machine operator can call up the appropriate brief instructions on the control and is thus integrated into the maintenance process.

The various modules are as follows:

TPM Machine

Single-user system for SINUMERIK with user interface and local data storage which can also be networked later with TPM Cell or in projects with TPM Plant. Licensing is for each machine.

TPM Cell

Acknowledgement, evaluation and data storage on a central PC. The number of machines that can be connected is restricted to a maximum of 16 machines with TPM IFC.

TPM IFC

The TPM user interface without a local database for SINUMERIK can only be used in combination with TPM Cell or in projects with TPM Plant. Licensing is for each machine.

TPM HMI

An additional TPM user interface on PCs in the production area for connection to TPM Cell or TPM Plant. Licensing is for each installation.

Integration

Preconditions:

- TPM Machine/TPM IFC: SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3 and HMI-Advanced
- TPM HMI: Standard PC with Pentium IV or higher 1 GB RAM with Windows XP Professional with corresponding capacities
- TPM Cell: Server operating system with the appropriate licenses (Windows 2003 Server) and database, e.g. Microsoft SQL Server 2003, are also required.
- Mouse (useful for operation)

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TPM – Total Productive Maintenance

Selection and ordering data

Description	Order No.
TPM	
Support for maintenance and repair Software package	
Languages: Chinese Simplified, English, French, German, Hungarian, Italian, Russian, Spanish	
TPM Machine	
Preventive maintenance, local version for SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3	
Software option	
• Single license without data carrier	**6FC5800-0AP32-0YB0**
• CD-ROM without license for current software version	**6FC6000-1AC00-0AA8**
• CD-ROM without license for specific software version	**6FC6000-1AC0■-■AA8**
• Upgrade	**6FC6000-1AC0■-■AF0**
TPM Cell	
Maintenance management for Windows-based PC	
• Single license without data carrier	**6FC6000-1BF00-0AB0**
• Single license with CD-ROM of current software version	**6FC6000-1BC00-0AA0**
• Single license with CD-ROM of specific software version	**6FC6000-1BC0■-■AA0**
TPM IFC	**6FC5800-0AP46-0YB0**
Preventive maintenance for network-capable controls for SINUMERIK 840Di sl/840D sl with SINUMERIK PCU 50.3	
Software option	
• Single license without data carrier	
TPM HMI	**6FC6000-1DF00-0AB0**
Additional user interface for Windows-based PC	
• Single license without data carrier	
TPM demo version	**6FC6000-1AC00-0AT7**
TPM Machine/TPM Cell	
• Trial license with CD-ROM of current software version	

Example of specific software version, e.g. 2.1:
6FC6000-1AC0**2**-**1**A..

RCS – Remote Control System

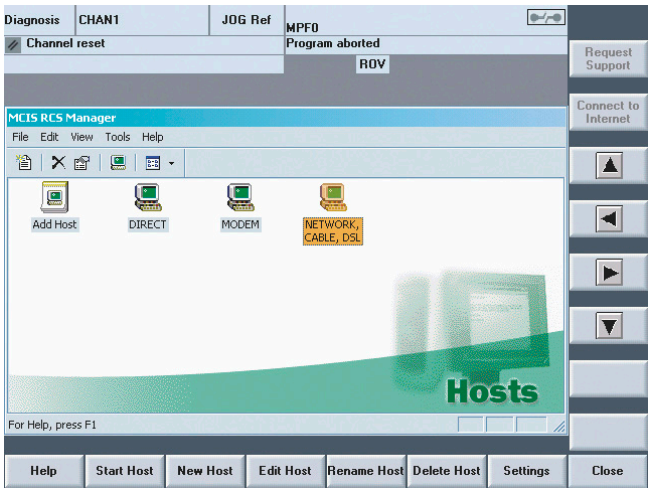
Overview



The software products RCS Host and RCS Viewer or RCS Commander permit remote maintenance of the complete machinery by means of remote control from a central service point.

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Overview



Remote diagnostics for SINUMERIK with Windows-based HMI

RCS Host and RCS Viewer software facilitates remote maintenance of machines with HMI-Advanced. Remote maintenance functions include the complete remote control of all user interfaces, exchange of files between systems as well as remote administration for network administrators.

The Host software is already included on the Windows-based SINUMERIK PCUs on delivery. The function can be ordered separately for each SINUMERIK operator panel.

The RCS Viewer software is installed on the PC in the service center.

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
- Conference calls involving several specialists
- Rapid data transfer to and from the machine

Function

- Automatic establishment of Internet connection
- Status display on the operator panel and in the PLC
- Connection control via the PLC

As well as Symantec pcAnywhere basic functions, e.g.:

- Remote control, monitoring and administration
- Transfer of files including file synchronization
- Session recording
- Exchange of text information (chat)
- Event logging
- Remote working, local printing
- Simultaneous connections on Viewer possible
- Multiplex configuration with several Viewers and one host
- Effective security concept to prevent unauthorized access (login and password, operator approval or callback to a previously defined connection)

Integration

The components can be connected via:

- Ethernet in local networks (LAN)
- Wide Area Networks (WAN)
- Internet (VPN)
- Point-to-point connection (analog, ISDN modem)

Preconditions:

- RCS Viewer
  PCs with Windows XP Professional operating system and network or modem connection
- RCS Host
  - SINUMERIK control
  - HMI-Advanced operating software version 6.3.15 and higher

Selection and ordering data

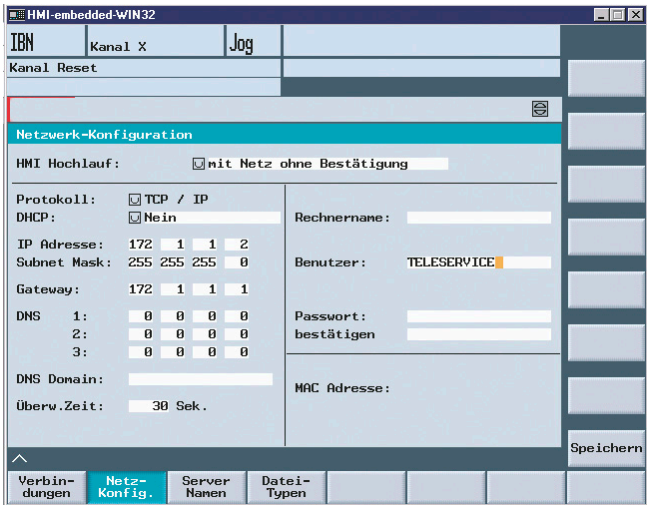
Description	Order No.
RCS Host For SINUMERIK 840Di sl/840D sl Software option Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC5800-0AP30-0YB0**
• Single license without data carrier	
RCS Viewer for PC/PG	
• Single license without data carrier	**6FC6000-6DF00-0BB0**
• Single license with CD-ROM of current software version	**6FC6000-6DC00-0BA0**
• Single license with CD-ROM of specific software version	**6FC6000-6DC0■-■BA0**

Example of a specific software version, e.g. 1.1:
6FC6000-6DC01-1BA0

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RCS – Remote Control System
RCS Host/RCS Viewer Embedded

Overview



Remote diagnostics integrated in CNC software for NCU

The software products RCS Host and RCS Viewer Embedded permit remote maintenance of machines with HMI-Embedded. Remote maintenance functions include complete remote control, exchange of files between the machine and communications partner, as well as remote administration for network administrators.

The RCS Host option can be activated using machine data in combination with a license.

The RCS Viewer Embedded software is installed from CD-ROM onto a Windows-based PC in the service center.

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 jobs

Machine availability is enhanced thanks to:

- Rapid online presence on site
- Conference calls involving several specialists
- Rapid data transfer to and from the machine

Function

- Remote control
- Remote monitoring
- Remote administration
- File transfer

Integration

The components can be connected via:

- Ethernet in local networks (LAN)
- Wide Area Networks (WAN)
- Internet (VPN)

Preconditions:

- RCS Viewer Embedded
  - PC with Windows XP Professional operating system and Ethernet network interface connection
  - Optional: VPN router for reliable, secure access to the Internet or company networks (Cisco 801/803 was tested)
- RCS Host
  - SINUMERIK 840D sl and CNC software for NCU
  - Option for managing up to 4 additional network drives
  - Optional: VPN router for reliable, secure access to the Internet or company networks (Cisco 801/803 was tested)

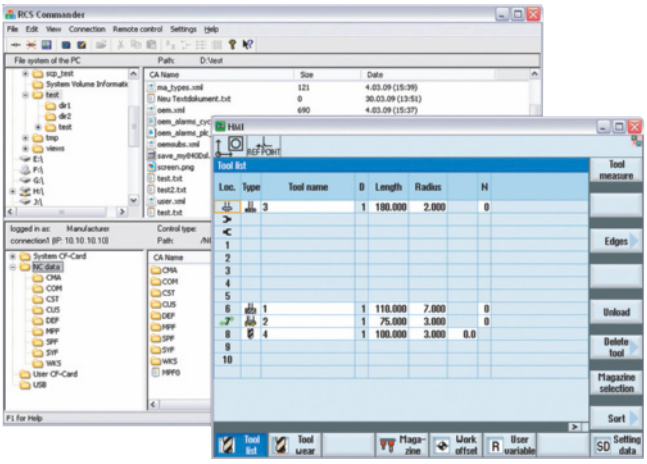
Selection and ordering data

Description	Order No.
RCS Host For SINUMERIK 840D sl Software option Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC5800-0AP30-0YB0**
• Single license without data carrier	
Managing of up to 4 additional network drives Via Ethernet Software option	**6FC5800-0AP01-0YB0**
• Single license without data carrier	
RCS Viewer Embedded For PC/PG	
• Single license without data carrier	**6FC6000-6DF88-8BB0**
• Single license with CD-ROM of current software version	**6FC6000-6DC80-0BA0**
• Single license with CD-ROM of specific software version	**6FC6000-6DC0■-■BA0**

Example of a specific software version, e.g., 1.01:
6FC6000-6DC81-1BA0.

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Overview



Remote diagnostics for SINUMERIK Operate operating software

The RCS Commander permits remote maintenance of machines with the SINUMERIK Operate operating software, version 2.6 or higher, from a standard Windows PC. Remote maintenance comprises the exchange of files between the service PC and CNC, and remote control of the HMI user interface.

On the NCU end, RCS Commander permits access to files on the CF card and to files in the NCK area. Various user profiles are supported. The RCS Commander software is installed on the PC at the Service department.

If remote access to the HMI user interface via a modem is required, the RCS Host option is additionally required on the CNC. The associated RCS Host software is already included on the SINUMERIK Operate operating software. The RCS Host option must be ordered for each NCU. The TS Adapter IE is approved as modem.

A standard SIMATIC STEP 7 license is required on the service PC/PG for PLC remote diagnostics.

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
- Conference calls involving several specialists
- Rapid data transfer to and from the machine

Function

- Remote control, monitoring and administration (RCS Host option required)
- File transfer to CF card and NCK area
- Connection is established following confirmation by the operator
- Status display on the operator panel
- Machine connections can be maintained centrally and access data can be administered via remote connections (Teleservice software required)

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)
- Internet (VPN), taking account of local IT security regulations (IT Policy)

Preconditions:

- Service PC/PG:
  - RCS Commander
    PC with Windows XP Professional/Vista operating system
  - Network or modem connection, e.g. with TS Adapter IE and Teleservice software (optional)
- SINUMERIK 840Di sl/840D sl:
  - SINUMERIK Operate operating software, SW Version 2.6 or higher
  - RCS Host option (only for remote access to SINUMERIK Operate)
  - TS Adapter IE analog/ISDN

Selection and ordering data

Description	Order No.
RCS Commander for PC/PG Languages: English, German	
• Single license with CD-ROM of current software version	**6FC5860-7YC00-0YA0**
• Single license with CD-ROM of specific software version	**6FC5860-7YC■■-0YA0**
RCS Host For SINUMERIK 840Di sl/840D sl Software option Languages: Chinese Simplified, English, French, German, Italian, Spanish	**6FC5800-0AP30-0YB0**
• Single license without data carrier	
TS Adapter IE modem For teleservice with integrated analog modem	**6ES7972-0EM00-0XA0**
TS Adapter IE ISDN For teleservice with integrated ISDN terminal adapter	**6ES7972-0ED00-0XA0**
SIMATIC STEP 7 Software V5.4 Languages: English, French, German, Italian, Spanish	**6ES7810-4CC08-0YA5**
• Floating license with DVD-ROM	
Teleservice Software V6.1 Languages: English, French, German, Italian, Spanish	**6ES7842-0CE00-0YE0**
• Floating license with CD-ROM	

Example of a specific software version, e.g. 1.0:
6FC5860-7YC**10**-0YA0

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ADDM – Data Management

Overview



With ADDM, you are completely in control of the SIMATIC and SINUMERIK controls – around the clock and with any program version. This tool is indispensable in a modern production area and ensures user-friendly backup, comparison and management of control data.

Benefits

- Absolute clarity in data management
  With ADDM, everything executes on a uniform user interface – all types and formats of CNC, PLC and configuration data right through to CNC software. The tool offers unambiguous access authorizations and intuitive handling. The directory structure is always in line with the physical production layout, even complex systems can be understood at a glance.
- Secure and flexible management of distributed control concepts
  ADDM can be flexibly used for every client/server and online storage system as well as for stand-alone machines. This means: Central data storage with maximum fault tolerance and availability as well as efficient archiving of all machine data.
  Thus: Fast feedback of the required version, if required. Checked, controlled, and documented archiving when several persons are working in parallel.
- Minimize downtimes
  You can rely on ADDM every time. Even when control components have to be replaced, for example. ADDM makes all the data available again immediately. With one click, without time-consuming reparameterization and configuration, whether for individual programs or complete hard disk partitions, you will have the right data in the right place.

Function

Controls fully mastered – across all program versions

Backup can be time-driven, fully-automatic or manual. The data are available at all times and can be used for fast, simple disaster recovery in the event of a fault.

System-active checking

If, for example, data changes become obvious in an online-offline comparison, automatic backup can take place and/or the change can be notified by e-mail.

Hot version backups

The required version can be called up immediately from up to 99 backups (regardless of archive versions).

Total transparency and overview

The practice-oriented structure is ideal not only for highly-complex control systems but also for non-networked single machines – with a uniform user interface for all data types and formats. Checked, controlled and documented archiving when several persons are working in parallel.

Totally Integrated Automation (TIA)

ADDM has a unique way of managing your data uniformly in production.

Optimum availability

Reliable backup of all system and configuring data, including documentation and circuit diagrams, can be carried out manually or automatically with time control – for made-to-measure distributed control concepts.

Easy to handle

No programming knowledge required – so no need for special training courses. With the use of communication modules, data can also be exchanged conveniently with controls via the MPI/PROFIBUS interface on TCP/IP.

Contiguous archiving

The machine data are fully versioned and archived and can be copied back at any time. This also includes the documentation.

Operator-free data backup using the ADDM Agent

Data backup of SINUMERIK controls can be time-driven or manual, without installing a user interface, using the ADDM Agent. The backup, load and compare functions can be performed remotely using the ADDM Client.

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Selection and ordering data

Description	Order No.
ADDM	
Software package	
Languages: English, German	
ADDM Single User	
For PC/PG with Windows XP	
• Single license with CD-ROM of current software version	**6BQ3030-1AA30-3AD0**
• Trial license with CD-ROM of current software version	**6BQ3030-1AA70-3AD0**
• Single user upgrade	**6BQ3030-1AB13-3AD0**
ADDM Client	
For PC/PG with Windows XP	
• Single license without data carrier	**6BQ3030-1AA20-1AC0**
• Single license with CD-ROM of current software version	**6BQ3030-1AA10-0AD0**
• Client upgrade from V5.x to V6.2 with CD-ROM	**6BQ3030-1AB11-3AD0**
ADDM Server	
For server PC with Windows XP and Windows 2003 Server	
• Single license with CD-ROM of current software version	**6BQ3030-1AA00-3AD0**
• Server upgrade from V5.x to V6.2 with CD-ROM	**6BQ3030-1AB10-3AD0**
ADDM Agent	
For SINUMERIK PCU with HMI-Advanced	
• Single license without data carrier	**6BQ3030-1AA00-1AB0**
• Single license with CD-ROM of current software version	**6BQ3030-4AA00-0AD0**
• Agent upgrade from V1.x to V1.3 with CD-ROM	**6BQ3030-1AB12-3AD0**

More information

Additional information is available in the Internet under:

www.siemens.com/addm

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SIMATIC STEP 7 for SINUMERIK hardware

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 can be used on:

- SINUMERIK PCU 50.3

Preconditions:

- Mouse and PC keyboard
- Operating system Windows XP SP1 for SIMATIC STEP7 V5.3
- Operating system Windows XP SP1 or SP1a for SIMATIC STEP7 V5.3 SP1
- Operating system Windows XP SP1 or SP2 for SIMATIC STEP7 V5.3 SP2

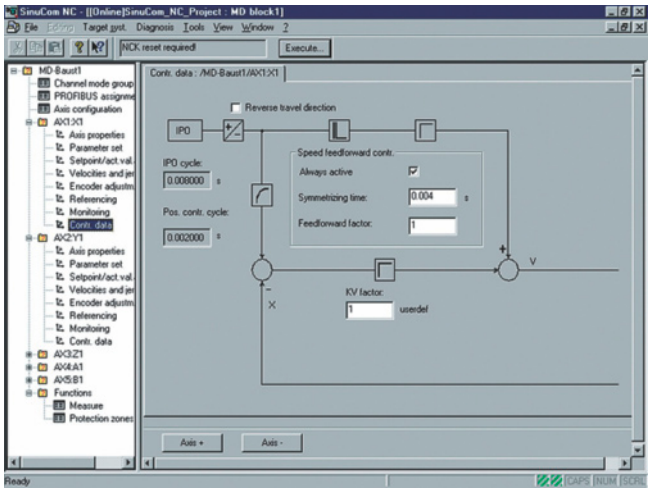
Selection and ordering data

Description	Order No.
SIMATIC STEP 7 for SINUMERIK hardware	
• Single license without data carrier	**6FC5252-0AY00-0AG1**
• Single license with CD-ROM of current software version	**6FC5252-0AY00-0AG0**
• Single license with CD-ROM of specific software version	**6FC5252-■AY01-■AG0**

Example of specific software version, e.g., 5.3:
6FC5252-**5**....-**3**...

SinuCom

Overview



The SinuCom program package consists of:

- SinuCom NC
  - SinuCom NC Trace
  - SinuCom NC SI
- SinuCom CFS
- SinuCom ARC
- Commissioning software for SINAMICS S120/ SIMODRIVE 611 digital
- SinuCom Protector

The SinuCom program package supports simple and effective commissioning of the SINUMERIK 840D sl control on CNC machines.

The programs provide comprehensive support to startup 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 CompactFlash Card images
- Administration of data for series commissioning
- Transmission of CNC user data
- Know-how protection – safeguard technological know-how against unauthorized access

Function

SinuCom NC

The SinuCom NC program enables the SINUMERIK 840D sl control to be started up easily using:

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

Preconditions:

- Windows XP operating system
- SINUMERIK 840D sl software version 1 or higher
- Mouse

The program is included in the scope of delivery of the SINUMERIK 840Di sl.

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Function (continued)

SinuCom NC 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 provides support in:

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

Preconditions:

- Windows XP operating system
- SINUMERIK 840D sl software version 1 and higher and HMI-Advanced software version 7.1 and 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 in accordance with EU Machinery Directive EN 954-1 (control category 3)
- 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 series commissioning
- Shorter commissioning times since, in the new acceptance mode, power-on alarms during the acceptance test are acknowledged by RESET
- User-friendly operation due to controlled execution and the automatic configuration of the Trace functions
- Unambiguous quality verification for original equipment manufacturers and customers, and for dealings with government agencies

Preconditions:

- Windows XP operating system
- SINUMERIK 840D sl software version 1 or higher and HMI-Advanced software version 7.1 or higher
- Mouse

SinuCom CFS

The SinuCom CFS program is used to generate an image for the SINUMERIK 840D sl NCU's CF card, in Ext3 format. It contains:

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

Preconditions:

- Windows XP operating system
- SINUMERIK 840D sl

When copying the software, be sure to follow the I DT software marketing guidelines!

Function (continued)

SinuCom ARC

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

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

Preconditions:

- Windows ME/NT 4.0/2000/XP operating system

Commissioning software for SINAMICS S120/ SIMODRIVE 611 digital

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

Preconditions:

- Windows XP operating system

SinuCom Protector

SinuCom Protector enables you to protect data – cycles – in the CNC by encoding them on a PC/PG and by using the cycle protection (P54 option). This enables you to secure your technological lead.

- Secrecy protection of technological know-how through cryptographic encryption

Preconditions:

- Windows XP operating system

Selection and ordering data

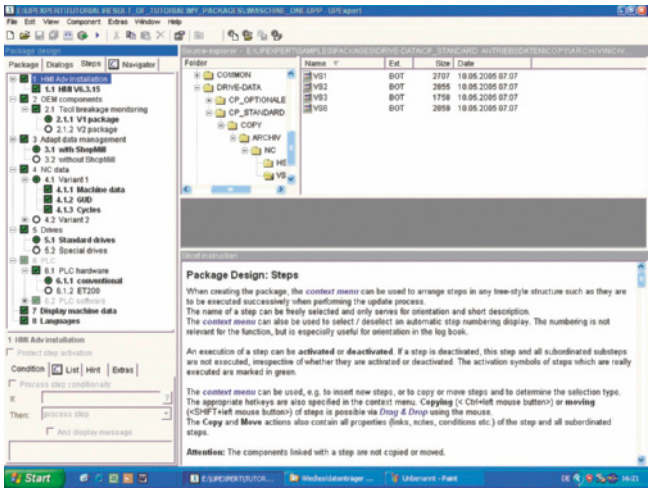
Description	Order No.
SinuCom Commissioning/service tools	
SinuCom NC (including SinuCom NC Trace/ SinuCom NC SI), SinuCom CFS, SinuCom ARC Commissioning software for SINAMICS S120/SIMODRIVE 611 digital, SinuCom Protector Languages: English, French, German, Italian, Spanish Documentation: English/German	
• Single license without data carrier	**6FC5250-0AY00-0AG1**
• Single license on DVD-ROM for current software version	**6FC5250-0AY00-0AG0**
• Single license on DVD-ROM for specific software version	**6FC5250-7AY00-■AG0**
• Software update service	**6FC5250-0AY00-0AG2**
• Update on DVD-ROM on order for specific software version	**6FC5250-7AY00-■AG3**

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

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SinuCom Update Agent

Overview



The SinuCom Update Agent tool assists the commissioning and servicing engineers with the series commissioning of SINUMERIK controls at the machine manufacturer and with software upgrades at the end customer.

Thanks to the modular concept, SinuCom Update Agent allows different machines of a series to be commissioned and upgraded with one update package.

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

Benefits

- Avoidance of upgrading errors through structured preparation and automation of process steps
- Significant reduction in upgrade times
- Simplification of upgrade process in the plant
- Detailed knowledge of the control system is needed only to configure the update package, but not to perform upgrades on the machine
- Automatic documentation of process steps during upgrading
- The comparison tool especially supports data structures specific to SINUMERIK

Design

The SinuCom Update Agent provides the following tools:

- UPExpert
  Configuring tool for creating the update package containing a configurable step sequence and the associated data
- UPDiff
  Data comparison between folders, SINUMERIK archives, files and CNC data
- UPTopo
  For creating an image of the SINAMICS topology and a library of SINAMICS components

Function

The SinuCom Update Agent offers support for upgrades/conversions, e.g., for the following:

- HMI systems
  - SINUMERIK Operate
  - HMI-Base
  - HMI-Embedded
  - HMI-Advanced
- OEM applications
- NCK area
  - CNC software (only SINUMERIK 840D sl)
  - Archives
- ShopMill/ShopTurn applications
- Standard cycles
- Measuring cycles
- Languages
- PLC
  - CNC software (only SINUMERIK 840D sl)
  - Modules
- OEM screens
- Machine data manipulation
- Drives
  - Manipulation of SINAMICS data in drive archives
  - Creation of a SINAMICS archive with specified topology

Integration

Preconditions:

- SINUMERIK 840D sl

Requirements for PC/PG:

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

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

- MS Dotnet Framework
  (included on product CD-ROM)
- MS Internet Explorer, version 6 or later
- Acrobat Reader, version 4 or later

Selection and ordering data

Description	Order No.
SinuCom Update Agent For series commissioning and software upgrades	
• Single license with CD-ROM of current software version	**6FC5862-2YC00-0YA0**
• Single license with CD-ROM of specific software version	**6FC5862-2YC■■-■YA0**

Example of specific software version, e.g. 03.00.05:
6FC5862-2YC**30-1**YA0

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Basic components

5



5/2 **CNC controls**
5/2 Introduction
5/3 SINUMERIK 802D sl
5/6 MCP machine control panel
5/7 MCP 802D sl machine control panel
5/8 MCPA module
5/9 SINUMERIK 840Di sl
5/15 MCI board extension, slot version
5/16 SINUMERIK 840D sl
5/19 NCU 710.2
NCU 720.2/NCU 720.2 PN/
NCU 730.2/NCU 730.2 PN
5/25 Numeric Control Extensions
NX10/NX15
5/26 Compile cycles
5/26 NCK OA package
5/27 SINUMERIK Safety Integrated

5/29 **SINUMERIK I/O**
5/29 SINUMERIK Analog Drive Interface
for 4 axes ADI 4
5/31 SINUMERIK PP 72/48 I/O module

5/32 **Supplementary components**
5/32 SITOP power supply

Part 11 **CAD CREATOR**
Dimension drawing and
2D/3D CAD generator
www.siemens.com/cadcreator

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Introduction

SINUMERIK CNC control

SINAMICS drive system

SINUMERIK 802D sl
1 MG/1 channel
6 axes
- 4 digital axes + 1 digital/analog spindle + 1 positioning axis
  or
- 3 digital axes + 2 digital/analog spindles + 1 positioning axis


SINUMERIK 802D sl


SINAMICS S120

SINUMERIK 840Di sl
PCU 50.3 + MCI2 board
2 MGs/2 channels
6 axes/spindles

10 MGs/10 channels
20 axes/spindles


SINUMERIK 840Di sl


SINAMICS S120 with CU320

SINUMERIK 840D sl

NCU 710.2
2 MGs/2 channels
6 digital axes/spindles

NCU 720.2/720.2 PN
10 MGs/10 channels
12 digital axes/spindles

NCU 730.2/NCU 730.2 PN
10 MGs/10 channels
31 digital axes/spindles


Numeric Control Extension NX10

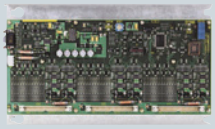

SINUMERIK 840D sl NCU 720.2


CF card


SINAMICS S120

SINUMERIK I/O

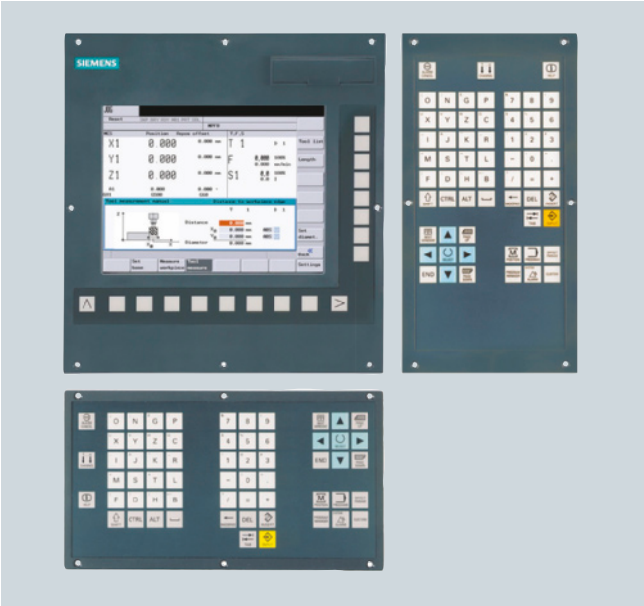

SINUMERIK Analog Drive Interface for 4 axes ADI 4


SINUMERIK PP 72/48 I/O module

5

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Overview



The SINUMERIK 802D sl is an operator panel control combining all the components of a CNC (NC, PLC, HMI) and drive control in a single unit. The full CNC keyboard (vertical or horizontal format) can be connected directly. The I/Os are operated via the PROFIBUS DP system.

The motors can be connected easily to the digital drives via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the control is ideally suited for applications on standardized machine tools – from one-off production runs to industrial scale manufacture.

The Manual Machine Plus for turning user interface enables a second type of programming by easy changeover. A program can be compiled manually and with simple cycles – in other words by doing. This program can then be used like a normal program for other parts. Manual Machine Plus is especially suitable for training purposes. The same machine can be used regardless of the level of training reached – either as a manual machine or as a CNC machine.

Benefits

- Easy to operate thanks to DIN programming and ISO code
- High reliability
- Compact control with very simple, interference-immune wiring
- Components delivered for individual construction
- Broad range of programming tools
- Digital drive technology via DRIVE-CLiQ
- Maintenance-free: no battery or fan
- Remote diagnostics via RCS 802 (pro version)
- Easy commissioning
- CF card for series commissioning and program memory/program execution

Function

- 6 digital servo drives (plus and pro versions)
  4 digital servo drives (value version)
- One additional positioning axis (plus and pro versions)
- Turning, milling, nibbling or grinding can be freely selected
- A bipolar or a unipolar analog spindle can be used
- RS 232 C interface
- Ethernet on-board (pro version)
- Pre-assigned machine data
- Sample program and PLC library included in scope of supply
- Very user-friendly PLC (SIMATIC S7-200) with ladder programming
- 216 digital inputs and 144 digital outputs (0.25 A)
- User interface with cycle support for T/M and G versions (external cylindrical, surface grinding)
- User interface Manual Machine Plus for turning (option)

Integration

The following components can be connected to the SINUMERIK 802D sl:

- Full CNC keyboard, vertical or horizontal format
- Up to 2 electronic handwheels
- One mini handheld unit, contains one handwheel
- Up to 2 SINUMERIK Analog Drive Interfaces for 4 axes ADI 4
- Up to 3 SINUMERIK PP 72/48 I/O modules
- One MCPA module for connecting an analog spindle via a ±10 V interface
- One MCP machine control panel via a PP 72/48 I/O module or one MCP 802D sl machine control panel via the MCPA module
- SINAMICS S120 drive system via DRIVE-CLiQ

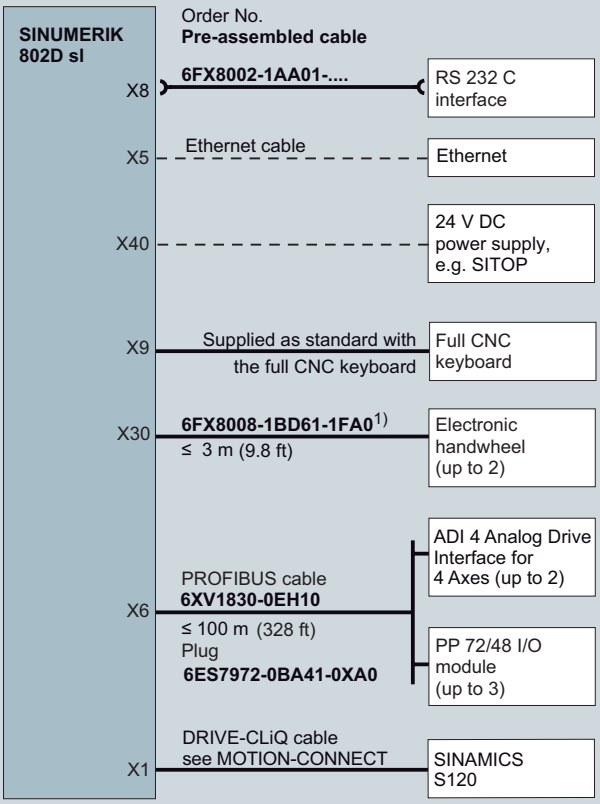
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Integration (continued)

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Information about PROFINET/Industrial Ethernet components can be found in the IK PI Catalog or in the Siemens Industry Mall.

www.siemens.com/industrymall



1) Length supplied: Only in 50 m (164 ft) rings.

Connection overview for SINUMERIK 802D sl

Technical specifications

Product name	6FC5370-0AA00-1AA0 SINUMERIK 802D sl T/M value	6FC5370-0AA00-2AA0 SINUMERIK 802D sl T/M plus	6FC5370-0AA00-3AA0 SINUMERIK 802D sl T/M pro	6FC5370-0AA00-2BA0 SINUMERIK 802D sl G/N plus	6FC5370-0AA00-3BA0 SINUMERIK 802D sl G/N pro
Input voltage	24 V DC				
Power consumption, max.	50 W				
Degree of protection according to EN 60529 (IEC 60529)					
• Front	IP65				
• Rear	IP20				
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).				
Relative 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 … +60 °C (-4 ... +140 °F)				
• Transport	-20 … +60 °C (-4 … +140 °F)				
• Operation	0 … 50 °C (32 ... 122 °F)				
Dimensions					
• Width	310 mm (12.2 in)				
• Height	330 mm (13.0 in)				
• Depth	70 mm (2.76 in)				
Weight, approx.	4.9 kg (10.8 lb)				
Approvals, according to	cULus				

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Technical specifications (continued)

Product name	6FC5303-0DT12-1AA0 SINUMERIK 802D sl full CNC keyboard, for vertical mounting	6FC5303-0DM13-1AA0 SINUMERIK 802D sl full CNC keyboard, for horizontal mounting
Input voltage	Via the PCU	
Degree of protection according to EN 60529 (IEC 60529)		
• Front	IP65	
• Rear	IP20	
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative 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 … +60 °C (-4 … +140 °F)	
• Transport	-20 … +60 °C (-4 … +140 °F)	
• Operation	0 … 50 °C (32 … 122 °F)	
Dimensions		
• Width	172 mm (6.77 in)	310 mm (12.2 in)
• Height	330 mm (13.0 in)	175 mm (6.89 in)
• Depth	32 mm (1.26 in)	
Weight, approx.	0.8 kg (1.76 lb)	
Approvals, according to	cULus	

Selection and ordering data

Description	Order No.
Hardware components	
SINUMERIK 802D sl Operator panel CNC (PCU) Including logbook and toolbox Current software version, export version	
• **Version T/M value**	**6FC5370-0AA00-1AA0**
• **Version T/M plus**	**6FC5370-0AA00-2AA0**
• **Version T/M pro**	**6FC5370-0AA00-3AA0**
• **Version G/N plus**	**6FC5370-0AA00-2BA0**
• **Version G/N pro**	**6FC5370-0AA00-3BA0**
SINUMERIK 802D sl Full CNC keyboard, vertical format For mounting on the side of the PCU , incl. connecting cable Length: 1.5 m (4.92 ft)	**6FC5303-0DT12-1AA0**
SINUMERIK 802D sl Full CNC keyboard, horizontal format For mounting below the PCU incl. connecting cable Length: 1.5 m (4.92 ft)	**6FC5303-0DM13-1AA0**
Terminal strip converter 50-pole	**6EP5406-5AA00**
Cable set 6 m (19.7 ft) ribbon cable, 50-pole, 8 insulation displacement connectors, 50-pole	**6EP5306-5BG00**
Industrial Ethernet cable Twisted-pair cable for peer-to-peer connection Length: 10 m (32.8 ft)	**6XV1870-3RN10**
1 GB CompactFlash card Empty For series commissioning and program memory/program execution	**6FC5313-5AG00-0AA0**

Description	Order No.
Software	
SINUMERIK 802D sl Toolbox T/M Current software version on CD-ROM, including • Cycles • Languages • PLC 802 programming tool • RCS 802 • PLC library • Adobe Reader	**6FC5810-0YC00-0YA8**
SINUMERIK 802D sl Toolbox G/N Current software version on CD-ROM, including • Cycles for G version • Languages • PLC 802 programming tool • RCS 802 • PLC library • Adobe Reader	**6FC5810-1YC00-0YA8**
SINUMERIK RCS 802 PC license On floppy disk Enables a PC for • Remote control • Snap shots Via Ethernet for the SINUMERIK 802D sl pro version	**6FC6000-6DA51-0AA0**
Manual Machine Plus for turning For SINUMERIK 802D sl Software option • Single license without data carrier	**6FC5800-0AP07-0YB0**

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SINUMERIK 802D sl
MCP machine control panel

Overview



The MCP machine control panel for the SINUMERIK 802D sl control offers a simple solution for machine tools.
All keys required for operation are available.

The keys are directly connected to the SINUMERIK PP 72/48 I/O module via ribbon cable. The cable connections are at the 24 V DC level for easier implementation. The PP 72/48 I/O module and the SINUMERIK 802D sl are connected over PROFIBUS.

Benefits

- Easily connected using ribbon cables and post links
- Suitable dimensions for the SINUMERIK 802D sl
- Fully equipped with all the necessary function elements
- Distributed connection via the SINUMERIK PP 72/48 I/O module over PROFIBUS

Function

- 24 V DC supply level
- Can be adapted to applications by means of replaceable keys
- User-assignable keys with LED indicator
- Emergency stop button with NO and NC contacts
- 2 override rotary switches for feedrate and spindle drive

Integration

The MCP machine control panel can be used with the CNC control:

- SINUMERIK 802D sl

Technical specifications

	6FC5603-0AD00-0AA2
Product name	MCP machine control panel, vertical format
Input voltage	24 V DC
Power consumption, max.	5 W
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 … +60 °C (-4 ... +140 °F)
• Transport	-20 … +60 °C (-4 … +140 °F)
• Operation	0 … 50 °C (32 ... 122 °F)
Dimensions	
• Width	172 mm (6.77 in)
• Height	330 mm (13.0 in)
• Depth	70 mm (2.76 in)
Weight, approx.	0.7 kg (1.54 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
MCP machine control panel, vertical format For mounting on the side of the PCU incl. ribbon cable	**6FC5603-0AD00-0AA2**
Accessories	
2nd contact block for emergency stop button With 2 contacts 1 NO + 1 NC, 2-pole screw terminal	**3SB3400-0A**

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Overview



The MCP 802D sl machine control panel for the SINUMERIK 802D sl offers a simple solution for machine tools. The panel includes all the keys required to operate the machine.

The cables for installing the MCP next to the SINUMERIK 802D sl operator panel are included in the scope of supply. The MCP can be connected only via the MCPA module.

Benefits

- ±10 V interface for an analog spindle
- High-speed inputs/outputs
- Easily connected using ribbon cables and post links on the MCPA module
- Suitable dimensions for the SINUMERIK 802D sl
- Fully equipped with all the necessary function elements
- Direct connection to SINUMERIK 802D sl via MCPA module

Function

- 5 V DC supply level
- Can be adapted to applications by means of replaceable keys
- User-assignable keys with LED indicator
- Emergency stop button with NO and NC contacts
- 2 override rotary switches for feedrate and spindle drive

Integration

The MCP 802D sl machine control panel can be used with the CNC control:

- SINUMERIK 802D sl

Technical specifications

	6FC5303-0AF30-1AA0
Product name	MCP 802D sl machine control panel, vertical format
Input voltage	5 V DC + 20 %/- 15 %
Power consumption, max.	5 W
Ports	
• Inputs/outputs	Connector acc. to MIL-C-83-503/DIN 41-651
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP54
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 … +60 °C (-4 ... +140 °F)
• Transport	-20 … +60 °C (-4 ... +140 °F)
• Operation	0 … 50 °C (32 ... 122 °F)
Dimensions	
• Width	172 mm (6.77 in)
• Height	330 mm (13.0 in)
• Depth	70 mm (2.76 in)
Weight, approx.	0.7 kg (1.54 lb)
Approvals, according to	cULus

Selection and ordering data

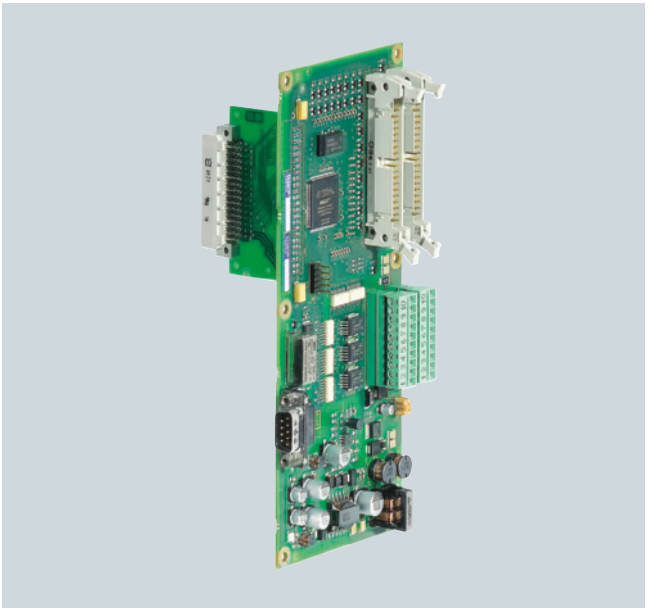
Description	Order No.
MCP 802D sl machine control panel, vertical format For mounting on the side of the PCU incl. ribbon cable	**6FC5303-0AF30-1AA0**
MCPA module For MCP 802D sl connection and with ±10 V interface for an analog spindle	**6FC5312-0DA01-0AA0**
Accessories	
2nd contact block for emergency stop button With 2 contacts 1 NO + 1 NC, 2-pole screw terminal	**3SB3400-0A**

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SINUMERIK 802D sl
MCPA module

Overview



The MCPA module features interfaces for the connection of an analog spindle, the MCP 802D sl machine control panel and terminal strips for additional, high-speed CNC inputs and outputs.

The MCPA is mounted on the rear side of the PCU of the SINUMERIK 802D sl. The specially provided mounting location is protected by a cover. The installation kit is included in the scope of supply.

Benefits

- ±10 V interface for one analog spindle (connector)
- Connecting plug (post link) for the MCP 802D sl machine control panel
- 2 terminal strips (screw-type terminals) for 8 additional high-speed CNC inputs and outputs each

Integration

The MCPA module can be used with the CNC control:

- SINUMERIK 802D sl

Technical specifications

	6FC5312-0DA01-0AA0
Product name	Machine Control Panel Analog, MCPA module
Voltage at inputs/outputs	24 V DC
Ports	
• Inputs/outputs, high-speed	16
Degree of protection according to EN 60529 (IEC 60529)	
• Front	IP00
• Rear	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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 … +60 °C (-4 ... +140 °F)
• Transport	-20 … +60 °C (-4 ... +140 °F)
• Operation	0 … 50 °C (32 ... 122 °F)
Dimensions	
• Width	205 mm (8.07 in)
• Height	95 mm (3.74 in)
• Depth	50 mm (1.97 in)
Weight, approx.	0.2 kg (0.44 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
Machine Control Panel Analog, MCPA module For MCP 802D sl connection and with ±10 V interface for an analog spindle	**6FC5312-0DA01-0AA0**

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Overview



The SINUMERIK 840Di sl is a fully PC-integrated numerical control and works in combination with the SINAMICS S120 drive system.

The control, which is open with regard to both hardware and software, is particularly suited to customers who are looking for distributed automation solutions in the field of PLC I/O and drives and/or prefer a fully PC-integrated control.

Benefits

- Robust industrial PC
- Flexible communication via USB and Ethernet interfaces
- System-wide openness as regards operation
- For use in machine tools, special machines and retrofits

Application

The technological areas of application for the SINUMERIK 840Di sl range from machine tools and special machines through handling devices to retrofits.

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

Design

The SINUMERIK 840Di sl consists of the PCU 50.3 industrial PC, the MCI2 board and the CNC software for 6 or 20 axes. The PROFIBUS DP interface on the MCI2 board enables the connection of the SINAMICS S120 drive system and the SIMATIC DP ET 200 I/O. The PROFIBUS DP with Motion Control functionality (isochronous, equidistant) is operated at a transfer rate of 12 Mbit/s.

The mounting brackets for installation behind an operator panel front must be ordered separately.

SINUMERIK PCU 50.3 including MCI2 board with integrated SIMATIC PLC 317-2 DP

- The latest Intel Mobile processor technology
- PCU 50.3-C: Intel Celeron M Mobile processor 1.5 GHz/512 MB/1 MB L2 Cache/400 MHz FSB
- PCU 50.3-P: Intel Pentium M Mobile processor 2.0 GHz/1 GB/2 MB L2 Cache/533 MHz FSB
- Replaceable 40 GB hard disk with transport mechanism: 12 GB for applications (HMI-Advanced, MCIS software) and data (part programs, documentation, other data) 15 GB for local backups and software to be installed
- Max. memory configuration 2 GB incl. graphics memory on 2 memory module slots
- Integral 2D/3D graphics; dynamic graphics memory (8 to 96 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 Mbit/s (RJ45)
  - 4 × USB 2.0
  - 1 × PROFIBUS/MPI interface
  - 1 × PROFIBUS DP master for I/Os and drive (on MCI2 board)
  - 1 × PROFIBUS DP slave or master for I/Os or MPI (on MCI2 board)
- Expansion slots:
  - 1 × PCI (175 mm (6.89 in)) or MCI board extension
  - 1 × CF card

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SINUMERIK 840Di sl

Function

Performance and flexibility

The SINUMERIK 840Di sl is available with different CNC software for up to 6 or 20 axes. Two hardware variants of the SINUMERIK 840Di sl are available depending on performance requirements.

The optional MCI board extension can be plugged in to connect handwheels, probes and high-speed inputs and outputs.

The SINAMICS S120 drive system is connected through the CU320 Control Unit. The connection to the SINUMERIK 840Di sl is established over PROFIBUS. A CU320 can control up to 6 axes. If more axes are needed, several CU320s can be connected to PROFIBUS.

Openness for HMI and PLCs

Thanks to openness for HMI and PLCs, users can apply their special know-how such that they achieve the individual technology solution desired.

Well-proven operator software and programming software

SINUMERIK 840Di sl Startup is included in the CNC software. Startup is a Windows program for easy familiarization with SINUMERIK 840Di sl and supports simple operating procedures as well as creating and activating user programs.

Function (continued)

SINUMERIK 840Di sl Startup is not specially designed for machine tool operation. The operating software HMI-Advanced is available as an optional user interface for machine tools. The SINUMERIK HMI programming package or the SINUMERIK HMI configuring package can be used to modify this user interface.

ShopMill or ShopTurn for the genuine workshop CNC and Motion Control Information System products (MCIS products) are also available.

Integration

The following components can be connected to the SINUMERIK 840Di sl:

- SINUMERIK operator panel front with/without TCU, machine control panel, Push Button Panel
- SINUMERIK handheld units
- Distributed SIMATIC PLC I/O via PROFIBUS DP connection
- SINUMERIK PP 72/48 I/O module
- SINUMERIK Analog Drive Interface for 4 axes ADI 4
- SINAMICS S120 drive system via CU320 Control Unit
- Feed and main spindle motors

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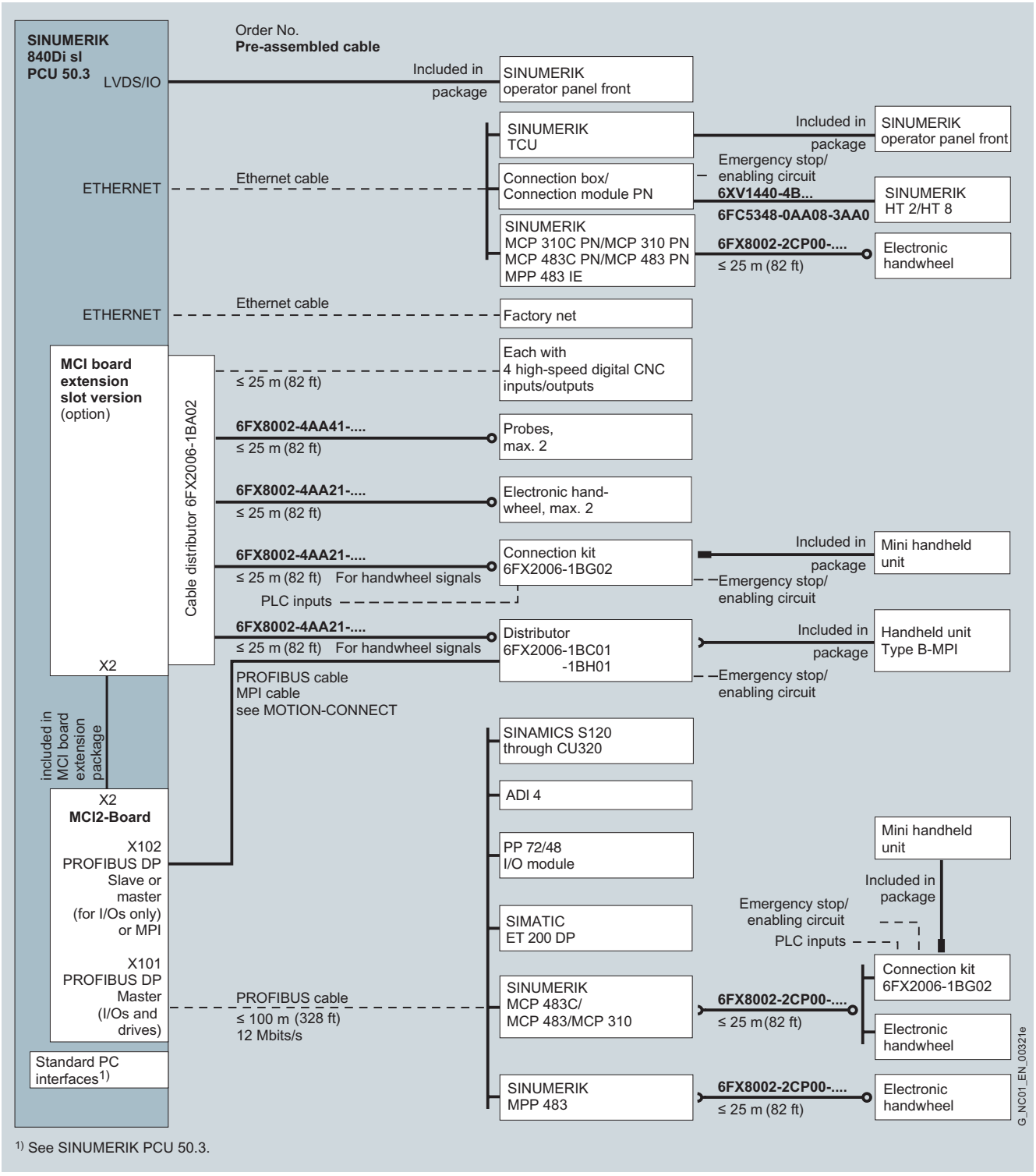
Technical specifications

Product name	6FC5220-0AA31-2AA0 SINUMERIK 840Di sl PCU 50.3-C with MCI2 board	6FC5220-0AA33-2AA0 SINUMERIK 840Di sl PCU 50.3-P with MCI2 board
Processor		
• Clock frequency	1.5 GHz	2 GHz
Input voltage	24 V DC	
Power consumption, max.	190 W	
Mains buffering time	20 ms	
Degree of protection according to EN 60529 (IEC 60529)	IP20	
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).	
Relative humidity		
• Storage	5 ... 95 % at 25 °C (77 °F)	
• Transport	5 ... 95 % at 25 °C (77 °F)	
• Operation	10 ... 80 % at 25 °C (77 °F)	
Ambient temperature		
• Storage	-20 … +60 °C (-4 ... +140 °F)	
• Transport	-20 … +60 °C (-4 … +140 °F)	
• Operation		
- With 9 W electronic output for expansion boards[1)]	5 … 55 °C (41 ... 131 °F)	
- With 14 W electronic output for expansion boards[1)]	5 … 50 °C (41 ... 122 °F)	
- With 24 W electronic output for expansion boards[1)]	5 … 45 °C (41 ... 113 °F)	
Dimensions		
• Width	297 mm (11.7 in)	
• Height	267 mm (10.5 in)	
• Depth	81.7 mm (3.22 in)	
Weight, approx.	7.2 kg (15.9 lb)	
Approvals, according to	cULus	

1) MCI2 board already inserted, in addition, for example, floppy disk drive or expansion cards such as MCI board extension.

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Integration (continued)



1) See SINUMERIK PCU 50.3.

Connection overview for SINUMERIK 840Di sl

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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Selection and ordering data

With SINUMERIK 840DiE sl/840 Di sl, there are essentially two methods for ordering software (see also the ordering examples).



Ordering as a bundle (hardware, software, and options)

Order No. with order code
License key included in delivery
For this type of order, the CNC software of the SINUMERIK 840Di sl is supplied on the hard disk of the SINUMERIK 840Di sl. The license key is included in the scope of supply as well as the CoL (Certificate of License).

If options are ordered for this using order codes according to the Overview of functions, the license keys will also be included in the scope of supply and the appropriate CoLs will be supplied.

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Ordering as a bundle (hardware, software, and options)

Description	Order No.	Order code
SINUMERIK 840Di sl - hardware with CNC software on hard disk and licenses installed		
SINUMERIK 840DiE sl with CNC software Export		
• **PCU 50.3-C 1.5 GHz/512 MB** + MCI2 board, Windows XP ProEmbSys	**6FC5220-0YA31-2AA0-Z**	Order codes required
• **PCU 50.3-P 2.0 GHz/1 GB** + MCI2 board, Windows XP ProEmbSys	**6FC5220-0YA33-2AA0-Z**	Order codes required
SINUMERIK 840Di sl with CNC software Standard		
• **PCU 50.3-C 1.5 GHz/512 MB** + MCI2 board, Windows XP ProEmbSys	**6FC5220-0XA31-2AA0-Z**	Order codes required
• **PCU 50.3-P 2.0 GHz/1 GB** + MCI2 board, Windows XP ProEmbSys	**6FC5220-0XA33-2AA0-Z**	Order codes required
Single license for software version		
• CNC software 6-3		**L11**
• CNC software 20-5		**L12**
• Current software version		**Q00+R00**
• Specific software version		**Q0■+R■■**
For further options, see Overview of functions		Order codes required
CNC software on hard disk, appropriate software version for machine operation incl. single license		
• HMI-Advanced operating software		**L00**
• ShopMill/ShopTurn incl. HMI-Advanced operating software		**L40**
Accessories		
Ordering with complete order numbers	For order numbers, refer to Ordering individually, accessories	

The possible software options are listed in the Overview of functions. Software options shown with an order code can be ordered in combination with the CNC software.

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Selection and ordering data (continued)

Ordering individually

Ordering with complete order numbers.
License key is obtained over the Internet.
The hardware components are ordered individually.
The CNC software of the SINUMERIK 840Di sl is ordered on a DVD-ROM, the corresponding license must be ordered separately, a CoL is included in the package. The software must then be installed.

When options are ordered (indicating the complete order numbers), the appropriate CoLs are supplied. The license key must be obtained over the Internet for both the CNC software and the options.

The order numbers of possible software options are listed in the Overview of functions.

Ordering hardware and accessories individually

Description	Order No.
SINUMERIK 840Di sl	
Consisting of: hardware with Windows XP ProEmbSys	
• **PCU 50.3-C** with MCI2 board	**6FC5220-0AA31-2AA0**
• **PCU 50.3-P** with MCI2 board	**6FC5220-0AA33-2AA0**
Accessories	
Mounting bracket	**6FC5248-0AF20-2AA0**
For SINUMERIK PCU, video link receiver or TCU behind operator panel front	
Memory expansion	
For SINUMERIK PCU 50.3	
• 512 MB	**6ES7648-2AG30-0GA0**
• 1 GB	**6ES7648-2AG40-0GA0**
MCI2 board	**6FC5222-0AA02-2AA0**
For SINUMERIK 840Di sl	
Hard disk	**6FC5247-0AF08-4AA0**
For SINUMERIK PCU 50.3 with support plate and damper	
1 GB CompactFlash card	**6FC5313-5AG00-0AA0**
Empty	
SIMATIC PC USB FlashDrive[1)]	**6ES7648-0DC40-0AA0**
2 GB, USB 2.0, metal enclosure, boot capability, incl. SIMATIC PC BIOS Manager	

Ordering software individually

Description	Order No.
CNC software 6-3/20-5 for SINUMERIK 840Di sl on DVD-ROM, incl. ShopMill HMI and ShopTurn HMI	
SINUMERIK 840DiE sl Export	
• Specific software version on DVD-ROM without single license	**6FC5820-3YC■■-■YA8**
• CNC software 6-3, single license	**6FC5820-1YP00-0YB0**
• CNC software 20-5, single license	**6FC5820-3YP00-0YB0**
• Software update service	**6FC5820-3YP00-0YL8**
SINUMERIK 840Di sl Standard	
• Specific software version on DVD-ROM without single license	**6FC5820-3XC■■-■YA8**
• CNC software 6-3, single license	**6FC5820-1XP00-0YB0**
• CNC software 20-5, single license	**6FC5820-3XP00-0YB0**
• Software update service	**6FC5820-3XP00-0YL8**
Software for machine operation	
ShopMill HMI/ShopTurn HMI incl. HMI-Advanced operating software for SINUMERIK 840DiE sl/ 840Di sl (the HMI-Advanced appropriate for the CNC software is already included in software version 1.4 SP1 and higher on the DVD-ROM of the CNC software.)	
• Single license	**6FC5800-0AP15-0YB0**
HMI-Advanced operating software	See HMI software for CNC controls

Example of specific software version 1.4 SP2:
6FC5820-3YC**10**-**4**YA8

1) Subject to export regulations AL: N and ECCN: EAR99H

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Selection and ordering data (continued)

Example for ordering as a bundle
(from software release 1.4 SP2)

Order using Order No. with order codes
Software installed on hard disk of hardware
License key included in delivery

Order item	Remark
Item 1: 1 × 6FC5220-0YA31-2AA0-Z L11+Q01+R04+A01+C11	SINUMERIK 840DiE sl with CNC software Export and options
Explanation for Item 1	
6FC5220-0YA31-2AA0	SINUMERIK 840DiE sl PCU 50.3-C/ 1.5 GHz with MCI2 board with CNC software Export
-Z	Followed by order codes (options)
L11	SINUMERIK 840DiE sl CNC software 6-3 on hard disk
Q01+R04	Specific software version Name of software version Q01+R04 corresponds to version 1.4 SP2 Single license
A01	1 × additional axis/spindle
C11	1 × additional machining channel
Item 2: 6FC5248-0AF20-2AA0	Mounting bracket for SINUMERIK PCU, video link receiver or TCU behind operator panel front

Example for ordering individually

Ordering via complete order numbers
(no order codes)
installation of the software on the hardware by the user
License key via the Internet

Order item	Remark
Item 1: 1 × 6FC5220-0AA31-2AA0	SINUMERIK 840Di sl PCU 50.3-C/ 1.5 GHz with MCI2 board
Item 2: 1 × 6FC5248-0AF20-2AA0	Mounting bracket for SINUMERIK PCU, video link receiver or TCU behind operator panel front
Item 3 1 × 6FC5820-3YC10-4YA8	SINUMERIK 840DiE sl CNC software 20-5 on DVD-ROM Export Specific software version 1.4 SP2 Without single license
Item 4: 1 × 6FC5820-1YP00-0YB0	SINUMERIK 840DiE sl CNC software 6-3 Export Without data carrier Single license
Item 5: 1 × 6FC5253-7BX10-5AG0	Operating software HMI Advanced for PCU 50.3 on CD-ROM Specific software version 7.5 Single license
Item 6: 1 × 6FC5800-0AA00-0YB0	1 × additional axis/spindle
Item 7: 1 × 6FC5800-0AC10-0YB0	1 × additional machining channel

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Overview



The MCI board extension slot version is offered as an option for connecting 2 handwheels (encoders with either differential signals or TTL signals), 2 probes and 4 high-speed digital CNC inputs and outputs.

Technical specifications

	6FC5222-0AA00-0AA1
Product name	MCI board extension, slot version
Power consumption, max.[1]	2.1 W
Degree of protection according to EN 60529 (IEC 60529)	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	5 ... 55 °C (41 ... 131 °F)
Dimensions	
• Width	90 mm (3.54 in)
• Height	120 mm (4.72 in)
• Depth	15 mm (0.59 in)
Weight, approx.	0.1 kg (0.22 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
MCI board extension slot version	**6FC5222-0AA00-0AA1**
Cable distributor For connection of 2 handwheels (encoders with differential or TTL signals, as required), 2 probes and 4 fast digital CNC inputs/outputs each Without DU box connector	**6FX2006-1BA02**
DU box connector (10 units)[2] For connecting devices to a cable distributor	**6FX2003-0FA00**

[1] Increase of power consumption by additional max. 5 W (max. 1 A; 5 V) depending on the connected handwheels.

[2] The pre-assembled cable 6FX8002-4AA21-.... is supplied with a DU box connector.

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SINUMERIK 840D sl

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 best suited for the mid to upper performance range.

The SINUMERIK 840D sl is characterized by:

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

With SINUMERIK 840D sl, integrated, certified safety functions SINUMERIK Safety Integrated are available. Consequently, highly effective protection for personnel and machines is achieved in a simple, economical and practical manner.

Benefits

- The SINUMERIK 840D sl is a digital CNC system for medium to complex tasks.
- Maximum performance and flexibility especially for complex multiple-axis systems
- Openness throughout, from the operation level to the NC kernel level.
- Integral, certified safety functions for man and machine: SINUMERIK Safety Integrated
- Well-proven operating and programming software such as ShopMill HMI or ShopTurn HMI and Motion Control Information System products (MCIS products) for the production area

Application

The SINUMERIK 840D sl can be used worldwide for turning, drilling, milling, grinding, laser machining, nibbling, punching, in tool and mold making, for high-speed cutting applications, for wood and glass processing, for handling operations, in transfer lines and rotary indexing machines, for mass production and JobShop production.

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

Design

The SINUMERIK 840D sl combines CNC, HMI, PLC, closed-loop control and communication tasks on one SINUMERIK NCU (NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 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 NCU high-performance multi-processor module. For increased operating performance, the SINUMERIK PCU 50.3 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 NCU high-performance multi-processor module can be installed to the left of the Line Module of the SINAMICS S120. 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.

With the NCU 720.2 PN/NCU 730.2 PN, the SINUMERIK 840D sl is offering integrated PROFINET functionality and supports PROFINET CBA and PROFINET IO.

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Function

Performance and flexibility

The scalability of the hardware and software – both in the CNC and control area – provides exceptional conditions for using the 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.

Up to 6 axes are available on the SINUMERIK 840D sl with NCU 710.2. With the NCU 720.2/NCU 720.2 PN/NCU 730.2/ NCU 730.2 PN, the number of axes can be increased to 31 and/or the performance of the drive control can be boosted.

Using the milling machining package, machining tasks such as the milling of free-form surfaces can be performed easily and conveniently. The following functions are included: 5-axis transformation with tool orientation, 5-axis tool length compensation, oriented tool retraction, tool-oriented RTCP, cardan millhead/nutating head, multi-axis interpolation, spline interpolation, and 3D tool radius compensation.

Use of an NCU 730.2/NCU 730.2 PN is recommended for maximum dynamics and accuracy with mold making or in the HSC sector.

PROFINET functionality

The PROFINET CBA functionality integrated in the NCU 720.2 PN/NCU 730.2 PN allows users to 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 commissioning is simplified and speeded up by pretesting at component level.

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. 256 PROFINET IO devices can be operated on the NCU 730.2 PN as an IO controller.

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. The SINUMERIK 840D sl offers openness right down to the NCK level. This open architecture and the high computing performance of the SINUMERIK 840D sl mean that the 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 certified safety functions

With SINUMERIK 840D sl, integrated, certified safety functions SINUMERIK Safety Integrated are available. Consequently, highly effective protection for personnel and machines is achieved in a simple, economical and practical manner.

Proven operating software and programming software

ShopMill HMI or ShopTurn HMI for genuine workshop CNC and MCIS products for the production area, e.g. CNC program management.

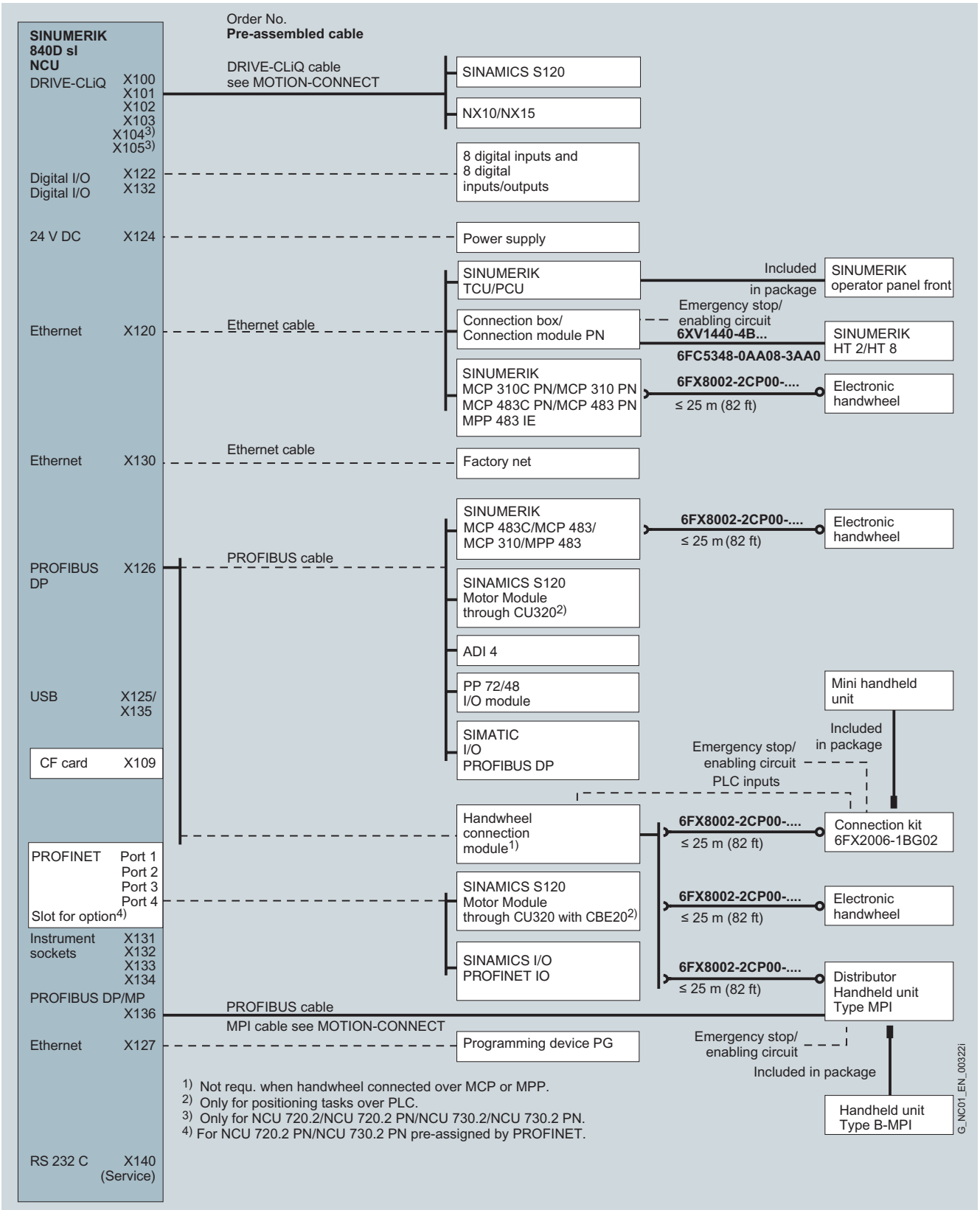
Integration

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

- SINUMERIK operator panel front with TCU, PCU 50.3, machine control panel, Push Button Panel
- SIMATIC CE panel
- SINUMERIK handheld units
- Distributed PLC I/O via PROFIBUS DP or PROFINET IO
- SINUMERIK PP 72/48 I/O module
- SINUMERIK Analog Drive Interface for 4 axes ADI 4
- SINAMICS S120 drive system
- Feed and main spindle motors

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Integration (continued)



Connection overview for SINUMERIK 840D sl

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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Overview



NCU 710.2

The NCU 710.2 represents the first performance stage of the SINUMERIK 840D sl range. Up to 6 axes are available in up to 2 machining channels which can be executed in up to 2 mode groups. Up to 6 axes/spindles are supported per channel. Interpolation is possible for a maximum of 6 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 720.2

The NCU 720.2 represents the mid-performance stage within the SINUMERIK 840D sl range. Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 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 720.2 PN

The NCU 720.2 PN represents the medium expansions stage within the SINUMERIK 840D sl with significantly higher PLC capacity compared to a NCU 720.2. The NCU 720.2 PN offers integrated PROFINET interfaces with PROFINET IO and PROFINET CBA.

Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 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 730.2

The NCU 730.2 of the SINUMERIK 840D sl represents the highest configuration within the SINUMERIK 840D sl range. Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 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 730.2 PN

The NCU 730.2 PN is the flagship of the SINUMERIK 840D sl and, with a significantly higher PLC capacity than an NCU 730.1, represents the most advanced configuration within the SINUMERIK 840D sl range. The NCU 730.2 PN offers integrated PROFINET interfaces with PROFINET IO and PROFINET CBA.

Up to 31 axes are available in up to 10 machining channels which can be executed in up to 10 mode groups. Up to 12 axes/spindles are supported per channel. Interpolation is possible for a maximum of 12 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.

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SINUMERIK 840D sl
NCU 710.2/720.2/720.2 PN/730.2/730.2 PN

Technical specifications

Product name	6FC5371-0AA10-0AA1 SINUMERIK 840D sl; NCU 710.2 with PLC 317-2DP	6FC5372-0AA00-0AA2 SINUMERIK 840D sl; NCU 720.2 with PLC 317-2DP	6FC5372-0AA01-0AA2 SINUMERIK 840D sl; NCU 720.2 PN with PLC 319-3PN/DP	6FC5373-0AA00-0AA2 SINUMERIK 840D sl; NCU 730.2 with PLC 317-2DP	6FC5373-0AA01-0AA2 SINUMERIK 840D sl; NCU 730.2 PN with PLC 319-3PN/DP
RAM	512 MB DRAM; 1 MB SRAM	1 GB DRAM; 1 MB SRAM			
SIMATIC S7 – integrated	PLC 317-2DP		PLC 319-3PN/DP	PLC 317-2DP	PLC 319-3PN/DP
Input voltage	24 V				
Degree of protection to EN 60529 (IEC 60529)	IP20				
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).				
Relative humidity					
• Storage	10 ... 95 % at 25 °C (77 °F)				
• Transport	10 ... 95 % at 25 °C (77 °F)				
• Operation	≤ 85 % for max. 2 months				
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	50 mm (1.97 in)				
• Height	418 mm (16.5 in)				
• Depth	272 mm (10.7 in)				
Weight, approx.	2.9 kg (6.39 lb)		3.8 kg (8.38 lb)	3.6 kg (7.94 lb)	3.8 kg (8.38 lb)
Approvals, according to	cULus				

Selection and ordering data

Description	Order No.
Hardware	
NCU 710.2 With PLC 317-2DP	**6FC5371-0AA10-0AA1**
NCU 720.2 With PLC 317-2DP	**6FC5372-0AA00-0AA2**
NCU 720.2 PN With PLC 319-3PN/DP[1)]	**6FC5372-0AA01-0AA2**
NCU 730.2 With PLC 317-2DP	**6FC5373-0AA00-0AA2**
NCU 730.2 PN With PLC 319-3PN/DP[1)]	**6FC5373-0AA01-0AA2**
Seal for external cooling (1 pack = 10 units) For NCU 710.2/NCU 720.2/ NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN	**6FC5348-0AA07-0AA0**
Numeric Control Extension NX10 Extension of drive control for SINUMERIK 840D sl up to 3 axes	**6SL3040-0NC00-0AA0**
Numeric Control Extension NX15 Extension of drive control for SINUMERIK 840D sl up to 6 axes	**6SL3040-0NB00-0AA0**
CNC user memory Expanded by 2 MB each	**6FC5800-0AD00-0YB0**
PLC user memory Expanded by 128 KB each	**6FC5800-0AD10-0YB0**

Description	Order No.
Software	
HMI user memory Additional on CF card of NCU Software option • Single license without data carrier	**6FC5800-0AP12-0YB0**
Accessories	
1 GB CompactFlash card Empty	**6FC5313-5AG00-0AA0**
Spacers For NCU 720.2/NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN	**6FC5348-0AA06-0AA0**
Battery	**6FC5247-0AA18-0AA0**
Dual fan/battery module	**6FC5348-0AA02-0AA0**
Blanking cover For NCU 710.2/NCU 720.2/ NCU 720.2 PN/ NCU 730.2/NCU 730.2 PN and Control Unit CU320	**6SL3064-3BB00-0AA0**

[1)] The NCU 730.2 PN requires the CNC software for NCU with the SINUMERIK Operate operating software 6FC5850-...

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Selection and ordering data (continued)

Description	Order No.
Software	
CNC software 6-3 with HMI-Embedded for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5840-1YG00-0YA0**
• Specific software version	**6FC5840-1YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5840-1XG00-0YA0**
• Specific software version	**6FC5840-1XG■■-■YA0**
CNC software 31-5 with HMI-Embedded for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5840-3YG00-0YA0**
• Specific software version	**6FC5840-3YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5840-3XG00-0YA0**
• Specific software version	**6FC5840-3XG■■-■YA0**
CNC software 6-3/31-5 with HMI-Embedded for NCU on DVD-ROM	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Without single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5840-3YC00-0YA8**
• Specific software version	**6FC5840-3YC■■-■YA8**
• Software update service	**6FC5840-3YP00-0YL8**
• CNC software 6-3 with HMI-Embedded Single license	**6FC5840-1YF00-0YB0**
• CNC software 31-5 with HMI-Embedded Single license	**6FC5840-3YF00-0YB0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5840-3XC00-0YA8**
• Specific software version	**6FC5840-3XC■■-■YA8**
• Software update service	**6FC5840-3XP00-0YL8**
• CNC software 6-3 with HMI-Embedded Single license	**6FC5840-1XF00-0YB0**
• CNC software 31-5 with HMI-Embedded Single license	**6FC5840-3XF00-0YB0**

Description	Order No.
Software	
CNC software 6-3 and ShopMill HMI for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5841-1YG00-0YA0**
• Specific software version	**6FC5841-1YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5841-1XG00-0YA0**
• Specific software version	**6FC5841-1XG■■-■YA0**
CNC software 31-5 and ShopMill HMI for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5841-3YG00-0YA0**
• Specific software version	**6FC5841-3YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5841-3XG00-0YA0**
• Specific software version	**6FC5841-3XG■■-■YA0**
CNC software 6-3/31-5 and ShopMill HMI for NCU on DVD-ROM	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Without single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5841-3YC00-0YA8**
• Specific software version	**6FC5841-3YC■■-■YA8**
• Software update service	**6FC5841-3YP00-0YL8**
• CNC software 6-3 and ShopMill HMI Single license	**6FC5841-1YF00-0YB0**
• CNC software 31-5 and ShopMill HMI Single license	**6FC5841-3YF00-0YB0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5841-3XC00-0YA8**
• Specific software version	**6FC5841-3XC■■-■YA8**
• Software update service	**6FC5841-3XP00-0YL8**
• CNC software 6-3 and ShopMill HMI Single license	**6FC5841-1XF00-0YB0**
• CNC software 31-5 and ShopMill HMI Single license	**6FC5841-3XF00-0YB0**

Example of specific software version 1.4:
6FC5840-3YC**10-4**...
6FC5841-3YC**10-3**...

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Selection and ordering data (continued)

Description	Order No.
Software	
CNC software 6-3 and ShopTurn HMI for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5842-1YG00-0YA0**
• Specific software version	**6FC5842-1YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5842-1XG00-0YA0**
• Specific software version	**6FC5842-1XG■■-■YA0**
CNC software 31-5 and ShopTurn HMI for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5842-3YG00-0YA0**
• Specific software version	**6FC5842-3YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5842-3XG00-0YA0**
• Specific software version	**6FC5842-3XG■■-■YA0**
CNC software 6-3/31-5 and ShopTurn HMI for NCU on DVD-ROM	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Without single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5842-3YC00-0YA8**
• Specific software version	**6FC5842-3YC■■-■YA8**
• Software update service	**6FC5842-3YP00-0YL8**
• CNC software 6-3 and ShopTurn HMI Single license	**6FC5842-1YF00-0YB0**
• CNC software 31-5 and ShopTurn HMI Single license	**6FC5842-3YF00-0YB0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5842-3XC00-0YA8**
• Specific software version	**6FC5842-3XC■■-■YA8**
• Software update service	**6FC5842-3XP00-0YL8**
• CNC software 6-3 and ShopTurn HMI Single license	**6FC5842-1XF00-0YB0**
• CNC software 31-5 and ShopTurn HMI Single license	**6FC5842-3XF00-0YB0**

Description	Order No.
Software	
Language extensions[1] **for the operating software HMI-Embedded/ShopMill HMI/ ShopTurn HMI/HMI-Advanced**[2]	**6FC5253-7BX10-■XG8**
On DVD-ROM	
Languages: Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Swedish, Turkish	
• Without single license specific software version	
Additional languages	**6FC5800-0AN00-0YB0**
Use of language extensions	
Software option	
• Single license without data carrier	

Example of specific software version 1.4:
6FC5842-3YG**10-3**...
Example of specific software version 7.6:
6FC5253-**7**BX10-**6**XG8

[1] Please inquire about available software versions.
[2] HMI-Advanced also available in: Romanian and Slovak.

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Selection and ordering data (continued)

Description	Order No.
Software	
CNC software 6-3 with SINUMERIK Operate for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5850-1YG00-0YA0**
• Specific software version	**6FC5850-1YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5850-1XG00-0YA0**
• Specific software version	**6FC5850-1XG■■-■YA0**
CNC software 31-5 with SINUMERIK Operate for NCU on CF card	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5850-3YG00-0YA0**
• Specific software version	**6FC5850-3YG■■-■YA0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5850-3XG00-0YA0**
• Specific software version	**6FC5850-3XG■■-■YA0**
CNC software 6-3/31-5 with SINUMERIK Operate for NCU on DVD-ROM	
Languages: Chinese Simplified, English, French, German, Italian, Spanish	
Without single license	
SINUMERIK 840DE sl Export	
• Current software version	**6FC5850-3YC00-0YA8**
• Specific software version	**6FC5850-3YC■■-■YA8**
• Software update service	**6FC5850-3YP00-0YL8**
• CNC software 6-3 with SINUMERIK Operate Single license	**6FC5850-1YF00-0YB0**
• CNC software 31-5 with SINUMERIK Operate Single license	**6FC5850-3YF00-0YB0**
SINUMERIK 840D sl Standard	
• Current software version	**6FC5850-3XC00-0YA8**
• Specific software version	**6FC5850-3XC■■-■YA8**
• Software update service	**6FC5850-3XP00-0YL8**
• CNC software 6-3 with SINUMERIK Operate Single license	**6FC5850-1XF00-0YB0**
• CNC software 31-5 with SINUMERIK Operate Single license	**6FC5850-3XF00-0YB0**

Description	Order No.
Software	
Language extensions for the SINUMERIK Operate operating software[1]	**6FC5860-0YC■■-■YA8**
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	
Additional languages	**6FC5800-0AN00-0YB0**
Use of language extensions	
Software option	
• Single license without data carrier	
SINUMERIK 840D sl/840Di sl Toolbox	Supplied on the DVD-ROM containing the CNC software for NCU.
Languages: English, German	

Example of specific software version 2.6:
6FC5850-3YC**20-6**...
6FC5860-0YC**20-6**YA8

The possible software options are listed in the Overview of functions. Software options shown with an order code can be ordered in combination with the CNC software for NCU.

[1] Please inquire about available software versions.

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Selection and ordering data (continued)

Ordering as a bundle

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

Order item	Remark
Item 1:	
1 × 6FC5840-3YG10-4YA0-Z M01+A03+C11	SINUMERIK 840DE sl CNC software 31-5 with HMI-Embedded for NCU On CF card Languages: Chinese Simplified, English, French, German, Italian, Spanish Export Specific software version 1.4 Single license Travel to fixed stop with Force Control 3 × additional axis/spindle 1 × additional machining channel

Explanation for Item 1:

1 × 6FC5840-3YG10-4YA0	SINUMERIK 840DE sl CNC software 31-5 with HMI-Embedded for NCU On CF card Languages: Chinese Simplified, English, French, German, Italian, Spanish Export Specific software version 1.4 Single license
-Z	Followed by order codes:
M01	Travel to fixed stop with Force Control
A03	3 × additional axis/spindle
C11	1 × additional machining channel

Ordering individually

Ordering via complete order numbers
License key obtained over Internet

Order item	Remark
Item 1:	
1 × 6FC5840-3YG10-4YA0	SINUMERIK 840DE sl CNC software 31-5 with HMI-Embedded for NCU On CF card Languages: Chinese Simplified, English, French, German, Italian, Spanish Export Specific software version 1.4 Single license
Item 2:	
1 × 6FC5800-0AM01-0YB0	Travel to fixed stop with Force Control
Item 3:	
3 × 6FC5800-0AA00-0YB0	3 × additional axis/spindle
Item 4:	
1 × 6FC5800-0AC10-0YB0	1 × additional machining channel

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Overview



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

The modules are in 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 component can control up to 3 additional servo axes and each NX15 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/NX15 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/NX15 components on the NCU 710.2
- Up to 5 NX10/NX15 components on the NCU 720.2/NCU 720.2 PN/NCU 730.2/NCU 730.2 PN

The NX10/NX15 is 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

	6SL3040-0NC00-0AA0	6SL3040-0NB00-0AA0
Product name	Numeric Control Extension NX10	Numeric Control Extension NX15
Rated voltage	24 V DC	
• Permitted range	20.4 ... 28.8 V DC	
Current consumption at 24 V DC, typ. [1]	800 mA	
Inrush current, typ.	1.6 A	
Digital inputs	4	
Digital inputs/outputs	4 (parameterizable)	
Degree of protection to EN 60529 (IEC 60529)	IP20	
Humidity rating		
• Long-term storage in transport packaging	Class 1K4 according to EN 60721-3-1 Temperature -25 … +55 °C (-13 … +131 °F) Relative/absolute humidity 10 … 100 %/≤ 26 g/m³	
• Transport	Class 2K4 according to EN 60721-3-2 Temperature -40 … +70 °C (-40 … +158 °F) Relative/absolute humidity 5 … 95 %/≤ 60 g/m³	
• Operation	Class 3K3 according to 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 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 (0.98 in)	
• Height	380 mm (15.0 in)	
• Depth	230 mm (9.06 in)	
Weight, approx.	1.5 kg (3.31 lb)	
Approvals, according to	cULus	

Selection and ordering data

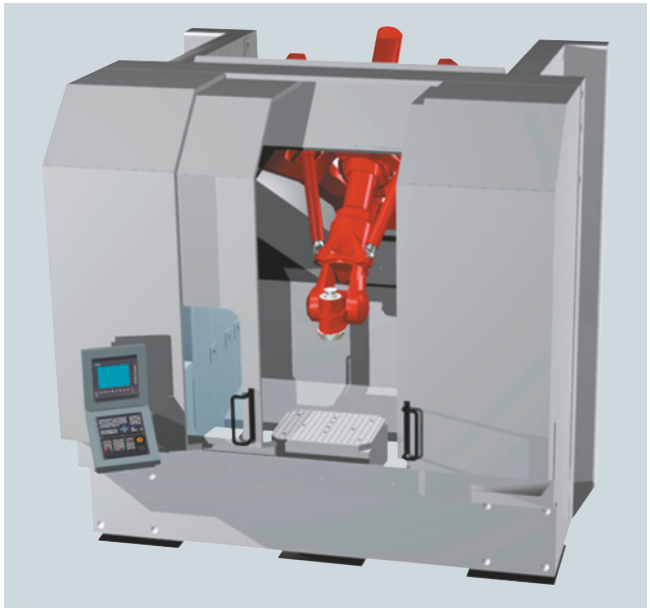
Description	Order No.
Numeric Control Extension NX10 Extension of the drive control for SINUMERIK 840D sl up to 3 axes	**6SL3040-0NC00-0AA0**
Numeric Control Extension NX15 Extension of the drive control for SINUMERIK 840D sl up to 6 axes	**6SL3040-0NB00-0AA0**

[1] Without digital inputs and DRIVE-CLiQ supply.

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SINUMERIK 840D sl
Compile cycles

Overview



The openness of the SINUMERIK 840D sl NCK 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. The compile cycles can either be programmed based on the NCK OA package and the appropriate development environment, or through development and testing in industrial conditions contracted to Siemens.

Below is a selection of the technological add-on functions that have already been developed in the form of loadable compile cycles and are available as options with SINUMERIK 840D sl:

- 1D/3D clearance control in position control cycle
- Axial coupling in the machine coordinate system
- Handling transformation package
- Pantograph kinematics transformation, two axes
- PARACOP 3-axis transformation for parallel kinematics (first channel)
- Tripod-hybrid-kinematics Exechon transformation
- Laser switching signal, high-speed
- Continue machining at the contour
- PROFIBUS tool and process monitoring
- Space error compensation for kinematic transformations
- Axis collision protection
- Crank interpolation

Additional compile cycles are implemented or being developed or can be developed at the customer's request.

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.

SINUMERIK 840D sl
NCK OA package

Overview

The NCK OA package (NCK Open Architecture package) is a component of the SINUMERIK Open Architecture. This can be used to implement manufacturer-specific NCK functions (compile cycles) in the system. These are integrated in the CNC software of the NCU in the programming languages C or C++.

The NCK OA package is subject to export authorization.

An OEM contract is required to use the NCK OA package.

A SUN workstation with a Solaris operating system must be used as development system.

More information

For further information about compile cycles and the NCK OA package, contact:

Siemens AG
Industry Sector

I DT MC MT S 3
Contact: Mr. Hanneforth

Phone: +49 9131 98-3498
Fax: +49 9131 98-63498
E-mail: horst.hanneforth@siemens.com

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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 EN ISO 13849-1 and safety integrity level SIL 2 according to EN 61508. Consequently, important functional safety requirements can be implemented easily and economically. Available functions include, among others:

- 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-oriented input/output signals.

They can be implemented for each individual axis and spindle:

- Safe shutdown
  Provides 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 operation stop (SBH)
  Monitors drives for standstill. The drives remain fully functional for position control.
- Safe standstill (SH)
  Pulse suppression of drives, providing safe electronic interruption of the power supply.
- Safely reduced speed (SG)
  Monitoring of configurable velocity limit values, e.g. during setup without enabling button.
- 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 brake control (integrated into the Motor Module)
  - Cyclic brake test
- Safety-oriented communication via standard bus
  Connection of distributed I/O for process and safety signals using the PROFIsafe protocol via PROFIBUS.
- Integrated acceptance test
  Partially automated acceptance test for all safety-related functions. Simple operation of the test process, automatic configuration of Trace functions and automatic generation of an acceptance record.

Integration

Preconditions for SINUMERIK 840D sl:

- General
  - SINUMERIK 840D sl
    (NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/
    NCU 730.2 PN)
  - SINAMICS S120 booksize format
  - The measuring circuit cables must comply with the specifications of SINAMICS S120.
- For the integrated acceptance test
  - SinuCom NC software tool (can run on PC/PG)
- Sensor/actuator integration with PROFIsafe I/Os
- Fail-safe modules
  - SIMATIC ET 200S or
  - SIMATIC ET 200eco or
  - SIMATIC ET 200pro or
  - DP/AS-i F-Link
- S7 F Configuration Pack software module

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Selection and ordering data

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

Only one SI Basic and one SI Comfort option can be ordered for each NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/ NCU 730.2 PN. 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:

Order item	Remark
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:

Order item	Remark
1 × 6FC5800-0AM64-0YB0	SI Comfort
5 × 6FC5800-0AC70-0YB0	SI axis/spindle

More information

The following type test certificates are available for the SINUMERIK 840D sl:

- Type Examination Certificate of the BGIA (EN ISO 13849/EN 61508)
- Certificate of TÜV Rheinland (ISO 13849/IEC 61508)
- Certificate of TÜV Rheinland North America (NFPA 79/IEC 61508)

A list of the certified software releases and hardware versions is provided with each Certificate of Licence (CoL) of the SINUMERIK Safety Integrated option.

The Safety Integrated functions of the SINUMERIK are usually certified by independent institutes. A current list of components that have already been certified can be requested from your local Siemens office. If you have any questions relating to certifications that have not yet been completed, please contact your local Siemens office.

Download from:

http://support.automation.siemens.com/WW/view/en/28369234/134200

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Overview



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

Benefits

- Connection via PROFIBUS DP
- Motion Control functionality (isochronous mode)

Design

- 4 inputs for incremental encoders (TTL signals) or optionally 4 inputs[1] 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[2]
  (4 general, 6 drive-specific)
- 10 digital drive-specific inputs[2]
- On-board status display on 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 interface module can be used with the following controls:

- SINUMERIK 802D sl
- SINUMERIK 840Di sl
- SINUMERIK 840D sl[3]

SINUMERIK 802D sl

Two ADI 4 interface modules can be connected to the SINUMERIK 802D sl, permitting analog control of all its axes.

Encoder connection

With SINUMERIK 802D sl (in accordance with the existing number of axes), the following configurations are available as standard for each ADI 4:

- 4 × TTL signal inputs with S/R[4]
  - 3 × 2500, 1 × 1024
  - 1 × 9000, 1 × 18000, 1 × 1024, 1 × 2500
    or
  - 3 × 2048, 1 × 1024
  - 1 × 9000, 1 × 18000, 1 × 1024, 1 × 2048

Other configurations can be implemented on request.

SINUMERIK 840Di sl/840D sl

Several ADI 4 interface modules can be connected to the SINUMERIK 840Di sl/840D sl, permitting analog control of all axes of the SINUMERIK 840Di sl and up to 20 axes of the SINUMERIK 840D sl. Mixed operation of digital drives and ADI 4 modules is possible; the axes can interpolate with one another.

Encoder connection

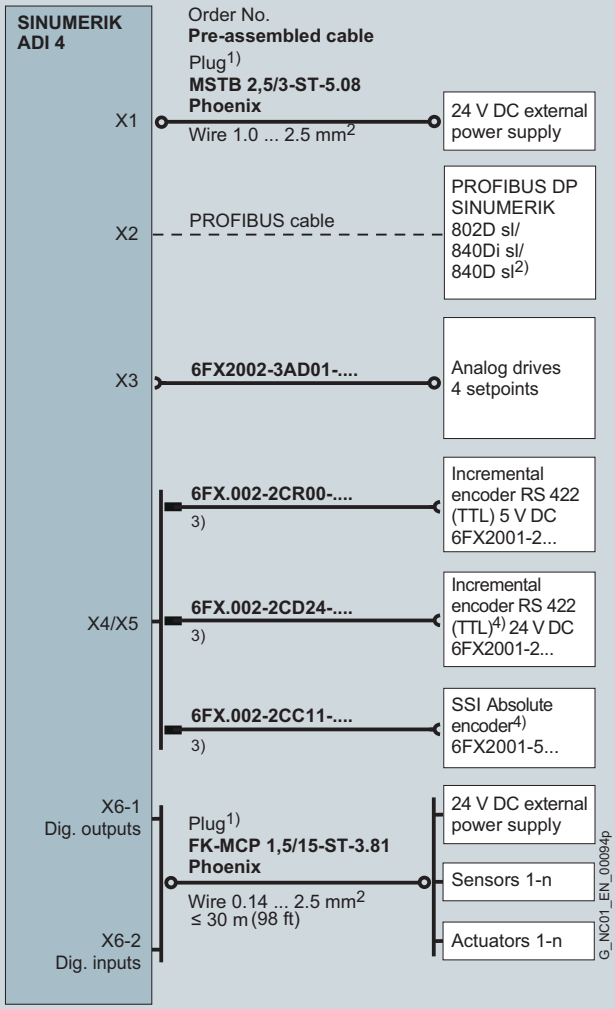
- TTL incremental encoder with differential transfer
  - Track A and inverted signal A
  - Track B and inverted signal B
  - Zero signal and inverted zero signal
  - Output frequency max. 1.5 MHz
  - Phase shift of track A to track B: 90° ± 30°
  - Power consumption max. 300 mA
- Absolute encoder with 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.

[1] Cannot be used with SINUMERIK 802D sl.
[2] Only 9 can be used with SINUMERIK 802D sl.
[3] Not for NCU 720.2 PN/NCU 730.2 PN.
[4] S/R = Signals/Revolution

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SINUMERIK Analog Drive Interface for 4 axes ADI 4

Integration (continued)



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.

Connection overview for ADI 4

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Technical specifications

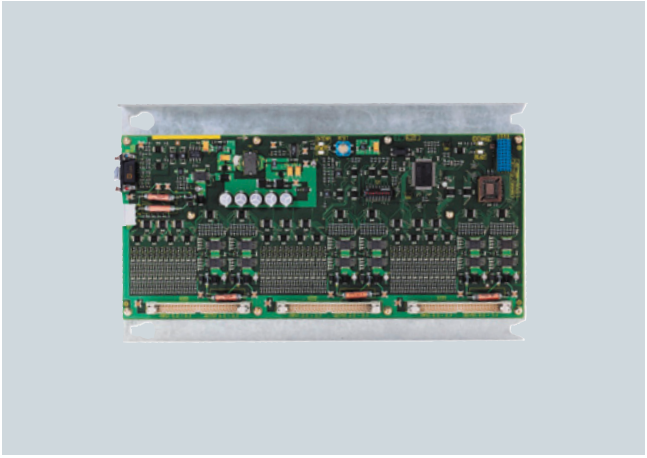
Product name	6FC5211-0BA01-0AA4 SINUMERIK Analog Drive Interface for 4 axes ADI 4
Input voltage	24 V DC
Power consumption, max.	30.2 W
Degree of protection according to EN 60529 (IEC 60529)	IP20
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative 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	cULus

Selection and ordering data

Description	Order No.
SINUMERIK Analog Drive Interface for 4 axes ADI 4	**6FC5211-0BA01-0AA4**

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Overview



The SINUMERIK PP 72/48 I/O module is connected to PROFIBUS DP and provides 72 digital inputs and 48 digital outputs. The 3 plug-in connectors for the inputs and outputs are 50-pole post links for connecting ribbon cables. Terminal strip converters can be used or the direct connection of distribution boards, for example, is possible.

Benefits

- Connection via PROFIBUS DP
- 3 post links with 24 digital inputs and 16 digital outputs each with 24 V DC, 0.25 A
- With mounting plate for easy mounting
- Integral 24 V DC power supply with electrical isolation between inputs and outputs and PROFIBUS

Technical specifications

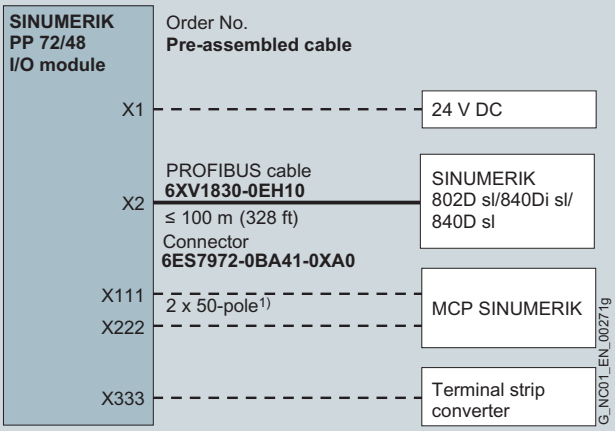
Product name	6FC5611-0CA01-0AA1 SINUMERIK PP 72/48 I/O module
Input voltage	24 V DC
Power consumption, max.	11 W
Degree of protection according to EN 60529 (IEC 60529)	IP00
Humidity rating based on EN 60721-3-3	Class 3K5 condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity	
• 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 … +60 °C (-4 ... +140 °F)
• Transport	-20 … +60 °C (-4 … +140 °F)
• Operation	0 … 50 °C (32 ... 122 °F)
Dimensions	
• Width	325 mm (12.8 in)
• Height	194 mm (7.64 in)
• Depth	35 mm (1.38 in)
Weight, approx.	1.2 kg (2.65 lb)
Approvals, according to	cULus

Integration

The SINUMERIK PP 72/48 I/O module can be used for the following CNC controls:

- SINUMERIK 802D sl
- SINUMERIK 840Di sl
- SINUMERIK 840D sl

A power supply +24 V DC is required for the module and the digital outputs.



1) Standard product, ordered by the meter.

Connection overview for SINUMERIK PP 72/48 I/O module

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Selection and ordering data

Description	Order No.
SINUMERIK PP 72/48 I/O module I/O module for 72 digital inputs and 48 digital outputs	**6FC5611-0CA01-0AA1**
Accessories	
Terminal strip converter 50-pole	**6EP5406-5AA00**
Cable set Consisting of: 6 m (19.7 ft) ribbon cable, 50-pole 8 insulation displacement connectors, 50-pole	**6EP5306-5BG00**
PROFIBUS cable	**6XV1830-0EH10**
PROFIBUS connectors	**6ES7972-0BA41-0XA0**

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Overview



Controlled power supplies

The 24 V power supply units 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.

Benefits

- High degree of efficiency
  The efficiency of approximately 90 % 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/weight 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 mains voltage variation. The loads are protected from overvoltage spikes which lengthens the lifetime and reduces downtimes.
- Low residual ripple
  The low residual ripple of less than 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.

Benefits (continued)

- 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 silicone

More information

Additional information is available in the Internet under:

www.siemens.com/sitop

www.siemens.com/industrymall

Selection and ordering data

Description	Order No.
Controlled power supply 24 V DC, 1-phase	
Input voltage: 120 V/230 V AC (85 … 132 V/170 ... 264 V AC)	
Output voltage: 24 V DC ± 3 %	
Approvals: cULus, CSA	
• 2.5 A	**6EP1332-2BA10**
• 5 A	**6EP1333-2BA01**
• 10 A	**6EP1334-2BA01**
Controlled power supply 24 V DC, 1-phase, slim design	
Input voltage: 120 V/230 V AC (85 … 132 V/170 ... 264 V AC)	
Output voltage: 24 V DC ± 1 %	
Approvals: cULus	
• 5 A	**6EP1333-1AL12**
• 10 A	**6EP1334-1AL12**
Controlled power supply 48 V DC, 3-phase	
Input voltage: 400 … 500 V 3 AC (320 … 575 V 3 AC)	
Output voltage: 48 V DC ± 3 %	
Approvals: cULus	
• 10 A	**6EP1456-2BA00**

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Overview



Modular power supplies

The modular concept is based on power supply basic units in compact form with a 24 V DC output voltage.

- Metal housing for standard rail mounting
- 5 A and 10 A units with ultra wide range input up to 500 V AC with single-phase and two-phase connection (L1 and N, L1 and L2)
- 20 A and 40 A units with wide range input with single-phase or three-phase connection
- Power boost with up to three times the rated current
- 50 % extra power is available for 5 seconds
- Adjustable output voltage up to 28.8 V
- 3 × LED status display
- Selectable short-circuit behavior: Constant current with automatic restart or latching shutdown
- Switchover for parallel operation
- Radio interference level Class B
- Input current harmonics limitation acc. to EN 61000-3-2 (except 6EP1337-3BA00)

For power supplies with protective coatings, see Catalog KT 10.1 or the Siemens Industry Mall.

Add-on modules

Three add-on modules offer supplementary functions.

The signaling module can be snapped onto the side of the basic unit; complete with isolated signaling contacts Output voltage OK and Power supply availability OK; with signal input for remote ON/OFF switching of basic unit.

The buffer module bridges network failures for up to 3 seconds with capacitors for energy storage; mounted on standard mounting rails at any location in the control cabinet.

The redundancy module decouples the basic units from each other via diodes so that a redundant 24 V power supply can be established.

Power supply units and add-on modules

- Ambient temperature 0 ... 60 °C (32 ... 140 °F)

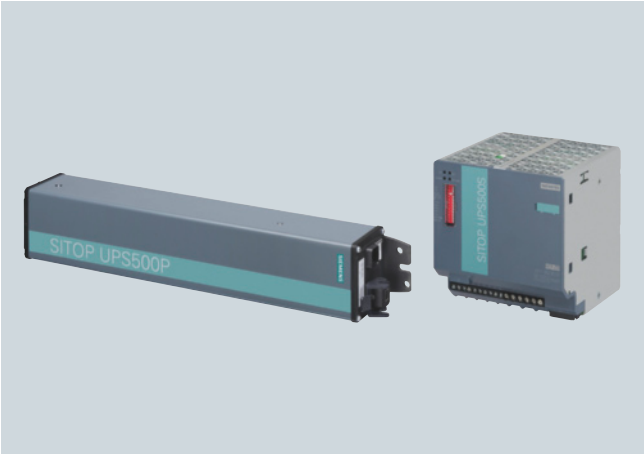
Selection and ordering data

Description	Order No.
Power supply basic unit SITOP modular 24 V DC Output voltage: 24 V DC ± 3 % Approvals: cULus	
• **5 A** Input voltage: 120 … 230 V/230 … 500 V AC (85 … 264 V/176 … 500 V)	**6EP1333-3BA00**
• **10 A** Input voltage: 120 … 230 V/230 … 500 V AC (85 … 264 V/176 … 550 V)	**6EP1334-3BA00**
• **20 A** Input voltage: 120 … 230 V AC (85 … 264 V)	**6EP1336-3BA00**
• **20 A** Input voltage: 400 … 500 V 3 AC (320 … 550 V)	**6EP1436-3BA00**
• **20 A** Input voltage: 400 … 500 V 3 AC (360 … 550 V)	**6EP1436-3BA10**
• **40 A** Input voltage: 120/230 V AC (85 … 132 V/176 … 264 V)	**6EP1337-3BA00**
• **40 A** Input voltage: 400 … 500 V 3 AC (320 … 570 V)	**6EP1437-3BA10**
Power supply basic unit 48 V DC Input voltage: 400 … 500 V 3 AC (320 … 550 V) Output voltage: 48 V DC ± 3 % Approvals: cULus	
• **20 A**	**6EP1457-3BA00**
Signaling module Input voltage: 24 V DC Approvals: UL	**6EP1961-3BA10**
Buffer module Input voltage: 24 V DC (24 ... 28.8 V) V_{in} approx. 1 V Approvals: UL	
• **40 A**	**6EP1961-3BA00**
Redundancy module Input voltage: 24 V DC (24 ... 28.8 V) V_{in} approx. 0.5 V Approvals: cULus	
• **20 A**	**6EP1961-3BA20**

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Overview



DC UPS uninterruptible power supplies

To protect against longer power failures, the 24 V SITOP power supply units can be expanded to a DC UPS. SITOP offers two systems for this: With battery modules as energy storage units which buffer for hours, and capacitors for 24 V buffering in the minutes range.

DC UPS modules and battery modules

- 24 V buffering in the hours range
- DC UPS modules with up to 40 A output current
- Battery management protects 24 V loads and rechargeable batteries
- Monitoring of readiness, incoming cable, aging and charge status of the battery
- Signaling via LED, signaling contacts and PC interfaces
- Large range of battery modules
  - 2.5 Ah: Ambient temperature -40 ... +60 °C (-40 ... +140 °F)
  - 1.2 ... 12 Ah: Ambient temperature 5 ... 40 °C (41 ... 104 °F)

Absolutely maintenance-free DC UPS with capacitor technology

- 24 V buffering in the minutes range
- For standard rail mounting:
  SITOP UPS500S 15 A/2.5 or 5 kWs, for combining with up to 3 UPS501S expansion modules (5 kWs)
- For distributed use: UPS500P 7 A/5 kWs and 10 kWs to IP65 degree of protection
- Long-life double-layer capacitors, also for high temperatures up to 60 °C (140 °F)
- Absolutely maintenance-free
- No ventilation required at the installation site
- Quick restoration of buffer readiness

Selection and ordering data

Description	Order No.
DC UPS module 24 V DC Input voltage: 24 V DC (22 ... 29 V) Output voltage: 24 V DC Mains operation: 22 ... 29 V Battery operation: 27 ... 19 V Approvals: cULus	
• **6 A**	**6EP1931-2DC21**
• **6 A** with serial interface	**6EP1931-2DC31**
• **6 A** with USB interface	**6EP1931-2DC42**
• **15 A**	**6EP1931-2EC21**
• **15 A** with serial interface	**6EP1931-2EC31**
• **15 A** with USB interface	**6EP1931-2EC42**
• **40 A**	**6EP1931-2FC21**
• **40 A** with USB interface	**6EP1931-2FC42**
Battery modules For 6 A, 15 A and 40 A DC UPS modules Charging voltage: 27.0 V DC at 25 °C (77 °F) Output voltage: 24 V DC End-of-charge voltage: 27 V Exhaustive discharge protection: 19 V Approvals: cURus	
• **1.2 Ah**	**6EP1935-6MC01**
• **3.2 Ah**	**6EP1935-6MD11**
• **7 Ah**	**6EP1935-6ME21**
• **12 Ah**	**6EP1935-6MF01**
• **2.5 Ah/high-temperature battery** Charging voltage: 27.7 V DC at 25 °C (77 °F) End-of-charge voltage: 27.7 V	**6EP1935-6MD31**
Maintenance-free DC UPS with capacitor technology	
SITOP UPS500S basic unit 15 A Input voltage: 24 V DC Output voltage: 24 V DC (23.3 ... 24.7 V or 24 V ± 3 %) Approvals: cULus, cCSAus	
• **2.5 kWs**	**6EP1933-2EC41**
• **5 kWs**	**6EP1933-2EC51**
SITOP UPS501S expansion module Input voltage: 24 V DC Output voltage: 24 V DC	
• **5 kWs**	**6EP1935-5PG01**
SITOP UPS500P basic unit 7 A Elongated format for mounting on support arm, IP65 degree of protection Input voltage: 24 V DC Output voltage: 24 V DC (23.3 ... 24.7 V or 24 V ± 3 %)	
• **5 kWs**	**6EP1933-2NC01**
• **10 kWs**	**6EP1933-2NC11**

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SINAMICS S120 drive system

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Part 11 CAD CREATOR
Dimension drawing and 2D/3D CAD generator
www.siemens.com/cadcreator

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SINAMICS S120 drive system

Overview



Control Units CU310 DP, CU320, NCU 720.2 and Numeric Control Extension NX15

Platform Concept and Totally Integrated Automation

All SINAMICS versions are based on a platform concept. Common 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 without 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-maintenance solutions with the SINUMERIK, SIMOTION, and SIMATIC control systems.



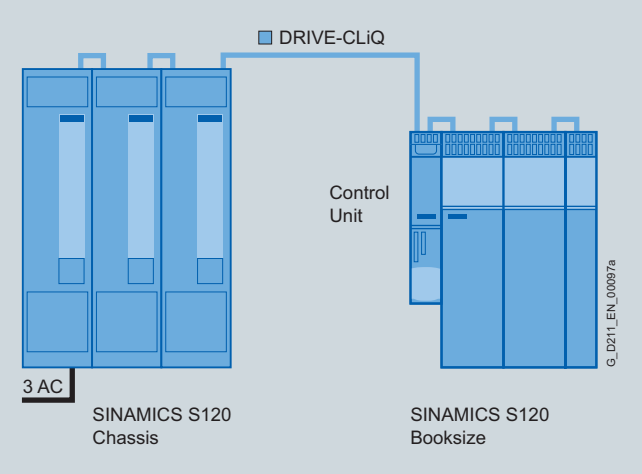
SINAMICS S120 blocksize, booksize, and chassis formats

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Overview

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.



Modular system for demanding 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. SIZER, a high-performance configuring 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 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 features Line Modules (infeed modules) and Motor Modules (inverter modules) covering a wide power range which, having been designed for seamless integration, pave the way for compact multi-axis drive configurations.

New 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. This exchange usually took place via a fieldbus, which required a great deal of time and effort for installation and configuration. SINAMICS S120 takes a different approach. A central Control Unit controls the drive for all connected axes and also establishes the technological links between the drives and/or axes. Since all the required data is stored in the central Control Unit, it does not need to be transferred. Inter-axis connections can be established within a Control Unit. They can be easily configured in the STARTER commissioning tool or with the drive commissioning wizard integrated in the SINUMERIK HMI interface. Of course, a number of Control Units can be interconnected to create an expanded group if your application exceeds the computing performance of one Control Unit.

Simple technological tasks can be carried out automatically by the SINAMICS S120 Control Unit. For more complex numerical tasks, they are 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. For the implementation of distributed solutions, the NCU can also be placed up to 100 m (328 ft) away from the drive group. In case of application solutions that have a greater number of motion axes in the machine kinematics, the system base units can be expanded with the additional Numeric Control Extensions NX10/NX15.

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.

Swift and automatic: The electronic rating plate

All SINAMICS S120 components with a DRIVE-CLiQ interface have an electronic rating plate that 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.

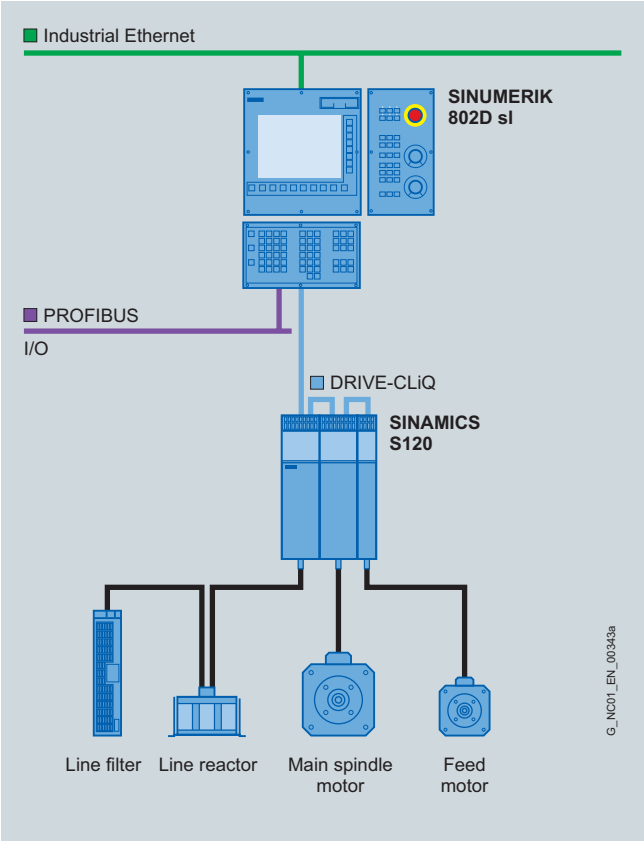
In addition to the technical data, the rating plate includes logistical data (manufacturer ID, order number, and globally unique ID). Since these data can be called up electronically on site or remotely, all the components used in a machine can always be individually identified, which helps simplify servicing.

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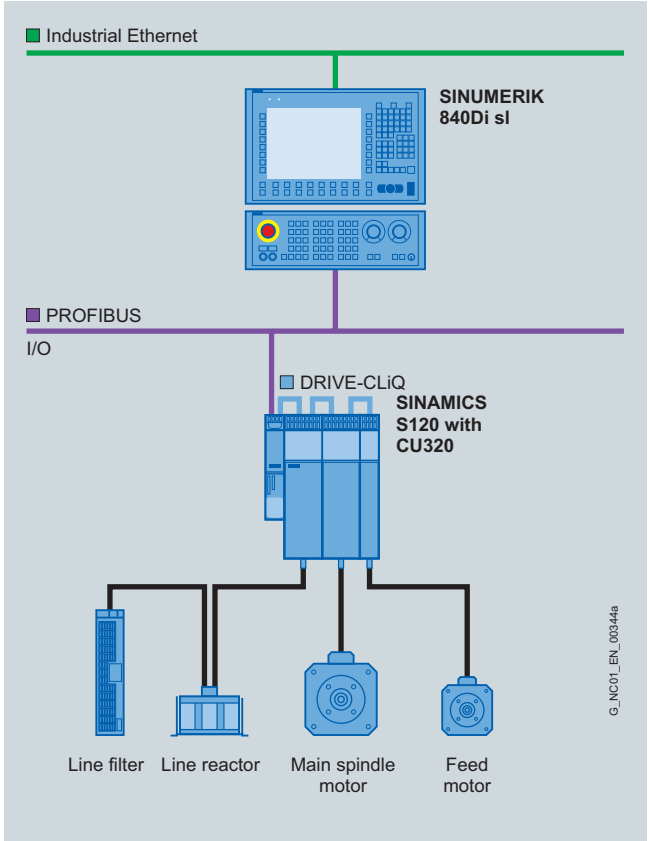
SINAMICS S120 drive system

Overview

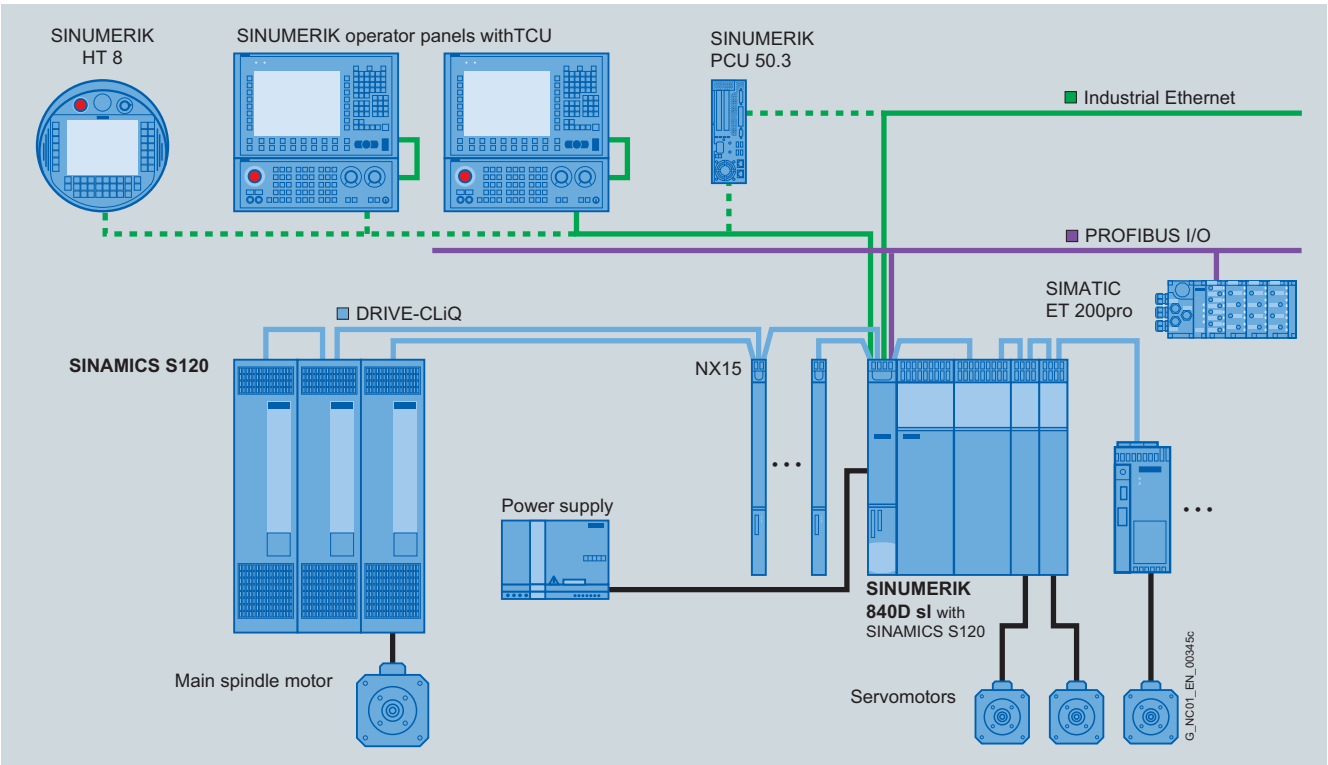
The following overviews feature the SINAMICS S120 components that are primarily used for multi-axis drive tasks.



SINAMIC S120 drive system with SINUMERIK 802D sl



SINAMICS S120 drive system with SINUMERIK 840Di sl



SINAMICS S120 drive system with SINUMERIK 840D sl

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Overview

Control Units



Control Units CU310 DP, CU320, NCU 720.2 and Numeric Control Extension NX15

Control Units for drive control in SINUMERIK, the Numeric Control Extensions NX and the CU320

These central Control Units can be used to create links between individual drives and implement simple technology functions.

SINAMICS S120 CU320 Control Unit

The CU320 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 840Di sl

The SINAMICS S120 CU320 and CU310 DP Control Units are used in conjunction with the SINUMERIK 840Di sl and with independent multi-axis drive configurations.

SINUMERIK 840D sl

- NCU 710.2/NCU 720.2/NCU 720.2 PN/NCU 730.2/ NCU 730.2 PN with integrated drive control for up to 6 axes
- Numeric Control Extensions NX10/NX15 for extended control of up to 3/6 axes

SINUMERIK 802D sl

- With integrated drive control of up to 5 axes

Control Unit CU310 DP

The CU310 DP Control Unit is used to control a single drive on the basis of Power Modules. A PROFIBUS interface and a TTL/HTL encoder evaluation circuit are standard.

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.

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SINAMICS S120 drive system

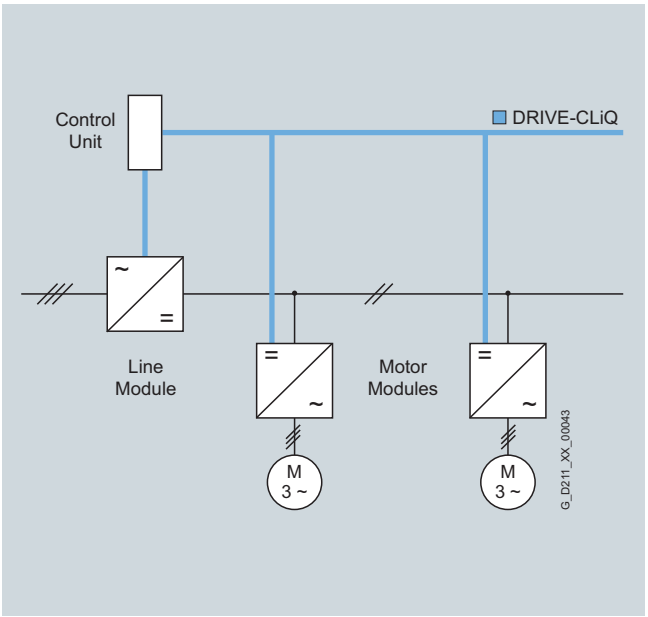
Overview

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 two Motor Modules in booksize format



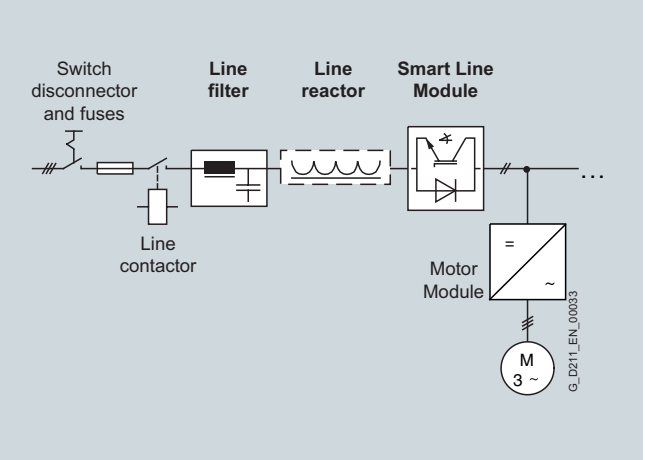
Motor Modules are designed for multi-axis drives and are controlled by a SINUMERIK NCU or a CU320 Control Unit. The Motor Modules are interconnected through a common DC bus. Since the Motor Modules share the same DC link, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The voltage-source DC link is supplied with mains voltage by a Line Module.

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 resistor 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 Class C2 limits (EN 61800-3).



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 and hardly cause any harmonics.

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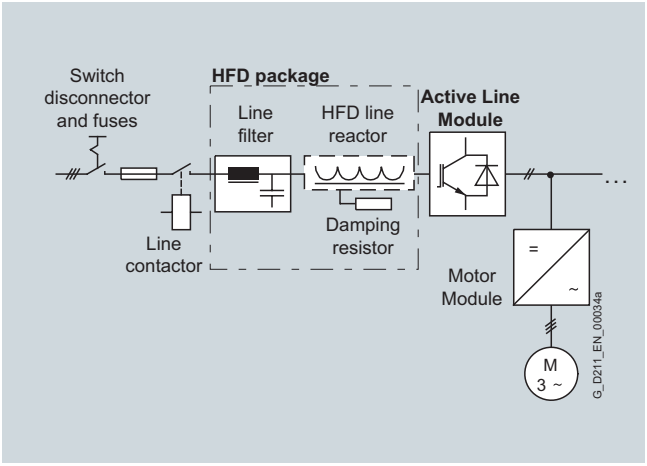
Overview

Active Line Modules of booksize and chassis format in systems with SINAMICS S120 runtime firmware above 2.5 SP1

It is essential that the Active Interface Module matched to the output type is used (block diagram, see Active Line Modules in chassis format).

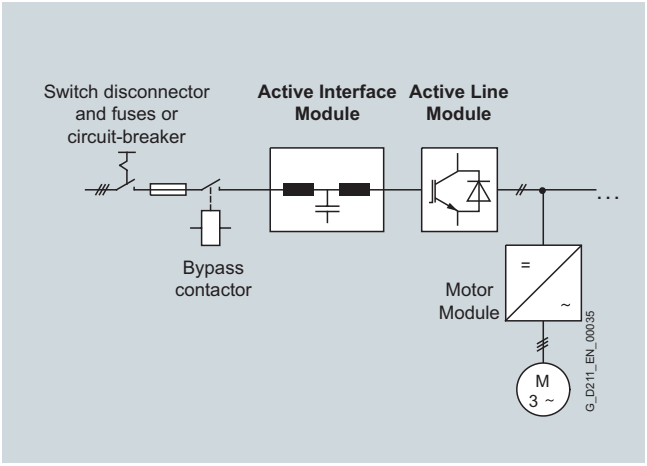
Active Line Modules of booksize format in systems with SINAMICS S120 runtime firmware below 2.5 SP1

It is essential that the HFD line reactor matched to the output type is used with these combinations with Active Line Modules in booksize format. To minimize interference emission, the Active Line Module should always be operated with a combination of line filter and line reactor (see the block diagram below).



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.

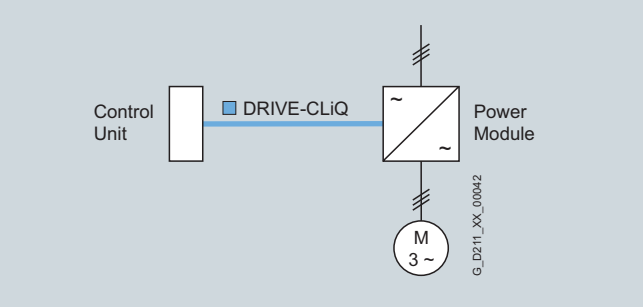


Power Modules

The simplest version of a SINAMICS S120 drive system consists of a CU310 DP 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 Control Unit CU310 DP



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 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 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 formats are available:

- Motor Modules and Line Modules in booksize and chassis formats
- Power Modules in blocksize and chassis formats

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SINAMICS S120 drive system

Overview

Booksize format

Booksize format units are optimized for multi-axis applications and are mounted adjacent to one another. The connection for the shared voltage-source 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 unit. The front panel (where the connections are located) and the width of the components are common to all designs.

Internal air cooling

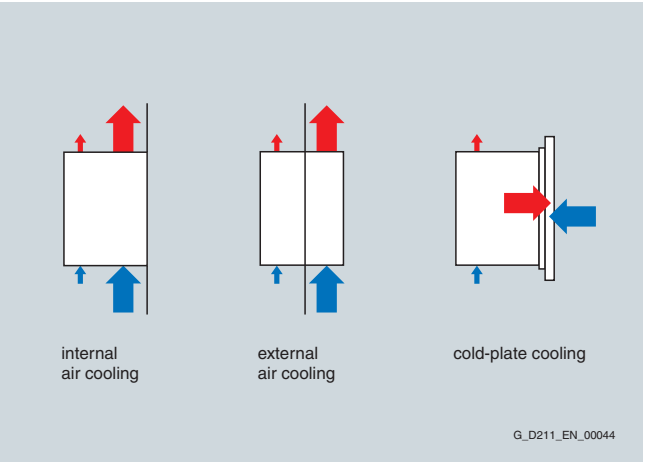
In this standard solution, the power loss from the electronics and power units of the drive components is removed by natural cooling or by a forced-ventilation system and routed to the interior of the control cabinet.

External air cooling

External air cooling uses the "through-hole" method. The components' power unit heat sinks pass through the mounting surface in the control cabinet and can thus release 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 heat sink, with its cooling fins and the fan unit (part of the scope of supply), protrudes to the rear into a separate ventilation cabin, which can also open outwards. 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, for example, water-cooled.



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.



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Overview

Blocksize format

The units in blocksize format are optimized for single-axis applications.

The CU310 DP/CU310 PN Control Units or CUA31/CUA32 Control Unit Adapters can be snapped on directly. The units are cooled by an internal air cooling circuit.



Power Module with CU310 DP Control Unit plugged in

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 electronics 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.

Die SINAMICS S120 components have been developed for installation in cabinets

They have the following features and characteristics:

- User friendliness
- Simple assembly and wiring
- Practical connection system, cable routing in accordance with EMC requirements
- Uniform design
- Contiguous assembly
- Various cooling solutions

Rugged units

The following units are equipped as standard with varnished coating:

- Blocksize format units
- Booksize format units
- Control Units CU and NX
  SINUMERIK 840D sl: NCU
- Sensor Modules
- Terminal modules

The varnish coating protects the sensitive SMD components against corrosive gases, chemically active dust and moisture.

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SINAMICS S120 drive system

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 DP
- CU320
- CUA31/CUA32



Control Units SINUMERIK 840D sl
- NCU 710.2
- NCU 720.2
- NCU 720.2 PN
- NCU 730.2
- NCU 730.2 PN

NX10/NX15



Motor Modules
- Single Motor Modules
- Double Motor Modules



Sensor Modules

SMC10/SMC20/SMC30
SME20/SME25
SME120/SME125



Supplementary system components

DMC20
DME20
TM41



Power Modules



AC motors

Synchronous motors
1PH8 motors
1FT6 motors
1FT7 motors
1FK7 motors
1FN3/1FN6 linear motors
1FW6 built-in torque motors
1FE1 built-in motors
2SP1 motor spindles
Gearboxes

Asynchronous motors
1PH8 motors
1PH7 motors
1PH4 motors
1PH2 built-in motors
Gearboxes

Connection system

MOTION-CONNECT
DRIVE-CLiQ cables
Power cables
Signal cables

G_NC01_EN_00366d

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Technical specifications

Unless specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS S120 drive system.

Electronics power supply	DC 24 V, -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 stressing	
• 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 FSC	147 m/s^2 (482 ft/s^2) (15 × *g*)/11 ms
- Blocksize format FSD 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 according to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
• Shock 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, additional 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 according 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)
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 according 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 According to EN 61800-5-1	2

[1] In transport packaging.

Technical specifications (continued)

European standards	
EN 954-1	Safety of machinery – safety-related parts of control systems Part 1: General design principles
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: Emissions
EN 55011	Industrial, scientific and medical high-frequency devices (ISM devices) – radio interference – limit values and measuring techniques
EN 60204-1	Electrical equipment of machines Part 1: General definitions
EN 61800-3	Variable-speed electric drives Part 3: EMC product standard including 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, www.ul.com according to UL and CSA standards)

More information

For satisfactory and reliable operation of the drive system, original components of the SINAMICS system and 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.

Configuring instructions for setting up a drive system with SINAMICS S120 are included in the system descripition (on the CD-ROM supplied with the Catalog NC 61).

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Communication

Overview

Most machine tools and production machines use digital bus systems. These handle communications between the control level, the machine control, the sensors and actuators. There are two types of communication: process communication and data communication.

Process communication

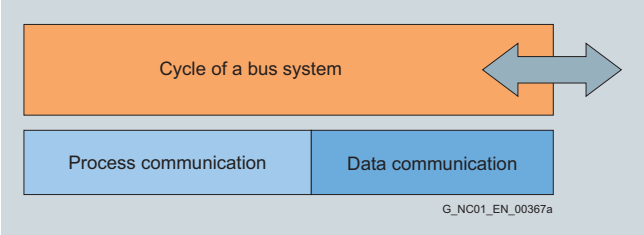
Process communication involves cyclically transmitting control data and setpoints. The number of connected sensors and actuators is usually specified by the configuration which makes the bus cycle of process communication very constant.

Data communication

Data communication is often required for engineering and is not directly linked to the execution of the production process. Data are sporadically (acyclically) exchanged with connected devices. The volume of this communication can be very large with over 100 bytes per device and communication task.

Bus cycle

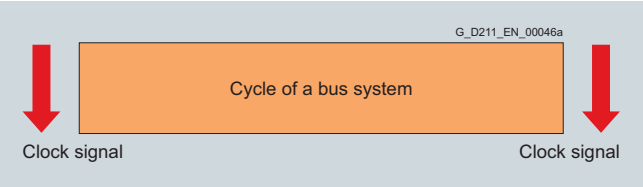
The bus cycle comprises of process communication and data communication.



Communication types of a bus systems

Requirements of drive controls

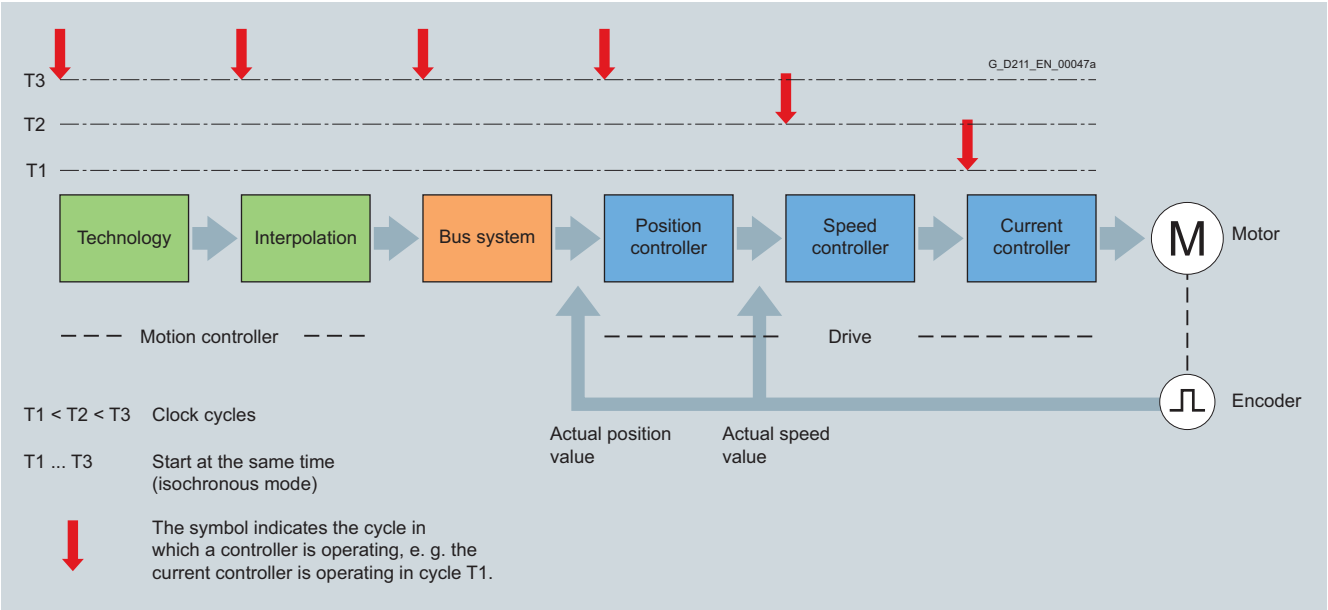
Most modern drives have a digital closed-loop control. This closed-loop control ensures that the controlled variable of the drive, for example the speed or position, are achieved and maintained. This type of digital closed-loop control comprises several intertwined controls (position, speed, current). These must be matched to one another, i.e. they must be synchronized. This synchronization is important to keep the controls stable and to accurately maintain the controlled variable and/or to achieve it quickly. If some of the components of the closed-loop control are located outside the drive, a bus system must be used to manage the communication between these components. This bus system must be as synchronized as the closed-loop controls. This is referred to as isochronous operation. For drives in the area of Motion Control Systems isochronous operation must be extremely quick and very accurate. It ensures that the length of the bus cycle deviates only very slightly. Acceptable values are less than 1 µs. This synchronization is achieved through clock signals.



Constant bus cycle

So that a bus system can be used for Motion Control applications it must permit process communication and isochronous operation.

An additional bus system is often used for data communication. PROFIBUS and PROFINET can combine all of these requirements in a single bus system. Industrial Ethernet, the predecessor of PROFINET, does not fulfill the requirements with respect to real-time communication.



The principle of digital drive controls

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Overview



What are Profiles?

Profiles used in automation technology define certain characteristics and responses for devices, device groups or whole systems which specify their main and unique properties. Only devices with manufacturer-neutral identical profiles can "interoperate" on a fieldbus and thus fully exploit the advantages of a fieldbus.

Profiles are specifications defined by manufacturers and users for certain characteristics, performance features, and behaviors of devices and systems. They aim to ensure that devices and systems which belong to one product family by virtue of their "product-compliant" development are interoperable and, to a certain degree, exchangeable in bus operation.

Profile types

Profiles can be distinguished as "application profiles" (general or specific) and "system profiles":

- Application profiles
  mainly refer to devices (drives) and contain an agreed selection of bus communication as well as specific device applications.
- System profiles
  describe system classes and include the master functionality, program interfaces, and integration methods.

PROFIdrive

The PROFIdrive profile is a specific application profile.

Design

PROFIdrive in drive applications

The PROFIdrive profile defines the device behavior and the access procedure to drive data for electrical drives on PROFIBUS, from simple frequency converters up to high-performance servo controllers.

It contains a detailed description of how the communication functions "slave-to-slave communication", "constant bus cycle time", and "isochronous mode" are used meaningfully for drive applications. In addition, it specifies all device characteristics which influence interfaces connected to a controller over PROFIBUS or PROFINET. This includes the sequence control, encoder interface, standardization of values, definition of standard message frames, and access to drive parameters, etc.

The PROFIdrive profile supports both central and distributed Motion Control concepts.

The basic philosophy: Keep it simple

The PROFIdrive profile tries to keep the drive interface as simple as possible and free from technology functions. This philosophy ensures that reference models as well as the functionality and performance of the PROFIBUS/PROFINET master have no or very little influence on the drive interface

Segmentation into application/utilization categories

The integration of drives into automation solutions depends heavily on the drive task. To cover the extensive range of drive applications from the most simple frequency converter up to highly dynamic, synchronized multi-axis systems with a single profile, PROFIdrive defines six application categories which cover most drive applications.

- Category 1 – Standard drives (such as pumps, fans, stirring units, etc.)
- Category 2 – Standard drives with technology functions
- Category 3 – Positioning drives
- **Category 4 – Motion control drives with central, higher-level motion control intelligence**
- Category 5 – Motion control drives with central, higher-level motion control intelligence and the patented "Dynamic Servo Control" positioning concept
- Category 6 – Motion control drives with distributed motion control intelligence integrated in the drives

PROFIdrive defines a device model based on function modules which cooperate in the device and generate the intelligence of the drive system. These modules have objects assigned to them which are described in the profile and are defined with respect to their functions. The overall functionality of a drive is therefore described through the sum of its parameters.

In contrast to other drive profiles, PROFIdrive defines only the access mechanisms to the parameters as well as a subset of profile parameters (approx. 30) such as the fault buffer, drive control and device identification.

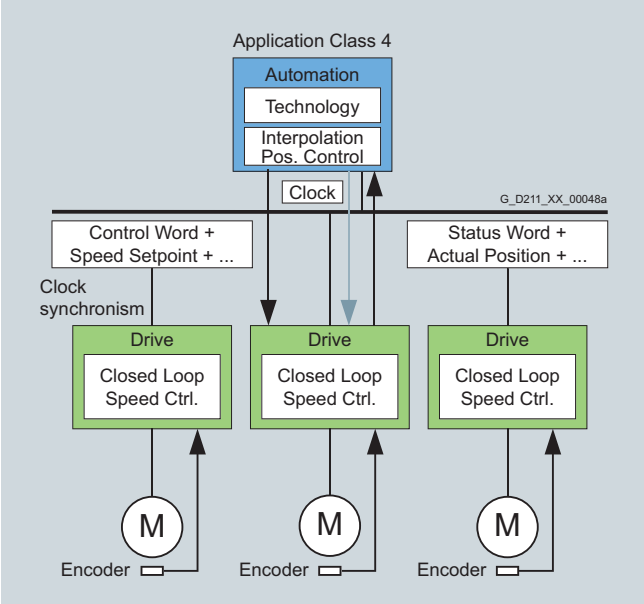
All other parameters are vendor-specific which gives drive manufacturers great flexibility with respect to implementing function modules. The elements of a parameter are accessed acyclically over the "DP-V1 parameter channel".

As a communication protocol, PROFIdrive uses DP-V0, DP-V1, and the DP-V2 expansions for PROFIBUS including the functions slave-to-slave communication and isochronous mode, or PROFINET IO with real-time classes RT and IRT.

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PROFIdrive

Design



PROFIdrive and SINAMICS

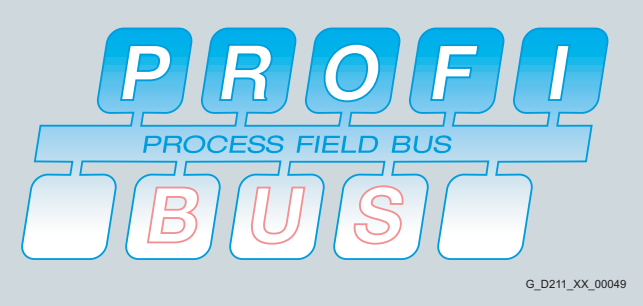
Utilization category 4 is the most important category for highly dynamic and highly complex Motion Control tasks. This application category describes in detail the master/slave relationship between the controller and the drives which are connected to each other over PROFIBUS and PROFINET.

The DSC (Dynamic Servo Control) function significantly improves the dynamic response and stiffness of the position control loop by minimizing the dead times, which usually occur for speed setpoint interfaces, with an additional feedback network in the drive. The position control loop is closed in the drive which permits very fast position control cycles (e.g. 125 µs for SINAMICS S120) and thus limits dead times exclusively to the control behavior.

In SINAMICS S120, the drive interface has been implemented according to the PROFIdrive profile V4 and Utilization Categories 1 to 4 (category 4 with and without DSC) and is referred to below as the PROFIdrive interface.

PROFIBUS

Overview



What is PROFIBUS?

PROFIBUS is the most successful open fieldbus used for automation technology which can be used for a wide range of applications. Standardization according to IEC 61158/EN 50170 provides future protection for your investment.

PROFIBUS defines the technical and functional features of a serial fieldbus system with which distributed programmable field controllers of the low-end (sensor/actuator level) to mid performance range (cell level) can be networked.

The demands of users for an open, vendor-independent communication system resulted in the specification and standardization of the PROFIBUS protocol.

Multi-vendor installation

Through the conformity and interoperability test performed by the test laboratories authorized by PROFIBUS & PROFINET International (PI) and the certification of the devices by PI, the user can rest assured that quality and functionality are also ensured for multi-vendor installations.

PROFIBUS variants

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 the intrinsically safe transmission technology specified 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 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.

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Design

Bus station

PROFIBUS DP distinguishes between two different master classes and one slave class:

Class 1 DP master

The DP master Class 1 is the central component in PROFIBUS DP. The central master station exchanges information with distributed stations (DP slaves) in a fixed, repeated message cycle.

Class 2 DP master

Devices of this type are used (programming, configuration or control devices) during start-up, for configuring the DP system, for diagnostics or controlling the plant during normal operation. 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 sends input information, measured values or actual values to the DP master in response. A DP slave never sends data independently, it must always be prompted by the DP master.

The volume of input and output data depends on the device and can be up to 244 bytes per DP slave and transfer direction.

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 of 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 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 signal jitter between cycles 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.

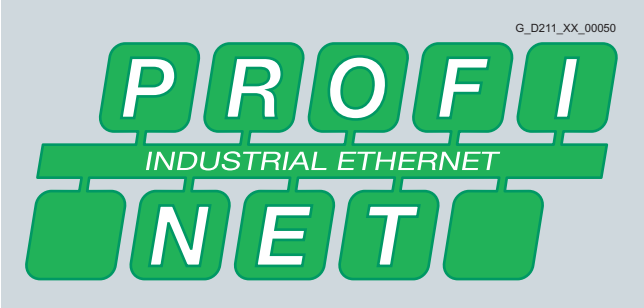
SINUMERIK and PROFIBUS DP

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 (not applicable to NCU 7...2PN).

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PROFINET

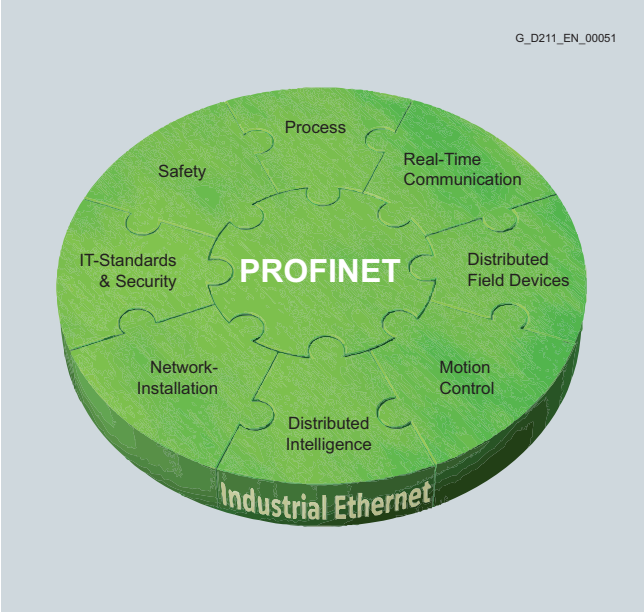
Overview



PROFINET is the innovative and open Industrial Ethernet standard (IEC 61158) for industrial automation. 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 be easily integrated without any modification of existing devices.

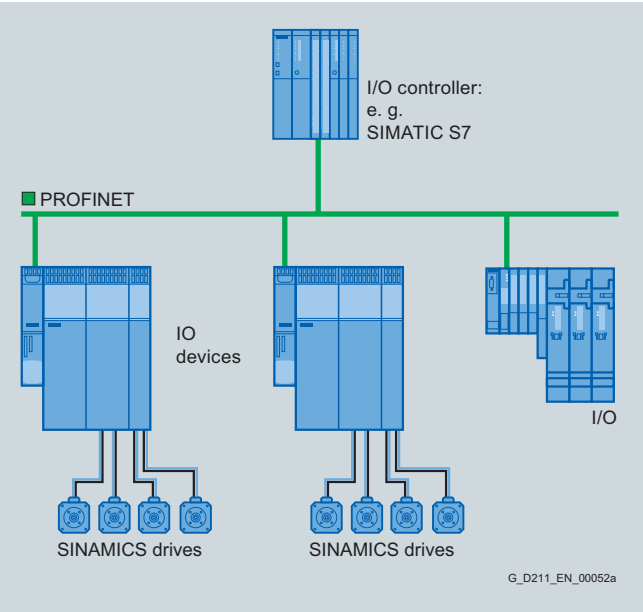


Design

PROFINET device concept

PPROFINET distinguishes between the controller and devices assigned to it. 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). In addition, PROFINET permits communication between controllers and devices of different I/O 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.

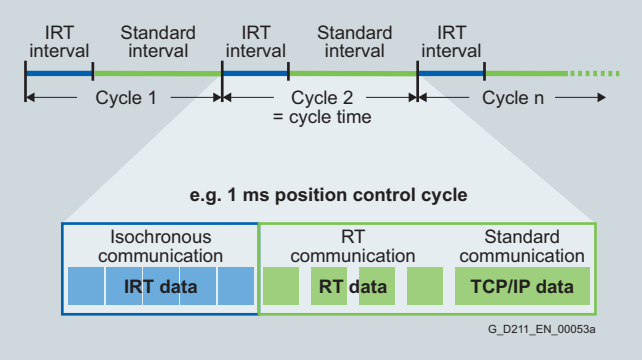
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Design

PROFINET IO with IRT for Motion Control

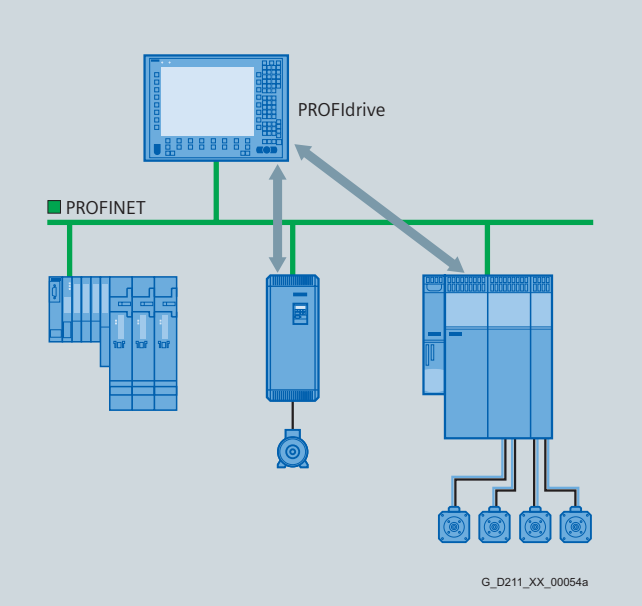
In this case, a Motion Control system controls or synchronizes axes using the PROFINET network. This requires cyclic, isochronous data exchange with the drives. PROFINET IO with IRT fulfills this requirement. The communication cycle is subdivided into different, time-specific channels for this purpose. The first channel is used for isochronous real-time communication (IRT), followed by real-time communication (RT) and standard TCP/IP communication. By configuring the application, e.g. synchronous operation of two axes, the IRT messages are determined implicitly and the corresponding configuration data are 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 permits a switch to forward the IRT messages without delay from the input port to the specified output port and then to the target device..



Transition from PROFIBUS to PROFINET

The functional interface between the controller and the SINAMICS drives for PROFINET and PROFIBUS is defined by the PROFIdrive drive profile 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 Control Unit and a CBE20 Communication Board
  The CU320 Control Unit on SINAMICS S120 is linked to the PROFINET IO network via the CBE20 Communication Board. The CBE20 Communication Board includes the PROFINET ASIC ERTEC400.
  - 4 ports with one RJ45 socket each
  - Integrated 4-port switch
  - 100 Mbit/s full duplex
  - PROFINET IO Device
  - PROFINET IO with RT and IRT
  - Standard TCP/IP communication to engineering

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 stations. This permits high-performance data transmission with 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, the so-called ERTEC (Enhanced Real Time Ethernet Controller), in the corresponding interfaces (switch integrated into device) or network components (switch).

Automation with PROFINET

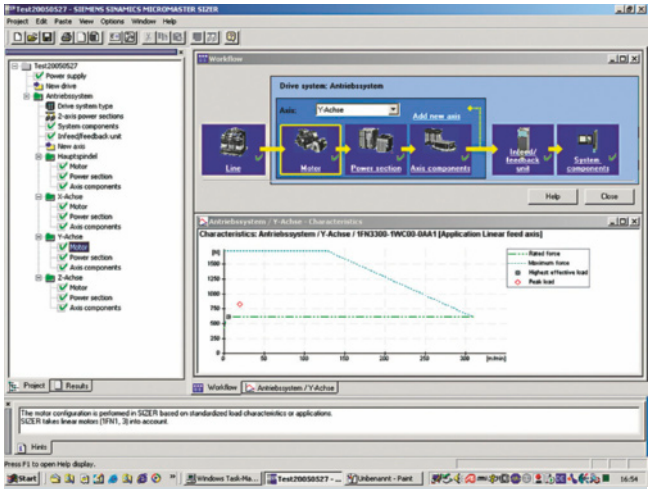
With these and other features PROFINET fulfills all automation requirements: Industry-compatible installation technology, real-time capability, deterministic responses, integration of distributed field devices, simple network administration and diagnostics, protection against unauthorized access, efficient 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 and adapted to the requirements of the machine. Collisions are prevented and an optimal data throughput is achieved.

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SIZER configuration tool

Overview



The easy configuration of the following drives and controls is carried out by the configuration tool SIZER:

- SINAMICS drive family
- MICROMASTER 4 drive family
- SINUMERIK CNC control
- SIMOTION Motion Control System
- SIMATIC Technology

The tool provides technical support when sizing the hardware and firmware components required for a drive task. SIZER supports the complete configuration of the drive system, from simple individual drives to complex multi-axis applications.

SIZER supports all stages of the configuration in form of a workflow:

- Configuration of the line supply
- Dimensioning of the motor and gearbox, including calculation of mechanical transmission elements
- Configuration of the drive components
- Support of topology configuration
- Selection of CNC control
- Selection of operator components
- Selection of HMI software
- Selection of the required accessories
- Selection of the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER was being developed, particular importance was placed on high usability and a universal, function-based approach to the drive task. The extensive user guidance makes using the tool easy. Status information keeps you continually informed about the progress of the configuration process.

The SIZER user interface is available in German, English, French 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 supports the configuration of drive devices and the copying/pasting/editing of existing drives that have already been configured.

The configuration process produces the following results:

- A parts list of the components required (export to Excel, use of the Excel data sheet for import to VSR)
- Technical specifications of the system
- Characteristic curves
- Information about harmonic effects on the supply
- Arrangement drawing of drive and control components and dimensional drawings of motors

These results are displayed in a results tree and can be reused for documentation purposes.

User support is provided by the technological online help menu, which provides the following information:

- 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

Minimum system requirements

PG or PC with Pentium II 400 MHz (Windows 2000), Pentium III 500 MHz (Windows XP)

512 MB RAM (1024 MB recommended)

At least 4.1 GB of free hard disk space

An additional 100 MB of free hard disk space on Windows system drive

Monitor resolution 1024 × 768 pixels

Windows XP Professional SP2 / XP Home Edition SP2 / Vista Business

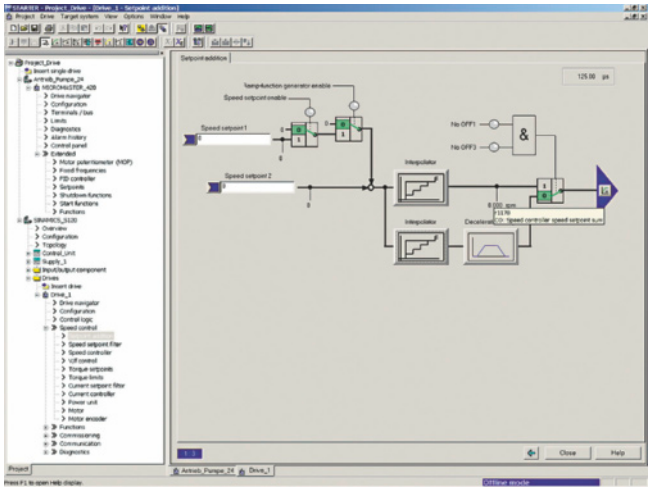
Microsoft Internet Explorer 6.0

Selection and ordering data

Description	Order No.
Configuration tool for SIZER for SINAMICS and MICROMASTER English/French/German/Italian	**6SL3070-0AA00-0AG0**

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Overview



The easy-to-use STARTER commissioning tool can be used to:

- Start up
- Optimize and
- Diagnose

This software can be operated either as a standalone PC application or can be integrated into the SCOUT engineering system (on SIMOTION) or SINAMICS STEP 7 (with Drive ES Basic). The basic functions and handling are the same regardless.

In addition to the SINAMICS drives, the current version of STARTER also supports MICROMASTER 4 devices and inverters for the SIMATIC ET 200S FC and SIMATIC ET 200pro FC distributed I/O system.

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 wizards, which make all the basic settings in the drive. This ensures that even though only a small number of parameter settings have been made, the drive configuration has already progressed far enough to permit axis movement.

The individual settings required are made using graphics-based parameterization screen forms, which also display the mode of operation.

Examples of individual settings that can be made include:

- Terminals
- Bus interface
- Setpoint channel (e.g. fixed setpoints)
- Closed-loop speed control (e.g. ramp-function generator, limits)
- BICO interconnections
- Diagnostics

Overview (continued)

Experts can gain rapid access to the individual parameters via the Expert List and do not have to navigate dialogs. An individual compilation of frequently used parameters can be saved in individual user lists.

In addition, the following functions are available for optimization purposes:

- Self-optimization of controller setting (depending on drive)
- Trace (depending on drive) (not supported for MICROMASTER 4, SINAMICS G110, SINAMICS G120, SINAMICS G110D, SINAMICS G120D, SIMATIC ET 200S FC and SIMATIC ET 200pro FC)

Diagnostics functions provide information about:

- Control/status words
- Parameter status
- Operating conditions
- Communication states

Performance

- Easy to use: Only a small number of settings need to be made for successful first commissioning: Axis turning
- Solution-based dialog-based user guidance simplifies commissioning
- Self-optimization functions reduce manual effort for optimization.

Minimum hardware and software requirements

PG device or PC with Pentium III 1 GHz

512 MB RAM (1 GB RAM recommended)

Screen resolution 1024 × 768 pixels, 16-bit color depth

Free hard disk memory: 2 GB

Windows XP Professional SP2 or SP3

Windows Vista Business SP1, Windows Vista Ultimate SP1

Microsoft Internet Explorer 6.0

Selection and ordering data

Description	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER English/French/German/Italian/Spanish	**6SL3072-0AA00-0AG0**

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STARTER commissioning tool

Accessories

Connection

Communication between the Control Unit (CU) of the drive and the programming device (PG) or PC is possible via a serial interface, via PROFIBUS or Ethernet/PROFINET, depending on the Control Unit version. The accessories in the following table are available for the respective drive system.

Selection and ordering data

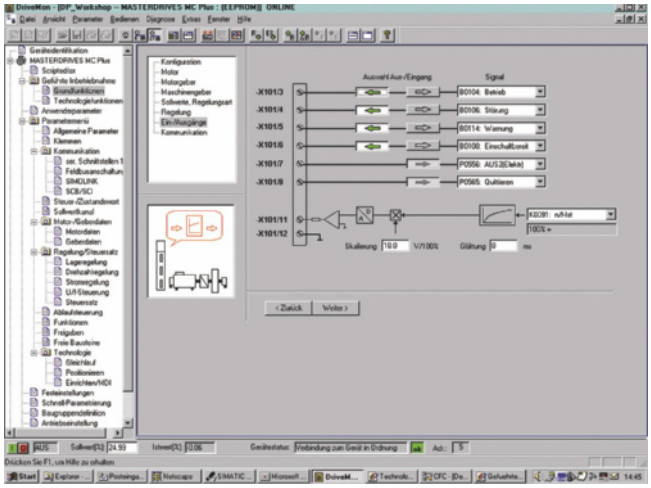
Recommended accessories for communication between drive and programming device or PC	
Description	Order No.
RS232 **SIMATIC S7 connecting cable** RS232 null modem cable, 6 m (19.69 ft)	**6ES7901-1BF00-0XA0**
PROFIBUS **Communications card CP 5512** (PCMCIA card Type 2 + adapter with 9-pole SUB-D socket, for Windows XP Professional and PCMCIA 32)	**6GK1551-2AA00**
SIMATIC DP connecting cable 12 MBaud, for PG connection, pre-assembled with 2 x 9-pole SUB-D connector, 3 m (9.84 ft)	**6ES7901-4BD00-0XA0**
PROFINET Standard CAT5 Ethernet cable or PROFINET cable required. For Ethernet communication, the CBE20 Communication Board is required in the CU320.	

More information

The commissioning tool STARTER is also available on the Internet under
http://support.automation.siemens.com/WW/view/en/10804985/133100

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Overview



Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management.

It is based on the operator interface of the STEP 7 Manager, the essential element when it comes to engineering.

Various software packages are available for selection.

- Drive ES Basic –
  for entry into the world of Totally Integrated Automation and the capability of routing beyond network boundaries and the use of the SIMATIC teleservice.
- Drive ES SIMATIC –
  for simply assigning parameters in the STEP 7 communication software instead of programming.

Design

- **Drive ES Basic** is the basic software to parameterize all of the drives online and offline and a prerequisite for use of the Drive ES Graphic software. Using the Drive ES Basic basic software, the automation and the drives can be handled with the SIMATIC Manager software. Drive ES Basic is the starting point for common data archiving for complete projects and for extending the use of routing and the SIMATIC teleservice to drives. Drive ES Basic provides the engineering tools for the new motion control functions - peer-to-peer data traffic, equidistance and isochronous operation with PROFIBUS DP and also provides the easy integration of drives with PROFINET IO in SIMATIC environments.

Design (continued)

- **Drive ES SIMATIC** requires that STEP 7 has first been installed. It includes a SIMATIC block library and permits simple and safe programming of the PROFIBUS and/or PROFINET IO interface in the SIMATIC CPU for the drives.
  There is no need for separate, time-consuming programming of the data exchange between the SIMATIC CPU and the drive.
  All Drive ES users need to remember is:
  Copy – Modify – Download – Ready.
  Customized, fully-developed function blocks are copied from the library into user-specific projects.
  Frequently-used functions are set to run in program format:
  - Read out complete diagnostics buffer automatically from the drive
  - Download complete parameter set automatically from the SIMATIC CPU into the drive, e.g. when a device has to be replaced.
  - Load part parameter sets (e.g. for recipe and product change) automatically from the SIMATIC CPU
  - Complete parameter assignment or partial parameter sets are uploaded from the drive into the SIMATIC CPU, i.e. updated.

Drive ES SIMATIC package:

- **PROFIBUS DP communications software** for S7-300 with CPUs with integrated DP interface (function block libraries DRVDPS7, POSMO) S7-400 with CPUs with integrated DP interface or with CP443-5 (function block libraries DRVDPS7, POSMO) and S7-300 with CP342-5 (function block library DRVDPS7C)
- **USS-Protocol communications software** for S7-300 with integral PtP interfaces or with CP340/341 and S7-400 with CP441 (function block library DRVUSSS7)
- **STEP 7 slave object manager** for the easy configuration of drives as well as for non-cyclic PROFIBUS DP communication with the drives; supports the conversion of DVA_S7 to Drive ES projects (only for V5.1 upwards)
- **STEP 7 device object manager** for the easy configuration of drives PROFINET IO interfaces (V5.4 and higher)
- **SETUP program** for installing the software in the STEP 7 environment
- **PROFINET IO communications software** for S7-300 with CPUs with integral PN interface, S7-400 with CPUs with integral PN interface or with CP (DRVDPS7 block library, respectively). PROFINET IO and PROFIBUS DP use the same blocks from the DRVDPS7 library, i.e. the blocks are able to serve both buses with a common block (only from V5.4 upwards)

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Drive ES engineering software

Selection and ordering data

Description	Order No.
Drive ES Basic V5.4 SPx[1]	
• Configuration software for the integration of drives into Totally Integrated Automation	
• Requirement: STEP 7 V5.3 or higher, SP 3	
• Supply format: on DVD En, Fr, Ger, It, Sp with electronic documentation	
Floating license, 1 user	**6SW1700-5JA00-4AA0**
Floating license, (copy license), 60 users	**6SW1700-5JA00-4AA1**
Software update service for single license	**6SW1700-0JA00-0AB2**
Software update service for copy license, 60 users	**6SW1700-0JA00-1AB2**
Upgrade from V5.x to V5.4 SPx[1]	**6SW1700-5JA00-4AA4**
Drive ES SIMATIC V5.4 SPx[1]	
• Function block library for SIMATIC for the parameterization of the communication with the drives	
• Requirement: STEP 7 V5.3 or higher, SP 3	
• Supply format: on CD-ROM En, Fr, Ger, It, Sp with electronic documentation	
Single license, incl. 1 runtime license	**6SW1700-5JC00-4AA0**
Runtime license (without data carrier)	**6SW1700-5JC00-1AC0**
Software update service for single license	**6SW1700-0JC00-0AB2**
Upgrade from V5.x to V5.4 SPx[1]	**6SW1700-5JC00-4AA4**

Options

Software Update Service Drive ES

A software update service is available for the Drive ES software. The user will automatically obtain the most current software, Service Packs and full versions for 12 months following the receipt of the order.

The software update service can only be ordered for an existing full version (i.e. one that has already been ordered).

- Software update service duration: 12 months

The software update service will be automatically extended by another 12 months unless it is terminated up to 6 weeks prior to its expiry.

Description	Order No.
Drive ES Basic	
Software update service for single license	**6SW1700-0JA00-0AB2**
Software update service for copy license	**6SW1700-0JA00-1AB2**
Drive ES SIMATIC	
Software update service for single license	**6SW1700-0JC00-0AB2**

[1] The latest SP is always included automatically.

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Overview

New system architecture with a central Control Unit

Electronically coordinated single drives work together to perform the drive tasks. Higher-level controls operate the drives to achieve the required coordinated movement. This requires cyclic data exchange between the control and the drives. This exchange usually took place via a fieldbus, which required a great deal of time and effort for installation and configuration. SINAMICS S120 takes a different approach. A central Control Unit controls the drives for all connected axes and also establishes the technological links between the drives and/or axes. Since all the required data is stored in the central Control Unit, it does not need to be transferred. Inter-axis connections can be established within a Control Unit and easily configured with the STARTER commissioning tool using a mouse. In conjunction with the SINUMERIK, the drives are configured using the SINUMERIK drive wizards.

- Simple technological tasks can be carried out automatically by the SINAMICS S120 Control Unit
- CU310 Control Units are available for single drives
- The CU320 Control Unit is designed for multi-axis applications
- The Control Units in the SINUMERIK CNCs are available as an integrated solution in various rating classes for implementing coordinated motion control in a multi-axis interpolation grouping on machine tools.

Each of these Control Units is based on an object-oriented SINAMICS S120 standard firmware which contains all of the most popular control modes and can be scaled to meet even the most advanced performance requirements.

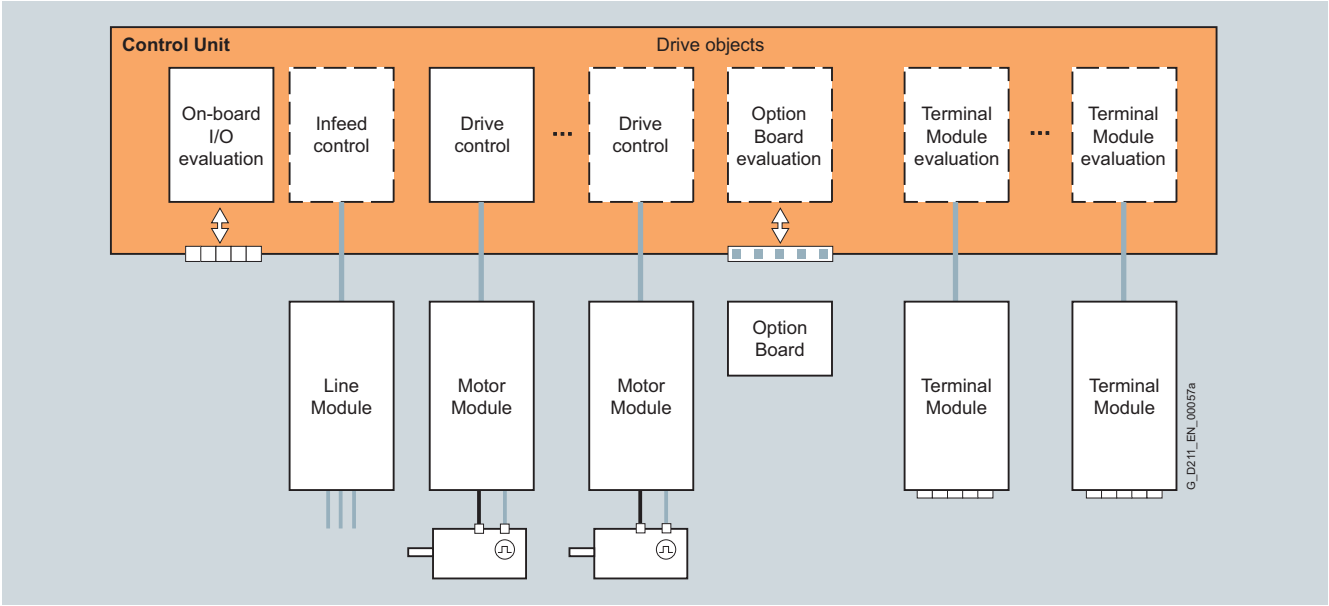
The drive controls are supplied as ready-to-configure drive objects:

- Infeed Control for mains infeed
- Servo Control for permanent-magnet excited synchronous and asynchronous motors with demanding dynamic requirements

All these control variants are based on the principle of field-oriented, closed-loop Vector control.

Drive objects

A drive object is a self-contained software function with its own parameters and, if necessary, its own fault messages and warnings.



Technology packages

The Control Units and SINUMERIK support coordinated motion control of multiple drive.

Comprehensive package of open-loop and closed-loop control functions

A range of different standard functions, e.g. setpoint input, dataset changeover, controller optimization, kinetic buffering, etc. provide a high degree of operational reliability and extremely flexible operating conditions, but functions are also available that can be used to increase the energy efficiency at the machine

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Control Units

Function

Overview of main open-loop and closed-loop control functions:

	Closed-loop control types S120	Open-loop control types S120	Main functions S120 for booksize/chassis	Comment, note
Infeed Control	• Booksize - Current control without/with mains sensor - V_{DC}-control without/with 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
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 changeover • 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)

Function modules

For stand-alone drive solutions, the additively activatable function module EPos can be called up on the SINAMICS S120 Control Units for the absolute/relative positioning of linear and rotary axes (Modulo) with motor encoders (indirect measuring system) or machine encoders (direct measuring system). The basic positioner can be used to resolve uncomplicated and clear motion control tasks without additional external technological outlay from the drive itself.

Integrated safety functions

The Control Units support drive-autonomous Safety Integrated Basic functions and also licensed Safety Integrated Extended functions.

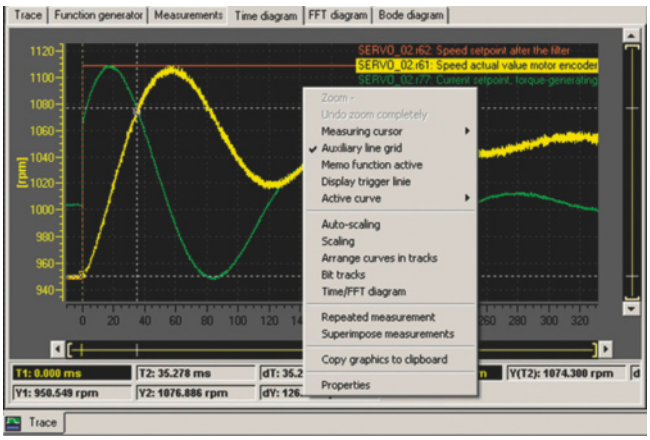
CompactFlash Card

The functions of the SINAMICS S120 drives are stored on a CompactFlash Card. This card contains the firmware and parameter settings for all drives in the form of a project. The CompactFlash Card can also hold additional projects, which means that the correct project can be accessed immediately when series machines of different types are commissioned. When the Control Unit has booted, the data on the CompactFlash Card are read and loaded to the work memory.

The firmware is organized in objects. Drive objects are used to implement open-loop and closed-loop control functions for Line Modules, Motor Modules, Power Modules and other system components connected by DRIVE-CLiQ.

Diagnostics optimally supported by trace function

The time characteristics of input and output variables associated with drive objects can be measured by the integrated trace function and displayed using the STARTER commissioning tool or on the SINUMERIK. Up to 4 signals can be recorded simultaneously. Recording can be triggered as a function of freely selectable boundary conditions, e.g. the value of an input or output variable.



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Overview



The CU310 DP Control Units are designed for the communication and open-loop/closed-loop control functions of a Power Module and combine with the Power Module to create a powerful single drive.

Design

The CU310 DP Control Units have the following interfaces as standard:

- 1 DRIVE-CLiQ socket for communication with other DRIVE-CLiQ devices, e.g. Sensor or Terminal Modules
- 1 PM-IF interface for communication with Power Modules in blocksize format
- 1 interface to the BOP20 Basic Operator Panel
- 1 encoder evaluation
  The following encoder signals can be evaluated:
  - Incremental encoder TTL/HTL
  - SSI encoder without incremental signals
- 4 parameterizable digital inputs (floating)
- 4 parameterizable bidirectional digital inputs/digital outputs (non-floating)
- 1 serial RS232 interface
- 1 slot for the CompactFlash Card on which firmware and parameters are stored
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses) for controlling the connected PM340 Power Module
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor connection

The status of the CU310 DP Control Units 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 DP Control Unit controls Power Modules in blocksize format via the PM-IF interface. In this case, other DRIVE-CLiQ components such as Sensor or Terminal Modules can be connected to the DRIVE-CLiQ socket on the Control Units.

The CU310 DP Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool or with the HMI-based tool integrated in the SINUMERIK. The CU310 DP Control Unit requires a CompactFlash Card with firmware version 2.4 or higher.

- A CU310 DP Control Unit communicates with the higher-level control system using PROFIBUS and the PROFIdrive V4 profile.
- 1 PROFIBUS interface with PROFIdrive V4 profile
- An external 24 V power supply can be connected to the CU310 DP Control Unit when the power connection for the Power Module is not occupied.

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CU310 DP Control Unit

Technical specifications

Product name	Control Unit CU310 DP
Current requirement At 24 V DC, max. without taking account of digital outputs and DRIVE-CLiQ supply	0.35 A for CU310 DP + 0.5 A for Power Module PM340
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 4 isolated digital inputs 4 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.	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 mm^2
Digital outputs (sustained short-circuit-proof)	4 bidirectional non-isolated digital inputs/digital outputs
• 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 mm^2
Encoder evaluation	• Incremental encoder TTL/HTL • SSI encoder without incremental signals
• Encoder 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)

Technical specifications (continued)

Product name	Control Unit CU310 DP
Power loss	< 20 W
PE connection	On enclosure with M5 screw
Dimensions	
• Width	73 mm (2.87 in)
• Height	183.2 mm (7.17 in)
• Depth	89.6 mm (3.53 in)
Weight, approx.	0.95 kg (2 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
Control Unit CU310 DP Without CompactFlash Card	**6SL3040-0LA00-0AA1**
Accessories	
PROFIBUS connector	
• Without PG/PC connection	**6ES7972-0BA41-0XA0**
• With PG/PC connection	**6ES7972-0BB41-0XA0**
STARTER commissioning tool	**6SL3072-0AA00-0AG0**
Accessories for re-ordering	
Accessories pack (3 plug-in terminals, 1 dust-proof blanking plug) For DRIVE-CLiQ port	**6SL3064-8LA00-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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

1) The specified delay times refer to the hardware. The actual reaction time depends on the time slice 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.

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Overview



The CU310 PN Control Units are designed for the communication and open-loop/closed-loop control functions of a Power Module and combine with the Power Module to create a powerful single drive.

Design

The CU310 PN Control Units have the following interfaces as standard:

- 1 DRIVE-CLiQ socket for communication with other DRIVE-CLiQ devices, e.g. Sensor or Terminal Modules
- 1 PM-IF interface for communication with Power Modules in blocksize format
- 1 interface to the BOP20 Basic Operator Panel
- 1 encoder evaluation
  The following encoder signals can be evaluated:
  - Incremental encoder TTL/HTL
  - SSI encoder without incremental signals
- 4 parameterizable digital inputs (floating)
- 4 parameterizable bidirectional digital inputs/digital outputs (non-floating)
- 1 serial RS232 interface
- 1 slot for the CompactFlash Card on which firmware and parameters are stored
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses) for controlling the connected PM340 Power Module
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor connection

The status of the CU310 PN 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 PN Control Unit drives Power Modules in blocksize format via the PM-IF interface. In this case, other DRIVE-CLiQ components such as Sensor or Terminal Modules can be connected to the DRIVE-CLiQ socket on the Control Units.

The CU310 PN Control Unit and other connected components are commissioned and diagnosed with the STARTER commissioning tool or with the HMI-based tool integrated in the SINUMERIK. The CU310 PN Control Unit requires a CompactFlash Card with firmware version 2.4 or higher.

A CU310 PN Control Unit communicates with the higher-level control system using PROFINET IO and the PROFIdrive V4 profile.

- 1 PROFINET interface with 2 ports (RJ45 sockets) with PROFIdrive V4 profile

The SINAMICS S120 drive system with CU310 PN 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 in accordance with PROFIdrive according to Specification V4
- Standard TCP/IP communication for engineering processes using the STARTER commissioning tool
- Integrated 2-port switch with 2 RJ45 sockets based on the ERTEC ASIC. The optimum topology (line, star, tree) can therefore be configured without additional external switches.

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CU310 PN Control Unit

Technical specifications

Product name	Control Unit CU310 PN
Current requirement At 24 V DC, max. without taking account of digital outputs and DRIVE-CLiQ supply	0.4 A for CU310 PN + 0.5 A for Power Module PM340
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	In accordance with IEC 61131-2 Type 1 4 isolated digital inputs 4 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.	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 mm^2
Digital outputs (sustained short-circuit-proof)	4 bidirectional non-isolated digital inputs/digital outputs
• 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 mm^2
Encoder evaluation	• Incremental encoder TTL/HTL • SSI encoder without incremental signals
• Encoder 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)

Technical specifications (continued)

Product name	Control Unit CU310 PN
Power loss	< 20 W
PE connection	On enclosure with M5 screw
Dimensions	
• Width	73 mm (2.87 in)
• Height	183.2 mm (7.21 in)
• Depth	89.6 mm (3.53 in)
Weight, approx.	0.95 kg (2 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
Control Unit CU310 PN Without CompactFlash Card	**6SL3040-0LA01-0AA1**
Accessories	
Industrial Ethernet FC for CU310 PN	
• RJ45 Plug 180 (1 unit)	**6GK1901-1BB10-2AA0**
• RJ45 Plug 180 (10 units)	**6GK1901-1BB10-2AB0**
• Stripping Tool	**6GK1901-1GA00**
• Standard Cable GP 2 × 2	**6XV1840-2AH10**
• Flexible Cable GP 2 × 2	**6XV1870-2B**
• Trailing Cable GP 2 × 2	**6XV1870-2D**
• Trailing Cable 2 × 2	**6XV1840-3AH10**
• Marine Cable 2 × 2	**6XV1840-4AH10**
STARTER commissioning tool	**6SL3072-0AA00-0AG0**
Accessories for re-ordering	
Accessories pack (3 plug-in terminals, 1 dust-proof blanking plug) For DRIVE-CLiQ port	**6SL3064-8LA00-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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

1) The specified delay times refer to the hardware. The actual reaction time depends on the time slice 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.

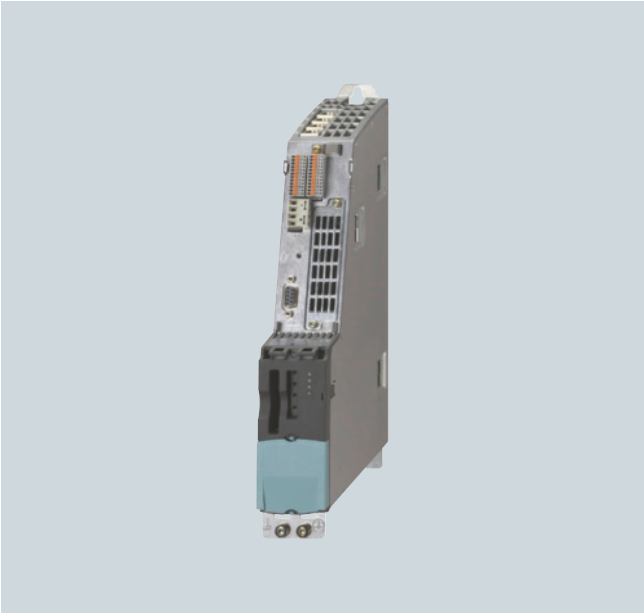
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Overview



The communication, open-loop and closed-loop control functions for one or more Motor Modules and Active Line Modules run in a CU320 Control Unit. The CU320 Control Unit is designed fundamentally for multi-axis operation

Design



CU320 Control Unit, without protective cover

Design (continued)

CU320 Control Units feature the following interfaces as standard:

- 4 DRIVE-CLiQ sockets for communication with other DRIVE-CLiQ devices, e.g., Motor Modules, Active Line Modules, Sensor Modules, Terminal Modules [1)]
- 1 PROFIBUS interface
- 8 parameterizable digital inputs (floating)
- 8 parameterizable bidirectional digital inputs/digital outputs (non-floating), of which 6 are high-speed digital inputs
- 1 serial RS 232 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[1)]
- 3 test sockets and one reference ground for commissioning support
- 1 connection for the electronics 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 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 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 Control Unit can be fixed to the wall of the control cabinet using the integrated fixing lugs. As the CU320 Control Unit is not as deep as the Line Modules, suitable spacers are available to increase the depth of the CU320 Control Unit to 270 mm (10.63 in).

The CU320 Control Unit can be mounted on the side of the Line Module in booksize format via brackets integrated in a Line Module.

Integration

DRIVE-CLiQ components, for example, Motor Modules and Active Line Modules, can be connected to a CU320 Control Unit. The number of modules depends on the performance required, including duty type and additional functions.

Communication between a CU320 Control Unit and the connected components takes place via DRIVE-CLiQ.

If an application requires more than one Control Unit, the number can be increased accordingly. The Control Units are then interconnected on a higher-level control via PROFIBUS with the PROFIdrive V4 profile.

The integrated safety functions such as safe brake control must be selected in two channels. Two digital inputs are required for this purpose.

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

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CU320 Control Unit

Technical specifications

Product name	CU320 Control Unit
Current requirement at 24 V DC, max. Excluding digital outputs, option slot expansion, and DRIVE-CLiQ supply	0.8 A
Conductor cross-section, max.	2.5 mm^2
Fuse protection, max.	20 A
Digital inputs	8 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.	10 mA
• Delay times of digital inputs[1], approx.	
- L → H	50 µs
- H → L	100 µs
• Delay times 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 mm^2
Digital outputs (sustained short-circuit-proof)	8 bidirectional non-isolated digital inputs/digital outputs
• Voltage	DC 24 V
• 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.	0.5 mm^2
Power loss	20 W
PE connection	On enclosure with M5 screw
Ground connection	On enclosure with M5 screw
Dimensions	
• Width	50 mm (1.97 in)
• Height	270 mm (10.63 in)
• Depth	226 mm (8.90 in)
Weight, approx.	1.5 kg (3.31 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
CU320 Control Unit Without CompactFlash Card	**6SL3040-0MA00-0AA1**
Accessories	
PROFIBUS connector	
• Without PG/PC connection	**6ES7972-0BA41-0XA0**
• With PG/PC connection	**6ES7972-0BB41-0XA0**
Spacers (2 units) For increasing the depth of the CU320 Control Unit to 270 mm (10.63 in) if the brackets on the side are not to be 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	
Accessories pack (3 plug-in terminals, 1 dust-proof blanking plug) For DRIVE-CLiQ port	**6SL3064-8MA00-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input or output is processed.

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Overview



The CompactFlash Card contains the firmware and parameter settings. It is inserted into the appropriate slot on the CU310 or CU320 Control Unit

Design

A CU320 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 full computing capacity of the CU320 Control Unit is only available on systems with performance expansion 1.

The Control Unit 310 has been designed to control only single axes. Performance expansion 1 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 (performance expansion 1 in the current version).

The computing capacity requirement and utilization of the CU320 Control Unit can be calculated with the SIZER configuration tool.

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. You will need the serial number of the CompactFlash Card and the order number 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.

Integration

For stand-alone operation of the SINAMICS S120 without a CNC, the control functions can be optionally extended with the Safety Integrated Extended Functions

- Safe Stop 2
- Safe Operating Stop
- Safely Limited Speed
- Safe Speed Monitor

The Safety Integrated Extended Functions can be ordered for each axis using the short option code. It is, however, also possible to enable the Safety Integrated Extended Functions later. You will need the serial number of the CompactFlash Card and the order number of the firmware option to be enabled.

The Safety Integrated Extended Functions cannot be used with CU310 and CU320 Control Units in combination with SINUMERIK.

Selection and ordering data

Description	Order No.
CompactFlash Card for CU310 DP, CU310 PN, CU320 Control Units	
With current firmware version including Certificate of License	
• Without performance expansion	**6SL3054-0AA00-1AA0**
• With performance expansion 1 firmware option	**6SL3054-0AA01-1AA0**
• With Safety license for 1 axis[1]	
- Without performance expansion[1]	**6SL3054-0AA00-1AA0-Z F01**
- With performance expansion 1 firmware option[1]	**6SL3054-0AA01-1AA0-Z F01**
• With safety license for 2 axes[1]	
- Without performance expansion[1]	**6SL3054-0AA00-1AA0-Z F02**
- With performance expansion 1 firmware option[1]	**6SL3054-0AA01-1AA0-Z F02**
• With safety license for 3 axes[1]	
- Without performance expansion[1]	**6SL3054-0AA00-1AA0-Z F03**
- With performance expansion 1 firmware option[1]	**6SL3054-0AA01-1AA0-Z F03**
• With safety license for 4 axes[1]	**6SL3054-0AA01-1AA0-Z F04**
- With performance expansion 1 firmware option[1]	
• With safety license for 5 axes[1]	**6SL3054-0AA01-1AA0-Z F05**
- With performance expansion 1 firmware option[1]	
Firmware license	
• Performance expansion 1 option including Certificate of License for upgrading the license of a CompactFlash Card	**6SL3074-0AA01-0AA0**
• Safety Integrated Extended Functions option including Certificate of License for one axis for upgrading the license of a CompactFlash Card. This option must be ordered once per axis, up to 5 times for one CompactFlash Card[1]	**6SL3074-0AA10-0AA0**

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

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CompactFlash Card

More information

Firmware version

The firmware version is encoded in the order number of the CompactFlash Card supplied. If the CompactFlash Card with Order No. 6SL3054-0AA00.-1AA0 is ordered for the current firmware version, its order number is different to the order number of the CompactFlash Card supplied.

The firmware version is encoded as follows in the order number printed on the CompactFlash Card:

Structure of the Order No.:	6SL3054-0■■0■-1AA0
Firmware version	↑
1	B
2	C
4	E
Version	↑
1	B
2	C
3	D
4	E
5	F
6	G
	↑
Without performance expansion	0
With performance expansion 1	1

Example 1: A CompactFlash Card with order number 6SL3054-0AA00-1AA0 is ordered (current firmware version as specified in the catalog). The CompactFlash Card with the most recent firmware version is confirmed and shipped, e.g., order number 6SL3054-0CG00-1AA0 for firmware version 2.6. For spare parts a specific firmware version can be ordered, e.g. 6SL3054-0CD00-1AA0 for firmware version 2.3.

Example 2[1)]: A CompactFlash Card with firmware version 2.5 and a Safety license for a CU310 PN Control Unit are required:

Order No. 6SL3054-0CF00-1AA0-Z
F01

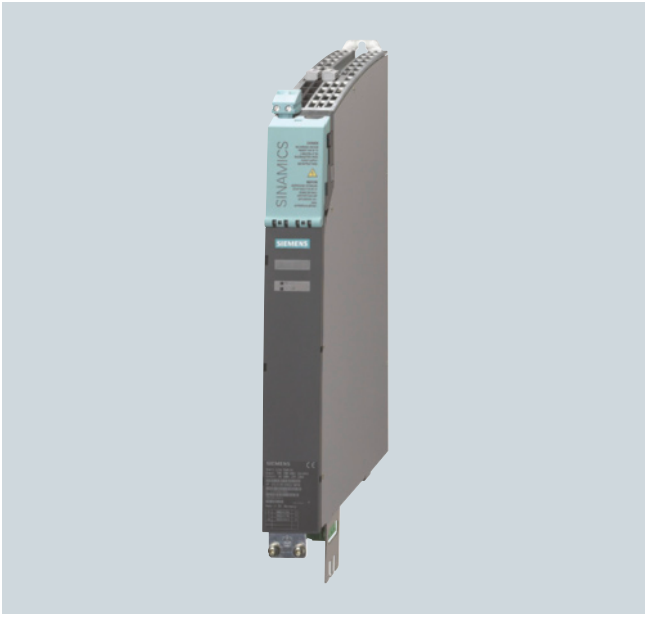
Example 3[1)]: A CompactFlash Card with firmware version 2.5, performance expansion 1, and 3 Safety licenses for a CU320 Control Unit are required:

Order No. 6SL3054-0CF01-1AA0-Z
F03

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

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Overview



Smart Line Modules are stable, line-commutated feed/feedback units (diode bridge for incoming supply; stable, line-commutated feedback via IGBTs) with 100 % continuous regenerative feedback power. The feedback regenerative 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 by means of 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 electronics 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 und 36 kW Smart Line Modules)

The status of the Smart Line Modules is indicated via two multicolor LEDs.

The signal cable shield can be connected to the Line Module by means of a terminal element, e.g. type KLBÜ 3-8 SC by Weidmüller.

Design (continued)

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the Control Unit when mounted 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 (on 16 kW and 36 kW Smart Line Modules only)
- 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/outputs
- Connector X22 for digital inputs/outputs (on 5 kW and 10 kW Smart Line Modules only)
- Connector X1 for line supply connection (on 5 kW and 10 kW Smart Line Modules only)
- 1 set of warning signs in 16 languages
- 1 heat conducting foil (for Smart Line Modules with cold plate cooling only)

Technical specifications

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 With rated power	
• Fundamental component ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.65 … 0.90
Overvoltage category According to EN 60664-1	Class III
DC link voltage, approx.	1.35 × line voltage[2]
Electronics 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, power units with increased air cooling through built-in fans - Cold plate cooling (5 kW and 10 kW)
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 directive)
Approvals, according to	cULus

[1] Smart Line Modules 16 kW and 36 kW in booksize format with drive firmware version V2.5 or higher with appropriate parameterization and reduced output 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. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications

Line supply voltage 380 … 480 V 3 AC					
• Internal air cooling		6SL3130-6AE15-0AB0	6SL3130-6AE21-0AB0	6SL3130-6TE21-6AA3	6SL3130-6TE23-6AA3
• External air cooling		6SL3131-6AE15-0AA0	6SL3131-6AE21-0AA0	–	–
• Cold plate cooling		6SL3136-6AE15-0AA0	6SL3136-6AE21-0AA0	–	–
Product name		Smart Line Module in booksize format			
Feed/feedback power					
• Rated power P_{rated}					
- With 380 V 3 AC	kW	**5**	**10**	**16**	**36**
- With 460 V 3 AC[3]	(HP)	(5)	(10)	(18)	(40)
• For S6 duty (40 %) P_{S6}	kW	6.5	13	21	47
• P_{max}	kW	10	20	35	70
DC link current					
• At 540/600 V DC	A	9.3/8.3	18.5/16.6	30/27	67/60
• For S6 duty (40 %)	A	11	22	35	79
• Maximum	A	16.6	33.2	59	117
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
• For S6 duty (40 %) at 400 V	A	10.6	21.1	33	72
• At 400 V max.	A	15.7	31.2	54	107
Current requirement 24 V DC electronics power supply, max.	A	1.0	1.3	1.1	1.5
Current carrying capacity					
• 24 V DC busbars	A	20	20	20	20
• DC link busbars	A	100	100	100	200
DC link capacitance					
• Smart Line Module	µF	220	330	710	1410
• Drive line-up, max.	µF	6000	6000	20000	20000
Internal/external air cooling					
• Power loss[1]					
- Internal air cooling	kW	0.11	0.2	0.19	0.41
- External air cooling int./ext.	kW	0.06/0.05	0.1/0.1	–	–
• Cooling air requirement	m^3/s (ft^3/s)	0.008 (0.3)	0.008 (0.3)	0.016 (0.6)	0.031 (1.1)
• Sound pressure level L_{pA} (1 m)	dB	< 60	< 60	< 60	< 60
Cold plate cooling					
• Power loss, int./ext.[1]	kW	0.05/0.05	0.08/0.11	–	–
• Thermal resistance R_{th}	K/W	0.175	0.175	–	–
Line supply connection U1, V1, W1		Screw-type terminals (X1)	Screw-type terminals (X1)	Screw-type terminals (X1)	M6 screw stud (X1)
• Conductor cross-section	mm^2	2.5 … 6	2.5 … 6	2.5 … 10	2.5 … 50
Shield connection		Shield connection plate integr. into the connector	Shield connection plate integr. into the connector	Shield connection plate integr. into the connector	See Accessories
PE connection		M5 screw	M5 screw	M5 screw	M6 screw
Cable length, max. Total of all motor cables and DC link[2]					
• Shielded	m (ft)	350 (1148)	350 (1148)	350 (1148)	350 (1148)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	50 (1.97)	50 (1.97)	100 (3.94)	150 (5.91)
• 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)	–	–
- 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)
• With external air cooling	kg (lb)	5.3 (11.7)	5.4 (11.9)	–	–
• With cold plate cooling	kg (lb)	4 (8.82)	4 (8.82)	–	–

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

[2] Max. cable lengths in conjunction with HFD reactors, see derating characteristics.

[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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Selection and ordering data

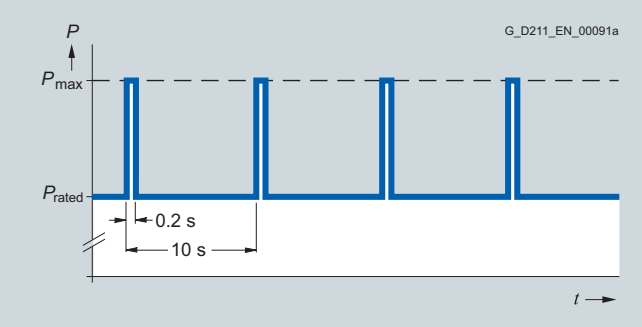
Description	Order No.
Smart Line Module in booksize format	
Internal air cooling	
Rated power:	
• 5 kW (5 HP)	**6SL3130-6AE15-0AB0**
• 10 kW (10 HP)	**6SL3130-6AE21-0AB0**
• 16 kW (18 HP)	**6SL3130-6TE21-6AA3**
• 36 kW (40 HP)	**6SL3130-6TE23-6AA3**
External air cooling	
Rated power:	
• 5 kW (5 HP)	**6SL3131-6AE15-0AA0**
• 10 kW (10 HP)	**6SL3131-6AE21-0AA0**
Cold plate cooling	
Rated power:	
• 5 kW (5 HP)	**6SL3136-6AE15-0AA0**
• 10 kW (10 HP)	**6SL3136-6AE21-0AA0**
Accessories	
Shield connection plate 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 mm^2 for Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) and 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 adapters (2 units) For multitier configuration Screw 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**

Description	Order No.
Accessories (continued)	
Warning labels in 16 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: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Swedish, Turkish.	**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**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

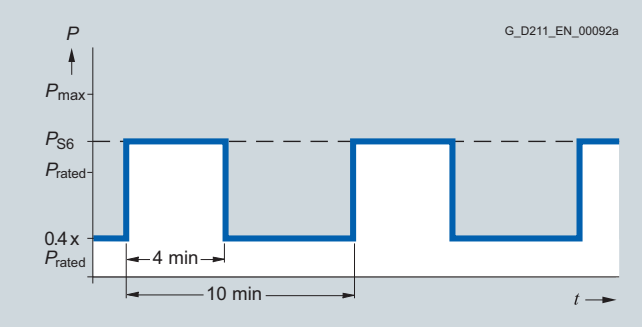
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Characteristic curves

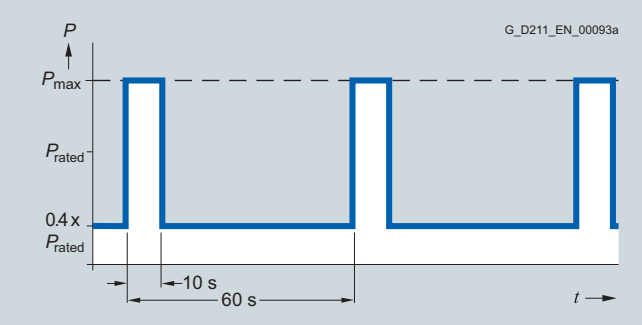
Overload capability



Duty cycle with initial load

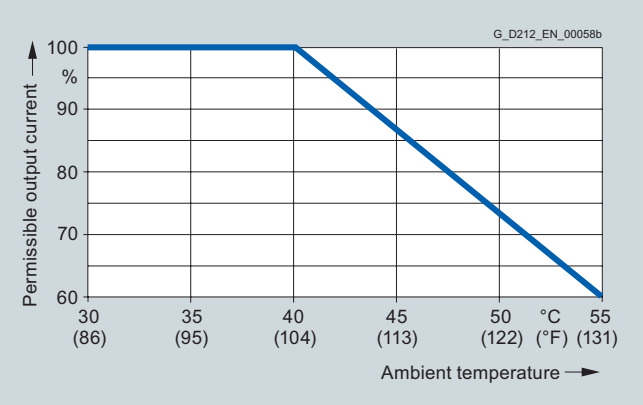


S6 duty cycle with initial load

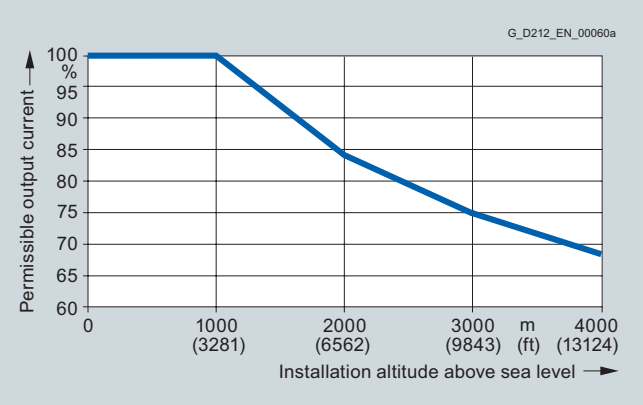


S6 duty cycle with initial load

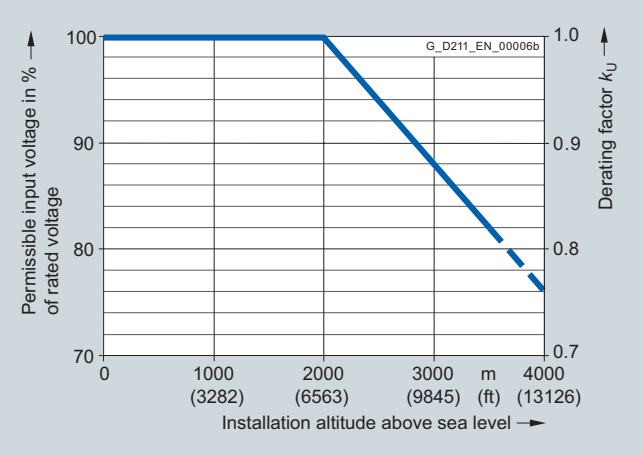
Derating characteristics



Output power as a function of ambient temperature



Output power as a function of installation altitude



Voltage derating as a function of installation altitude

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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	**6SL3000-0CE21-6AA0**
36 (40)	6SL3130-6TE23-6AA3	**6SL3000-0CE23-6AA0**

Technical specifications

Line supply voltage 380 … 480 V 3 AC

Product name		6SL3000-0CE15-0AA0 Line reactor	6SL3000-0CE21-0AA0	6SL3000-0CE21-6AA0	6SL3000-0CE23-6AA0
Rated current	A	14	28	35	69
Power loss	kW	0.062	0.116	0.11	0.17
Line supply/load connection 1U1, 1V1, 1W1 / 1U2, 1V2, 1W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	4	10	10	16
PE connection		Screw terminals	Screw terminals	M5 screw studs according to DIN 46234	M6 screw studs according to DIN 46234
• Conductor cross-section	mm^2	4	10		
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	150 (5.91)	177 (6.97)	219 (8.62)	228 (8.98)
• Height	mm (in)	175 (6.89)	196 (7.72)	180 (7.09)	235 (9.25)
• Depth	mm (in)	70 (2.76)	110 (4.33)	144 (5.67)	224 (8.82)
Weight, approx.	kg (lb)	3.7 (8)	7.5 (17)	9.5 (21)	17 (38)
Approvals, according to		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	6SL3130-6TE23-6AA3
• Rated power of the Smart Line Module	kW	5	10	16	36

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Smart Line Modules
Line filters

Overview



In plants with strict EMC requirements, 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 (grounded) 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	**6SL3000-0BE21-6DA0**
36 (40)	6SL3130-6TE23-6AA3	**6SL3000-0BE23-6DA1**

Technical specifications

Line supply voltage 380 … 480 V 3 AC

		6SL3000-0HE15-0AA0	6SL3000-0HE21-0AA0	6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA1
Product name		Line filter			
Rated current	A	16	25	36	74
Power loss	kW	0.02	0.02	0.06	0.018
Line supply/load connection L1, L2, L3/U, V, W		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	10	10	10	35
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
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	60 (2.36)	60 (2.36)	50 (1.97)	75 (2.95)
• Height	mm (in)	285 (11.22)	285 (11.22)	420 (16.54)	433 (17.05)
• Depth	mm (in)	122 (4.80)	122 (4.80)	226 (8.90)	226 (8.90)
Weight, approx.	kg (lb)	2.1 (5)	2.3 (5)	5.0 (11)	7.5 (17)
Approvals, according to		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	6SL3130-6TE23-6AA3
• Rated power of the Smart Line Module	kW	5	10	16	36

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Overview

Suitable line-side power components are assigned depending on the power rating of the Smart Line Module.

The tables below list recommended components.

Further information about the specified line contactors, switch disconnectors, fuses and circuit breakers can be found in the Catalogs LV 1 and ET B1.

Selection and ordering data

Assignment of line-side power components to Smart Line Modules in booksize format

Rated power	Assignment to Smart Line Module in booksize format	**Line contactor**	**Circuit breaker IEC 60947**	**Circuit breaker UL489/CSA C22.2 No. 5-02**	**Main switch**
kW (HP)	Type	Type	Order No.	Order No.	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	**3RT1035-...**	**3RV1031-4FA10**	**3VL2105-2KN30-....**	**3LD2504-0TK51**
36 (40)	6SL3130-6TE23-6AA3	**3RT1045-...**	**3RV1041-4LA10**	**3VL2108-2KN30-....**	**3LD2704-0TK51**

Rated power	Assignment to Smart Line Module in booksize format	**Fuse switch disconnector**	**Switch disconnector with fuse holders**	**LV HRC fuse (gL/gG)**			**UL/CSA fuse, Class J**[1] Available from: Ferraz Shawmut www.ferrazshawmut.com		
kW (HP)	Type	Order No.	Order No.	Rated current	Size	Order No.	Rated current	Size	Reference No.
5 (5)	6SL3130-6AE15-0AB0 6SL3131-6AE15-0AA0 6SL3136-6AE15-0AA0	**3NP4010-0CH01**	**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	**3NP4010-0CH01**	**3KL5030-1GB01**	35 A	000	**3NA3814**	35 A	27 × 60	**AJT35**
16 (18)	6SL3130-6TE21-6AA3	**3NP4010-0CH01**	**3KL5030-1GB01**	35 A	000	**3NA3814**	35 A	27 × 60	**AJT35**
36 (40)	6SL3130-6TE23-6AA3	**3NP4010-0CH01**	**3KL5230-1GB01**	80 A	000	**3NA3824**	80 A	29 × 117	**AJT80**

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

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Overview



Active Line Modules are self-commutated rectifier/regenerative units (with IGBTs in rectifier and regenerative 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 by means of integrated pre-charging resistors.

In order to operate an Active Line Module, it is absolutely essential to use the appropriate Active Interface Module or matching HFD line reactorh.

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 electronics 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. Weidmüller type KLBÜ CO 4. 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 terminal element, 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 for drive control on the immediate left
- DRIVE-CLiQ cable (length depends on module width) to connect Active Line Module to adjacent Motor Module
- 2 blanking plugs for sealing 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
- Integrated fans in the Active Line Modules 16 kW to 55 kW Slide-in fan unit for Active Line Modules 80 kW and 120 kW (the supply voltage is provided by the Active Line Module for both the integral fan as well as the slide-in fan unit)
- 1 set of warning signs in 16 languages
- 1 heat conducting foil (for Active Line Modules with cold plate cooling only)

Integration

The Active Line Module receives its control information via DRIVE-CLiQ from:

- CU320 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl with
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

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Technical specifications

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	
• Active Mode	
- Fundamental component (cos φ_1)	1.0 (factory setting), can be altered by input of a reactive current setpoint
- Total (λ)	1.0 (factory setting)
• Smart Mode	
- Fundamental component	> 0.96
- Total	0.65 … 0.90
Efficiency in %	98
Overvoltage category According to EN 60664-1	Class III
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)
Electronics power supply	24 V DC, -15 %/+20 %
Radio interference suppression	
• Standard combination, consisting of: Active Line Module + Active Interface Module)	Category C3 according to EN 61800-3 up to 350 m (1148 ft) total cable length
• 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
• Alternative combination, consisting of: Active Line Module + HFD line reactor	No radio interference suppression
• Extended alternative combination, consisting of: Active Line Module + HFD line filter package (including Wideband Line Filter)	Category C2 according to EN 61800-3

Cooling method	• Internal air cooling (power units with increased air cooling by built-in fans) • External air cooling (power units with increased air cooling by built-in fans) • Cold plate cooling • Liquid cooled
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 directive)
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 %.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC						
• 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 cooled	6SL3135-					7TE31-2AA3
Product name		Active Line Module in booksize format				
Feed/feedback power						
• Rated power P_{rated} - With 380 V 3 AC - With 460 V 3 AC[9)]	kW (HP)	**16** (18)	**36** (40)	**55** (60)	**80 (64[4)])** (100) (75[4)])	**120 (84[4)])** (150) (100[4)])
• For S6 duty (40 %) P_{S6}	kW	21	47	71	106	145
• P_{max}	kW	35	70	91 (110[5)])	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[5)])	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[5)])	200	267
Current requirement 24 V DC electronics power supply, max.	A	1.1	1.5	1.9	2.0	2.5 (2.1[8)])
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[1)]						
- Total power loss for cooling methods: Internal air cooling, external air cooling; cold plate, liquid cooled	kW	0.29	0.67	0.95	1.39	2.26
- With external air cooling, int./ext.	kW	0.09/0.2	0.17/0.5	0.25/0.7	0.3/1.0	0.55/1.71
• Cooling air requirement	m^3/s (ft^3/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.[1)]	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
Liquid cooled[6)]						
• Power loss, int./ext.	kW	–	–	–	–	0.46/1.8
- Rated volumetric flow for water at 70 kPa pressure drop[7)]	l/min (US gal/min)	– –	– –	– –	– –	8 (2.1)
- Volume of liquid, internal	ml	–	–	–	–	100
- Max. coolant temperature		–	–	–	–	
- Without derating	°C (°F)	–	–	–	–	45 (113)
- With derating	°C (°F)	–	–	–	–	50 (122)
- Sound pressure level L_{pA} (1 m)	dB	–	–	–	–	< 73

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC						
• 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 cooled	6SL3135-					7TE31-2AA3
Product name		Active Line Module in booksize format				
Feed/feedback power						
• Rated power P_{rated} - With 380 V 3 AC - With 460 V 3 AC[9]	kW (HP)	**16** (18)	**36** (40)	**55** (60)	**80 (64[4])** (100) (75[4])	**120 (84[4])** (150) (100[4])
Line supply connection U1, V1, W1		Screw terminals (X1)	M6 screw stud (X1)	M8 screw stud (X1)	M8 screw stud (X1)	M8 screw stud (X1)
• Conductor crosssection, max.	mm^2	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)[2]	630 (2067)[2]	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[3]	mm (in)	–	–	–	629 (24.76)	629 (24.76)
- With screwed fitting	mm (in)	–	–	–	–	553 (21.77)[6]
• 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)
- Liquid cooled	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)
• Liquid cooled	kg (lb)	–	–	–	–	23 (50.7)

1) Power loss of Active Line Module at rated power including losses of 24 V DC electronics power supply.

2) Max. cable lengths in combination with Active Interface Module and Basic Line Filter (Category C3 according to EN 61800-3).

3) The fan is supplied with the Active Line Module and must be installed before the Active Line Module is commissioned.

4) In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink. For further information see System description (on CD-ROM supplied with the Catalog NC 61).

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

6) 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.

7) This value applies to water as coolant; for other coolants, refer to the SINAMICS S120 Equipment Manual (for Order No., refer to Documentation).

8) For 6SL3135-7TE31-2AA3.

9) 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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Selection and ordering data

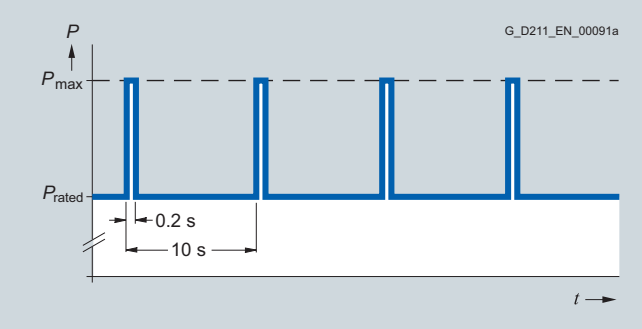
Description	Order No.
Active Line Module in booksize format	
Internal air cooling	
Rated power:	
• 16 kW (18 HP)	**6SL3130-7TE21-6AA3**
• 36 kW (40 HP)	**6SL3130-7TE23-6AA3**
• 55 kW (60 HP)	**6SL3130-7TE25-5AA3**
• 80 kW (100 HP)	**6SL3130-7TE28-0AA3**
• 120 kW (150 HP)	**6SL3130-7TE31-2AA3**
External 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-Cooled	
Rated power:	
• 120 kW (150 HP)	**6SL3135-7TE31-2AA3**
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) and 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**

Description	Order No.
Accessories (continued)	
DC link adapters (2 units) For multitier configuration Screw 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 16 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: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**6SL3166-3AB00-0AA0**
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For DRIVE-CLiQ port	
• For Active Line Modules 100 mm (3.94 in) wide, int./ext. air cooling	**6SL3163-8FD00-0AA0**
• For Active Line Modules 150 mm (5.91 in) wide, int./ext. air cooling	**6SL3163-8GF00-0AA0**
• For Active Line Modules 200 mm (7.87 in) wide, int./ext. air cooling	**6SL3163-8HH00-0AA0**
• For Active Line Modules 300 mm (11.81 in) wide, int./ext. air cooling	**6SL3163-8JM00-0AA0**
• For Active Line Modules 300 mm (11.81 in) wide, liquid cooled	**6SL3163-8JM50-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

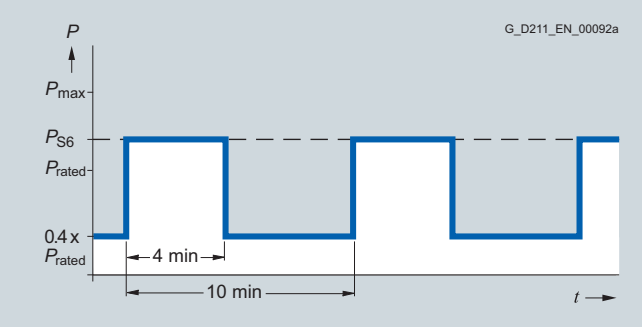
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Characteristic curves

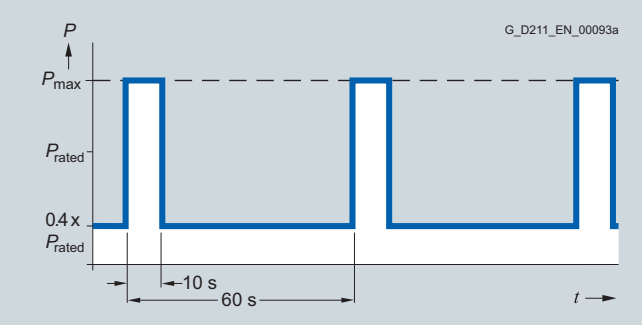
Overload capability



Duty cycle with initial load

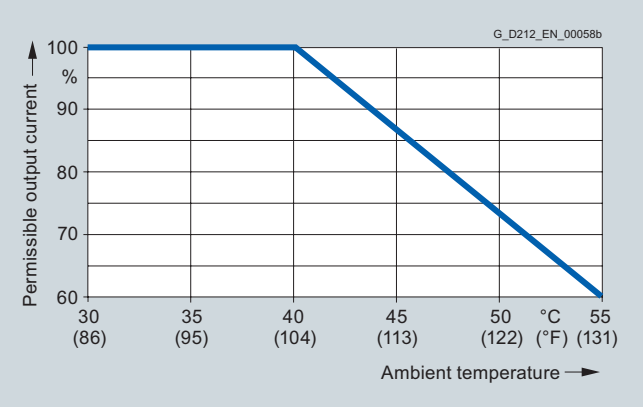


S6 duty cycle with initial load

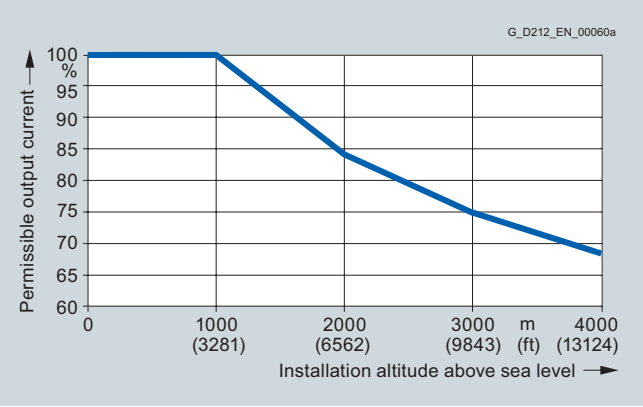


S6 duty cycle with initial load

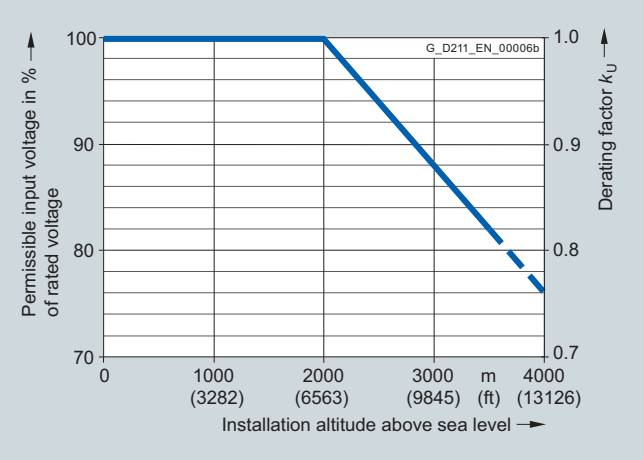
Derating characteristics



Output power as a function of ambient temperature



Output power as a function of installation altitude



Voltage derating as a function of installation altitude

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Active Line Modules
Active Interface Modules

Overview



Active Interface Modules for 16 kW, 36 kW, 55 kW and 80 kW/120 kW

The Active Interface Modules combined with the Active Line Modules 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:

- X21 connector for temperature evaluation and fan control
- X24 connector for connecting the 24 V supply for the integrated fan
- DRIVE-CLiQ cable for connecting the Control Unit to the Active Interface 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 16 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**

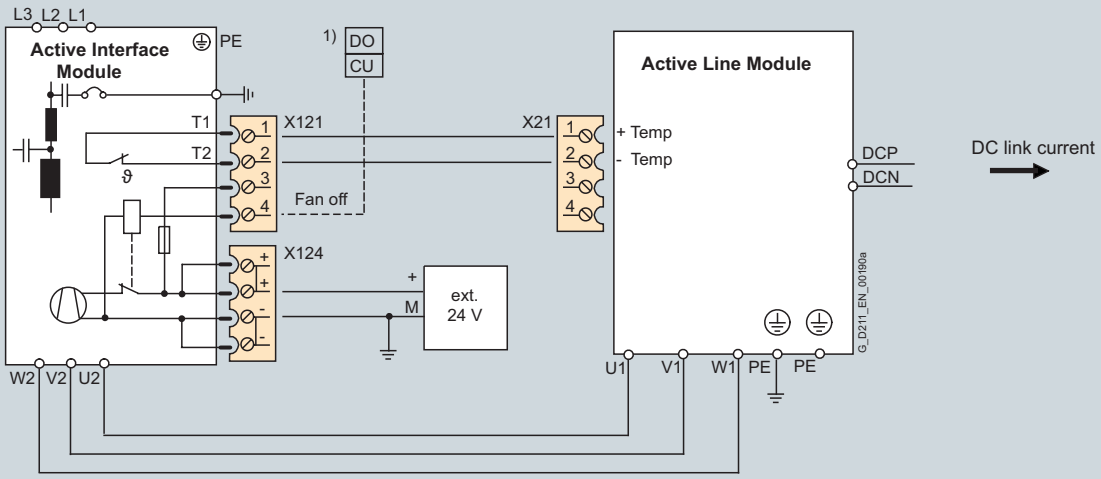
Accessories

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 and 120 kW	**6SL3163-1AM00-0AA0**
DRIVE-CLiQ cable, pre-assembled 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**

[1] For Active Interface Module 16 kW, included in scope of supply.

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Integration



1) Digital input (DI) or digital output (DO), controlled via Control Unit.

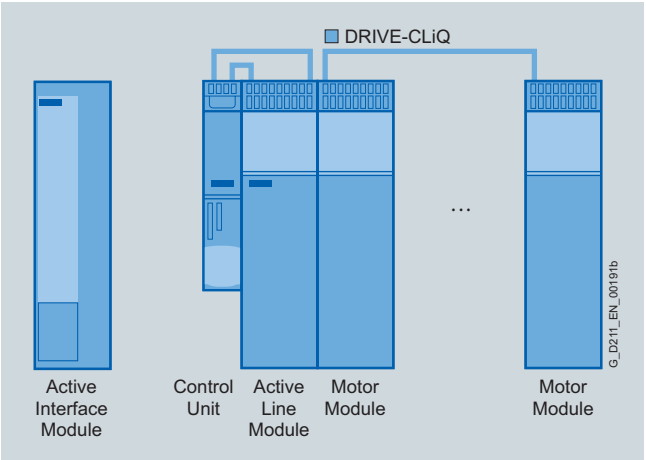
Connection example for Active Interface Module

The Active Interface Module requires a 24 V DC supply for operation of the integral fan.
The fan rotates after the 24 V DC supply is applied and can, if necessary (service life, noise), be shut off from the Control Unit over 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.

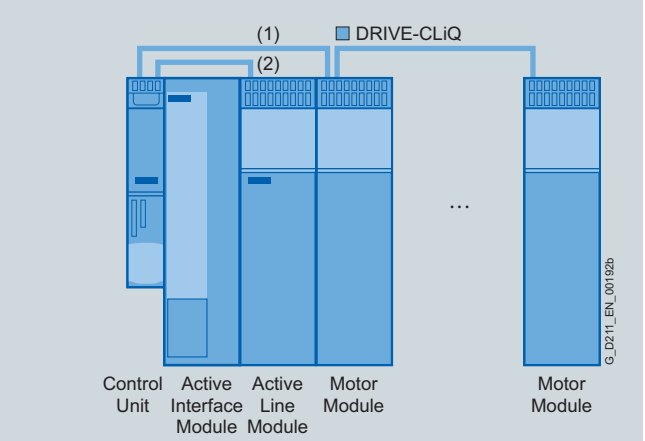
The Active Interface Modules must be operated on Active Line Modules which are equipped with SINAMICS FW version 2.5 SP1, or SINUMERIK 840D sl SW version 1.5 HF5/2.5 HF2 or higher. HFD packages are available for SINAMICS S120 drive solutions that build on runtime versions below FW V2.5 SP1 (e.g. integrated drive controls in SINUMERIK 840D sl and SINUMERIK 802D sl).

The power cables between the Active Interface Module and Active Line Module must be shielded if limit values for interference suppression are to be complied with. The cable shield can be routed over the shield connection set (option) to the Active Interface Module or Active Line Module.



Separate Active Interface Module

Depending on the position of the Active Interface Module in the drive system, additional DRIVE-CLiQ cables may be required. If it is separately installed next to the left side of the Control Unit and Active Line Module, no additional DRIVE-CLiQ cables are required. If the Active Interface Module is placed between the Control Unit and Active Line Module, the DRIVE-CLiQ cables supplied with the Active Line Modules are suitable for setting up a line topology, i.e. Active Line Module and all Motor Modules in series on one DRIVE-CLiQ line. If the Active Line Module is connected over a separate DRIVE-CLiQ line, the DRIVE-CLiQ cable marked with (1) must be ordered. A DRIVE-CLiQ cable suitable for connection (2) is included in the scope of supply of the Active Line Module. For DRIVE-CLiQ cables for different configurations, see the MOTION CONNECT connection system.



(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:	0.6 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

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Active Line Modules
Active Interface Modules

Technical specifications

Line supply voltage 380 … 480 V 3 AC						
• Internal air cooling		6SL3100-0BE21-6AB0	6SL3100-0BE23-6AB0	6SL3100-0BE25-5AB0	6SL3100-0BE28-0AB0	6SL3100-0BE31-2AB0
Product name		Active Interface Module				
Rated current	A	27	60	88	132	200
Current requirement 24 V DC electronics power supply, max.	A	0.25	0.5	0.6	1.2	1.2
Internal resistance of the "Fan off" digital input (X21/Pin 4)	Ω	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %
Power loss	W	300	390	450	575	800
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 supply/load connection L1, L2, L3 / U2, V2, W2		Screw terminals	Screw 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

Refer to Active Line Modules in booksize format.

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Active Line Modules
HFD line reactors/damping resistors

Overview



HFD line reactor and damping resistor

As an alternative to the Active Interface Modules, a solution is also possible using an HFD line reactor package as a line connection for the Active Line Modules. The line reactors with HFD characteristics and damping resistor can be ordered in the form of an HFD package or as an HFD package in combination with line filters and are necessary for the function of the Active Line Modules.

The HFD packages are used with SINAMICS S120 drive solutions that build on runtime versions below FW V2.5 SP1 (e.g. integrated drive controls in SINUMERIK 802D sl/840D sl). The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Benefits

- Limitation of mains and HF harmonic effects
- Storing the energy in step-up converter mode of the Active Line Modules for stepping up the DC link voltage
- The damping resistor connected to the HFD line reactor dampens possible system oscillations.

Application

HFD line reactors can be used for 400 V 3 AC -10 % to 480 V 3 AC +10 %; 50/60 Hz ±10 %.

Selection and ordering data

Line supply voltage 380 ... 480 V 3 AC	**HFD package**		**HFD package with Wideband Line Filter**	
Rated infeed power of the Active Line Module	Suitable for Active Line Module	Contains HFD line reactor + damping resistor	Contains HFD reactor + damping resistor + Wideband Line Filter	
kW (HP)	Type	Order No.		Order No.
HFD package with 0.3 kW damping resistor[1]				
16 (18)	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	6SL3000-0DE21-6AA0 + 6SN1113-1AA00-0DA0	**6SN1111-0AA00-0BV0**	6SL3000-0DE21-6AA0 + 6SN1113-1AA00-0DA0 + 6SL3000-0BE21-6AA0	**6SN1111-0AA00-1BV0**
36 (40)	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	6SL3000-0DE23-6AA0 + 6SN1113-1AA00-0DA0	**6SN1111-0AA00-0CV0**	6SL3000-0DE23-6AA0 + 6SN1113-1AA00-0DA0 + 6SL3000-0BE23-6AA0	**6SN1111-0AA00-1CV0**
FD package with 0.8 kW damping resistor				
16 (18)	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3136-7TE21-6AA3	6SL3000-0DE21-6AA0 + 6SL3100-1BE21-3AA0	**6SN1111-0AA00-0BV1**	6SL3000-0DE21-6AA0 + 6SL3100-1BE21-3AA0 + 6SL3000-0BE21-6AA0	**6SN1111-0AA00-1BV1**
36 (40)	6SL3130-7TE23-6AA3 6SL3131-7TE23-6AA3 6SL3136-7TE23-6AA3	6SL3000-0DE23-6AA0 + 6SL3100-1BE21-3AA0	**6SN1111-0AA00-0CV1**	6SL3000-0DE23-6AA0 + 6SL3100-1BE21-3AA0 + 6SL3000-0BE23-6AA0	**6SN1111-0AA00-1CV1**
55 (60)	6SL3130-7TE25-5AA3 6SL3131-7TE25-5AA3 6SL3136-7TE25-5AA3	6SL3000-0DE25-5AA1 + 6SL3100-1BE21-3AA0	**6SN1111-0AA00-0DV0**	6SL3000-0DE25-5AA1 + 6SL3100-1BE21-3AA0 + 6SL3000-0BE25-5AA0	**6SN1111-0AA00-1DV0**
80 (100)	6SL3130-7TE28-0AA3 6SL3131-7TE28-0AA3 6SL3136-7TE28-0AA3	6SL3000-0DE28-0AA1 + 6SL3100-1BE21-3AA0	**6SN1111-0AA00-0EV0**	6SL3000-0DE28-0AA1 + 6SL3100-1BE21-3AA0 + 6SL3000-0BE28-0AA0 +	**6SN1111-0AA00-1EV0**
120 (150)	6SL3130-7TE31-2AA3 6SL3131-7TE31-2AA3 6SL3136-7TE31-2AA3 6SL3135-7TE31-2AA3	6SL3000-0DE31-2AA1 + 6SL3100-1BE21-3AA0	**6SN1111-0AA00-0FV0**	6SL3000-0DE31-2AA1 + 6SL3100-1BE21-3AA0 + 6SL3000-0BE31-2AA1	**6SN1111-0AA00-1FV0**

[1] For a safe operation of the 0.3 kW damping resistor a temperature measurement during operation is necessary (see SINAMICS S120 Equipment Manual Booksize Power Units). Therefore the 0.8 kW damping resistor should be applied preferably.

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Active Line Modules
HFD line reactors/damping resistors

Technical specifications

Line supply voltage 380 … 480 V 3 AC

Product name		6SL3000-0DE21-6AA0 HFD line reactor	6SL3000-0DE23-6AA0	6SL3000-0DE25-5AA1	6SL3000-0DE28-0AA1	6SL3000-0DE31-2AA1
Rated current	A	30	67	103	150	225
Power loss, typically	kW	0.17	0.25	0.35	0.45	0.59
Line supply/ load connection 1U1, 1V1, 1W1/ 1U2, 1V2, 1W2		Screw terminals 16 mm^2	Screw terminals 35 mm^2	Screw terminals 70 mm^2	M10 connecting lugs	M10 connecting lugs
PE connection		Screw terminals 16 mm^2	Screw terminals 35 mm^2	Screw terminals 70 mm^2	M10 connecting lugs	M10 connecting lugs
Degree of protection		IP20	IP20	IP20	IP00	IP00
Dimensions						
• Width	mm (in)	150 (5.91)	150 (5.91)	150 (5.91)	200 (7.87)	275 (10.83)
• Height	mm (in)	125 (4.92)	235 (9.25)	290 (11.42)	210 (8.27)	265 (10.43)
• Length	mm (in)	330 (12.99)	330 (12.99)	330 (12.99)	380 (14.96)	480 (18.90)
Weight, approx.	kg (lb)	13 (28.7)	21 (46.3)	27 (59.5)	37 (81.6)	67 (148)
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 infeed power of the Active Line Module	kW	16	36	55	80	120

Selection and ordering data

Damping resistor (part of the HFD package) Description	Order No.
HFD resistor 0.8 kW for all HFD line reactors	**6SL3100-1BE21-3AA0**
External pulsed resistor 0.3 kW	**6SN1113-1AA00-0DA0**

Technical specifications

Product name		6SL3100-1BE21-3AA0 HFD resistor for all HFD line reactors	6SN1113-1AA00-0DA0 External pulsed resistor
Resistance, low inductance	Ω	15	15
Damping For 0 … 230 kHz	dB	≤ 3	≤ 3
Power	kW	0.8	0.3
Cooling method		Natural cooling	Natural cooling
Degree of protection to EN 60529 (IEC 60529)		IP51	IP54
Dimensions			
• Width	mm (in)	270 (10.63)	80 (3.15)
• Height	mm (in)	75 (2.95)	210 (8.27)
• Depth	mm (in)	555 (21.85)	53 (2.09)
Weight, approx.	kg (lb)	5.5 (12.1)	3.4 (7.50)
Connecting cable Included in the scope of supply	m (ft)	5 (16.41)	3 (9.84)
Approvals, according to		cULus	cULus

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Active Line Modules
Line filters

Overview



In plants which have been specifically designed to ensure EMC, line filters work together with Active Interface Modules or with the HFD line reactors 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 RI suppression commensurate with the relevant operating 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 before the machines are approved for delivery.

Optional line filter ranges that are coordinated with the power ranges in booksize format are available for the SINAMICS S120 drive system. These line filters differ with regard to the frequency range in which they reduce the conducted emissions.

- 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[1].
- Wideband Line Filters are matched to the combinations of Active Line Modules and HFD line reactors[2].

[1] The Active Interface Modules must be operated on Active Line Modules which are equipped with SINAMICS FW version 2.5 SP1, or SINUMERIK 840D sl SW version 1.5 HF5/2.5 HF2 or higher.

[2] HFD packages are available for SINAMICS S120 drive solutions that are based on runtime versions below FW V2.5 SP1 (e.g. integrated drive controls in SINUMERIK 840D sl and SINUMERIK 802D sl)

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.

Three types of applications can be implemented using Basic Line Filters:

- 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 in the drive configuration
- In combination with the HFD line reactor, CE EMC can be achieved for the Active Line Modules 16 kW, 36 kW and 55 kW, if:
  - The machine/plant is only commissioned in industrial networks
  - No. of axes <12
  - Total cable lengths < 150 m (492 ft)
  - The machine manufacturer (OEM) must have the CE conformity of the machine/system confirmed by an accredited EMC test laboratory (e.g. by EPCOS; emv.labor@epcos.com)

Selection and ordering data

Rated power of the Active Line Module	Suitable for Active Line Module in booksize format	**Basic Line Filter**
kW (HP)		Order No.
16 (18)	6SL3130-7TE21-6AA3 6SL3131-7TE21-6AA3 6SL3135-7TE21-6AA3	**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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Active Line Modules
Basic Line Filters

Technical specifications

Line supply voltage 380 … 480 V 3 AC						
		6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA1	6SL3000-0BE25-5DA0	6SL3000-0BE28-0DA0	6SL3000-0BE31-2DA0
Product name		Basic Line Filter				
Rated current	A	36	74	105	132	192
Power loss	kW	0.016	0.028	0.041	0.048	0.086
Line supply/load connection L1, L2, L3 / U, V, W		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw 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

More information

You must follow the instructions in the Equipment Manual when using Basic Line Filters in conjunction with 16 kW to 55 kW Active Line Modules: SINAMICS S120 booksize power units.

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Overview



The damping characteristics of Wideband Line Filters for Active Line Modules from 16 kW to 120 kW not only conform with the requirements of EMC standards for the frequency range of 150 kHz to 30 MHz, but also include low frequencies of 2 kHz and above. As a result, these line filters have an extended function area, as with the Active Interface Modules, which means that they can, to a certain extent, be used regardless of the machine installation location and any unknown line properties (e.g. line impedance).

For the Active Line Modules in booksize format, HFD packages (HFD line reactor incl. damping resistor) together with the Wideband Line Filters can be supplied as a functionally harmonized logistical unit[1)].

Note:
Radio interference suppression is required in accordance with EMC standards (product standard IEC 61800-3, EN 61800-3; VDE 0160 T 100) and is mandatory due to guidelines (laws) in the EU. For this purpose, the separate and compact Active Interface Modules or the HFD packages (HFD line reactor and damping resistor) are required in combination with the Wideband Line Filter. The Wideband Line Filter with the HFD package forms a unit specially matched to the step-up converter principle of the Active Line Modules. Use of other filters can lead to exceeding of limit values, resonances, overvoltages and irreparable damage to motor or other equipment.

The HFD packages are used for SINAMICS S120 drive solutions that build on runtime versions below FW V2.5 SP1 (e.g. integrated automatic speed controls in SINUMERIK 802D sl/840D sl).

Technical specifications

Line supply voltage 380 … 480 V 3 AC

		6SL3000-0BE21-6AA0	6SL3000-0BE23-6AA0	6SL3000-0BE25-5AA0	6SL3000-0BE28-0AA0	6SL3000-0BE31-2AA0
Product name		Wideband Line Filter				
Rated current	A	30	67	103	150	225
Power loss	kW	0.07	0.09	0.11	0.15	0.20
Line supply/ load connection L1, L2, L3 / U, V, W		Screw-type terminals 10 mm^2	Screw-type terminals 50 mm^2	Screw-type terminals 50 mm^2	Screw-type terminals 95 mm^2	M10 connecting lugs
PE connection		At the enclosure with M5 bolt	At the enclosure with M8 bolt	At the enclosure with M8 bolt	At the enclosure with M8 bolt	At the enclosure with M8 bolt
Degree of protection		IP20	IP20	IP20	IP20	IP00
Dimensions						
• Width	mm (in)	130 (5.12)	130 (5.12)	130 (5.12)	200 (7.87)	300 (11.81)
• Height	mm (in)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)
• Depth	mm (in)	150 (5.91)	245 (9.65)	260 (10.24)	260 (10.24)	260 (10.24)
Weight, approx.	kg (lb)	8.5 (18.7)	14.5 (32.0)	15.5 (34.2)	26 (57.3)	34.5 (76.1)
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

1) See HFD line reactors.

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Active Line Modules – Wideband Line Filters/ Adapter set for HFD reactors

Accessories



Line filter package assembled with an adapter set

The adapter sets for booksize format units are designed for very compact assembly. They enable line filters and HFD line reactors to be installed compactly one above the other in the control cabinet.

Selection and ordering data

Power of the Active Line Module	Suitable for HFD line filter package	**Adapter set for HFD reactors**
kW (HP)		Order No.
16 (18)	6SL3000-0FE21-6AA0	**6SL3060-1FE21-6AA0**
36 (40)	6SL3000-0FE23-6AA0	**6SN1162-0GA00-0CA0**

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Overview

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

The tables below list recommended components.

Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and ET B1.

Selection and ordering data

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 switch	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**

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-....**	**3NP4010-0CH01**	**3KL5030-1GB01**	**3KX3552-3EA01**
36 (40)	7TE23-6AA3	**3RV1041-4LA10**	**3VL2108-2KN30-....**	**3NP4010-0CH01**	**3KL5230-1GB01**	**3KX3552-3EA01**
55 (60)	7TE25-5AA3	**3VL2712-1DC33-....**	**3VL2112-2KN30-....**	**3NP4270-0CA01**	**3KL5530-1GB01**	**3KX3552-3EA01**
80 (100)	7TE28-0AA3	**3VL3720-1DC33-....**	**3VL3117-2KN30-....**	**3NP4270-0CA01**	**3KL5530-1GB01**	**3KX3552-3EA01**
120 (150)	7TE31-2AA3	**3VL3725-1DC36-....**	**3VL3125-2KN30-....**	**3NP5360-0CA00**	**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: Ferraz Shawmut www.ferrazshawmut.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.

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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 motoring and generating 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. With the addition of an external braking resistor, they can be used for applications with intermittent regenerative operation such as stopping.
A Braking Module is only required with a 100 kW Basic Line Module in addition to external braking resistor for regenerative operation.

Design

The Basic Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 line supply connection
- 1 connection for the 24 V DC electronics 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 for drive control on the immediate left
- DRIVE-CLiQ cable (length depends on module width) to connect Basic Line Module to adjacent Motor Module
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- 1 set of warning signs in 16 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 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl with
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

SINAMICS runtime software with firmware version 2.5 and higher is required for operation of a Basic Line Module.

The Basic Line Modules must be operated on a Control Unit which is equipped with SINAMICS FW version 2.5 SP1, or SINUMERIK 840D sl SW version 1.5 HF5/2.5 HF2 or higher.

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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Technical specifications

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 With rated power	
• Fundamental component (cos φ_1)[2]	> 0.96
• Total (λ)	0.75 … 0.93
Overvoltage category According to EN 60664-1	Class III
DC link voltage, approx.	1.35 × line voltage[2]
Electronics power supply	DC 24 V, -15 %/+20 %
Radio interference suppression	
• Standard	
- 20 kW and 40 kW Basic Line Modules	No radio interference suppression
- 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)
Cooling method	• Internal ventilator, power units with increased air cooling by built-in fans • 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
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 directive)
Approvals, according to	cULus

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

[2] The DC link voltage is unregulated and load-dependent. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC				
• Internal air cooling with varnished modules		6SL3130-1TE22-0AA0	6SL3130-1TE24-0AA0	6SL3130-1TE31-0AA0
• Cold plate cooling		6SL3136-1TE22-0AA0	6SL3136-1TE24-0AA0	6SL3136-1TE31-0AA0
Product name		Basic Line Module in booksize format		
Power				
• Rated power P_{rated}				
- With 380 V 3 AC	kW	**20**	**40**	**100**
- With 460 V 3 AC[2]	(HP)	(25)	(50)	(125)
• For S6 duty (40 %) P_{S6}	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	–
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 terminals	Screw terminals	–
• Conductor cross-section, max.	mm^2	0.5 … 4	0.5 … 10	
Current requirement 24 V DC electronics 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 supply connection		Screw terminals	Screw terminals	M8 screw stud
U1, V1, W1				
• 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 electronics power supply.

[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

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Selection and ordering data

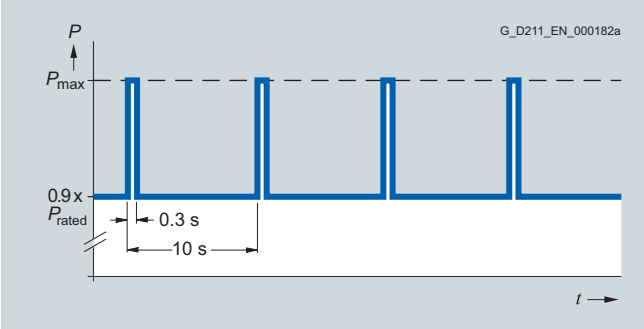
Description	Order No.
Basic Line Module in booksize format	
Internal air cooling	
Rated power:	
• 20 kW (25 HP)	**6SL3130-1TE22-0AA0**
• 40 kW (50 HP)	**6SL3130-1TE24-0AA0**
• 100 kW (125 HP)	**6SL3130-1TE31-0AA0**
Cold plate cooling	
Rated power:	
• 20 kW (25 HP)	**6SL3136-1TE22-0AA0**
• 40 kW (50 HP)	**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 adapters (2 units) For multitier configuration Screw 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**

Description	Order No.
Accessories (continued)	
Warning labels in 16 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: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**6SL3166-3AB00-0AA0**
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**
• For Basic Line Modules with a width of 150 mm (5.91 in)	**6SL3163-8MF00-0AA0**
• For Basic Line Modules with a width of 200 mm (7.87 in)	**6SL3163-8NH00-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

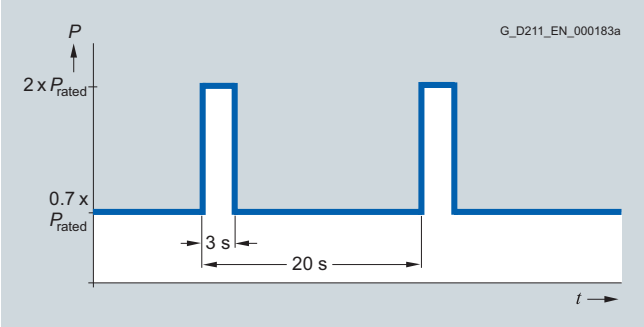
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Characteristic curves

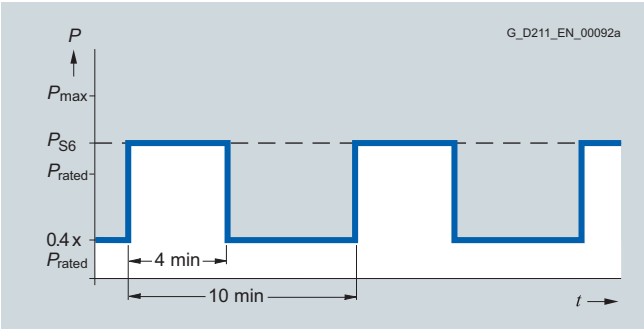
Overload capability



Load cycle with previous load

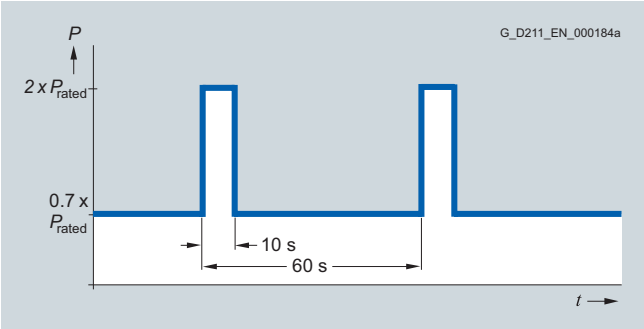


Load cycle with previous load



S6 load cycle with previous load

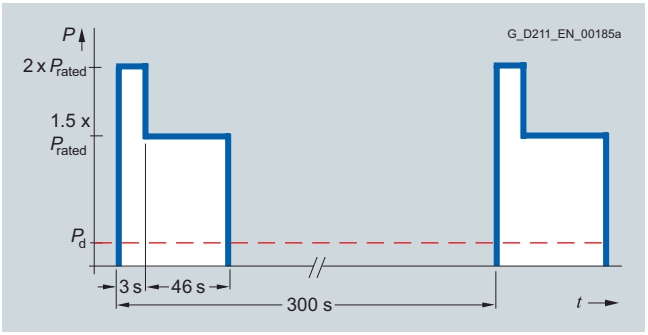
20 kW and 40 kW Basic Line Modules only



Load cycle with previous load

Braking power with external braking resistor

The following load 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:

$P_{max} = V^2/R$

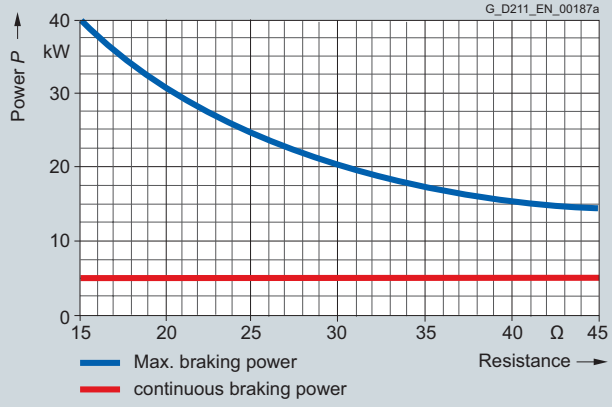
V = Activation threshold

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.

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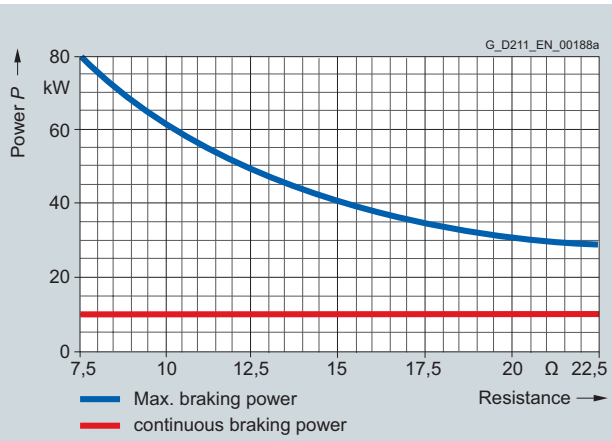
Characteristic curves (continued)



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

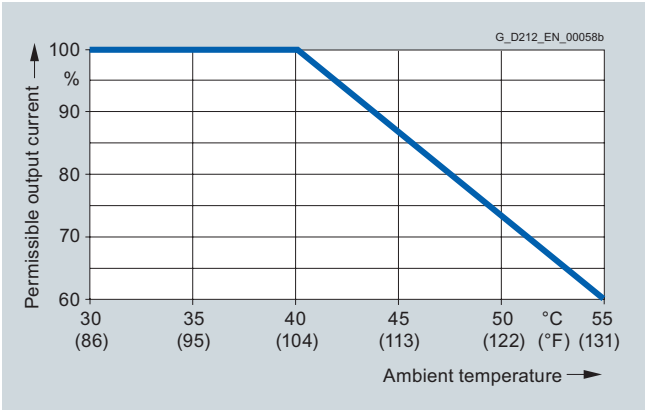


Braking power of the 40 kW Basic Line Modules depending on the connected braking resistor

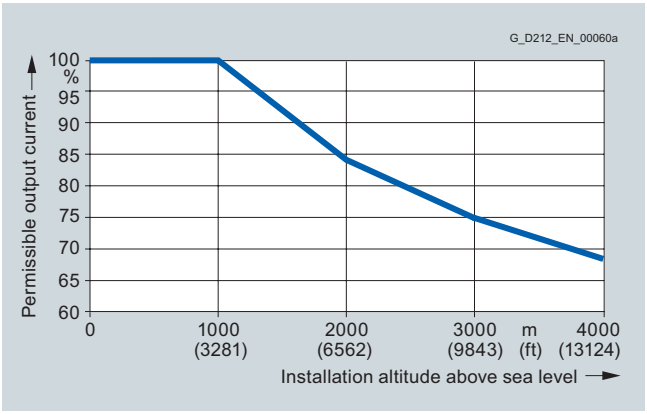
When the recommended braking resistor is used, the following values result for the maximum braking power or continuous braking power:

Braking resistor 6SE7028-0ES87-2DC0
Resistance value = 8 Ω → max. braking power = 75 kW; continuous braking power = 10 kW (limited by braking module)

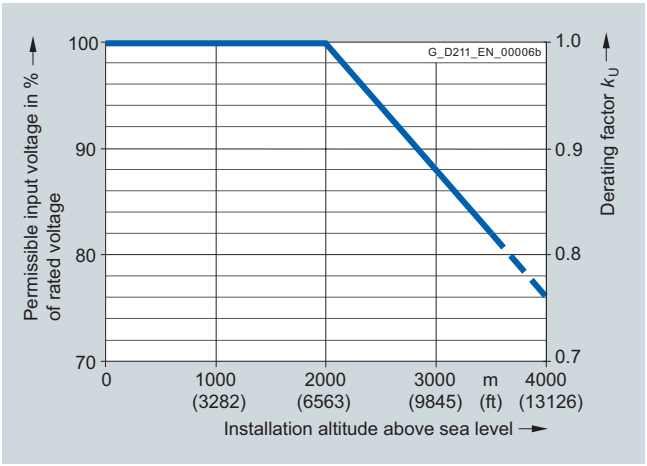
Derating characteristics



Output power as a function of ambient temperature



Output power as a function of installation altitude



Voltage derating as a function of installation altitude

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Basic Line Modules
Line reactors

Overview



20 kW and 100 kW line reactors

Line reactors limit the low-frequency harmonic effects and reduce the load on the rectifiers 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**

6

Technical specifications

Line supply voltage 380 … 480 V 3 AC				
		6SL3000-0CE22-0AA0	6SL3000-0CE24-0AA0	6SL3000-0CE31-0AA0
Product name		Line reactor		
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 supply/load connection		Screw terminals	Screw terminals	Flat connector for M8 screw
• Conductor cross-section	mm^2	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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Overview



In plants with strict EMC requirements, 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 (grounded) 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				
		6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA1	6SL3000-0BE31-2DA0
Product name		Line filter		
Rated current	A	36	74	192
Power loss	kW	0.016	0.02	0.09
Line supply/load connection L1, L2, L3 / U, V, W		Screw terminals	Screw terminals	Screw 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 (3.66)	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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Basic Line Modules
Recommended line-side components

Overview

Suitable line-side power components are assigned depending on the power rating of the Basic Line Module.

The tables below list recommended components.

Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and ET B1.

Selection and ordering data

Assignment of line-side power components to Basic Line Modules in booksize format

Rated power	Assignment to Basic Line Module in booksize format	**Line contactor**	**Output coupling device for line contactor**	**Main switch**
kW (HP)	Type 6SL3130-6SL3136-	Type	Order No.	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	Assignment to Basic Line Module in booksize format	**Circuit breaker IEC 60947**	**Circuit breaker UL489/CSA C22.2 No. 5-02**	**Fuse switch disconnector**
kW (HP)	Type 6SL3130-6SL3136-	Order No.	Order No.	Order No.
20 (25)	1TE22-0AA0	**3RV1041-4JA10**	**3VL2106-2KN30-....**	**3NP4010-0CH01**
40 (50)	1TE24-0AA0	**3VL2710-1DC33-....**	**3VL2110-2KN30-....**	**3NP4010-0CH01**
100 (125)	1TE31-0AA0	**3VL3725-1DC36-....**	**3VL3125-2KN30-....**	**3NP4270-0CA01**

Rated power	Assignment to Basic Line Module in booksize format	**Switch disconnector with fuse holders**	**LV HRC fuse (gL/gG)**			**UL/CSA fuse, Class J**[1] Available from: Ferraz Shawmut www.ferrazshawmut.com		
kW (HP)	Type 6SL3130-6SL3136-	Order No.	Rated current	Size	Order No.	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.

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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 electronics power supply connection via integrated 24 V DC busbars
- 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, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent module
- 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 sealing 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 16 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 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl mit
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

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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 cooled
A	kW (HP)[1]	Order No.	Order No.	Order No.	Order No.
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)	**6SL3120-1TE32-0AA3**	**6SL3121-1TE32-0AA3**	**6SL3126-1TE32-0AA3**	**6SL3125-1TE32-0AA3**

Accessories

Description	Order No.
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**

Description	Order No.
DC link adapters (2 units) For multitier configuration Screw 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/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 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 16 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: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**6SL3166-3AB00-0AA0**

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

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Accessories (continued)

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**
• 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**
• For Motor Modules 300 mm (11.81 in) wide, liquid cooled	**6SL3162-8EM50-0AA0**
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

Technical specifications

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]
Electronics 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 cooled
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 directive)
Approvals, according to	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to EN 954-1

[1] 3 A ... 85 A Single Motor Modules with firmware version V2.5 and higher with appropriate parameterization and reduced power 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. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications

DC link voltage 510 ... 720 V DC						
• 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 cooled	6SL3125-	–	–	–	–	–
Product name		Single Motor Module in booksize format				
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 (40 %) I_{S6}	A	3.5	6	10	24	40
• I_{max}	A	6	10	18	36	56
Type rating[1]						
• 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[2]	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 mm^2, 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
Internal/external air cooling						
• Power loss[3]						
- With internal air cooling in control cabinet	kW	0.05	0.07	0.1	0.19	0.31
- With external air cooling, int./ext.[2]	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. [3]	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

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Technical specifications (continued)

DC link voltage 510 … 720 V DC						
• 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 cooled	6SL3125-	–	–	–	–	–
Product name		Single Motor Module in booksize format				
Output current						
• Rated current I_{rated}	A	**3**	**5**	**9**	**18**	**30**
Motor connection U2, V2, W2		Connector (X1)[4], max. 30 A	Connector (X1)[4], max. 30 A	Connector (X1)[4], max. 30 A	Connector (X1)[4], max. 30 A	Connector (X1)[4], 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 (8.90/2.63)	226/66.5 (8.90/2.63)	226/66.5 (8.90/2.63)	226/66.5 (8.90/2.63)	226/66.5 (8.90/2.63)
- 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)

1) Rated power of a standard asynchronous (induction) motor at 600 V DC link voltage.

2) Rated DC link current for dimensioning an external DC connection.
For instructions for calculating the DC link current when dimensioning the Line Module, see System description (on the CD-ROM supplied with the Catalog NC 61).

3) Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

4) Connector not included in scope of supply, see Accessories.

5) With reinforced DC link busbar set, 150 A is possible (accessories).

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Technical specifications

DC link voltage 510 … 720 V DC						
• Internal air cooling	6SL3120-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• External air cooling	6SL3121-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• Cold plate cooling	6SL3126-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• Liquid cooled	6SL3125-	–	–	–	–	1TE32-0AA3
Product name		Single Motor Module in booksize format				
Output current						
• Rated current I_{rated}	A	**45**	**60**	**85**	**132 (105[5])**	**200 (140[5])**
• Base-load current I_H	A	38	52	68	105	141
• For S6 duty (40 %) I_{S6}	A	60	80	110	150	230
• I_{max}	A	85	113	141	210	282
Rated pulse frequency	kHz	4	4	4	4	4
Power With 600 V DC link voltage						
• Rated power	kW	24	32	46	71	107
• Based on I_H	kW	21	28	37	57	76
DC link current I_d[1]	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[3]						
- With internal air cooling in control cabinet	kW	0.46	0.62	0.79	1.29	2.09
- With external air cooling, int./ext.[2]	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.[3]	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
Liquid cooled[6]						
• Power loss, int./ext.	kW	–	–	–	–	0.39/1.7
- Rated volumetric flow for water at 70 kPa pressure drop[7]	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

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Technical specifications (continued)

DC link voltage 510 … 720 V DC						
• Internal air cooling	6SL3120-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• External air cooling	6SL3121-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• Cold plate cooling	6SL3126-	1TE24-5AA3	1TE26-0AA3	1TE28-5AA3	1TE31-3AA3	1TE32-0AA3
• Liquid cooled	6SL3125-	–	–	–	–	1TE32-0AA3
Product name		Single Motor Module in booksize format				
Output current						
• Rated current I_{rated}	A	**45**	**60**	**85**	**132 (105[5])**	**200 (140[5])**
Motor connection U2, V2, W2		M6 screw stud (X1)	M6 screw stud (X1)	M8 screw stud (X1)	M8 screw stud (X1)	M8 screw stud (X1)
• Conductor cross-section, max.	mm^2	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), DC 24 V, 2 A	Plug-in connector (X11), DC 24 V, 2 A	Plug-in connector (X11), DC 24 V, 2 A	Plug-in connector (X11), DC 24 V, 2 A	Plug-in connector (X11), DC 24 V, 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[4]	mm (in)	–	–	–	629 (24.76)	629 (24.76)
- With screwed fitting	mm (in)	–	–	–	–	553 (21.77)[6]
• 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)
- Liquid cooled	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)
• Liquid cooled	kg (lb)	–	–	–	–	21 (46.3)

1) Rated power of a standard asynchronous (induction) motor at 600 V DC link voltage.

2) Rated DC link current for dimensioning an external DC connection.
For instructions for calculating the DC link current when dimensioning the Line Module, see System description (on the CD-ROM supplied with the Catalog NC 61).

3) Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

4) The fan is supplied with the Motor Module and must be installed before the Motor Module is commissioned.

5) In the case of cold plate cooling, derating is necessary due to heat transfer to the external heat sink. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

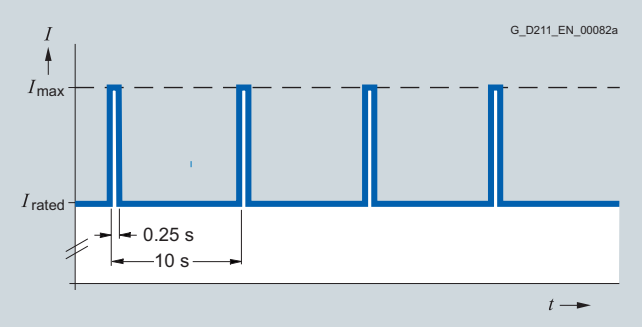
6) The coolant connections are located on the lower side of the components. All connection elements can be accessed using an appropriate tool. Thread type of water connections: Pipe thread ISO 228 G ½ B.

7) This value applies to water as coolant; for other coolants, refer to the SINAMICS S120 Equipment Manual (for Order No., refer to Documentation).

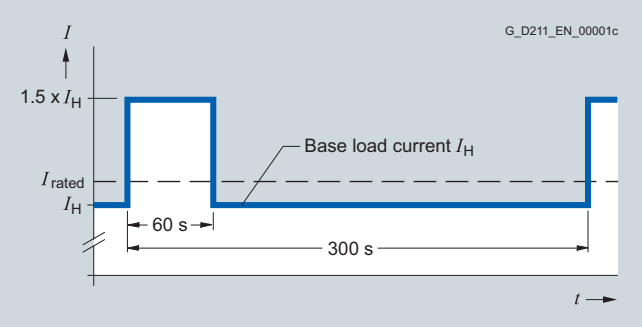
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Characteristic curves

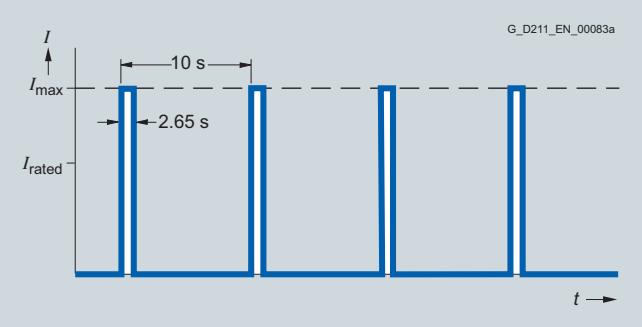
Overload capability



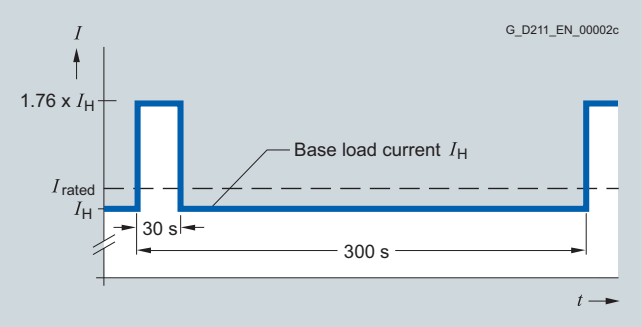
Duty cycle with initial load



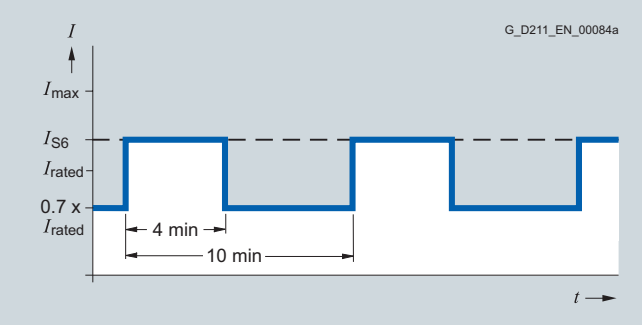
Duty cycle with 60 s overload with a duty cycle duration of 300 s



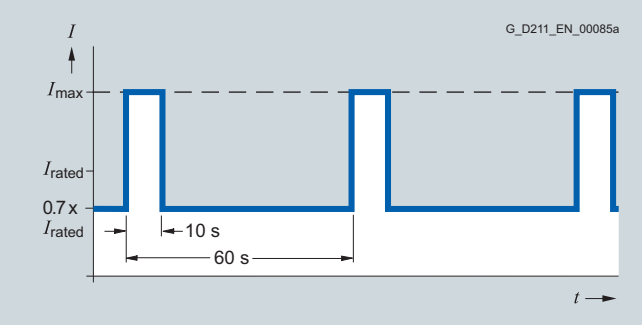
Duty cycle without initial load



Duty cycle with 30 s overload with a duty cycle duration of 300 s



S6 duty cycle with initial load with a duty cycle duration of 600 s

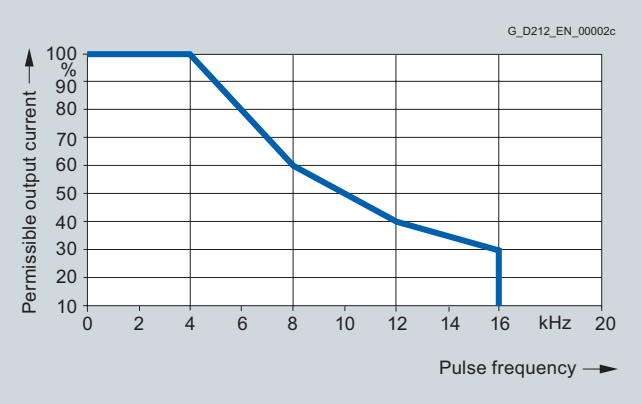


S6 duty cycle with initial load with a duty cycle duration of 60 s

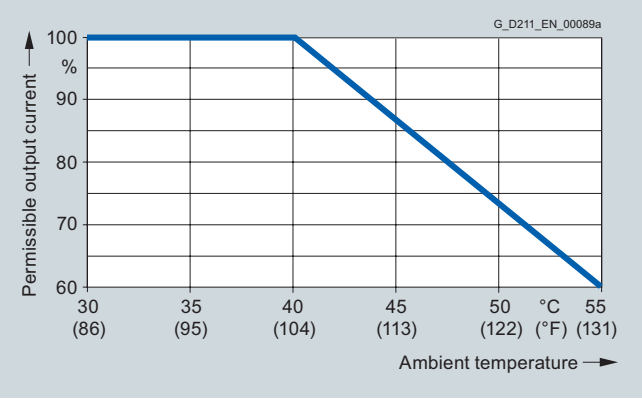
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Characteristic curves (continued)

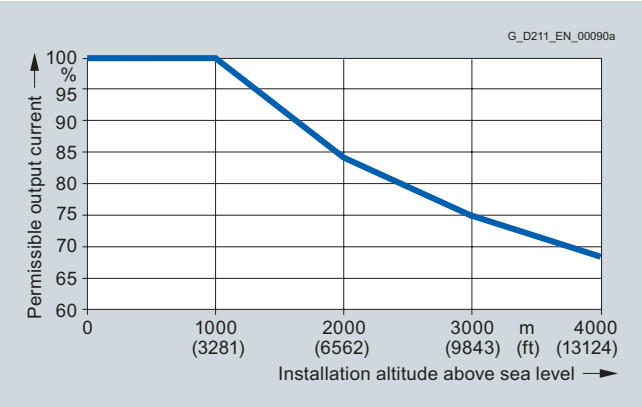
Derating characteristics



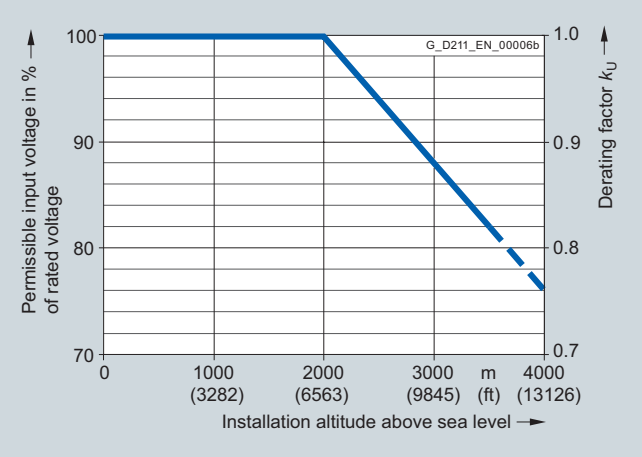
Output current as a function of pulse frequency



Output current as a function of ambient temperature



Output current as a function of installation altitude



Voltage derating as a function of installation altitude

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Motor Modules
Double Motor Modules

Design



Double Motor Modules feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 electronics 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. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable (length depends on module width) to connect Motor Module to adjacent module
- 2 blanking plugs for sealing 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 16 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 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl mit
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

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Selection and ordering data

Rated output current	Type rating[1]	Double Motor Module in booksize format		
		Internal air cooling	External air cooling	Cold plate cooling
A	kW (HP)	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 (2 × 10)	**6SL3120-2TE21-8AA3**	**6SL3121-2TE21-8AA3**	**6SL3126-2TE21-8AA3**

Accessories

Description	Order No.
Power connector (X1/X2) 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**
DC link rectifier adapter For direct supply of the 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) and 100 mm (3.94 in)	**6SL3162-2BD00-0AA0**
DC link adapters (2 units) For multitier configuration Screw 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**
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 16 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: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**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**
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.

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Technical specifications

DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line supply voltage 380 ... 480 V 3 AC)[1]
Output frequency	0 … 650 Hz[2]
Electronics 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
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 directive)
Approvals, according to	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to EN 954-1

Characteristic curves

Refer to Single Motor Modules in booksize format.

[1] With firmware version V2.5 and higher with appropriate parameterization and reduced power 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. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications (continued)

DC link voltage 510 … 720 V DC					
• Internal air cooling		6SL3120-2TE13-0AA3	6SL3120-2TE15-0AA3	6SL3120-2TE21-0AA3	6SL3120-2TE21-8AA3
• External air cooling		6SL3121-2TE13-0AA3	6SL3121-2TE15-0AA3	6SL3121-2TE21-0AA3	6SL3121-2TE21-8AA3
• Cold plate cooling		6SL3126-2TE13-0AA3	6SL3126-2TE15-0AA3	6SL3126-2TE21-0AA3	6SL3126-2TE21-8AA3
Product name		Double Motor Module in booksize format			
Output current					
• Rated current I_{rated}	A	**2 × 3**	**2 × 5**	**2 × 9**	**2 × 18**
• For S6 duty (40 %) I_{S6}	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]					
- With internal air cooling in control cabinet	kW	0.095	0.13	0.185	0.345
- With external air cooling, int./ext.	kW	0.06/0.035	0.07/0.06	0.09/0.095	0.105/0.24
• Cooling air requirement	m^3/s (ft^3/s)	0.008 (0.3)	0.008 (0.3)	0.008 (0.3)	0.016 (0.6)
• Sound press. level L_{pA} (1 m (3.28 ft))	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 x connectors (X1, X2)[4], max. 30 A (not included in scope of supply, see Accessories)	2 x connectors (X1, X2)[4], max. 30 A (not included in scope of supply, see Accessories)	2 x connectors (X1, X2)[4], max. 30 A (not included in scope of supply, see Accessories)	2 x connectors (X1, X2)[4], 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		Integr. into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integr. into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integr. into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integr. 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 (8.90/2.63)	226/66.5 (8.90/2.63)	226/66.5 (8.90/2.63)	226/66.5 (8.90/2.63)
- 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 standard asynchronous (induction) motor at 600 V DC link voltage.

2) Rated DC link current for dimensioning an external DC connection.
For instructions for calculating the DC link current when dimensioning the Line Module, see System description (on the CD-ROM supplied with the Catalog NC 61).

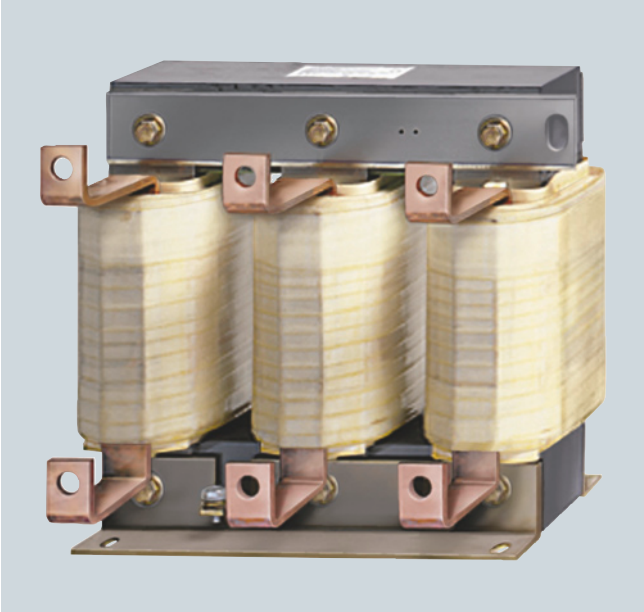
3) Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

4) Connector not included in scope of supply, see Accessories.

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Motor Modules
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 control loop settings are difficult to adjust). 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.

For information about whether a series motor reactor is necessary, as well as a selection guide, see the System description (on the CD-ROM supplied with the Catalog NC 61). Compliance with the notes for the motors used in the Configuration Manual is also essential.

Selection and ordering data

Rated current	Rated inductance	**Series motor reactor**
A	mH	Order No.
22.5	0.1	**4EU2452-0EG00-4BA0**
22.5	0.2	**4EU2452-0EH00-4BA0**
22.5	0.3	**4EU2552-0EF00-4BA0**
54	0.1	**4EU2752-0EK00-4BA0**
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**

Technical specifications

Input voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)

		4EU2452-0EG00-4BA0	4EU2452-0EH00-4BA0	4EU2552-0EF00-4BA0	4EU2752-0EK00-4BA0
Product name		Series motor reactor			
Rated current	A	22.5	22.5	22.5	54
Rated inductance	mH	0.1	0.2	0.3	0.1
Power loss	kW	0.123	0.123	0.146	0.213
Continuous current I_{thmax}, therm. perm.	A	25	25	25	60
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}	%	7.9	12.8	23	19
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	M6 screw	M6 screw	M6 screw
Degree of protection		IP00	IP00	IP00	IP00
Dimensions					
• Width	mm (in)	225 (8.86)	225 (8.86)	225 (8.86)	260 (10.64)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)	248 (9.76)
• Depth	mm (in)	91 (3.58)	91 (3.58)	115 (4.53)	133 (5.24)
Weight, approx.	kg (lb)	11 (24.3)	11 (24.3)	16 (35.3)	25 (55.1)
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-...

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Technical specifications

Input voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)

		4EU3052-0EB00-4BA0	4EU3652-0EC00-4BA0	4EU3951-0AR00-4B	4EU4521-0BS00-4B
Product name		Series motor reactor			
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
Contin. 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)

		6SE7028-2HS87-1FE0	6SE7026-0HS87-1FE0
Product name		Series motor reactor	
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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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 energy is converted to heat loss in an external braking resistor. Braking Modules function 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 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 electronics 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.

Selection and ordering data

Description	Order No.
Braking Modules in booksize format 1.5 kW/100 kW	**6SL3100-1AE31-0AB0**

Selection and ordering data (continued)

Description	Order No.
Accessories	
Warning labels in 16 languages This label set can be glued over the standard German or English labels to provide warnings in other languages. The following languages are available in each label set: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**6SL3166-3AB00-0AA0**
Accessories for re-ordering	
Accessories pack (plug-in terminals, DRIVE-CLiQ jumper, dust-proof blanking plugs) For Braking Module 50 mm (1.97 in) wide, int./ext. air cooling For DRIVE-CLiQ port	**6SL3160-8PB00-0AA0**

Technical specifications

DC link voltage 510 ... 720 V DC	Braking Modules in booksize format
Internal air cooling	6SL3100-1AE31-0AB0
Rated power P_{DB}	1.5 kW
Peak power P_{max}	100 kW
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	According to 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 consumpt. at 24 V DC, typ.	10 mA
• Conductor cross-section, max.	1.5 mm^2
Digital outputs Sustained short-circuit-proof	
• Voltage	24 V DC
• Load current per digital output, max.	100 mA
• Conductor cross-section, max.	1.5 mm^2
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

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Overview



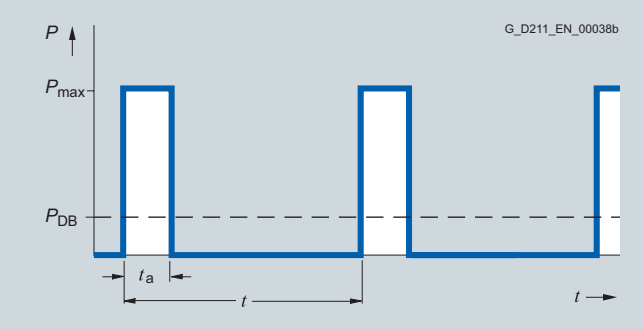
The excess energy of the DC link is dissipated via the braking resistor.

The corresponding braking resistor is connected to a Braking Module or Basic Line Module. The braking resistor is positioned outside the cabinet or switchgear room. This arrangement enables the resulting heat loss around the Line Modules/Motor Modules to be dissipated, thereby allowing a corresponding reduction in the level of air conditioning required.

Selection and ordering data

Description	Suitable for	Order No.
Braking resistor		
• 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

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Technical specifications

DC link voltage 510 ... 720 V DC					
		6SN1113-1AA00-0DA0		6SL3100-1BE31-0AA0	
Product name		Braking resistors for Braking Modules in booksize format			
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 power 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		–	
Suitable for Braking Module		6SL3100-1AE31-0AB0		6SL3100-1AE31-0AB0	

DC link voltage 510 ... 720 V DC			
		6SE7023-2ES87-2DC0	6SE7028-0ES87-2DC0
Product name		Braking resistors for Basic Line Modules in booksize format	
Resistance	Ω	20	8
Rated power P_{DB}	kW	5	12.5
Peak power P_{max}	kW	30	75
Load duration For peak power 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 terminals	Screw terminals
• Switching capacity		AC 250 V/max. 10 A DC 42 V/0.2 A	AC 250 V/max. 10 A DC 42 V/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		UL, CSA	UL, CSA
Suitable for Basic Line Module		6SL3130-1TE22-0AA0	6SL3130-1TE24-0AA0

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Overview



Capacitor Modules are used to increase the DC link capacitance to bridge momentary power failures.

Capacitor Modules are connected to the DC link voltage via the integrated DC link busbars. Capacitor Modules function autonomously.

Several Capacitor Modules can be operated in parallel up to the precharging limit of the used Line Modules. For more information see the System description (on the CD-ROM supplied with the Catalog NC 61).

Design

Capacitor Modules feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 2 PE (protective earth) connections

Technical specifications

DC link voltage 510 ... 720 V DC	Capacitor Modules in booksize format
Internal air cooling	6SL3100-1CE14-0AA0
Capacitance	4000 µF
Current carrying capacity	
• 24 V DC busbars	20 A
• DC link busbars	100 A
Power loss	0.025 kW
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	
Warning labels in 16 languages This label set can be glued over the standard German or English labels to provide warnings in other languages. The following languages are available in each label set: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish	**6SL3166-3AB00-0AA0**

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DC link components
Control Supply Modules

Overview



The Control Supply Module in booksize format provides a 24 V DC power supply via the line or DC link. This makes 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

Control Supply Modules feature the following connections and interfaces as standard:

- 1 line connection
- 2 DC link connections via integrated DC link busbars
- 2 electronics power supply connections via integrated 24 V DC bars
- 1 connection for the electronics 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)
- 2 PE (protective earth) connections

The status of the Control Supply Modules is indicated via two multi-color LEDs.

Technical specifications

DC link voltage 510 ... 720 V DC ***Line supply voltage 380 ... 480 V AC***	Control Supply Modules in booksize format
Internal air cooling	6SL3100-1DE22-0AA0
Rated input current	
• At 400 V 3 AC	2.2 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	26 V DC
Rated output current[1]	20 A
Current carrying capacity	
• 24 V DC busbars[1]	20 A
• DC link busbars	100 A
Line supply connection L1, L2, L3 (X1)	Screw 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 booksize format	**6SL3100-1DE22-0AA0**
Accessories	
Warning labels in 16 languages This label set can be glued over the standard German or English labels to provide warnings in other languages. The following languages are available in each label set: Chinese Simplified, Czech, Danish, Dutch, Finnish, French, Greek, Italian, Japanese, Korean, Polish, Portuguese/Brazilian, Russian, Spanish, Swedish, Turkish.	**6SL3166-3AB00-0AA0**
24 V terminal adapter For all Line Modules und Motor Modules in booksize format	**6SL3162-2AA00-0AA0**
24 V jumper For connecting the 24 V busbar (for booksize format)	**6SL3162-2AA01-0AA0**

[1] If the Control Supply Module is loaded with more than 10 A, it must be installed in the center of the drive line-up to ensure a current distribution as even as possible among the loads connected to the right and left of it. It is not permissible to connect Control Supply Modules in parallel.

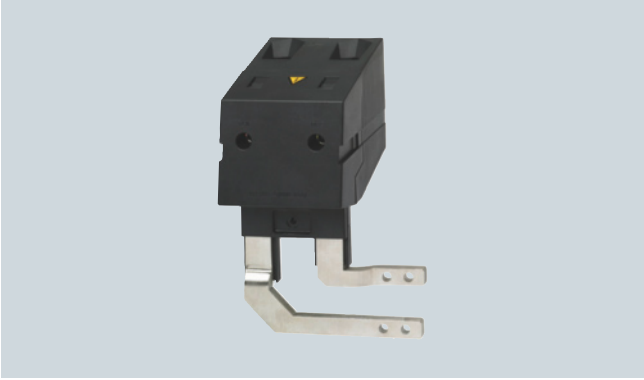
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Overview

DC link rectifier adapter



DC link rectifier adapter for module widths of 50 mm ... 100 mm (1.97 in ... 3.94 in).



DC link rectifier adapter for module 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 module 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. It can be mounted on the right or left side of the Motor Module; the identification of the poles (DCN and DCP) on the DC link adapter changes in accordance with the mounting position. The DC link cables are routed from behind. DC link adapters are supplied in sets of 2 units.

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Technical specifications

		DC link rectifier adapter		DC link adapter
		6SL3162-2BD00-0AA0	6SL3162-2BM00-0AA0	6SL3162-2BM01-0AA0
Conductor cross-section (screw-type terminals)	mm^2	0.5 … 10	35 … 95	35 … 95
Current carrying capacity	A	43	200	200
Weight, approx.	kg (lb)	0.06 (0.13)	0.48 (1.06)	0.76 (1.68)
Approvals, according to		cURus	cURus	cURus

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 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 format	**6SL3162-2BM01-0AA0**

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Line Modules
Active Line Modules

Overview



A wide range of single-axis Line Modules and Motor Modules with graded current/power ratings can be supplied:

- Active Line Modules: Single-axis version
  In chassis format with rated power from 132 kW to 300 kW
- Single Motor Modules: Single-axis version
  In chassis format with rated output currents of 210 A to 490 A

In principle, all Single Motor Modules can operate on Active Line Modules for the corresponding voltage range.

The self-commutated rectifier/regenerative units (with IGBTs in rectifier and regenerative 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 supply connection
- 1 connection for the 24 V DC electronics 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 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl with
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

Selection and ordering data

Description	Order No.
Active Line Module in chassis format	
Rated power:	
• 132 kW (200 HP)	**6SL3330-7TE32-1AA0**
• 160 kW (225 HP)	**6SL3330-7TE32-6AA0**
• 235 kW (350 HP)	**6SL3330-7TE33-8AA0**
• 300 kW (450 HP)	**6SL3330-7TE35-0AA0**

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Technical specifications

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 component (cos φ_1)	1.0 (factory setting) can be altered by input of a reactive current setpoint
• Total (λ)	1.0 (factory setting)
Overvoltage category According to 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 × line voltage
Electronics power supply	24 V DC, -15 %/+20 %
Radio interference suppression	
• Standard With Active Interface Module	Category C3 according to EN 61800-3
Cooling method	Increased air cooling by means of built-in 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 directive)
Approvals, according to	cULus

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Technical specifications

Line supply voltage 380 … 480 V 3 AC					
		6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
Product name		Active Line Module in chassis format			
Feed/feedback power					
• Rated power P_{rated} - With 400 V 3 AC - With 460 V 3 AC[2]	kW (HP)	**132** (200)	**160** (225)	**235** (350)	**300** (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 electronics power supply, max.	A	1.1	1.1	1.35	1.35
• Fan supply at 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	m^3/s (ft^3/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 supply 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.	mm^2	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.	mm^2	2 × 185	2 × 185	2 × 185	2 × 185
PE connection		M10 screw	M10 screw	M10 screw	M10 screw
• Max. conductor cross-section					
- PE1/GND	mm^2	1 × 185	1 × 185	1 × 185	1 × 185
- PE2/GND	mm^2	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)

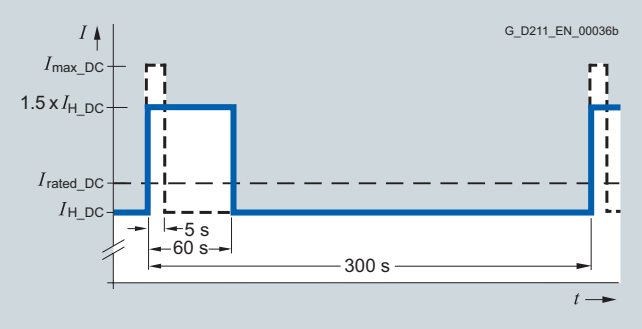
[1] Total sound pressure level of Active Interface Module and Active Line Module.

[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

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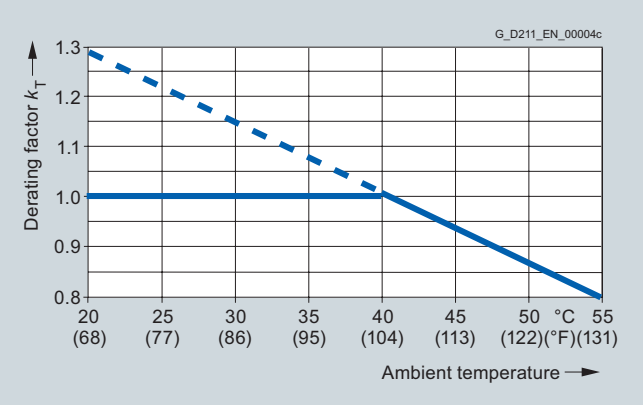
Characteristic curves

Overload capability



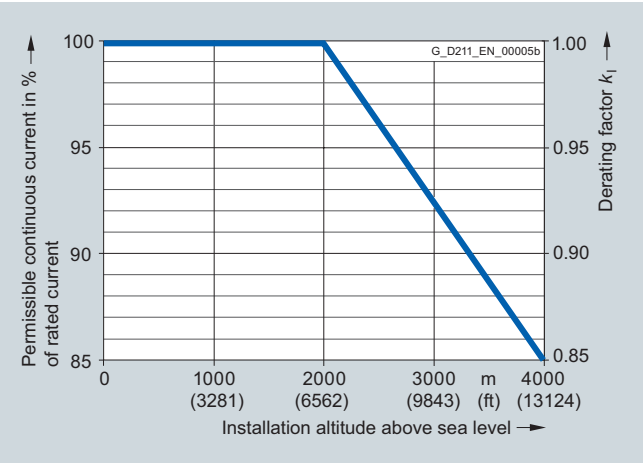
High overload

Derating characteristics

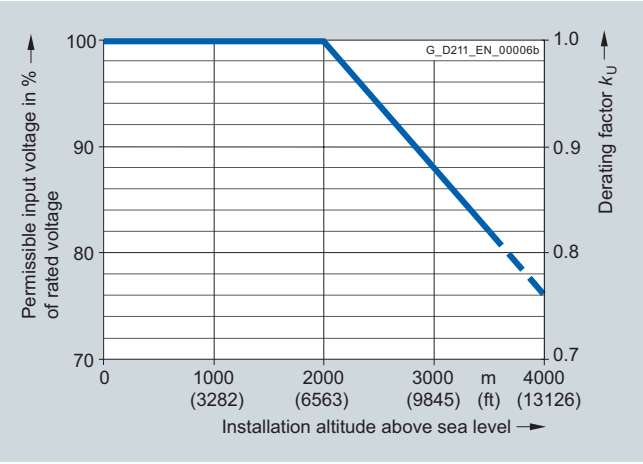


Current derating as a function of the ambient temperature

Note: A derating factor k_T > 1.0 is applicable only in conjunction with "current derating as a function of installation altitude". The rated current data may not be exceeded. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).



Current derating as a function of the installation altitude



Voltage derating as a function of installation altitude

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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 RI suppression, the pre-charging circuit for the Active Line Module, the line supply voltage sensing circuit and monitoring sensors. The bypass contactor is an integral component in types 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 the CU320 Control Unit or the SINUMERIK NCU and the 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 the CU320 Control Unit or the SINUMERIK NCU and the first Motor Module

Selection and ordering data

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

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Technical specifications

Line supply voltage 380 … 480 V 3 AC					
		6SL3300-7TE32-6AA0		6SL3300-7TE33-8AA0	6SL3300-7TE35-0AA0
Product name		Active Interface Module in chassis format			
Rated current	A	210	260	380	490
Bypass contactor		Included	Included	Included	Included
DC link capacitance Drive line-up, max.					
• At 50 Hz 400 V	µF	31200	31200	57600	57600
• At 60 Hz 480 V	µF	20800	20800	38400	38400
Current requirement					
• 24 V DC electronics power supply, max.	A	0.17	0.17	0.17	0.17
• Fan supply at 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 supply/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	6SL3330-7TE32-1AA0	6SL3330-7TE32-6AA0	6SL3330-7TE33-8AA0	6SL3330-7TE35-0AA0
• Rated power of the Active Line Module	kW (HP)	132 (200)	160 (225)	235 (350)	300 (450)

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

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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.

Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and ET B1.

Selection and ordering data

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	Type 6SL3300-	Type 6SL3330-	
132 (200)	210	7TE32-6AA0	7TE32-1AA0	included in Active Interface Module
160 (225)	260	7TE32-6AA0	7TE32-6AA0	included in Active Interface Module
235 (350)	380	7TE33-8AA0	7TE33-8AA0	included in Active Interface Module
300 (450)	490	7TE35-0AA0	7TE35-0AA0	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	Type 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**	315 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**

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Design



The Single Motor Modules in chassis format feature the following connections and 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 electronics power supply connection
- 3 DRIVE-CLiQ sockets
- 1 motor connection
- 1 safe standstill input (enable pulses)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 PE/protective conductor 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 Control Unit
- SINUMERIK 802D sl
- SINUMERIK 840D sl with
  - NCU 710.2
  - NCU 720.2
  - NCU 720.2 PN
  - NCU 730.2
  - NCU 730.2 PN
  - Numeric Control Extensions NX10/NX15

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

DC link voltage Up to 2000 m (6562 ft) above sea level	510 ... 720 V DC (line supply voltage 380 ... 480 V 3 AC)
Output frequency	0 … 300 Hz[1)]
Electronics 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 directive)
Approvals, according to 510 ... 720 V DC Motor Modules only	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to EN 954-1

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). For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications (continued)

DC link voltage 510 … 720 V DC

		6SL3320-1TE32-1AA3	6SL3320-1TE32-6AA3	6SL3320-1TE33-1AA3	6SL3320-1TE33-8AA3	6SL3320-1TE35-0AA3
Product name		Single Motor Module in chassis format				
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 (40 %) I_{S6}	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 at 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 standard asynchronous (induction) motor at 600 V DC link voltage.

[2] Rated DC link current for dimensioning an external DC connection.
For instructions for calculating the DC link current when dimensioning the Line Module, see System description (on the CD-ROM supplied with the Catalog NC 61).

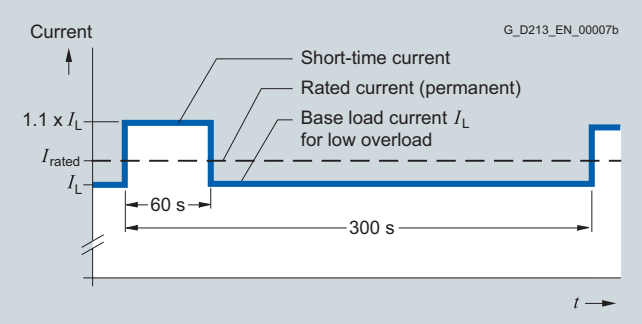
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Characteristic curves

Overload capability

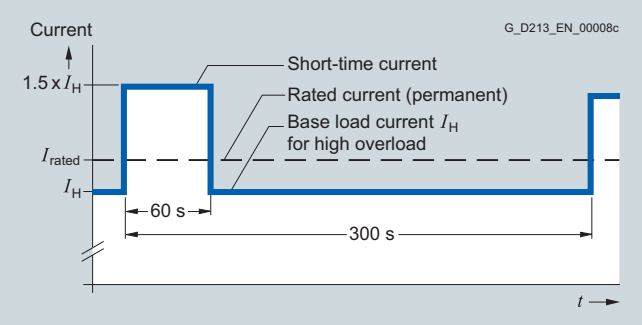
Load cycle data for Single Motor Modules in chassis format

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 duration of 300 s.



High overload

Derating factors

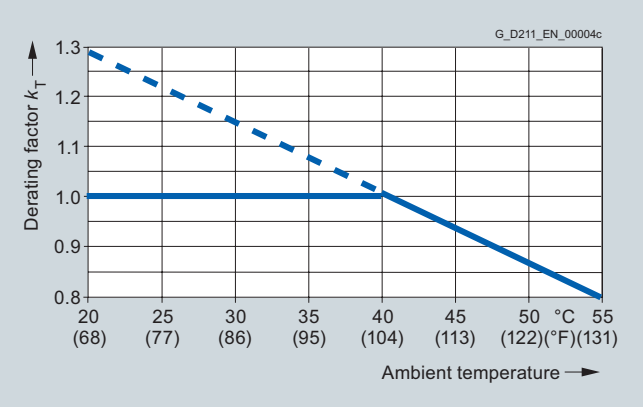
When the pulse frequency is increased, the derating factor of the output current must be taken into account.

This derating factor must be applied to the currents specified in the technical data.

Derating factor of the output current as a function of the pulse frequency for devices with a rated pulse frequency of 2 kHz

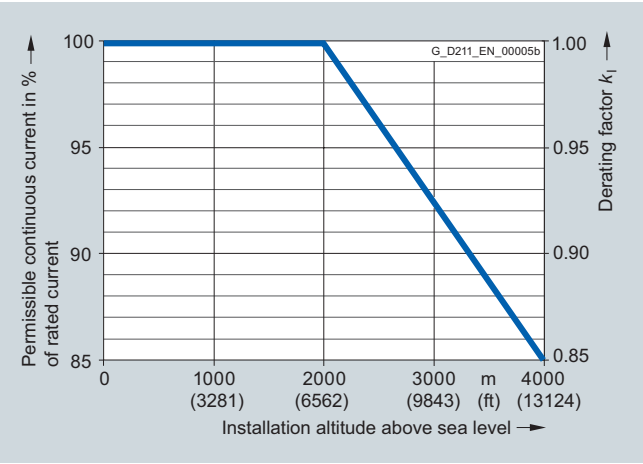
Single Motor Module in chassis format	Type rating	Output current	**Derating factor**
Type		for a pulse frequency of 2 kHz	for a pulse frequency of 4 kHz
6SL3320- ...	kW (HP)	A	
1TE32-1AA3	110 (150)	210	**0.82**
1TE32-6AA3	132 (200)	260	**0.83**
1TE33-1AA3	160 (250)	310	**0.88**
1TE33-8AA3	200 (300)	380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

Derating factors (continued)

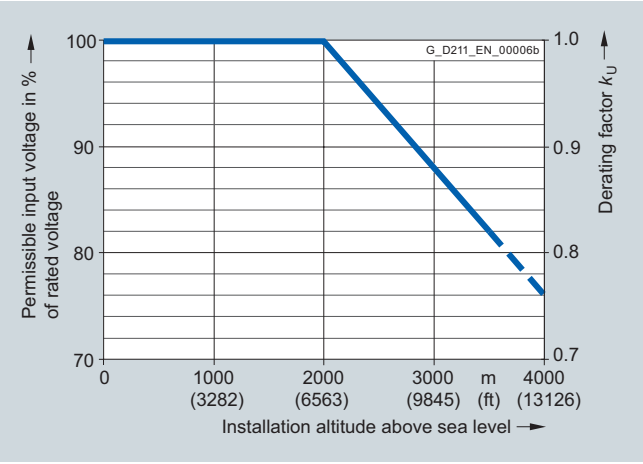


Current derating as a function of the ambient temperature

Note: A derating factor k_T > 1.0 is applicable only in conjunction with "current derating as a function of installation altitude". The rated current data may not be exceeded. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).



Current derating as a function of the installation altitude

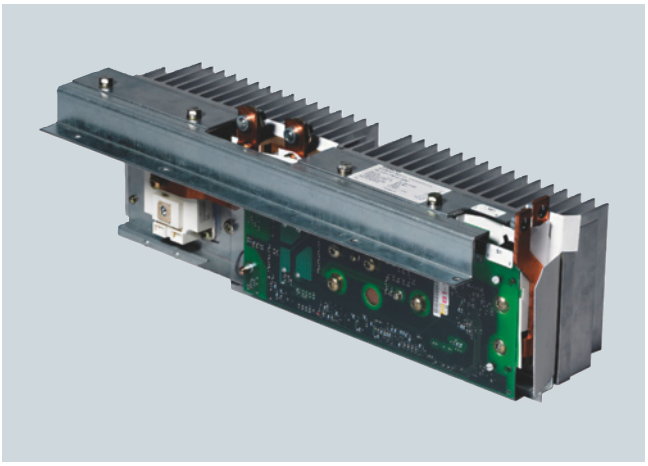


Voltage derating as a function of installation altitude

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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 excess DC link energy is dissipated in the external braking resistor. Braking Modules function 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 in chassis format are inserted in a mounting location inside the Motor Modules, Line Modules or Power Modules and are cooled by the fans on these modules. The supply voltage for the electronics is taken from the DC link. The Braking Module is connected to the DC link by means of the busbar sets and flexible cables, which are supplied as standard.

The activation threshold of the Braking Module can be adjusted by means of a DIP switch. The braking power values specified in the technical data apply to the upper activation threshold.

Design

The Braking Modules in chassis format feature the following connections and interfaces as standard:

- 1 DC link connection
- 1 braking resistor connection
- 1 digital input (inhibit Braking Module/acknowledge error)
- 1 digital output (Braking Module inhibited)
- 1 DIP switch for adjusting the application threshold

Selection and ordering data

Description	Order No.
Braking Module in chassis format	
• Frame size FX, 25 kW/125 kW	**6SL3300-1AE31-3AA0**
• Frame size GX, 50 kW/250 kW	**6SL3300-1AE32-5AA0**
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**

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Technical specifications

DC link voltage 510 … 720 V DC

Product name		6SL3300-1AE31-3AA0 Braking Module in chassis format	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)	50 (164)	50 (164)
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.	mm^2	1.5	1.5
Digital outputs Sustained short-circuit-proof			
• Voltage	V	DC 24	DC 24
• Load current per digital output, max.	mA	500	500
• Conductor cross-section, max.	mm^2	1.5	1.5
R1/R2 connection		M8 screw	M8 screw
• Conductor cross-section, max.	mm^2	35	50
Weight, approx.	kg (lb)	3.6 (8)	7.3 (16)
Approvals, according to		cURus	cURus
Suitable for installation in a Motor Module, Power Module, Active Line Module, Basic Line Module	Frame size	FX	GX

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DC link components
Braking resistors

Overview



The excess energy of the DC link is dissipated via the braking resistor.

The braking resistor is connected to a Braking Module. The braking resistor is positioned outside the cabinet or switchgear room. This arrangement enables the resulting heat loss around the Line Modules / Motor Modules to be dissipated, thereby allowing a corresponding reduction in the level of air conditioning required in the cabinet.

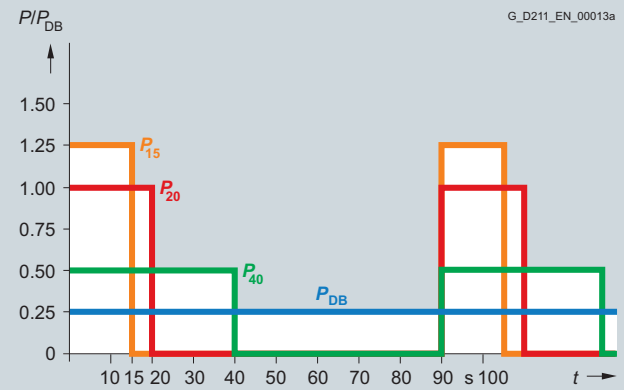
2 braking resistors with different rated and peak power values are available for chassis format units.

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.

Selection and ordering data

Description	Suitable for Braking Module in chassis format	Order No.
Braking resistor		
• 25 kW/125 kW	6SL3300-1AE31-3AA0	**6SL3000-1BE31-3AA0**
• 50 kW/250 kW	6SL3300-1AE32-5 . A0	**6SL3000-1BE32-5AA0**

Characteristic curves



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

Technical specifications

DC link voltage 510 ... 720 V DC			
		6SL3000-1BE31-3AA0	6SL3000-1BE32-5AA0
Product name		Braking resistor	
Resistance	Ω	4.4	2.2
Rated power P_{DB}	kW	25	50
Peak power P_{max}	kW	125	250
Load duration For peak power	s	15	15
Cycle duration Of braking duty cycle	s	90	90
Current, max.	A	189	378
Cable entry		Via cable gland M50	Via cable gland M50
Power connection		Via stud M10	Via stud M10
• Conductor cross-section, max.	mm^2	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

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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 supply connection
- DCP/R1 and DCN DC link terminals
- PM-IF interface for connection of the PM340 Power Module and CU310 Control Unit or CUA31/CUA32 Control Unit Adapter. The PM340 Power Module also supplies power to the CU310 Control Unit or CUA31/CUA32 Control Unit Adapter by means of an integrated power pack
- Terminals DCP/R1 and R2 for connection of an external braking resistor
- Motor connected using screw 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 Unit (braking chopper) is dimensioned 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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Power Modules

Integration

The PM340 Power Modules in blocksize format communicate with the CU310 Control Unit or the CUA31/CUA32 Control Unit Adapter via the PM-IF interface.



PM340 Power Module in blocksize format with CU310 DP Control Unit



PM340 Power Module in blocksize format with CUA31 Control Unit Adapter

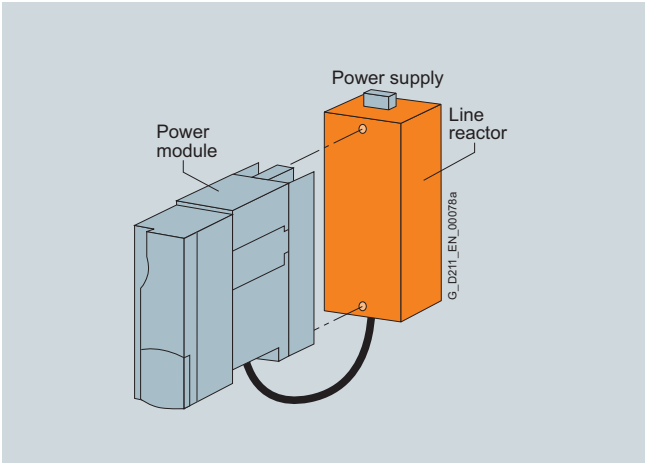
Many system components for PM340 Power Modules are designed as base components, i.e. the component is mounted on the fastening plate and the PM340 Power Module in front of them in a space-saving construction. Up to two base components can be mounted in front of one another.

	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)

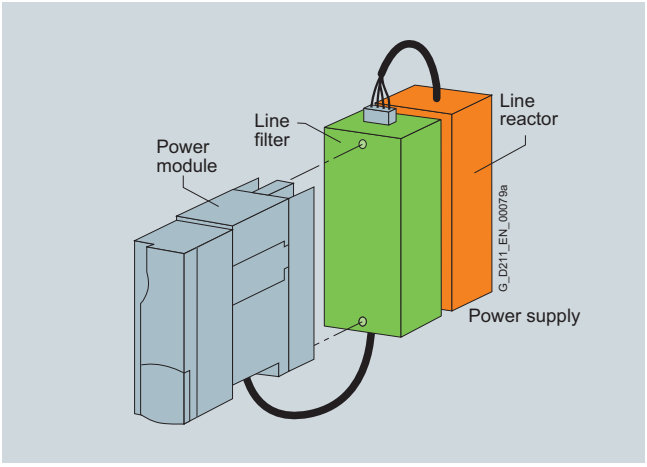
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Integration (continued)



Basic layout of a PM340 Power Module with line reactor as base component

On the line side, the line-side reactors have terminals and on the Power Module side, they have 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.



Power Module PM340 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 diagram above. In this case, the line connection is from 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

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 With rated power	
• Fundamental component ($\cos \varphi_1$)	> 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 × line voltage
Output frequency	0 … 650 Hz[1)]
Electronics 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	Increased 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 directive)
Approvals, according to	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, control category 3 according to EN 954-1

1) Note the correlation between max. output frequency, pulse frequency and current derating. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

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Technical specifications (continued)

Line supply voltage 200 … 240 V 1 AC				
		6SL3210-1SB11-0...	6SL3210-1SB12-3...	6SL3210-1SB14-0...
Product name		PM340 Power Module in blocksize format		
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 (40 %) I_{S6}	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 (0.2)	0.005 (0.2)	0.005 (0.2)
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 supply connection L, N		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1.0 … 2.5	1.0 … 2.5	1.0 … 2.5
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	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 terminals	Screw terminals	Screw 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 (3)	1.3 (3)	1.3 (3)

[1] Nominal HP based on asynchronous motors (induction motors). 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 maintain the limit values of EN 61800-3 Category C2.

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Technical specifications (continued)

Line supply voltage 380… 480 V 1 AC

Product name		6SL3210-1SE11-3UA0	6SL3210-1SE11-7UA0	6SL3210-1SE12-2UA0	6SL3210-1SE13-1UA0	6SL3210-1SE14-1UA0
		PM340 Power Module in blocksize format				
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 (40 %) I_{S6}	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 supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw 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 terminals	Screw terminals	Screw terminals	Screw terminals	Screw 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 terminals	Screw terminals	Screw terminals	Screw terminals	Screw 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 (induction motors). 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 maintain the limit values of EN 61800-3 Category C2.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC

Product name		6SL3210-1SE16-0...	6SL3210-1SE17-7...	6SL3210-1SE21-0...	6SL3210-1SE21-8...	6SL3210-1SE22-5...	6SL3210-1SE23-2...
		PM340 Power Module in blocksize format					
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 (40 %) I_{S6}	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	m^3/s (ft^3/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 supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1.0 … 6	1.0 … 6	1.0 … 6	2.5 … 10	2.5 … 10	2.5 … 10
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1.0 … 6	1.0 … 6	1.0 … 6	2.5 … 10	2.5 … 10	2.5 … 10
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	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 (8.82)	4.0 (8.82)	4.0 (8.82)	6.5 (14.3)	6.5 (14.3)	6.5 (14.3)

1) Nominal HP based on asynchronous motors (induction motors). 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 maintain the limit values of EN 61800-3 Category C2.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC

Product name		6SL3210-1SE23-8...	6SL3210-1SE24-5...	6SL3210-1SE26-0...	6SL3210-1SE27-5...	6SL3210-1SE31-0...
		PM340 Power Module in blocksize format				
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 (40 %) I_{S6}	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	m^3/s (ft^3/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 supply 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	mm^2	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	mm^2	10 … 35	10 … 35	10 … 35	10 … 35	10 … 35
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud	M6 screw stud
• Conductor cross-section	mm^2	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 (229)	70 (229)	70 (229)	70 (229)	70 (229)
• 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	mm (in)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)	203.5 (8.01)
- PM340 with CU310	mm (in)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)	293.1 (11.54)
- PM340 with CUA31	mm (in)	233.8 (9.20)	233.8 (9.20)	233.8 (9.20)	233.8 (9.20)	233.8 (9.20)
Frame size		FSD	FSD	FSD	FSE	FSE
Weight, approx. PM340 without/with int. filter	kg (lb)	15.9/19.3 (35.1/42.6)	15.9/19.3 (35.1/42.6)	15.9/19.3 (35.1/42.6)	19.8/27.1 (43.7/59.8)	19.8/27.1 (43.7/59.8)

1) Nominal HP based on asynchronous motors (induction motors). 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 maintain the limit values of EN 61800-3 Category C2.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC

Product name		6SL3210-1SE31-1...	6SL3210-1SE31-5...	6SL3210-1SE31-8...
		PM340 Power Module in blocksize format		
Output current				
• Rated current I_{rated}	A	**110**	**145**	**178**
• Base-load current I_H	A	95	115	155
• For S6 duty (40 %) I_{S6}	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 supply 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 the 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 (229)	70 (229)	70 (229)
• 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 (24.96/36.77)	634/934 (24.96/36.77)	634/934 (24.96/36.77)
• 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 (induction motors). 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 %.

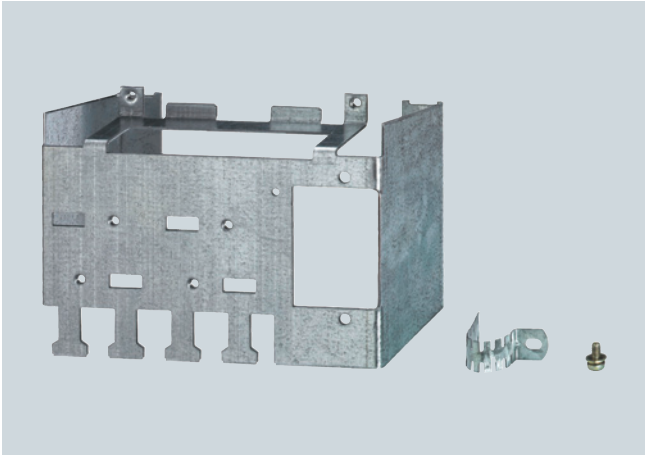
3) Max. motor cable length 25 m (82 ft) (shielded) for PM340 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

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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



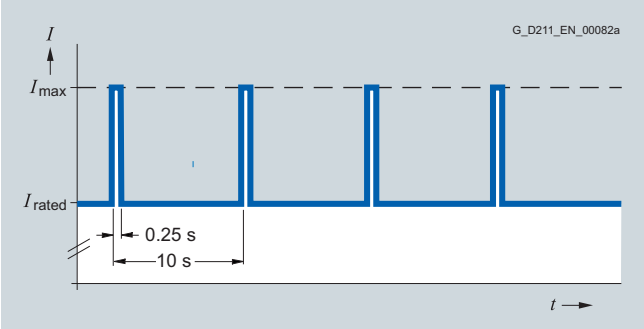
Example of shield connection kit for PM340 frame size FSB

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**

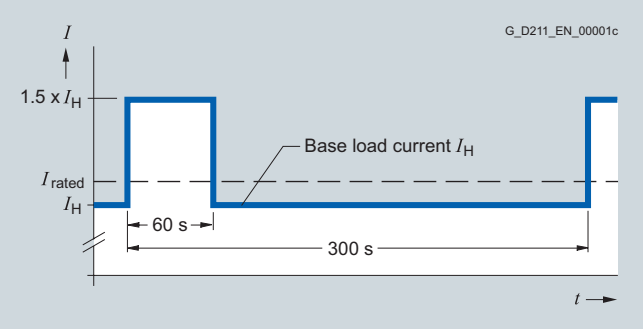
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Characteristic curves

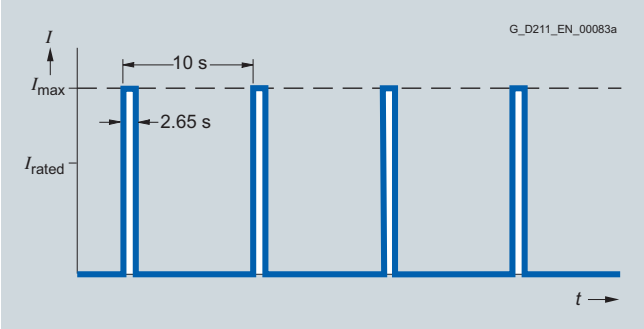
Overload capability



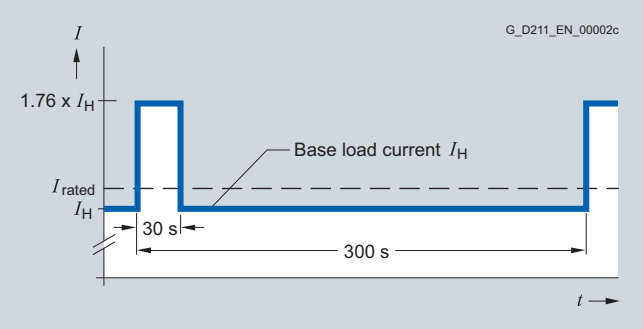
Load cycle with previous load



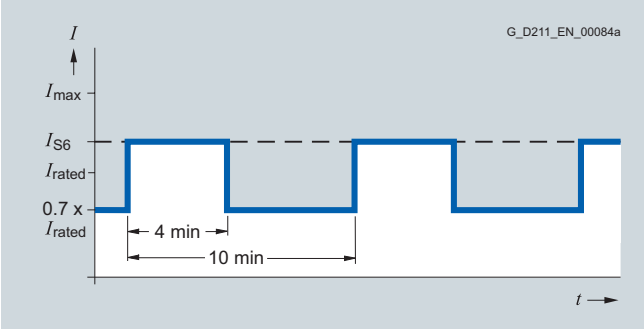
Load cycle with 60 s overload with a load cycle period of 300 s



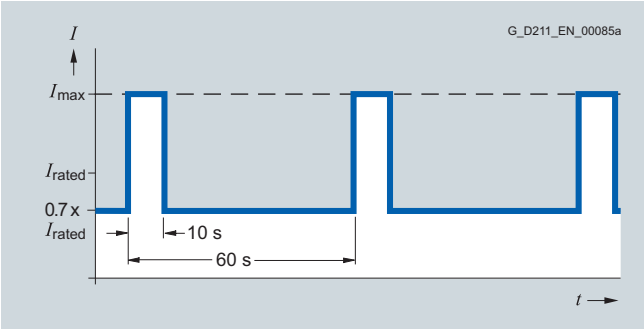
Load cycle without previous load



Load cycle with 30 s overload with a load cycle period of 300 s



S6 load cycle with previous load with a load cycle period of 600 s

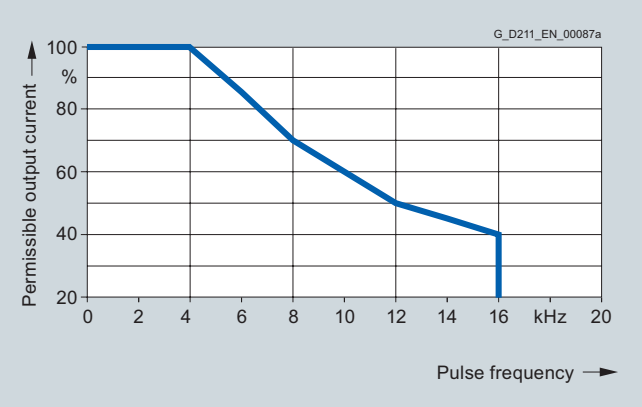


S6 load cycle with previous load with a load cycle period of 60 s

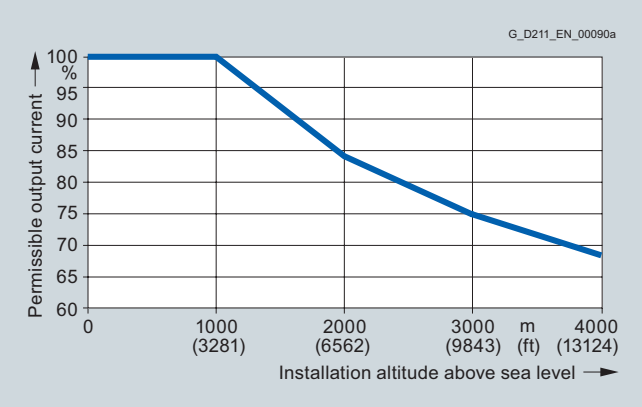
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Characteristic curves (continued)

Derating characteristic



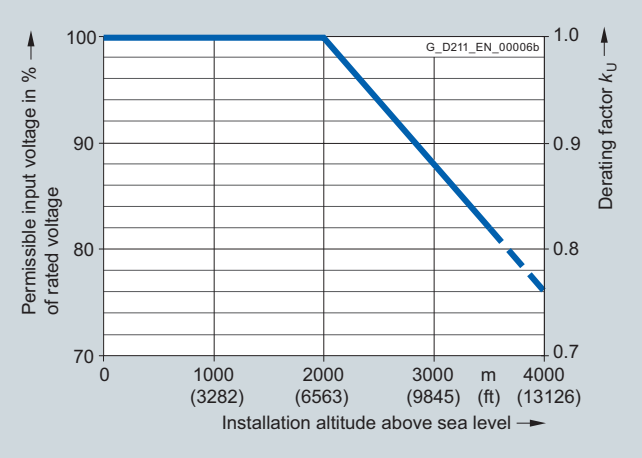
Output current as a function of pulse frequency, frame size FSA to FSE



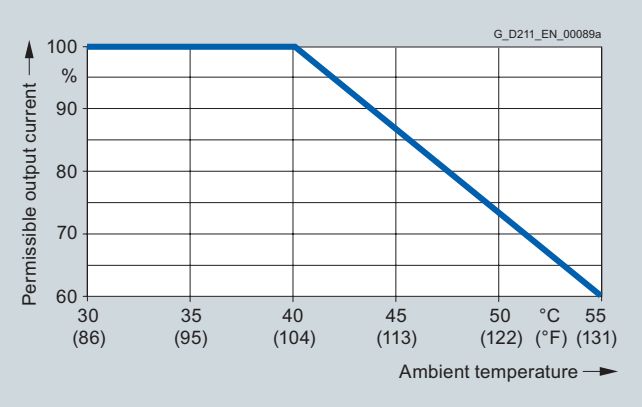
Output current as a function of installation altitude



Output current as a function of pulse frequency, frame size FSF



Voltage derating as a function of installation altitude



Output current as a function of ambient temperature

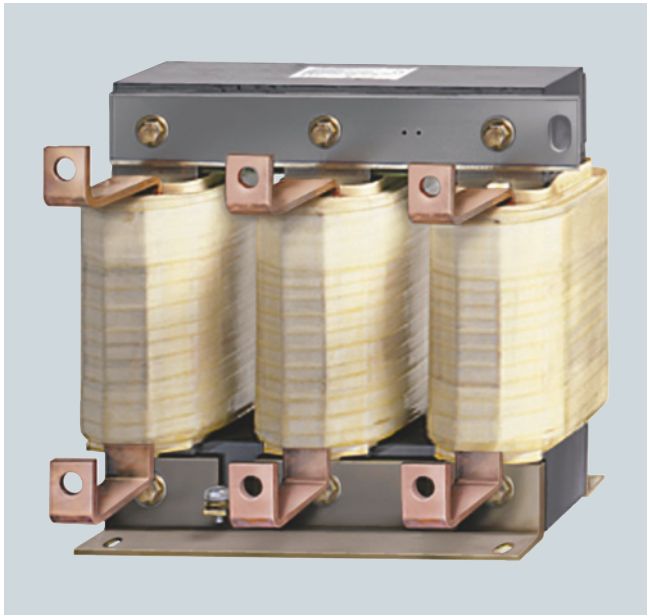
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Overview



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 low-impedance supply systems with $u_k \leq 1\ \%$, the phase effects on the system from the PM340 Power Modules are minimal. The matched line reactor is essential where the effective supply impedance equals $u_k > 1\ \%$. The voltage drop u_k across the supply impedance increases with the current. The specified condition therefore becomes more and more important as the rated power of the Power Modules increases. For further information see System description (on the CD-ROM supplied with the Catalog NC 61).

Integration

The line reactors for PM340 Power Modules of 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 Module are already connected at the line reactor.

The line reactor is connected to the line connection through terminals.



PM340 Power Module frame size FSB with base line reactor and shield connection kit

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Technical specifications

Line supply voltage 200 … 240 V 1 AC			
		6SE6400-3CC00-4AB3	6SE6400-3CC01-0AB3
Product name		Line reactor	
Rated current	A	3.4	8.1
Power loss, approx. At 50/60 Hz	kW	0.0125/0.015	0.0115/0.0145
Line supply connection U1, V1, W1		Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6
Load connection		Cable	Cable
• Conductor cross-section		3 × AWG16 (1.5 mm^2)	3 × AWG16 (1.5 mm^2)
• Length, approx.	m (ft)	0.38 (1.25)	0.38 (1.25)
PE connection		M5 screw stud	M5 screw stud
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, 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							
		6SE6400-3CC00-2AD3	6SE6400-3CC00-4AD3	6SE6400-3CC00-6AD3	6SL3203-0CD21-0AA0	6SL3203-0CD21-4AA0	6SL3203-0CD22-2AA0
Product name		Line reactor					
Rated current	A	1.9	3.5	4.8	9	11.6	25
Power loss At 50/60 Hz	kW	0.006/0.007	0.0125/0.015	0.0075/0.009	0.009/0.011	0.027/0.032	0.098/0.118
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	6	6	6
Load connection		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		3 × AWG16 (1.5 mm^2)	3 × AWG16 (1.5 mm^2)	3 × AWG16 (1.5 mm^2)	3 × AWG16 (1.5 mm^2)	3 × AWG16 (1.5 mm^2)	4 × AGW10 (2.5 mm^2)
• 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 stud	M5 screw stud	M5 screw stud	M5 screw stud	M5 screw stud	M5 screw stud
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, 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.

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Technical specifications (continued)

Line supply voltage 380 … 480 V 3 AC

		6SL3203-0CD23-5AA0	6SL3203-0CJ24-5AA0	6SL3203-0CD25-3AA0	6SL3203-0CJ28-6AA0	6SE6400-3CC11-2FD0	6SE6400-3CC11-7FD0
Product name		Line reactor					
Rated current	A	31.3	47	63	94	151	186
Power loss At 50/60 Hz	kW	0.037/0.044	0.090/0.115	0.090/0.115	0.170/0.215	0.280/0.360	0.280/0.360
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm^2	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 mm^2)	4 × 16 mm^2	4 × 16 mm^2	4 × 35 mm^2	–	–
• Length, approx.	m (ft)	0.49 (1.61)	0.7 (2.3)	0.7 (2.3)	0.7 (2.3)		
PE connection		M5 screw stud	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, 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)

[1] With correctly connected load connection cable.

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Selection and ordering data

Rated output current	Type rating	Suitable for Power Module, 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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Overview

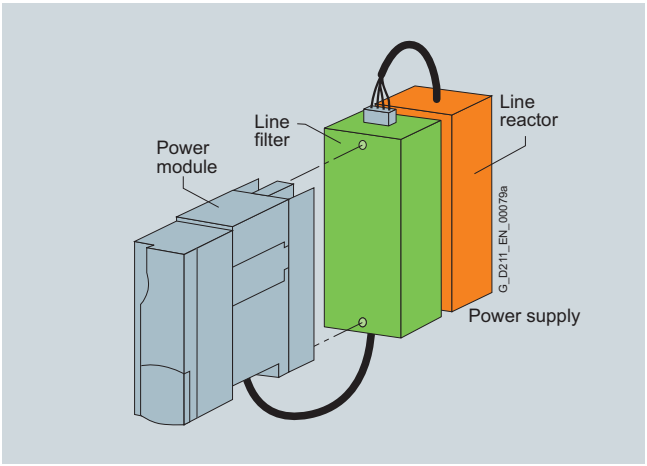


In plants with strict EMC requirements, the line filter for frame size FSA restricts the conducted interference emanating from the PM340 Power Module to the limit values of Class C2 as defined in EN 61800-3. The line filter is suited only for direct connection to TN (grounded) systems.

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

Line supply voltage 380 … 480 V 3 AC	Line filter
Rated current	6 A
Power loss	< 5 W
Line supply connection L1, L2, L3	Screw terminals
• Conductor cross-section	2.5 mm^2
PE connection	M4 screw stud
Load connection U, V, W	Shielded cable
• Conductor cross-section	3 × 2.5 mm^2
• Length, approx.	0.4 m (1.31 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, 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**

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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).

Further information about the line contactors, switch disconnectors, fuses and circuit-breakers specified in the tables can be found in Catalogs LV 1 and ET B1.

Selection and ordering data

Assignment of line-side power components to Power Modules in blocksize format

Rated output current	Type rating	Suitable for Power Module, blocksize format	**Line contactor**	**Circuit breaker IEC 60947 and UL489/ CSA C22.2 No. 5-02**	**UL/CSA fuse, Class J** Available from: Ferraz Shawmut www.ferrazshawmut.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	Suitable for Power Module, blocksize format	**Line contactor**	**Circuit breaker IEC 60947**	**Circuit breaker UL489/ CSA C22.2 No. 5-02**	**Main switch**
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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Selection and ordering data (continued)

Rated output current	Type rating	Suitable for Power Module, blocksize format	**Fuse switch disconnector**	**Switch disconnector with fuse holders**	**Fuse**	**UL/CSA fuse, Class J**[1] Available from: Ferraz Shawmut www.ferrazshawmut.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**

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

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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 sizes are operated without line reactor, the braking resistors can also be installed under the Power Modules.

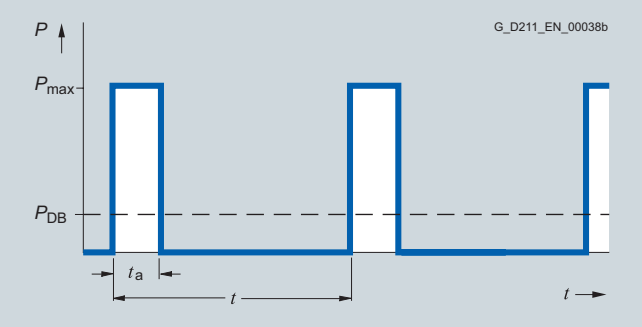
The braking resistors for the Power Modules of the FSC to FSF frame sizes should be placed outside the control cabinet or the switchgear room in order to direct the resulting heat loss away from the Power Modules, thereby allowing a corresponding reduction in the level of air conditioning required.

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, blocksize format	Order No.
DC link voltage 240 ... 360 V DC (line supply voltage 200 ... 240 V 1 AC)		
Braking resistor		
• 180 Ω	Frame size FSA	**6SE6400-4BC05-0AA0**
DC link voltage 510 ... 720 V DC (line supply 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	**6SE6400-4BD22-2EA0**
• 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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DC link components
Braking resistors

Technical specifications

DC link voltage 240 … 360 V DC	6SE6400-4BC05-0AA0
Product name	Braking resistor
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 Module, blocksize format	FSA

6

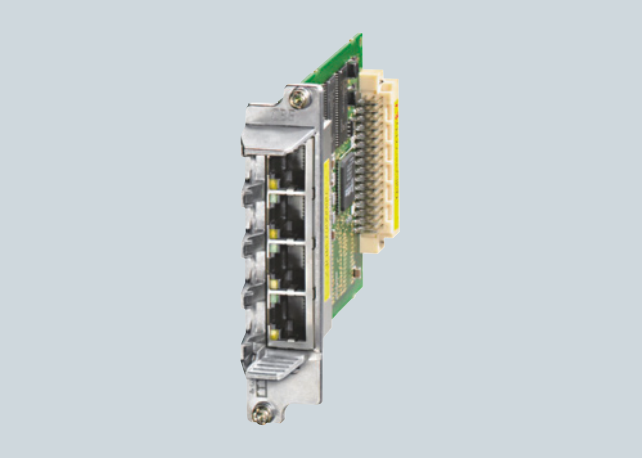
DC link voltage 510 ... 720 V DC		6SE6400-4BD11-0AA0	6SL3201-0BE12-0AA0	6SE6400-4BD16-5CA0	6SE6400-4BD21-2DA0	6SE6400-4BD22-2EA0	6SE6400-4BD24-0FA0
Product name		Braking resistor					
Resistance	Ω	390	160	56	27	15	8.2
Rated power P_{DB}	kW	0.1	0.2	0.65	1.2	2.2	4.0
Peak power P_{max}	kW	1.7	4.1	12	24	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 Module, blocksize format		FSA	FSB	FSC	FSD	FSE	FSF

[1] With correctly connected load connection cable.

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CBE20 Communication Board

Overview



The CBE20 Communication Board can be used to connect to a PROFINET IO network via a CU320 Control Unit.

The SINAMICS S120/SINAMICS G130 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 Control Unit.

Technical specifications

Product name	CBE20 Communication Board
Current requirement At 24 V DC	0.16 A
Ambient temperature, perm.	
• Storage and transport	-40 … +70 °C (-40 ... +158 °F)
• Operation	0 … 55 °C (32 ... 131 °F)
Dimensions	130 mm × 78 mm (5.12 in x 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 145 (1 unit)	**6GK1901-1BB30-0AA0**
• RJ45 plug 145 (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**

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

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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 be operated on a CU320 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 electronics 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 a multi-color LED.

Integration

The CUA31 Control Unit Adapter is snapped onto the Power Module in blocksize format and communicates with the CU320 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 devices such as Sensor Modules or Terminal Modules can be connected to the Control Unit Adapter.

Selection and ordering data

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

Technical specifications

Product name	CUA31 Control Unit Adapter
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

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Overview



CUA32 Control Unit Adapter

The CUA32 Control Unit Adapter converts the PM-IF interface to a DRIVE-CLiQ interface. The CUA32 Control Unit Adapter is also equipped with integral HTL/TTL encoder evaluation. With the CUA32 Control Unit Adapter, Power Modules in blocksize format can be operated on a CU320 Control Unit or on an NCU 7.x of the SINUMERIK.

Design

The CUA32 Control Unit Adapter features the following interfaces:

- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses)
- 1 encoder evaluator for
  - Incremental encoder TTL/HTL
  - SSI encoder without incremental signals

The status of the CUA32 Control Unit Adapter is indicated via a multi-color LED.

Integration

The CUA32 Control Unit Adapter is snapped onto the Power Module in blocksize format and communicates with the CU320 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 devices such as Sensor Modules or Terminal Modules can be connected to the Control Unit Adapter.

Selection and ordering data

Description	Order No.
CUA32 Control Unit Adapter Without DRIVE-CLiQ cable	**6SL3040-0PA01-0AA0**
Accessories for re-ordering	
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

Technical specifications

Product name	CUA32 Control Unit Adapter
Current requirement, max. At 24 V DC without DRIVE-CLiQ supply	0.15 A for CUA32 + max. 0.5 A for PM340 Power Module
Conductor cross-section, max.	2.5 mm^2
Power loss	< 4 W
Encoder evaluation	TTL or HTL incremental encoders (parameterizable)
Encoder supply	24 V DC/0.35 A or 5 V DC/0.35 A
Limiting frequency	300 kHz
Cable length, max.	
• For TTL incremental encoder (only bipolar signals permitted)	100 m (328 ft)
• For HTL incremental encoder	
- For unipolar signals	100 m (328 ft)
- For bipolar signals	300 m (984 ft)
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.	0.32 kg (0.71 lb)
Approvals, according to	cULus

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DMC20 DRIVE-CLiQ Hub Module

Overview



DMC20 DRIVE-CLiQ Hub Module

The DMC20 DRIVE-CLiQ Hub Module is used to implement star-shaped distribution 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 devices
- 1 connection for the electronics power supply via the 24 V DC supply connector

The status of the DMC20 DRIVE-CLiQ Hub Module is indicated via a multi-color LED.

Selection and ordering data

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

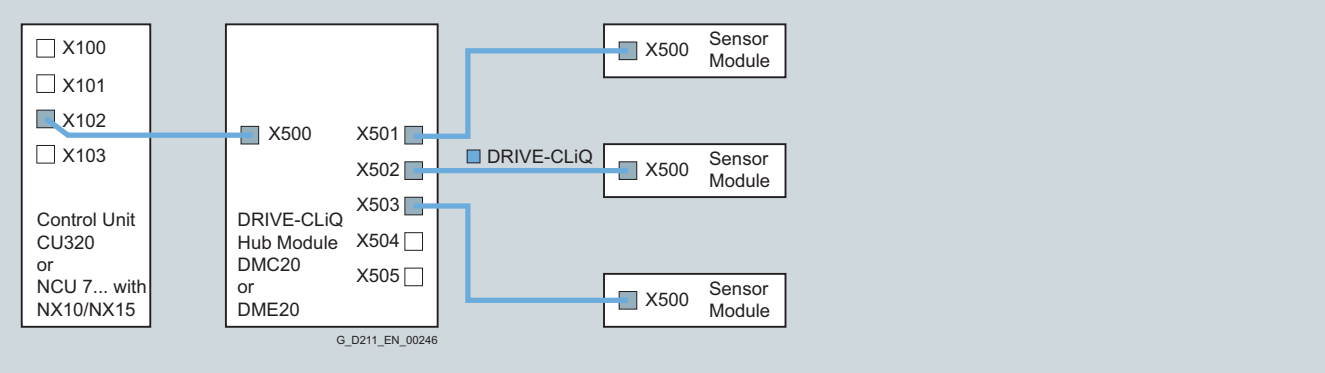
Technical specifications

Product name	DMC20 DRIVE-CLiQ Hub Module
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

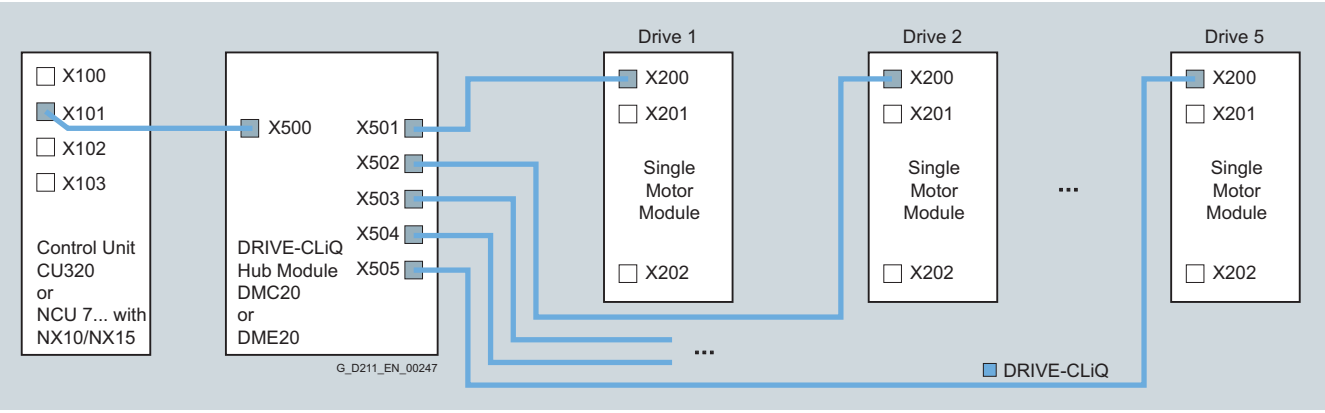
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Integration

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.



The DRIVE-CLiQ Hub Module allows individual DRIVE-CLiQ devices to be removed without interrupting the data exchange with the remaining devices in the DRIVE-CLiQ line.



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DME20 DRIVE-CLiQ Hub Module

Overview



DME20 DRIVE-CLiQ Hub Module

The DME20 DRIVE-CLiQ Hub Module is used to implement star-shaped distribution 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 devices
- 1 connection for the electronics power supply via the 24 V DC circular supply connector with conductor cross-section 4 × 0.75 mm^2 (pins 1+2 internally bridged; pins 3+4 internally bridged)

Selection and ordering data

Description	Order No.
DME20 DRIVE-CLiQ Hub Module Without DRIVE-CLiQ cable; without electronics power supply cable and circular connector for 24 V DC	**6SL3055-0AA00-6AB0**
Accessories	
24 V DC power supply cable	**Ordering and delivery Phoenix Contact** www.phoenixcontact.com
• Shielded connector, 5-pole, user-assembled	**Order No. 1508365**
• Non-shielded connector, 4-pole, user-assembled, Speedcon quick-lock	**Order No. 1521601**

Technical specifications

Product name	DME20 DRIVE-CLiQ Hub Module
Current requirement, max. At 24 V DC without DRIVE-CLiQ supply	0.15 A
• 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

Integration

Refer to DMC20 DRIVE-CLiQ Hub Module.

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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 electronics 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 in accordance with EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM15 Terminal Module via a shield connection terminal, e.g., Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection 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 a CU310, CU320 or SINUMERIK solution line 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	
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

Technical specifications

Product name	TM15 Terminal Module
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/O	
• Digital inputs/outputs	Parameterizable channel-by-channel as DI or DO
• Number of digital inputs/outputs	24
• 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	50 µs
- H → L	100 µs
Digital outputs Sustained short-circuit-proof	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (ohmic load)[1]	
- L → H, typ. L → H, max.	50 µs 100 µs
- H → L, typ. H → L, max.	150 µs 225 µs
• Aggregate 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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TM31 Terminal Module

Overview



With the TM31 Terminal Module, the number of available digital inputs and outputs and the number of analog inputs and outputs within a drive system can be expanded.

The TM31 Terminal Module also features relay outputs with changeover contact and a temperature sensor input.

Design

The following are located on the TM31 Terminal Module:

- 8 digital inputs
- 4 bidirectional digital inputs/outputs
- 2 relay outputs with changeover contact
- 2 analog inputs
- 2 analog outputs
- 1 temperature sensor input (KTY84-130 or PTC)
- 2 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The TM31 Terminal Module can be snapped on a TH 35 top-hat rail in accordance with EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM31 Terminal Module via a shield connection terminal, e.g., Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection terminal must not be used for strain relief.

The status of the TM31 Terminal Module is indicated via a multi-color LED.

Integration

The TM31 Terminal Module communicates with a CU310, CU320 or SINUMERIK Control Unit via DRIVE-CLiQ.

Selection and ordering data

Description	Order No.
TM31 Terminal Module Without DRIVE-CLiQ cable	**6SL3055-0AA00-3AA1**
Accessories for re-ordering	
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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Technical specifications

Product name	TM31 Terminal Module
Current requirement, max. At 24 V DC without taking account of digital outputs and DRIVE-CLiQ supply	0.5 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Digital inputs In accordance with IEC 61131-2 Type 1	
• 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 times of digital inputs[1], approx.	
- L → H	50 µs
- H → L	100 µs
• Conductor cross-section, max.	1.5 mm^2
Digital outputs Sustained short-circuit-proof	
• Voltage	24 V DC
• Load current per digital output, max.	100 mA
• Aggregate current of digital outputs, max.	400 mA
• Delay times of digital outputs[1]	
- Typ.	150 µs with 0.5 A resistive load
- Max.	500 µs
• Conductor cross-section, max.	1.5 mm^2
Analog inputs (a switch is used to toggle between voltage and current input)	
• As voltage input	
- Voltage range	-10 … +10 V
- Internal resistance R_i	100 kΩ
- Resolution[2]	11 bit + sign
• As current input	
- Current range	4 … 20 mA, -20 … +20 mA, 0 … 20 mA
- Internal resistance R_i	250 Ω
- Resolution[2]	10 bit + sign
• Conductor cross-section, max.	1.5 mm^2

Product name	TM31 Terminal Module
Analog outputs Sustained short-circuit-proof	
• Voltage range	-10 … +10 V
• Load current, max.	-3 … +3 mA
• Current range	4 … 20 mA, -20 … +20 mA, 0 … 20 mA
• Load resistance, max.	500 Ω for outputs in the range -20 … +20 mA
• Resolution	11 bit + sign
• Conductor cross-section, max.	1.5 mm^2
Relay outputs (changeover contacts)	
• Load current, max.	8 A
• Operational voltage, max.	250 V, AC, 30 V DC
• Switching capacity, max.	
- At 250 V AC	2000 VA (cos φ = 1) 750 VA (cos φ = 0.4)
- At 30 V DC	240 W (resistive load)
• Required minimum current	100 mA
• Conductor cross-section, max.	2.5 mm^2
Power loss	< 10 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.	0.87 kg (1.92 lb)
Approvals, according to	cULus

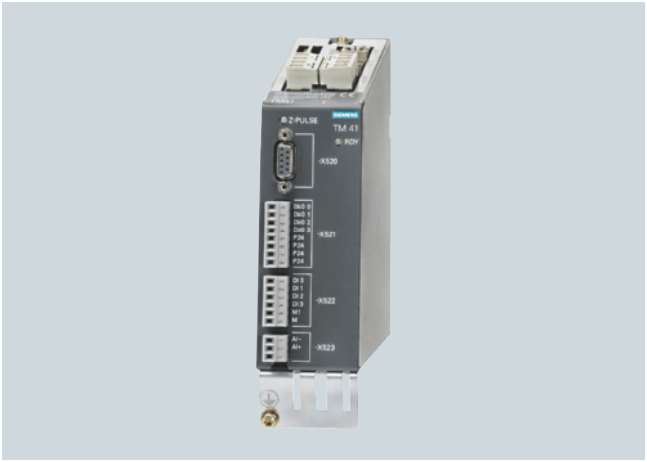
[1] The specified delay times refer to the hardware. The actual reaction time depends on the time slot in which the digital input is processed.

[2] If the analog input is to be operated in the signal processing sense with continuously variable input voltage, the sampling frequency $f_a = 1/t_{time\ slice}$ must be at least twice the value of the highest signal frequency f_{max}.

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TM41 Terminal Module

Overview



The TM41 Terminal Module supplies TTL signals which emulate an incremental encoder, e.g. to a higher-level control. The encoder interface (incremental encoder simulation) 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 simulation 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 to digital outputs
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The TM41 Terminal Module can be snapped on a TH 35 top-hat rail in accordance with EN 60715 (IEC 60715).

The signal cable shield can be connected to the TM41 Terminal Module via a shield connection terminal, e.g., Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection terminal must not be used for strain relief.

The status of the TM41 Terminal Module is indicated via a multi-color LED.

A 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 a CU310, CU320 or 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	
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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Technical specifications

Product name	TM41Terminal Module
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/O	
• Digital inputs/outputs	Individually parameterizable as DI or DO
• Number of digital inputs/outputs	4
• Number of digital input/outputs (with 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

Product name	TM41 Terminal Module
Digital outputs Sustained short-circuit-proof	
• Voltage	24 V DC
• Load current per digital output, max.	0.5 A
• Delay times (ohmic 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
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 (evaluation for resolver available soon)
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 is processed.

[2] If the analog input is to be operated in the signal processing sense with continuously variable input voltage, the sampling frequency $f_a = 1/t_{time\ slice}$ must be at least twice the value of the highest signal frequency f_{max}.

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VSM10 Voltage Sensing Module

Overview



The VSM10 Voltage Sensing Module can detect the exact line voltage characteristic and supports fault-free operation of Line Modules when power supply conditions are unfavorable, e.g. with severe voltage fluctuations or short-time interruptions.

The VSM10 Voltage Sensing Module is integrated in chassis format Active Interface Modules and chassis format Smart Line Modules. It can be used optionally with all booksize format Active Line Modules and 16 kW or 36 kW Smart Line Modules.

Design

The VSM10 Voltage Sensing Module has the following interfaces:

- 1 connection for direct line voltage detection up to 690 V
- 1 connection for line voltage detection using voltage transformers, maximum voltage 100 V
- 2 analog inputs (reserved for resonance monitoring in Active Interface Modules in chassis format)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 DRIVE-CLiQ socket
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE/protective conductor connection

The VSM10 Voltage Sensing Module can be snapped on a TH 35 top-hat rail in accordance with EN 60715 (IEC 60715).

The status of the VSM10 Voltage Sensing Module is indicated by a two-color LED.

Integration

The VSM10 Voltage Sensing Module communicates with the CU320 Control Unit or with the NCU 7.x of the SINUMERIK via DRIVE-CLiQ.

Technical specifications

Product name	VSM10 Voltage Sensing Module
Current requirement, max. at 24 V DC	0.2 A
• Conductor cross-section, max.	2.5 mm^2
Power loss, approx.	7.2 W
Line voltage detection	
• Input resistance	
- Terminal X521	> 362 kΩ/phase
- Terminal X522	> 2.5 MΩ/phase
Analog inputs Reserved for monitoring an Active Interface Module in chassis format	
• Internal resistance (between differential inputs)	approx. 100 kΩ
• Resolution	12 bit
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.	0.9 kg (1.98 lb)
Approvals, according to	cULus

Selection and ordering data

Description	Order No.
VSM10 Voltage Sensing Module Without DRIVE-CLiQ cable	**6SL3053-0AA00-3AA0**
Accessories for re-ordering	
Dust-proof blanking plugs (50 units) For DRIVE-CLiQ port	**6SL3066-4CA00-0AA0**

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Overview



In the case of the Safe Brake Relay, the brake is controlled in accordance with EN 954-1 safety class 3 and IEC 61508 SIL2 (available soon)

Design

The Safe Brake Relay can be installed below the Power Module on the shield connection plate.

Two cable harnesses are included in the scope of supply for connecting to the CTRL socket of the PM340 Power Module:

- 0.32 m (1.05 ft) length for frame sizes FSA to FSC
- 0.55 m (1.8 ft) length for frame sizes FSD to FSF

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.

Integration

The 24 V DC coil 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
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 coil)
Current requirement	
• Of motor brake, max.	2 A
• At 24 V DC, max.	0.3 A + the current requirement of 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**

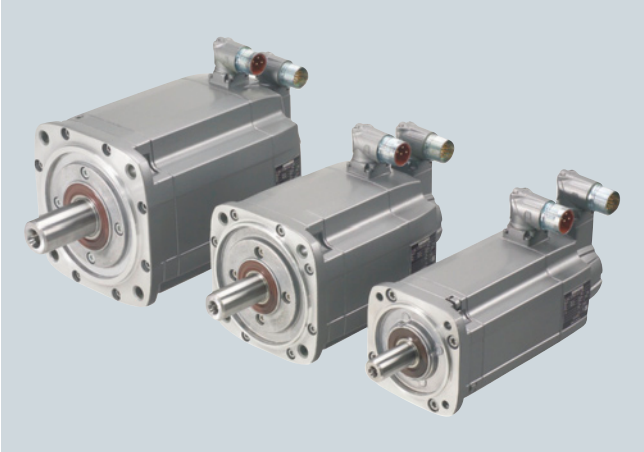
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Encoder system connection

Overview

Motors with DRIVE-CLiQ interface



DRIVE-CLiQ is the preferred method for connecting the encoder systems to SINAMICS S120.

Motors with DRIVE-CLiQ interface are available for this purpose, e.g.

- 1PH8/1FT6/1FT7/1FK7 synchronous motors
- 1PH8/1PH7/1PH4 asynchronous motors

Motors with DRIVE-CLiQ interface can be directly connected to the associated Motor Module via the available MOTION-CONNECT DRIVE-CLiQ cables. The connection of the MOTION-CONNECT DRIVE-CLiQ cable at the motor has degree of protection IP67.

The DRIVE-CLiQ interface supplies the motor encoder via the integrated 24 V DC supply and transfers the motor encoder and temperature signals and the electronic rating plate data, e.g. the unique identification number, rated 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 interface, 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 4194304, internal 2048 S/R) + commutating position 11 bit (encoder IC22DQ) • Absolute encoder (resolution 4194304, internal 2048 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ) • Absolute encoder 20 bit single-turn (resolution 1048576, internal 512 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM20DQ) • Absolute encoder 16 bit single-turn (resolution 65536, internal 32 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM16DQ) • Absolute encoder 15 bit single-turn (resolution 32768, internal 16 S/R) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM15DQ) • Resolver 15 bit (resolution 32768, internal, multi-pole) (R15DQ) • Resolver 14 bit (resolution 16384, internal, 2-pole) (R14DQ)
Current requirement at 24 V DC, max. (supplied over DRIVE-CLiQ MOTION-CONNECT 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 should be connected to the corresponding Motor Module or Power Module if possible. External encoders should be connected to the Control Unit. The DRIVE-CLiQ connections can, however, also be bundled via the DRIVE CLiQ Hub Module.

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SMC10 Sensor Module Cabinet-Mounted

Overview



The SMC10 Sensor Module Cabinet-Mounted is required to evaluate the encoders 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
- Multipole resolver

Design

The SMC10 Sensor Module Cabinet-Mounted features the following 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 electronics 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 on a TH 35 top-hat rail in accordance with 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 connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Integration

SMC10 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical specifications

Product name	SMC10 Sensor Module Cabinet-Mounted
Current requirement, max. At 24 V DC, not taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss, max.	10 W
Encoders which can be evaluated	• 2-pole resolver • Multipole 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 number of resolver pole pairs and 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
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.
SMC10 Sensor Module Cabinet-Mounted Without DRIVE-CLiQ cable	**6SL3055-0AA00-5AA0**

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SMC20 Sensor Module Cabinet-Mounted

Overview



The SMC20 Sensor Module Cabinet-Mounted is required to evaluate the encoders 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[1] with incremental signals sin/cos 1 V_{pp} (firmware version 2.4 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 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 electronics 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 on a TH 35 top-hat rail in accordance with 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 connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Integration

SMC20 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical specifications

Product name	SMC20 Sensor Module Cabinet-Mounted
Current requirement, max. At 24 V DC, not taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss, max.	10 W
Encoders which can be evaluated	• Incremental encoder sin/cos 1 V_{pp} • Absolute encoder EnDat • SSI encoder[1] with incremental signals sin/cos 1 V_{pp} (firmware version 2.4 and later)
• Encoder 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
Degree of protection	IP20
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	**6SL3055-0AA00-5BA2**

[1] Only encoders with 5 V supply voltage.

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SMC30 Sensor Module Cabinet-Mounted

Overview



The SMC30 Sensor Module Cabinet-Mounted is required to evaluate the encoders 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 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 electronics 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 signals A*, A and B*, B 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 connection terminal, e.g. Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1.

Integration

SMC30 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Technical specifications

Product name	SMC30 Sensor Module Cabinet-Mounted
Current requirement, max. At 24 V DC, not taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm^2
• Fuse protection, max.	20 A
Power loss, max.	10 W
Encoders which can be evaluated	• Incremental encoder TTL/HTL • SSI encoder with TTL/HTL incremental signals • SSI encoder without incremental signals
• Encoder 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
Degree of protection	IP20
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**

[1] Signal cables twisted in pairs and shielded.

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SME20/SME25 Sensor Modules External

Overview



SME20/SME25 Sensor Modules External are encoder evaluation units for machine encoders (direct measuring systems). The enclosures 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/D track)
- 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 6FX8002-2CA88-...

- KTY/PTC temperature sensors can be used for evaluation of the motor temperature.
- The Sensor Module is only suitable for motors without absolute track signals (C/D track):
  - Asynchronous motors (e.g. 1PH)
  - Synchronous motors with pole position identification (e.g. 1FN, 1FW, 1FE)

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 interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connector via circular plug
- 24 V DC electronics power supply via DRIVE-CLiQ link from the Control Unit/Motor Module
- 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, for connecting 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.

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

[2] For length code, see MOTION-CONNECT Connection system

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Technical specifications

Product name		SME20 Sensor Module External	SME25 Sensor Module External
Encoders		• Incremental encoder sin/cos 1 V_{pp} with 5 V power supply 0.3 A	• Absolute encoder EnDat with 5 V power supply 0.3 A • Absolute encoder SSI with incremental signals sin/cos 1 V_{pp} with 5 V voltage supply 0.3 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-pole M23 circular connector	17-pole M23 circular connector
Output		IP67 DRIVE-CLiQ connector	IP67 DRIVE-CLiQ connector
Current requirement At 24 V DC, max. not taking encoder into account	A	0.11	0.11
• Conductor cross-section, max.		Acc. to connector contacts	Acc. to connector contacts
• Fuse protection, max.		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 wire in the cable. However, the maximum length is 10 m (32.8 ft) (for further details, see the Equipment Manual "SINAMICS S120 Control Units and additional system components").

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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 and PTC thermistors.

Design

SME120/SME125 Sensor Modules External feature the following interfaces as standard:

- 1 DRIVE-CLiQ interface
- 1 encoder connection via circular connector
- 1 temperature sensor connection via circular connector
- 1 hall-effect sensor connection via circular connector (SME120 only)
- 24 V DC electronics power supply via DRIVE-CLiQ link from the Control Unit or Motor Module
- 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-effect sensor input (connector kits, 9-pole)	**6FX2003-0SU01**
Connector for SME120 encoder system interface (connector kits, 12-pole)	**6FX2003-0SA12**
Connector for SME125 encoder system interface (connector kits, 17-pole)	**6FX2003-0SA17**

[1)] For SME125, only SSI encoders with 5 V supply voltage.

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Technical specifications

Product name		SME 120 Sensor Module External	SME 125 Sensor Module External
Encoders		• Incremental encoder sin/cos 1 V_{pp} with 5 V voltage supply	• Absolute encoder EnDat with 5 V voltage 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-pole M23 circular connector	17-pole M23 circular connector
Temperature sensor input		6-pole M17 circular connector	6-pole M17 circular connector
Hall-effect sensor input		9-pole M23 circular connector	–
Output		IP67 DRIVE-CLiQ connector	IP67 DRIVE-CLiQ connector
Current requirement At 24 V DC, max. not taking encoder into account	A	0.16	0.16
• Current carrying capacity of the encoder supply, max. for measuring system (at 5 V DC) and, where applicable, including hall-effect sensor box	A	0.3	0.3
• Conductor cross-section, max.		Acc. to connector contacts	Acc. to connector contacts
• Fuse protection, max.		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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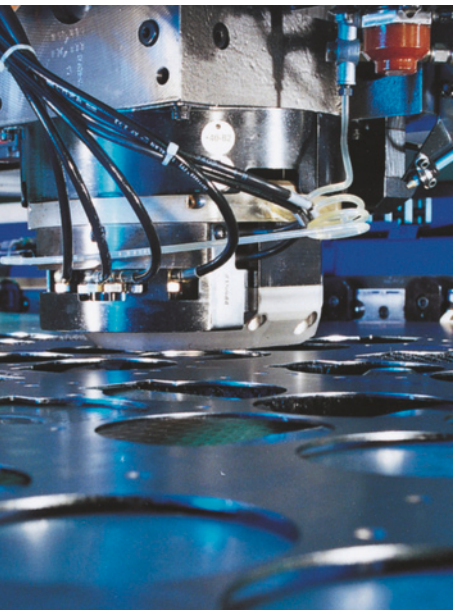
1) The maximum cable length for the encoder system interface depends on the current consumption of the encoder system and the cross-section of the wire in the cable. However, the maximum length is 10 m (32.8 ft) (for further details, see the Equipment Manual "SINAMICS S120 Control Units and additional system components").

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Notes

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Synchronous motors



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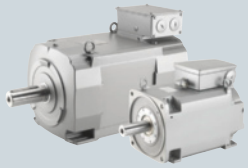
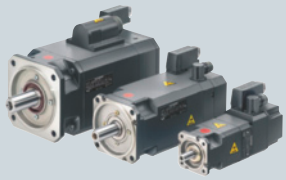
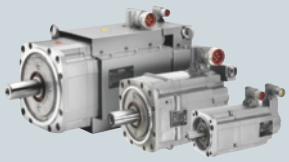
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Part 11 **CAD CREATOR**
Dimension drawing and 2D/3D CAD generator
www.siemens.com/cadcreator

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Type overview and rated data

Motor type	Designation	Degree of protection	Cooling method
 **1PH8**	Synchronous motor, permanent-magnet-excited Feed motor	IP55[1)] IP55/IP65[2)]	Forced ventilation Water cooling
 **1FT6**	Synchronous motor, permanent-magnet-excited Feed motor – High Performance	IP64 (optional IP65, IP67, IP68)	Natural cooling Forced ventilation Water cooling
 **1FT7** Compact	Synchronous motor, permanent-magnet-excited Feed motor – Compact Low torque ripple	IP64[3)] (optional IP65, IP67)	Natural cooling Forced ventilation Water cooling
1FT7 High Dynamic	Synchronous motor, permanent-magnet-excited Feed motor – High Dynamic Very low rotor moment of inertia	IP64 (optional IP65, IP67)	Forced ventilation Water cooling
 **1FK7** Compact	Synchronous motor, permanent-magnet-excited Feed motor – Compact Very high power density	IP64[4)] (optional IP65, IP67)	Natural cooling
1FK7 High Dynamic	Synchronous motor, permanent-magnet-excited Feed motor – High Dynamic Very low rotor moment of inertia	IP64[4)] (optional IP65, IP67	Natural cooling
1FK7 High Inertia	Synchronous motor, permanent-magnet-excited Feed motor – High Inertia High and variable load moment of inertia	IP64[4)] (optional IP65, IP67)	Natural cooling
 **1FK7-DYA**	Synchronous motor, permanent-magnet-excited Compact geared motor 1FK7 Compact with integrated single-stage gearbox	IP64	Natural cooling

[1)] Fan: IP55, optional: IP66.
[2)] SH 180 and higher: IP55.
[3)] Core type: IP65.
[4)] DE flange: IP67.

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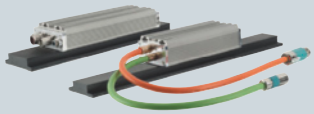
Type overview and rated data

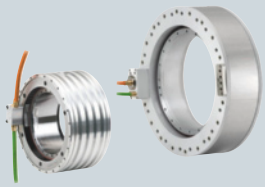
Shaft height	Rated power P_{rated} for S1 duty kW (HP)	Rated torque M_{rated}	Selection and ordering data
	0.01 0.1 1 10 100 1000		Page
SH 132	15.7 (21.1) – 57.5 (77.1)	96 ... 195 Nm (70.8 ... 144 lb_f-ft)	7/8 ... 7/9
SH 132/SH 180/SH 225	17.6 (23.6) – 228 (306)	109 ... 1651 Nm (80.4 ... 1218 lb_f-ft)	7/8 ... 7/11
SH 28/SH 36/SH 48/ SH 63/SH 80/SH 100/ SH 132	0.19 (0.3) – 15.5 (20.8)	0.3 ... 88 Nm (2.7 ... 779 lb_f-in)	7/18 ... 7/29
SH 80/SH 100/SH 132	6.9 (9.25) – 45.5 (61.0)	17 ... 160 Nm (150 ... 1416 lb_f-in)	7/30 ... 7/33
SH 63/SH 80/SH 100/ SH 132	3.2 (4.29) – 72 (96.6)	9.8 ... 290 Nm (86.7 ... 2567 lb_f-in)	7/34 ... 7/39
SH 36/SH 48/SH 63/ SH 80/SH 100	0.85 (1.14) – 10.47 (14)	1.4 ... 61 Nm (12.4 ... 540 lb_f-in)	7/42 ... 7/47
SH 80/SH 100	5 (6.71) – 15.1 (20.2)	21 ... 56 Nm (186 ... 496 lb_f-in)	7/48 ... 7/49
SH 63/SH 80/SH 100	3.1 (4.16) – 34.2 (45.9)	9.2 ... 125 Nm (81.4 ... 1106 lb_f-in)	7/50 ... 7/53
SH 63/SH 80	3.8 (5.10) – 10.8 (14.5)	11 ... 33 Nm (97.4 ... 292 lb_f-in)	7/54 ... 7/55
SH 63/SH 80	5.7 (7.64) – 21.7 (29.1)	16.5 ... 51 Nm (146 ... 451 lb_f-in)	7/54 ... 7/55
SH 20/SH 28/SH 36/ SH 48/SH 63/SH 80/ SH 100	0.05 (0.07) – 8.17 (11)	0.08 ... 37 Nm (0.71 ... 327 lb_f-in)	7/58 ... 7/61 7/64 ... 7/65
SH 20/SH 28/SH 36/ SH 48/SH 63/SH 80	0.05 (0.07) – 3.77 (5.06)	0.08 ... 18 Nm (0.71 ... 159 lb_f-in)	7/62 ... 7/63 7/64 ... 7/65
SH 48/SH 63/SH 80	0.9 (1.21) – 3.1 (4.16)	1.5 ... 15 Nm (13.3 ... 133 lb_f-in)	7/66 ... 7/67
SH 36/SH 48/SH 63/ SH 80	0.37 (0.5) – 1.88 (2.52)	6.5 ... 70 Nm (57.5 ... 620 lb_f-in)	7/88 ... 7/89

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Type overview and rated data

Motor type	Designation	Degree of protection	Cooling method
 **1FN3**	Synchronous linear motor, permanent-magnet-excited Direct drive	IP65	Water cooling
 **1FN6**	Synchronous linear motor, permanent-magnet-excited Direct drive	Primary section: IP65[1)]	Natural cooling Water cooling

Motor type	Designation	Degree of protection	Cooling method
 **1FW6**	Synchronous motor with permanent-magnet rotor, multi-pole Built-in torque motor for direct drive	IP23[2)]	Water cooling

Motor type	Designation	Degree of protection	Cooling method
 **1FE1**	Synchronous spindle with permanent-magnet rotor Built-in motor Main spindle motor	IP00	Water cooling
 **2SP1**	Motor spindle in synchronous and asynchronous design Main spindle motor	Working area: IP64 Behind spindle flange: IP53	Water cooling

Application

There are many fields of application for the 1PH8/1FT6/1FT7/1FK7/1FN3/1FN6/1FW6 synchronous motors.

On machine tools, they are designated and used as feed motors.

On production machines such as printing, packaging and textile machines they are designated as synchronous servo motors.

The motors are referred to generally in this documentation as synchronous motors, due to their principle of operation.

The 1FE1 built-in motors are used as motor spindles in machine tools for turning, milling, or grinding. The 2SP1 motor spindles are a motorized spindle series used in machine tools for milling.

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

[2)] The final degree of protection (minimum degree of protection is IP54) for the installed motor is determined by the machine manufacturer.

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Type overview and rated data

Primary section width mm	Feedrate force F_{rated} N (lb_f)	Velocity v_{MAX} at F_{rated}	Selection and ordering data
	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) Continuous load: 150 (33.7) … 10375 (2332)	105 … 836 m/min (345 … 2743 ft/min) 129 … 435 m/min (423 … 1427 ft/min)	7/92 … 7/95 7/96 … 7/97
80/115/130/ 209/289	66.3 (14.9) … 3000 (674)	93.9 … 1280 m/min (308 … 4200 ft/min)	7/104 … 7/107
80/115	119 (26.8) … 1430 (321)	57.5 … 852 m/min (189 … 2795 ft/min)	7/108 … 7/109

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
Outer diameter 230/310/385/440/ 502/576/730	109 (965) … 5760 (50982)	38 … 650 rpm	7/112 … 7/121

Diameter mm	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		Page
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)	7/124 … 7/127
High-Speed series 120/155/180/205/ 230/270	6.5 (8.72) … 94 (126)	5 … 300 Nm (44.3 … 2655 lb_f-in)	7/128 … 7/131
Spindle diameter 200/250	12 (16.1) … 53.4 (71.6)	42 … 170 Nm (372 … 1505 lb_f-in)	7/136 … 7/137

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Application (continued)

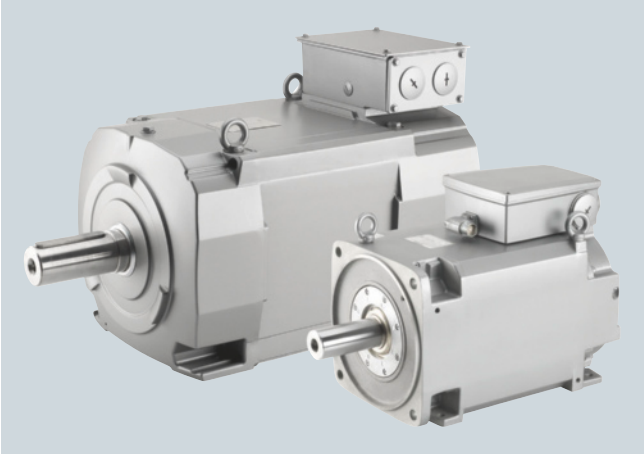
Core types can be supplied for certain motor types. These core types can be express delivered as replacement motors in the event of plant outages and offer the advantage of a quicker spare parts supply. For this reason, core types should be used for configuration wherever possible.

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.

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1PH8 motors

Overview



1PH8 motors are compact permanent-magnet synchronous motors with IP55/IP65 degree of protection and they extend and replace the current power spectrum of the well-proven 1FT series. The motors are available in different cooling types:

- Forced ventilation for SH 132
- Water cooling for SH 132/SH 180/SH 225

These 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.

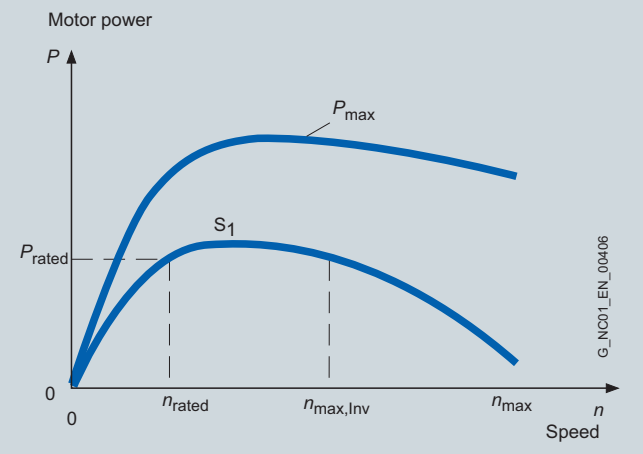
Benefits

- Broad power spectrum
- Diverse bearing concepts
- Different encoder types for closed-loop speed control and high-precision positioning mode
- Excellent performance features
  - Excellent rotational accuracy
  - Excellent vibration magnitudes
  - High dynamic performance (short ramp-up times)
- Low noise emission
- Simple and 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 1PH8 synchronous motors[1)]

The graph shows the typical relationship between motor speed and drive power for 1PH8 motors for S1 duty (continuous duty) in accordance with IEC 60034-1.

Data for S2 short-time duty and S6 continuous duty can be found in the 1PH8 Motors Configuration Manual.

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

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Technical specifications

Product name	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.)
- 1PH818	–	15 l/min (3.96 US gallons/min.)
- 1PH822	–	25 l/min (6.61 US gallons/min.)
• Connecting thread at NDE[1)]	–	G 3/8"
Ambient temperature, admissible	-15 ... +40 °C (5 ... 104 °F)	
Coolant inlet temperature	–	< 30 °C (86 °F)
Temperature monitoring	KTY 84 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)	
• 1PH813	Temperature class 155 (F)	
• 1PH818/1PH822	Temperature class 180 (H)	
Motor fan ratings	400 V 3 AC ± 10 %, 50 Hz 480 V 3 AC ± 10 %, 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 EN ISO 1680 Tolerance + 3 dB	Rated pulse frequency 4 kHz	Rated pulse frequency 4 kHz/2 kHz[2)]
• 1PH813	72 dB	68 dB
• 1PH818/1PH822	–	70 dB
Connection		
• 1PH813	Power connector or terminal box	
• 1PH818/1PH822	–	Terminal box
• Fan for 1PH813	Power connector or terminal box	–
• Encoder system	Connector for signals (without mating connector) or DRIVE-CLiQ	
Vibration magnitude	In accordance with Siemens/EN 60034-14 (IEC 60034-14)	
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[3)]	Tolerance R	
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)		
• 1PH813	IP55	IP65
• 1PH818/1PH822	–	IP55
• Fan	IP55, optional: IP66	–
Rating plate	1 unit attached to motor 1 unit supplied loose in terminal box	
Paint finish	Anthracite RAL 7016	
Approvals, according to	cURus	

S/R = signals/revolution

1) DE is the drive end with shaft. NDE is the non-drive end.
2) SINAMICS S120 booksize format: 4 kHz/chassis format: 2 kHz.
3) Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

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1PH8 motors, standard type – SH 132
Forced ventilation/water cooling

Selection and ordering data

Rated speed	Continuous speed, max.[1]	Operating speed, max.[2]	Rated power for S1 duty	Rated torque	Static torque	1PH8 synchronous motors Standard type
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	2500	15.7 (21.1)	100 (73.8)	105 (77.4)	**1PH8131-2■F ■■-■■■1**
2500	4500	4000	25 (33.5)	96 (70.8)	105 (77.4)	**1PH8131-2■L ■■-■■■1**
1500	4500	3000	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	2650	30.6 (41.0)	195 (144)	203 (150)	**1PH8137-2■F ■■-■■■1**
2500	4500	3850	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	3100	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	3400	30.6 (41.0)	146 (108)	155 (114)	**1PH8133-2■G 2■-■■■1**
1500	4500	2600	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	2300	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	3850	59.3 (79.5)	283 (209)	290 (214)	**1PH8138-2■G 2■-■■■1**

For versions, see Order number supplement and options.

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Motor type (repeated)	Effi-ciency	Moment of inertia	Weight, approx.	Rated current for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current[3] for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8131-2.F...	94.4	0.0446 (0.39)	85 (187)	29	30	30	**6SL312■-1TE23-0AA3**
1PH8131-2.L...	94.8			44	48	45	**6SL312■-1TE24-5AA3**
1PH8133-2.F...	94.8	0.0600 (0.53)	103 (227)	44	45	45	**6SL312■-1TE24-5AA3**
1PH8133-2.L...	95.1			55	59	60	**6SL312■-1TE26-0AA3**
1PH8135-2.F...	95.2	0.0750 (0.66)	120 (265)	43	44	45	**6SL312■-1TE24-5AA3**
1PH8135-2.G...	95.3			59	63	60	**6SL312■-1TE26-0AA3**
1PH8137-2.F...	95.2	0.0885 (0.78)	136 (300)	60	62	60	**6SL312■-1TE26-0AA3**
1PH8137-2.L...	95.4			83	89	85	**6SL312■-1TE28-5AA3**
1PH8137-2.M...	95.3			104[4]	115	132	**6SL312■-1TE31-3AA3**
1PH8131-2.F2...	94.6	0.0446 (0.39)	102 (225)	40	41	45	**6SL312■-1TE24-5AA3**
1PH8131-2.L2...	94.8			57	60	60	**6SL312■-1TE26-0AA3**
1PH8133-2.F2...	94.7	0.0600 (0.53)	120 (265)	42	43	45	**6SL312■-1TE24-5AA3**
1PH8133-2.G2...	95.0			57	61	60	**6SL312■-1TE26-0AA3**
1PH8135-2.F2...	95.0	0.0750 (0.66)	138 (304)	57	59	60	**6SL312■-1TE26-0AA3**
1PH8135-2.G2...	95.2			81	85	85	**6SL312■-1TE28-5AA3**
1PH8137-2.F2...	95.1	0.0885 (0.78)	153 (337)	58	60	60	**6SL312■-1TE26-0AA3**
1PH8137-2.G2...	95.4			85	90	85	**6SL312■-1TE28-5AA3**
1PH8138-2.F2...	95.8	0.0885 (0.58)	156 (344)	118	120	132	**6SL312■-1TE31-3AA3**
1PH8138-2.G2...	96.0			131	133	132	**6SL312■-1TE31-3AA3**

Format: Booksize	**1**	
Cooling: Internal air cooling		**0**
External air cooling		**1**
Motor Module: Single Motor Module		**1**

[1] Maximum speed which must not be exceeded.

[2] Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the converter (without protective circuit).

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

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1PH8 motors, standard type
SH 180/SH 225 – water cooling

Selection and ordering data

Rated speed	Continuous speed, max.[1]	Operating speed, max.[2]	Rated power for S1 duty	Rated torque	Static torque	1PH8 synchronous motors Standard type
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	1950	1950	61 (81.8)	583 (430)	600 (443)	**1PH8184-2■D2■-■■■1**
1500	2700	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	1450	1450	58 (77.8)	791 (583)	800 (590)	**1PH8186-2■C2■-■■■1**
1000	2050	2050	80 (107)	764 (564)	800 (590)	**1PH8186-2■D2■-■■■1**
1500	2950	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	1450	1450	72 (96.6)	982 (724)	1007 (743)	**1PH8224-2■C2■-■■■1**
1000	2050	2050	101 (135)	964 (711)	1007 (743)	**1PH8224-2■D2■-■■■1**
1500	2900	2900	151 (203)	961 (709)	1007 (743)	**1PH8224-2■F2■-■■■1**
2500	3500	3500	182 (244)	695 (513)	855 (631)	**1PH8224-2■L2■-■■■1**
700	1550	1550	95 (127)	1296 (956)	1330 (981)	**1PH8226-2■C2■-■■■1**
1000	1950	1950	135 (181)	1289 (951)	1330 (981)	**1PH8226-2■D2■-■■■1**
1500	2700	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	1450	1450	121 (162)	1651 (1218)	1680 (1239)	**1PH8228-2■C2■-■■■1**
1000	1950	1950	169 (227)	1614 (1190)	1680 (1239)	**1PH8228-2■D2■-■■■1**

For versions, see Order number supplement and options.

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Motor type (repeated)	Effi-ciency	Moment of inertia	Weight, approx.	Rated current for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current[3] for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8184-2.C2...	91.9	0.45 (3.98)	330 (728)	100	103	132	**6SL312■-1TE31-3AA3**
1PH8184-2.D2...	93.7			140	143	200	**6SL312■-1TE32-0AA3**
1PH8184-2.F2...	95.1			190	196	200	**6SL312■-1TE32-0AA3**
1PH8184-2.L2...	95.7			260	278	260	**6SL3320-1TE32-6AA0**
1PH8186-2.C2...	92.4	0.60 (5.31)	400 (882)	142	143	200	**6SL312■-1TE32-0AA3**
1PH8186-2.D2...	94.3			190	196	200	**6SL312■-1TE32-0AA3**
1PH8186-2.F2...	95.2			275	285	310	**6SL3320-1TE33-1AA0**
1PH8186-2.L2...	95.7			370	405	380	**6SL3320-1TE33-8AA0**
1PH8224-2.C2...	94.7	1.28 (11.3)	580 (1279)	180	183	200	**6SL312■-1TE32-0AA3**
1PH8224-2.D2...	95.6			255	262	260	**6SL3320-1TE32-6AA0**
1PH8224-2.F2...	96.2			355	367	380	**6SL3320-1TE33-8AA0**
1PH8224-2.L2...	96.1			365	460	380	**6SL3320-1TE33-8AA0**
1PH8226-2.C2...	95.2	1.66 (14.7)	700 (1544)	255	260	260	**6SL3320-1TE32-6AA0**
1PH8226-2.D2...	96.0			325	330	380	**6SL3320-1TE33-8AA0**
1PH8226-2.F2...	96.5			445	454	490	**6SL3320-1TE35-0AA0**
1PH8226-2.L2...	96.2			400	532	380	**6SL3320-1TE33-8AA0**
1PH8228-2.C2...	95.5	2.02 (17.9)	810 (1786)	305	306	310	**6SL3320-1TE33-1AA0**
1PH8228-2.D2...	96.2			395	408	490	**6SL3320-1TE35-0AA0**

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 which must not be exceeded.

2) Maximum permissible operating speed based on the induced voltage in the motor and the voltage stability of the converter (without protective circuit).

3) Compliance with the rated pulse frequencies is essential; the rated motor data is valid for 4 kHz (booksize format) or 2 kHz (chassis format).

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1PH8 motors, standard type
Forced ventilation/water cooling

Order number supplement for shaft height 132

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**
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 single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)										**E**										
Encoder systems for motors with DRIVE-CLiQ interface																				
22 bit incremental encoder (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)										**D**										
22 bit absolute encoder single-turn (resolution 4194304, internal 2048 S/R) with 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)										**F**										
Rated speed (winding version)																				
Cooling																				
Forced ventilation DE → NDE												**0**								
Forced ventilation NDE → DE												**1**								
Water cooling												**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**					
Fitted key	Full-key														**1**					
Fitted key	Half-key														**2**					
Bearing version	**Vibration magnitude acc. to Siemens[1]/EN 60034-14**								**Shaft and flange accuracy**											
Standard	R/A								R							**B**				
Standard	S/A								R							**C**				
Advanced Lifetime	S/A								R							**Q**				
Power connection (view of DE)	**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[2]	Right								DE								**E**			
Power connector top[2]	Left								DE								**F**			
Power connector top[2]	NDE								Left								**G**			
Power connector top[2]	DE								Left								**H**			
Version status																		**1**		
Special version (order codes are required for options)																				**Z**

[1] For a definition of vibration magnitude according to Siemens, please see 1PH8 Motors Configuration Manual.

[2] Power connectors only possible up to a maximum static current of I_0 = 85 A.

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Order number supplement for shaft heights 180 and 225

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**	■	**.**	**2**	■	**–**	■	■	■	**1**	**–**	**Z**
Shaft height 225	**1**	**P**	**H**	**8**	**2**	**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 single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)										**E**										
Encoder systems for motors with DRIVE-CLiQ interface																				
22 bit incremental encoder (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)										**D**										
22 bit absolute encoder single-turn (resolution 4194304, internal 2048 S/R) with 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)										**F**										
Rated speed (winding version)																				
Cooling																				
Water cooling												**2**								
Type of construction																				
IM B3 (IM B6, IM B7, IM B8, IM V6)													**0**							
IM V5													**1**							
IM B5 (IM V3)[1]													**2**							
IM B35 (IM V35)													**3**							
IM V15 (Not possible for belt output)													**5**							

Shaft extension DE	**Balancing**		
Plain shaft	–		**0**
Fitted key	Full-key		**1**
Fitted key	Half-key		**2**

Bearing version	**Vibration magnitude acc. to Siemens[2]/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 (view of DE)	**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] With 1PH818, continuous speed n_{max} = 3000 rpm.
With 1PH822, continuous speed n_{max} = 2500 rpm.

[2] For a definition of vibration magnitude according to Siemens, please see 1PH8 Motors Configuration Manual.

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1PH8 motors, standard type
Forced ventilation/water cooling

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.	Used with motors 1PH813	 1PH818 1PH822
A12	Additional PTC thermistor chain for alarm and tripping (Only possible for versions with terminal box.)	✔	✔
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 entry 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 entry DE/signal connection top (Only possible if 15th data position: A)	–	✔
K18	Radial shaft sealing ring DE 2) (Not possible if 14th data position: F, L or M)	✔	✔
K40	Regreasing system, DE and NDE	–	✔
K83	Terminal box 3) rotated through + 90°	–	✔
K84	Terminal box 3) rotated through – 90°	–	✔
K85	Terminal box 3) rotated through + 180°	–	✔
K90	Version with flange size A400 (Only possible if 12th data position: 2, 3 or 5)	–	✔ With 1PH818 only
L00	Replace terminal box (standard) with the next largest terminal box (Note dimension implications in CAD CREATOR.)	–	✔
P00	Undrilled cable entry plate	–	✔
P01	Cable entry plate 3 × M63 × 1.5 (Only with terminal box type 1XB7700-P02)	–	✔
L74	Fan in IP66 degree of protection	✔	–
	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, another terminal box type is used for side mounting. gk843 is used instead of gk833. Only pssible for types of construction IM B3 or IM B35.

2) Only appropriate if oil spray or oil vapor is occasionally deposited on the sealing ring.

3) Only possible in conjunction with option K09 or K10.

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Terminal box assignment, max. connectable conductor cross-sections

1PH8 motor Type		Terminal box Type	Cable entry Power	External signals	Outer cable diameter, max.[1] mm (in)	Number of main terminals	Cross-section per terminal, max. mm²	Rated current, max.[2] A
1PH813	Forced ventilation	gk833	1 × M40 × 1.5	1 × Ø 22 mm (0.87 in)[3]	32 (1.26)	Phases: 3 × M6 Grounding: 2 × M6	1 × 35	104
	Water cooling/ Forced ventilation with options K09 or K10	gk843	1 × M50 × 1.5	1 × Ø 22 mm (0.87 in)[3]	38 (1.50)	Phases: 3 × M6 Grounding: 2 × M6	1 × 50	125
1PH818 1PH822		1XB7322-P05 5)	2 × M50 × 1.5	1 × PG 13.5[4]	38 (1.50)	Phases: 3 × M12 Grounding: 2 × fixing eyelet	2 × 50	210
		1XB7422-P06 6)	2 × M63 × 1.5	1 × PG 13.5[4]	53 (2.09)	Phases: 3 × M12 Grounding: 2 × fixing eyelet	2 × 70	270
		1XB7700-P02 7)	2 × M75 × 1.5	1 × PG 13.5[4]	68 (2.68)	Phases: 3 × 2 × M12 Grounding: 2 × fixing eyelet	3 × 150	700

For terminal box type 1XB7, other cable entries can be ordered for the power depending on the standard, see options.

Ordering example

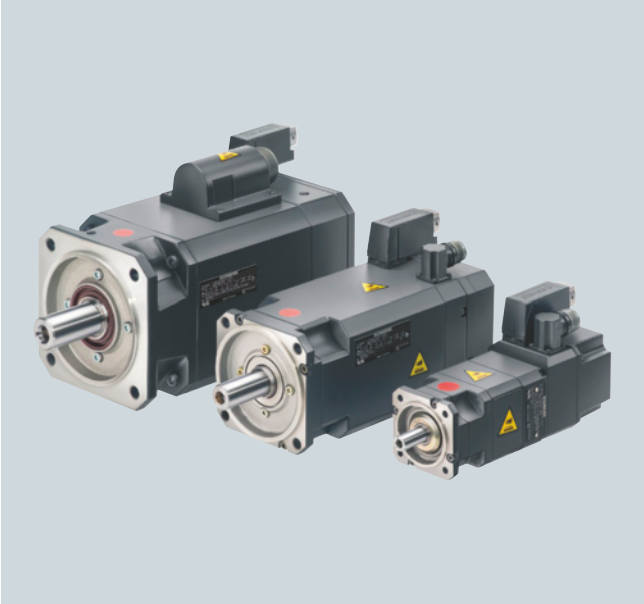
Selection criteria	Version	Structure of the order number
1PH8 motor	Shaft height 132 Rated power 17.6 kW Version status 1	**1PH8131-. . . . . - . . . 1**
	Synchronous version without brake	**1PH8131-2 . . . . - . . .1**
Encoder system	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**1PH8131-2M . . .- . . .1**
Rated speed	1500 rpm	**1PH8131-2MF . .- . . .1**
Cooling	Water cooling	**1PH8131-2MF2 .- . . .1**
Type of construction	IM B3 (IM V5, IM V6)	**1PH8131-2MF20- . . .1**
Shaft extension DE	Plain shaft	**1PH8131-2MF20-0 . .1**
Bearing version	Standard Vibration magnitude R/A Shaft and flange accuracy R	**1PH8131-2MF20-0B.1**
Connection	Power connection terminal box top Cable entry right Signal connection DE	**1PH8131-2MF20-0BA1**
Options		**1PH8131-2MF20-0BA1-Z**
	Additional PTC thermistor chain for alarm and tripping	**1PH8131-2MF20-0BA1-Z A12**
	Special paint finish worldwide: Primer and paint finish sky blue RAL 5015	**1PH8131-2MF20-0BA1-Z A12 K23 X05**

1) Dependent on the design of the metric cable gland.
2) Current carrying capacity based on EN 60204-1 and IEC 60364-5-52, according to installation type C.
3) Hole with Ø 22 mm (0.87 in), 90 ° to signal connection.
4) Arranged opposite of signal connection (sideways from cable entry plate).
5) Standard for motors with rated currents less than 210 A.
6) Standard for motors with rated currents greater than 210 A to 270 A.
7) Standard for motors with rated currents greater than 270 A to 700 A.

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1FT6 motors

Overview



1FT6 motors are permanent-magnet synchronous motors with compact dimensions.

1FT6 motors with built-in encoders are suitable for use with the SINAMICS S120 drive system.

The fully digital control system of the SINAMICS S120 drive system and the encoder technology of the 1FT6 motors fulfill the highest demands in terms of dynamic performance, speed setting range, and rotational and positioning accuracy.

Natural cooling, forced ventilation or water cooling are available as cooling methods. 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

- Optimum surface quality of the workpiece thanks to high rotational accuracy (sinusoidal current injection)
- Minimized downtime due to high dynamic performance
- Power and signal connections for use in highly contaminative areas
- Easy installation thanks to reduced cabling overhead
- High resistance to cantilever force
- High thermal reserves for continuous and overload conditions
- High overload capability (250 ms)
- Extremely high efficiency
- Extremely good drive dynamic response due to low rotor moments of inertia
- Low torque ripple (average value 1 %)
- High degree of protection

Application

- High-performance machine tools
- Machines with stringent requirements in terms of dynamic response, precision and flexibility, such as:
  - Packaging machines
  - High-bay racking vehicles
  - Conveyor systems
  - Handling equipment
  - Printing machines

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Technical specifications

Product name	1FT6 motor
Type of motor	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling, forced ventilation, water cooling
Temperature monitoring	KTY 84 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 ΔT = 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)	
• 1FT602 ... 1FT613	IM B5 (IM V1, IM V3)
• 1FT606 ... 1FT610	IM B14 (IM V18, IM V19)
• 1FT613	IM B35
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP64 standard type IP65 core type
Shaft extension on the drive end (DE) in accordance with DIN 748-3 (IEC 60072-1)	Plain shaft
Shaft and flange accuracy[1] **in accordance with DIN 42955 (IEC 60072-1)**	Tolerance N
Vibration magnitude 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 EN ISO 1680, max.	
• Motors with natural/water cooling	
- 1FT602 ... 1FT604	55 dB
- 1FT606 ... 1FT613	70 dB
• Motors with forced ventilation	
- 1FT608/1FT610	70 dB
- 1FT613	74 dB
Encoder systems, built-in	
• Without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R) • Absolute encoder 2048 S/R single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R) • Multi-pole resolver (number of pole pairs corresponds to number of pole pairs of the motor) • 2-pole resolver
• With DRIVE-CLiQ interface	• 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) + 11 bit commutation position (encoder IC22DQ) • 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) without commutation position (encoder IN22DQ) • 22 bit absolute encoder single-turn (resolution 4194304, 2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ) • 15 bit resolver (resolution 32768, multi-pole internal) (R15DQ) • 14 bit resolver (resolution 16384, 2-pole internal) (R14DQ)

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

Technical specifications (continued)

Product name (repeated)	1FT6 motor
Connection	
• Signals	Connector
• Power	Connector or terminal box possible for 1FT61
Paint finish	Anthracite RAL 7016
2nd rating plate	Enclosed separately
Approvals, according to	cURus
Options	• Shaft extension on the drive end (DE) with fitted key and keyway (half-key balancing) • Shaft and flange accuracy Tolerance R • Vibration magnitude Grade R • Built-in holding brake • Degree of protection IP65 • Degree of protection IP67, IP68 M5 sealing air connection present (except with forced ventilation) • Terminal box for power connection • Planetary gearbox, built-on (requires: Plain shaft extension, shaft and flange accuracy tolerance N, vibration magnitude grade A, and IP65 degree of protection)

S/R = signals/revolution

Options with order codes

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.	**Order code**
Paint finish: Jet black RAL 9005	**X01**
Paint finish: Cream white RAL 9001	**X02**
Paint finish: Reseda green RAL 6011	**X03**
Paint finish: Pebble gray RAL 7032	**X04**
Paint finish: Sky blue RAL 5015	**X05**
Paint finish: Light ivory RAL 1015	**X06**
Paint finish: Pearl dark grey RAL 9023	**X08**
Special paint finish for "worldwide" climate : primer and paint finish anthracite RAL 7016	**K23**
Special paint finish for "worldwide" climate: primer and paint finish selectable from X01 to X08	**K23+X..**
Primer (unpainted)	**K24**
Water connection on right side	**Q20**
Water connection on left side	**Q21**
Water connection below	**Q22**
Mounting of SP+ planetary gearbox	**J..**

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1FT6 motors, core type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Core type	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			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)
Natural cooling									
2000	100	4.8 (6.44)	27 (19.9)	23 (17)	11	**1FT6102-1AC71-■ ■ ■ 1**	4	99 (87.6)	27.5 (60.6)
		8.0 (10.7)	50 (36.9)	38 (28)	17.6	**1FT6105-1AC71-■ ■ ■ 1**	4	168 (148)	39.5 (87.1)
3000	48	1.4 (1.88)	5 (3.7)	4.3 (3.2)	2.9	**1FT6044-1AF71-■ ■ ■ 1**	2	5.1 (4.51)	8.3 (18.3)
	63	1.5 (2.01)	6 (4.4)	4.7 (3.5)	3.4	**1FT6062-1AF71-■ ■ ■ 1**	3	8.5 (7.52)	9.5 (20.9)
		2.2 (2.95)	9.5 (7)	7.0 (5.2)	4.9	**1FT6064-1AF71-■ ■ ■ 1**	3	13 (11.5)	12.5 (27.6)
	80	3.2 (4.29)	13 (9.6)	10.3 (7.6)	8.7	**1FT6082-1AF71-■ ■ ■ 1**	4	30 (26.5)	15 (33.1)
		4.6 (6.17)	20 (14.7)	14.7 (10.8)	11	**1FT6084-1AF71-■ ■ ■ 1**	4	48 (42.4)	20.5 (45.2)
		5.8 (7.78)	27 (19.9)	18.5 (13.6)	13	**1FT6086-1AF71-■ ■ ■ 1**	4	66.5 (58.8)	25.5 (56.2)
4500	63	1.7 (2.28)	6 (4.4)	3.6 (2.7)	3.9	**1FT6062-1AH71-■ ■ ■ 1**	3	8.5 (7.52)	9.5 (20.9)
		2.3 (3.08)	9.5 (7)	4.8 (3.5)	5.5	**1FT6064-1AH71-■ ■ ■ 1**	3	13 (11.5)	12.5 (27.6)
	80	4.9 (6.57)	20 (14.7)	10.5 (7.7)	12.5	**1FT6084-1AH71-■ ■ ■ 1**	4	48 (42.4)	20.5 (45.2)
		5.7 (7.64)	27 (19.9)	12 (8.8)	12.6	**1FT6086-1AH71-■ ■ ■ 1**	4	66.5 (58.8)	25.5 (56.2)
6000	36	0.88 (1.18)	2 (1.5)	1.4 (1)	2.1	**1FT6034-1AK71-■ ■ ■ 1**	2	1.1 (0.97)	4.4 (9.7)
	80	4.1 (5.50)	20 (14.7)	6.5 (4.8)	9.2	**1FT6084-1AK71-■ ■ ■ 1**	4	48 (42.4)	20.5 (45.2)

Type of construction:	IM B5		1
Connector outlet direction:	Transverse right (Not for 1FT603/1FT604/1FT606)		1
	Transverse left (Not for 1FT603/1FT604/1FT606)		2
	Axial NDE		3
	Axial DE		4
Encoder systems for motors without DRIVE-CLiQ interface:	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2047S/R)		A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]		E
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder ICC22DQ)		D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]		F
Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**	
Plain shaft	Tolerance N	Without	G
Plain shaft	Tolerance N	With	H
Vibration magnitude:	**Degree of protection:**		
Grade A	IP65		1

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Motor type (repeated)	Effi-ciency[2]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[4]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6102-1AC7...	93	12.1	5.7 (7.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6105-1AC7...	93	21.4	10.5 (14.8)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6044-1AF7...	88	3	1.6 (2.2)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6062-1AF7...	88	4.1	1.9 (2.6)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-1AF7...	89	6.1	3.0 (4.0)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6082-1AF7...	90	9.6	4.1 (5.5)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6084-1AF7...	91	13.2	6.3 (8.5)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6086-1AF7...	91	16.4	8.5 (11.4)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6062-1AH7...	89	5.7	2.8 (3.8)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-1AH7...	89	9.0	4.5 (6.0)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6084-1AH7...	91	19.8	9.4 (12.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6086-1AH7...	91	23.3	12.7 (17.0)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6034-1AK7...	89	2.6	1.3 (1.7)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6084-1AK7...	91	24.1	12.6 (16.9)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Natural cooling									
1500	100	3.8 (5.1)	27 (19.9)	24.5 (18.1)	8.4	**1FT6102-8AB7■-■ ■ ■ ■**	4	99 (87.6)	27.5 (60.6)
		6.4 (8.6)	50 (36.9)	41 (30.2)	14.5	**1FT6105-8AB7■-■ ■ ■ ■**	4	168 (148)	39.5 (87.1)
		9.6 (12.9)	70 (51.6)	61 (45)	20.5	**1FT6108-8AB7■-■ ■ ■ ■**	4	260 (230)	55.5 (122)
	132	9.7 (13.0)	75 (55.3)	62 (45.7)	19	**1FT6132-6AB71-■ ■ ■ ■**	3	430 (380)	85 (187)
		11.8 (15.8)	95 (70)	75 (55.3)	24	**1FT6134-6AB71-■ ■ ■ ■**	3	547 (484)	100 (220)
		13.8 (18.5)	115 (84.8)	88 (64.9)	27	**1FT6136-6AB71-■ ■ ■ ■**	3	664 (587)	117 (258)

Type of construction:	IM B5	1
	IM B14[2]) (Not for 1FT613)	2
Connector outlet direction:	Transverse right	1
	Transverse left	2
	Axial NDE (Not for 1FT613)	3
	Axial DE	4
Terminal box/ cable entry:	Transverse/from right	5
	Transverse/from left	6
	Axial/from NDE	7
	Axial/from DE	8
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	Degree of protection:	
Grade A	IP64	0
Grade A	IP65	1
Grade A	IP67	2
Grade A	IP68	6
Grade R	IP64	3
Grade R	IP65	4
Grade R	IP67	5
Grade R	IP68	7

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6102-8AB7...	92	8.7	4.2 (5.6)	9	**6SL312■-■TE21-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6105-8AB7...	92	16.0	7.9 (10.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6108-8AB7...	93	22.3	11.0 (14.8)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6132-6AB7 ...	95	21.6	11.8 (15.8)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6134-6AB7 ...	95	27.0	14.9 (20.0)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6136-6AB7...	95	34	18.1 (24.3)	45	**6SL312■-1 TE24-5AA3**	1.5	4 × 10	**6FX■002-5■S64-....**

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		**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

[1] If the absolute encoder is used, M_{rated} is reduced by 10 %.

[2] Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

[3] Optimum efficiency in continuous duty.

[4] With default setting of the pulse frequency.

[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] $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Natural cooling									
2000	63	0.8 (1.1)	4.0 (2.9)	3.7 (2.7)	1.9	**1FT6061-6AC7■-■■■■**	3	6.0 (5.31)	8.0 (7.6)
		1.1 (1.5)	6.0 (4.4)	5.2 (3.8)	2.6	**1FT6062-6AC7■-■■■■**	3	8.5 (7.52)	9.5 (20.9)
		1.7 (2.3)	9.5 (7)	8.0 (5.9)	3.8	**1FT6064-6AC7■-■■■■**	3	13 (11.5)	12.5 (27.6)
	80	1.6 (2.2)	8.0 (5.9)	7.5 (5.5)	4.1	**1FT6081-8AC7■-■■■■**	4	21 (18.5)	12.5 (27.6)
		2.4 (3.2)	13 (9.6)	11.4 (8.4)	6.6	**1FT6082-8AC7■-■■■■**	4	30 (26.5)	15.0 (33.1)
		3.5 (4.7)	20 (14.7)	16.9 (12.5)	8.3	**1FT6084-8AC7■-■■■■**	4	48 (42.4)	20.5 (45.2)
		4.7 (6.3)	27 (19.9)	22.5 (16.6)	10.9	**1FT6086-8AC7■-■■■■**	4	66.5 (58.8)	25.5 (56.2)
	100	4.8 (6.4)	27 (19.9)	23 (17)	11	**1FT6102-8AC7■-■■■■**	4	99 (87.6)	27.5 (60.6)
		8.0 (10.7)	50 (36.9)	38 (28)	17.6	**1FT6105-8AC7■-■■■■**	4	168 (148)	39.5 (87.1)
		11.5 (15.4)	70 (51.6)	55 (40.5)	24.5	**1FT6108-8AC7■-■■■■**	4	260 (230)	55.5 (122)
	132	11.5 (15.4)	75 (55.3)	55 (40.5)	23	**1FT6132-6AC71-■■■■**	3	430 (380)	85.0 (187)
		13.6 (18.2)	95 (70)	65 (47.9)	27	**1FT6134-6AC71-■■■■**	3	547 (484)	100 (220)
		15.5 (20.8)	115 (84.8)	74 (54.5)	30	**1FT6136-6AC71-■■■■**	3	664 (587)	117 (258)

Type of construction:	IM B5	1
	IM B14[2] (Not for 1FT613)	2
Connector outlet direction:	Transverse right (Not for 1FT606)	1
	Transverse left (Not for 1FT606)	2
	Axial NDE (Not for 1FT613)	3
	Axial DE	4
Terminal box/ cable entry: (Only for 1FT61)	Transverse/from right	5
	Transverse/from left	6
	Axial/from NDE	7
	Axial/from DE	8
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	Degree of protection:	
Grade A	IP64	0
Grade A	IP65	1
Grade A	IP67	2
Grade A	IP68	6
Grade R	IP64	3
Grade R	IP65	4
Grade R	IP67	5
Grade R	IP68	7

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6061-6AC7...	82	1.9	0.84 (1.1)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6062-6AC7...	84	2.7	1.3 (1.7)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6AC7...	87	4.2	2.0 (2.7)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6081-8AC7...	85	3.9	1.7 (2.3)	5	**6SL312■-■TE15-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6082-8AC7...	87	6.6	2.7 (3.6)	9	**6SL312■-■TE21-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6084-8AC7...	90	8.8	4.2 (5.6)	9	**6SL312■-■TE21-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6086-8AC7...	90	11.3	5.7 (7.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6102-8AC7...	93	12.1	5.7 (7.6)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6105-8AC7...	93	21.4	10.5 (14.8)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6108-8AC7...	93	29	14.7 (19.7)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 6	**6FX■002-5■S51-....**
1FT6132-6AC7...	95	29	15.7 (21.1)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 6	**6FX■002-5■S51-....**
1FT6134-6AC7 ...	95	36	19.9 (26.7)	45	**6SL312■-1 TE24-5AA3**	1.5	4 × 10	**6FX■002-5■S64-....**
1FT6136-6AC7...	95	42	24.1 (32.3)	45	**6SL312■-1 TE24-5AA3**	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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency.

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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Natural cooling									
3000	48	0.7 (0.9)	2.6 (1.9)	2.15 (1.6)	1.7	**1FT6041-4AF71-■■■■**	2	2.9 (2.57)	6.6 (14.6)
		1.4 (1.9)	5.0 (3.7)	4.3 (3.2)	2.9	**1FT6044-4AF71-■■■■**	2	5.1 (4.51)	8.3 (18.3)
	63	1.1 (1.5)	4.0 (2.9)	3.5 (2.6)	2.6	**1FT6061-6AF7■-■■■■**	3	6.0 (5.31)	8.0 (17.6)
		1.5 (2.0)	6.0 (4.4)	4.7 (3.5)	3.4	**1FT6062-6AF7■-■■■■**	3	8.5 (7.52)	9.5 (20.9)
		2.2 (3.0)	9.5 (7)	7.0 (5.2)	4.9	**1FT6064-6AF7■-■■■■**	3	13.0 (11.5)	12.5 (27.6)
	80	2.2 (3.0)	8.0 (5.9)	6.9 (5.1)	5.6	**1FT6081-8AF7■-■■■■**	4	21.0 (18.5)	12.5 (27.6)
		3.2 (4.3)	13 (9.6)	10.3 (7.6)	8.7	**1FT6082-8AF7■-■■■■**	4	30.0 (26.5)	15.0 (33.1)
		4.6 (6.2)	20 (14.7)	14.7 (10.8)	11	**1FT6084-8AF7■-■■■■**	4	48.0 (42.4)	20.5 (45.2)
		5.8 (7.8)	27 (19.9)	18.5 (13.6)	13	**1FT6086-8AF7■-■■■■**	4	66.5 (58.8)	25.5 (56.2)
	100	6.1 (8.2)	27 (19.9)	19.5 (14.4)	13.2	**1FT6102-8AF7■-■■■■**	4	99.0 (87.6)	27.5 (60.6)
		9.7 (13.0)	50 (36.9)	31 (22.8)	22.5	**1FT6105-8AF7■-■■■■**	4	168 (148)	39.5 (87.1)
		11.6 (15.6)	70 (51.6)	37 (27.3)	25	**1FT6108-8AF7■-■■■■**	4	260 (230)	55.5 (122.4)
	132	11.3 (15.2)	75 (55.3)	36 (26.5)	23	**1FT6132-6AF71-■■■■**	3	430 (380)	85.0 (187.4)

Type of construction:	IM B5	**1**								
	IM B14[2] (Not for 1FT604/1FT613)	**2**								
Connector outlet direction:	Transverse right (Not for 1FT604/1FT606)		**1**							
	Transverse left (Not for 1FT604/1FT606)		**2**							
	Axial NDE (Not for 1FT613 and not for 1FT6 with DRIVE-CLiQ and power connector size 3)		**3**							
	Axial DE		**4**							
Terminal box/ cable entry: (Only for 1FT61)	Transverse/from right			**5**						
	Transverse/from left			**6**						
	Axial/from NDE			**7**						
	Axial/from DE			**8**						
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)				**A**					
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]				**E**					
	Multi-pole resolver				**S**					
	2-pole resolver				**T**					
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)				**D**					
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]				**F**					
	15 bit resolver (R15DQ)				**U**					
	14 bit resolver (R14DQ)				**P**					
Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**								
Fitted key and keyway	Tolerance N	Without				**A**				
Fitted key and keyway	Tolerance N	With				**B**				
Fitted key and keyway	Tolerance R	Without				**D**				
Fitted 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 magnitude:	**Degree of protection:**									
Grade A	IP64						**0**			
Grade A	IP65						**1**			
Grade A	IP67						**2**			
Grade A	IP68						**6**			
Grade R	IP64						**3**			
Grade R	IP65						**4**			
Grade R	IP67						**5**			
Grade R	IP68						**7**			

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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[4]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT6041-4AF7 ...	85	1.9	0.8 (1.1)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6044-4AF7 ...	88	3.0	1.6 (2.2)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6061-6AF7 ...	86	2.7	1.3 (1.7)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6062-6AF7 ...	88	4.1	1.9 (2.6)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6AF7 ...	89	6.1	3.0 (4.0)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6081-8AF7 ...	88	5.8	2.5 (3.4)	9	**6SL312■-■TE21-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6082-8AF7 ...	90	9.6	4.1 (5.5)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6084-8AF7 ...	91	13.2	6.3 (8.5)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6086-8AF7 ...	91	16.4	8.5 (11.4)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6102-8AF7 ...	93	16.9	8.5 (11.4)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6105-8AF7 ...	94	32	15.7 (21.1)	30[6]	**6SL312■-1TE23-0AA3**	1.5	4 × 10	**6FX■002-5■S61-....**
1FT6108-8AF7 ...	93	41	22.0 (29.5)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6132-6AF7 ...	95	43	23.6 (31.7)	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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency.

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) 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 it

7) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Natural cooling									
4500	63	1.4 (1.9)	4.0 (2.9)	2.9 (2.1)	3.4	**1FT6061-6AH7■-■■■■**	3	6.0 (5.31)	8.0 (17.6)
		1.7 (2.3)	6.0 (4.4)	3.6 (2.7)	3.9	**1FT6062-6AH7■-■■■■**	3	8.5 (7.52)	9.5 (20.9)
		2.3 (3.1)	9.5 (7.0)	4.8 (3.5)	5.5	**1FT6064-6AH7■-■■■■**	3	13.0 (11.5)	12.5 (27.6)
	80	2.7 (3.6)	8.0 (5.9)	5.8 (4.3)	7.3	**1FT6081-8AH7■-■■■■**	4	21.0 (18.5)	12.5 (27.6)
		4.0 (5.4)	13.0 (9.6)	8.5 (6.3)	11.0	**1FT6082-8AH7■-■■■■**	4	30.0 (26.5)	15.0 (33.1)
		4.9 (6.6)	20.0 (14.7)	10.5 (7.7)	12.5	**1FT6084-8AH7■-■■■■**	4	48.0 (42.4)	20.5 (45.2)
		5.7 (7.6)	27.0 (19.9)	12.0 (8.8)	12.6	**1FT6086-8AH7■-■■■■**	4	66.5 (58.8)	25.5 (56.2)
	100	5.7 (7.6)	27.0 (19.9)	12.0 (8.8)	12.0	**1FT6102-8AH7■-■■■■**	4	99.0 (87.6)	27.5 (60.6)

Type of construction:	IM B5	1
	IM B14[2]	2
Connector outlet direction:	Transverse right (Not for 1FT606)	1
	Transverse left (Not for 1FT606)	2
	Axial NDE	3
	Axial DE	4
Terminal box/ cable entry: (Only for 1FT61)	Transverse/from right	5
	Transverse/from left	6
	Axial/from NDE	7
	Axial/from DE	8
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	**Degree of protection:**	
Grade A	IP64	0
Grade A	IP65	1
Grade A	IP67	2
Grade A	IP68	6
Grade R	IP64	3
Grade R	IP65	4
Grade R	IP67	5
Grade R	IP68	7

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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[4]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6061-6AH7...	88	4	1.9 (2.6)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6062-6AH7...	89	5.7	2.8 (3.8)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6AH7...	89	9.0	4.5 (6.0)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6081-8AH7...	89	8.6	3.8 (5.1)	9	**6SL312■-■TE21-0AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6082-8AH7...	90	14.8	6.1 (8.2)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6084-8AH7...	91	19.8	9.4 (12.6)	18[6]	**6SL312■-■TE21-8AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6086-8AH7...	91	23.3	12.7 (17.0)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6102-8AH7...	93	24.1	12.7 (17.0)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**

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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency.

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) 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 it.

7) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Natural cooling									
6000	28	0.19 (0.3)	0.4 (0.3)	0.3 (0.2)	1.1	**1FT6021-6AK71-■■■■**	3	0.21 (0.19)	1.2 (2.6)
		0.31 (0.4)	0.8 (0.6)	0.5 (0.4)	0.9	**1FT6024-6AK71-■■■■**	3	0.34 (0.30)	2.1 (4.6)
	36	0.47 (0.6)	1.0 (0.7)	0.75 (0.6)	1.2	**1FT6031-4AK71-■■■■**	2	0.65 (0.58)	3.1 (6.8)
		0.88 (1.2)	2.0 (1.5)	1.4 (1.0)	2.1	**1FT6034-4AK71-■■■■**	2	1.1 (0.97)	4.4 (9.7)
	48	1.1 (1.5)	2.6 (1.9)	1.7 (1.3)	2.4	**1FT6041-4AK71-■■■■**	2	2.9 (2.57)	6.6 (14.6)
		1.9 (2.6)	5.0 (3.7)	3.0 (2.2)	4.1	**1FT6044-4AK71-■■■■**	2	5.1 (4.51)	8.3 (18.3)
	63	1.3 (1.7)	4.0 (2.9)	2.1 (1.5)	3.1	**1FT6061-6AK7■-■■■■**	3	6.0 (5.31)	8.0 (17.6)
		1.3 (1.7)	6.0 (4.4)	2.1 (1.5)	3.2	**1FT6062-6AK7■-■■■■**	3	8.5 (7.52)	9.5 (20.9)
		1.3 (1.7)	9.5 (7.0)	2.1 (1.5)	3.5	**1FT6064-6AK7■-■■■■**	3	13.0 (11.5)	12.5 (27.6)
	80	2.9 (4.0)	8.0 (5.9)	4.6 (3.4)	7.7	**1FT6081-8AK7■-■■■■**	4	21.0 (18.5)	12.5 (27.6)
		3.5 (4.7)	13.0 (9.6)	5.5 (4.1)	9.1	**1FT6082-8AK7■-■■■■**	4	30.0 (26.5)	15.0 (33.1)
		4.1 (5.5)	20.0 (14.7)	6.5 (4.8)	9.2	**1FT6084-8AK7■-■■■■**	4	48.0 (42.4)	20.5 (45.2)

Type of construction:	IM B5	**1**							
	IM B14[2] (Not for 1FT602/1FT603/1FT604)	**2**							
Connector outlet direction:	Transverse right (Not for 1FT603/1FT604/1FT606)		**1**						
	Transverse left (Not for 1FT603/1FT604/1FT606)		**2**						
	Axial NDE		**3**						
	Axial DE		**4**						
Encoder systems for motors without DRIVE-CLiQ interface:	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048 S/R)			**A**					
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1] (Not for 1FT602)			**E**					
	Absolute encoder EnDat 512 S/R (encoder AM512S/R)[1] (Only for 1FT602)			**H**					
	Multi-pole resolver			**S**					
	2-pole resolver			**T**					
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)			**D**					
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ) (Not for 1FT602)[1]			**F**					
	20 bit absolute encoder single-turn +12 bit multi-turn (encoder AM20DQ) (Only for 1FT602)[1]			**L**					
	15 bit resolver (R15DQ)			**U**					
	14 bit resolver (R14DQ)			**P**					
Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**			**A**				
Fitted key and keyway	Tolerance N	Without			**A**				
Fitted key and keyway	Tolerance N	With			**B**				
Fitted key and keyway	Tolerance R	Without			**D**				
Fitted 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 magnitude:	**Degree of protection:**								
Grade A	IP64								**0**
Grade A	IP65 (Not for 1FT602)								**1**
Grade A	IP67								**2**
Grade A	IP68 (Not for 1FT602)								**6**
Grade R	IP64								**3**
Grade R	IP65 (Not for 1FT602)								**4**
Grade R	IP67								**5**
Grade R	IP68 (Not for 1FT602)								**7**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT6021-6AK7 ...	71	1.25	0.3 (0.4)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6024-6AK7 ...	80	1.25	0.5 (0.7)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6031-4AK7 ...	87	1.4	0.6 (0.8)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6034-4AK7 ...	89	2.6	1.3 (1.7)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6041-4AK7 ...	88	3	1.6 (2.2)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6044-4AK7 ...	89	5.9	3.1 (4.2)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6061-6AK7...	88	5	2.5 (3.4)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6062-6AK7...	89	7.6	3.8 (5.1)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6AK7...	89	12	4.0 (5.4)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6081-8AK7...	89	11.1	5.0 (6.7)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FT6082-8AK7...	90	17.3	8.2 (11.0)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6084-8AK7...	91	24.1	12.6 (16.9)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**

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		**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency

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) $P_{calc}\ [kW] = \frac{M_0\ [Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\ [HP] = \frac{M_0\ [lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Forced ventilation

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Forced ventilation[2]									
1500	100	9.3 (12.5)	65.0 (47.9)	59.0 (43.5)	21.7	**1FT6105-8SB7■-■■■■**	4	168 (148)	45.5 (100)
		13.0 (17.4)	90.0 (66.3)	83.0 (61.2)	31	**1FT6108-8SB7■-■■■■**	4	260 (230)	61.5 (135)
	132	16.0 (21.5)	110 (81.1)	102 (75.5)	36	**1FT6132-6SB71-■■■■**	3	430 (380)	91.0 (200)
		20.4 (27.4)	140 (103)	130 (95.8)	45	**1FT6134-6SB71-■■■■**	3	547 (484)	106 (233)
		25.1 (33.7)	175 (129)	160 (117)	55	**1FT6136-6SB71-■■■■**	3	664 (587)	123 (271)
2000	100	11.7 (15.7)	65.0 (47.9)	56.0 (41.3)	28	**1FT6105-8SC7■-■■■■**	4	168 (148)	45.5 (100)
		16.8 (22.5)	90.0 (66.3)	80.0 (59)	40	**1FT6108-8SC7■-■■■■**	4	260 (230)	61.5 (135)
	132	20.5 (27.5)	110 (81.1)	98.0 (72.2)	46	**1FT6132-6SC71-■■■■**	3	430 (380)	91.0 (200)
		26.2 (35.1)	140 (103)	125 (92.1)	57	**1FT6134-6SC71-■■■■**	3	547 (484)	106 (233)
		32.5 (43.6)	175 (129)	155 (114)	72	**1FT6136-6SC71-■■■■**	3	664 (587)	123 (271)

Type of construction:	IM B5	**1**
	IM B14[3] (Not for 1FT613)	**2**
Connector outlet direction:	Transverse right	**1**
	Transverse left	**2**
	Axial NDE (Not for 1FT613 and not for 1FT6 with DRIVE-CLiQ and power connector size 3)	**3**
	Axial DE	**4**
Terminal box/ cable entry:	Transverse/from right	**5**
	Transverse/from left	**6**
	Axial/from NDE	**7**
	Axial/from DE	**8**
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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	**E**
	Multi-pole resolver	**S**
	2-pole resolver	**T**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	**F**
	15 bit resolver (R15DQ)	**U**
	14 bit resolver (R14DQ)	**P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Fitted key and keyway	Tolerance R	Without	**D**
Fitted 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 magnitude:	Degree of protection:[4]	
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 Selection guides.

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Motor type (repeated)	Effi-ciency[5]	Static current	Calculated power P_{calc}[8]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[6]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[7]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT6105-8SB7...	92	21.9	10.2 (13.7)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6108-8SB7...	93	30	14.1 (18.9)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 6	**6FX■002-5■S51-....**
1FT6132-6SB7...	95	36	17.3 (23.2)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6134-6SB7...	95	44	22.0 (29.5)	60	**6SL312■-1TE26-0AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6136-6SB7...	96	55	27.5 (36.9)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6105-8SC7...	93	30	13.6 (18.2)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 6	**6FX■002-5■S51-....**
1FT6108-8SC7...	93	41	18.8 (25.2)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6132-6SC7...	95	47	23.0 (30.8)	60	**6SL312■-1TE26-0AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6134-6SC7...	96	58	29.3 (39.3)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6136-6SC7...	96	77	36.6 (49.1)	85	**6SL312■-1TE28-5AA3**	3	4 × 25	**6FX■002-5DG33-....**

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

Motor Module:
Single Motor Module **1**

Power cable:
MOTION-CONNECT 800 **8**
MOTION-CONNECT 500 **5**

Without brake cores **C**
With brake cores **D**

Length code **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Notes on forced ventilation

	Motors 1FT608/1FT610	Motors 1FT613
Direction of air flow	From NDE to DE	From DE to NDE
Connection	Power connector size 1 Cable, pre-assembled 6FX.002-5CA01-....	Terminal box Cable, by the meter 6FX.008-1BB11-....
Pin and terminal assignments	Pin 1: L1, Pin 2: N	U1/L1: V2/L2: W3/L3
Supply voltage	220 V 1 AC, 50 Hz 260 V 1 AC, 60 Hz	380 ... 420 V 3 AC, 50 Hz 380 ... 480 V 3 AC, 60 Hz
Fan current, max.	0.3 A	0.4 A
Weight of the fan module, approx.	4.8 kg (10.6 lb)	5.6 kg (12.3 lb)
Sound pressure level L_{pA} (1 m)	70 dB	74 dB

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Not for use in environments containing electrically conductive dust. Forced ventilation cannot be used in the presence of flammable, corrosive, electrically conductive or explosive dust.

3) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

4) The degree of protection refers to the motor. The built-on fan meets the requirements of degree of protection IP54.

5) Optimum efficiency in continuous duty.

6) With default setting of the pulse frequency.

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

8) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Forced ventilation

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FT6 synchronous motors Standard type	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			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)
Forced ventilation[2]									
3000	80	6.9 (9.3)	26.0 (19.2)	22.0 (16.2)	17	**1FT6084-8SF7■-■ ■ ■ ■**	4	48.0 (42.4)	25.0 (55.1)
		9.7 (13.0)	35.0 (25.8)	31.0 (22.8)	24.5	**1FT6086-8SF7■-■ ■ ■ ■**	4	66.5 (58.8)	30.0 (66.2)
	100	15.7 (21.1)	65.0 (47.9)	50.0 (36.9)	35	**1FT6105-8SF7■-■ ■ ■ ■**	4	168 (148)	45.5 (100)
		22 (29.5)	90.0 (66.3)	70.0 (51.6)	53	**1FT6108-8SF7■-■ ■ ■ ■**	4	260 (230)	61.5 (135)
	132	28.3 (38.0)	110 (81.1)	90.0 (66.3)	62	**1FT6132-6SF71-■ ■ ■ ■**	3	430 (380)	91.0 (200)
		34.6 (46.4)	140 (103)	110 (81.1)	72	**1FT6134-6SF71-■ ■ ■ ■**	3	547 (484)	106 (233)
		45.5 (61.0)	175 (129)	145 (106)	104	**1FT6136-6SF71-■ ■ ■ ■**	3	664 (587)	123 (271)
4500	80	9.4 (12.6)	26.0 (19.2)	20.0 (14.7)	24.5	**1FT6084-8SH7■-■ ■ ■ ■**	4	48.0 (42.4)	25.0 (55.1)
		12.7 (17.0)	35.0 (25.8)	27.0 (19.9)	31.5	**1FT6086-8SH7■-■ ■ ■ ■**	4	66.5 (58.8)	30.0 (66.2)
	100	18.8 (25.2)	65.0 (47.9)	40.0 (29.9)	41	**1FT6105-8SH7■-■ ■ ■ ■**	4	168 (148)	45.5 (100)
6000	80	10.7 (14.4)	26.0 (19.2)	17.0 (12.5)	25.5	**1FT6084-8SK7■-■ ■ ■ ■**	4	48.0 (42.4)	25.0 (55.1)
		13.8 (18.5)	35.0 (25.8)	22.0 (16.2)	29	**1FT6086-8SK7■-■ ■ ■ ■**	4	66.5 (58.8)	30.0 (66.2)

Type of construction:	IM B5	1
	IM B14[3] (Not for 1FT613)	2
Connector outlet direction: (Not for 1FT6136-6SF71)	Transverse right	1
	Transverse left	2
	Axial NDE (Not for 1FT613 and not for 1FT6 with DRIVE-CLiQ and power connector size 3)	3
	Axial DE	4
Terminal box/ cable entry: (Only for 1FT61)	Transverse/from right	5
	Transverse/from left	6
	Axial/from NDE	7
	Axial/from DE	8
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	Degree of protection:[4]	
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 Selection guides.

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Motor type (repeated)	Effi-ciency[5]	Static current	Calculated power P_{calc}[9]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[6]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[7]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6084-8SF7...	91	18.2	8.2 (11.0)	18[8]	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FT6086-8SF7...	91	25	11.0 (14.8)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6105-8SF7...	94	42	20.4 (27.4)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6108-8SF7...	94	62	28.3 (37.9)	60[8]	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6132-6SF7...	95	69	34.6 (46.4)	85	**6SL312■-1TE28-5AA3**	3	4 × 25	**6FX■002-5DG33-....**
1FT6134-6SF7...	96	83	44.0 (59.0)	85	**6SL312■-1TE28-5AA3**	3	4 × 25	**6FX■002-5DG33-....**
1FT6136-6SF7...	96	110	55.0 (73.8)	132	**6SL312■-1TE31-3AA3**	Terminal box (max. 4 × 35)		
1FT6084-8SH7...	91	26	12.3 (16.5)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6086-8SH7...	93	38	16.5 (22.1)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6105-8SH7...	94	59	30.6 (41.0)	85	**6SL312■-1TE28-5AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6084-8SK7...	91	35	16.3 (21.9)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■S64-....**
1FT6086-8SK7...	93	44	22.0 (29.5)	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		**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

Notes on forced ventilation

	Motors 1FT608/1FT610	Motors 1FT613
Direction of air flow	From NDE to DE	From DE to NDE
Connection	Power connector size 1 Cable, pre-assembled 6FX.002-5CA01-....	Terminal box Cable, by the meter 6FX.008-1BB11-....
Pin and terminal assignments	Pin 1: L1, Pin 2: N	U1/L1: V2/L2: W3/L3
Supply voltage	220 V 1 AC, 50 Hz 260 V 1 AC, 60 Hz	380 ... 420 V 3 AC, 50 Hz 380 ... 480 V 3 AC, 60 Hz
Fan current, max.	0.3 A	0.4 A
Weight of the fan module, approx.	4.8 kg (10.6 lb)	5.6 kg (12.3 lb)
Sound pressure level L_{pA} (1 m)	70 dB	74 dB

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) Not for use in environments containing electrically conductive dust. Forced ventilation cannot be used in the presence of flammable, corrosive, electrically conductive or explosive dust.

3) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

4) The degree of protection refers to the motor. The built-on fan meets the requirements of degree of protection IP54.

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) 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 it.

9) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Water cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT6 synchronous motors Standard type	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			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)
Water cooling[1] – SH 63/SH 80/SH 100									
1500	100	18.2 (24.4)	119 (87.7)	116 (85.5)	43	**1FT6108-8WB7■-■■■■**	4	260 (230)	61.5 (135)
2000	100	17.2 (23.1)	85.0 (62.6)	82.0 (60.4)	60	**1FT6105-8WC7■-■■■■**	4	168 (148)	45.5 (100)
		24.1 (32.3)	119 (87.7)	115 (84.8)	57	**1FT6108-8WC7■-■■■■**	4	260 (230)	61.5 (135)
3000	63	3.2 (4.3)	10.2 (7.5)	10.0 (7.4)	6.9	**1FT6062-6WF7■-■■■■**	3	8.5 (7.52)	9.5 (20.9)
		5.1 (6.8)	16.2 (11.9)	16.0 (11.8)	10.3	**1FT6064-6WF7■-■■■■**	3	13.0 (11.5)	12.5 (27.6)
	80	11.0 (14.8)	35.0 (25.8)	35.0 (25.8)	27	**1FT6084-8WF7■-■■■■**	4	48.0 (42.4)	21.0 (46.3)
		14.5 (19.4)	47.0 (34.6)	46.0 (33.9)	37	**1FT6086-8WF7■-■■■■**	4	66.5 (58.8)	26.0 (57.3)
	100	24.5 (32.9)	85.0 (62.6)	78.0 (57.5)	82	**1FT6105-8WF7■-■■■■**	4	168 (148)	45.5 (100)
		34.2 (45.9)	119 (87.7)	109 (80.3)	81	**1FT6108-8WF7■-■■■■**	4	260 (230)	61.5 (135)

Type of construction:	IM B5	1
	IM B14[2] (Not for 1FT613)	2
Connector outlet direction:	Transverse right (Not for 1FT606)	1
	Transverse left (Not for 1FT606)	2
	Axial NDE (Not for 1FT6 with DRIVE-CLiQ and power connec. size 3)	3
	Axial DE (1FT6062 only with water connection side or below)[3]	4
Terminal box/ cable entry: (Only for 1FT61)	Transverse/from right	5
	Transverse/from left	6
	Axial/from NDE	7
	Axial/from DE	8
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	Degree of protection:	
Grade A	IP64	0
Grade A	IP65	1
Grade A	IP67 (Not for 1FT610.-8WF7.- with terminal box)	2
Grade A	IP68 (Not for 1FT610.-8WF7.- with terminal box)	6
Grade R	IP64	3
Grade R	IP65	4
Grade R	IP67 (Not for 1FT610.-8WF7.- with terminal box)	5
Grade R	IP68 (Not for 1FT610.-8WF7.- with terminal box)	7

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[4]	Static current	Calculated power P_{calc}[8]	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 SINAMICS S120 drive system	Power connector	Cable cross-section[6]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT6108-8WB7...	91	43	18.7 (25.1)	45	**6SL312■-1TE24-5AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6105-8WC7...	91	58	17.8 (23.9)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6108-8WC7...	93	57	24.9 (33.4)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6062-6WF7...	84	6.9	3.2 (4.3)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6WF7...	87	10.3	5.1 (6.8)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6084-8WF7...	89	24.5	11.0 (14.8)	30	**6SL312■-1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FT6086-8WF7...	89	34	14.8 (19.9)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■S64-....**
1FT6105-8WF7...	93	83	26.7 (35.8)	85	**6SL312■-1TE28-5AA3**	3	4 × 25	**6FX5 002-5DG33-....**
1FT6108-8WF7...	95	86	37.4 (50.2)	85[7]	**6SL312■-1TE28-5AA3**	3	4 × 35	**6FX5 002-5DG43-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Notes on water cooling for 1FT6 motors

Inlet temperature of cooling water, max.	30 °C (86 °F)
Cooling water throughput, min.	5 l/min (5 l = 1.1 British gallons/1.32 US gallons)
Pressure at motor inlet	p_{max} = 2.5 bar
Cooling water connection	G 3/8“
Coolant	Water with up to 25 % corrosion protection (recommendation: Tyfocor)
Loss of pressure between inlet and outlet	< 0.1 bar

1) Delivered as standard with water connection at top.

2) Same flange as for IM B5 type of construction, but with metric threaded insert in the four mounting holes.

3) See options.

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) 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 it.

8) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Water cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT6 synchronous motors Standard type	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			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)
Water cooling[1] – SH 63/SH 80									
4500	63	4.7 (6.3)	10.2 (7.5)	10.0 (7.4)	9.6	**1FT6062-6WH7 1-■ ■ ■ ■**	3	8.5 (7.52)	9.5 (20.9)
		7.5 (10.1)	16.2 (11.9)	16.0 (11.8)	15.2	**1FT6064-6WH7 1-■ ■ ■ ■**	3	13.0 (11.5)	12.5 (27.6)
	80	16.5 (22.1)	35.0 (25.8)	35.0 (25.8)	39	**1FT6084-8WH7 1-■ ■ ■ ■**	4	48.0 (42.4)	21.0 (46.3)
		21.2 (28.4)	47.0 (34.6)	45.0 (33.2)	53	**1FT6086-8WH7 1-■ ■ ■ ■**	4	66.5 (58.8)	26.0 (57.3)
6000	63	6.2 (8.3)	10.2 (7.5)	9.8 (7.2)	12.7	**1FT6062-6WK7 1-■ ■ ■ ■**	3	8.5 (7.52)	9.5 (20.9)
		9.9 (13.3)	16.2 (11.9)	15.8 (11.6)	20	**1FT6064-6WK7 1-■ ■ ■ ■**	3	13.0 (11.5)	12.5 (27.6)
	80	21.4 (28.7)	35.0 (25.8)	34.0 (25.1)	51	**1FT6084-8WK7 1-■ ■ ■ ■**	4	48.0 (42.2)	21.0 (46.3)
		27.7 (37.2)	47.0 (34.6)	44.0 (32.4)	58	**1FT6086-8WK7 1-■ ■ ■ ■**	4	66.5 (58.8)	26.0 (57.3)

Type of construction:	IM B5	1
Connector outlet direction:	Transverse right (Not for 1FT606)	1
	Transverse left (Not for 1FT606)	2
	Axial NDE (Not for 1FT6 with DRIVE-CLiQ and power connector size 3)	3
	Axial DE (Not for 1FT6084-8WK)/(1FT6062 only with water connection on side or below)[2]	4
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)	A
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	E
	Multi-pole resolver	S
	2-pole resolver	T
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	F
	15 bit resolver (R15DQ)	U
	14 bit resolver (R14DQ)	P

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	A
Fitted key and keyway	Tolerance N	With	B
Fitted key and keyway	Tolerance R	Without	D
Fitted 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 magnitude:	Degree of protection:	
Grade A	IP64	0
Grade A	IP65	1
Grade A	IP67	2
Grade A	IP68	6
Grade R	IP64	3
Grade R	IP65	4
Grade R	IP67	5
Grade R	IP68	7

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT6062-6WH7...	88	9.7	4.8 (6.4)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6WH7...	90	15.4	7.6 (10.2)	18	**6SL312■-■TE21-8AA3**	1	4 × 2.5	**6FX■002-5■S11-....**
1FT6084-8WH7...	91	37	16.5 (22.1)	45	**6SL312■-1TE24-5AA3**	1.5	4 × 10	**6FX■002-5■S64-....**
1FT6086-8WH7...	93	52	22.1 (29.6)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**
1FT6062-6WK7...	90	12.9	6.4 (8.6)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FT6064-6WK7...	92	20.5	10.2 (13.7)	30	**6SL312■-1TE23-0AA3**	1	4 × 2.5	**6FX■002-5■S11-....**
1FT6084-8WK7...	92	47	22.0 (29.5)	60	**6SL312■-1TE26-0AA3**	3	4 × 10	**6FX■002-5■S14-....**
1FT6086-8WK7...	93	59	29.5 (39.6)	60	**6SL312■-1TE26-0AA3**	3	4 × 16	**6FX■002-5■S23-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Notes on water cooling for 1FT6 motors:

Inlet temperature of cooling water, max.	30 °C (86 °F)
Cooling water throughput, min.	5 l/min (5 l = 1.1 British gallons/1.32 US gallons)
Pressure at motor inlet	p_{max} = 2.5 bar
Cooling water connection	G 3/8“
Coolant	Water with up to 25 % corrosion protection (recommendation: Tyfocor)
Loss of pressure between inlet and outlet	< 0.1 bar

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1) Delivered as standard with water connection at top.
2) See options.
3) Optimum efficiency in continuous duty.
4) With default setting of the pulse frequency.
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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT6 motors, standard type
Water cooling

Selection and ordering

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT6 synchronous motors Standard type	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			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)
Water cooling – SH 132									
1500	132	23.6 (31.6)	155 (1372)	150 (1328)	58	**1FT6132-6WB76-■ ■ ■ ■**	3	430 (381)	90 (198)
		29.1 (39.0)	200 (1770)	185 (1637)	67	**1FT6134-6WB76-■ ■ ■ ■**	3	547 (484)	103 (227)
		36.1 (48.4)	240 (2124)	230 (2036)	90	**1FT6136-6WB76-■ ■ ■ ■**	3	665 (589)	120 (265)
		45.5 (61.0)	300 (2655)	290 (2567)	112	**1FT6138-6WB76-■ ■ ■ ■**	3	845 (748)	137 (302)
2500	132	35.3 (47.3)	155 (1372)	135 (1195)	82	**1FT6132-6WD76-■ ■ ■ ■**	3	430 (381)	90 (198)
		48.4 (64.9)	200 (1770)	185 (1637)	115	**1FT6134-6WD76-■ ■ ■ ■**	3	547 (484)	103 (227)
		57.6 (77.2)	240 (2124)	220 (2036)	149	**1FT6136-6WD76-■ ■ ■ ■**	3	665 (589)	120 (265)
		72.0 (96.6)	300 (2655)	275 (2434)	162	**1FT6138-6WD76-■ ■ ■ ■**	3	845 (748)	137 (302)

Type of construction:	IM B35	**6**
Terminal box/ cable entry:	Transverse/from right Transverse/from left Axial/from NDE Axial/from DE	**5** **6** **7** **8**
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) Absolute encoder EnDat 2048 S/R (encoder AM2048S/R) Multi-pole resolver 2-pole resolver	**A** **E** **S** **T**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ) 22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ) 15 bit resolver (R15DQ) 14 bit resolver (R14DQ)	**D** **F** **U** **P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance R	Without	**D**
Plain shaft	Tolerance N	Without	**G**
Plain shaft	Tolerance R	Without	**K**

Vibration magnitude:	Degree of protection:	
Grade A	IP64	**0**
Grade A	IP65	**1**
Grade A	IP67	**2**
Grade A	IP68	**6**
Grade R	IP64	**3**
Grade R	IP65	**4**
Grade R	IP67	**5**
Grade R	IP68	**7**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[1]	Static current	Calculated power P_{calc}[4]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection via terminal box type gk630		
				Rated output current[2]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Cable entry Terminal box	Connec-table cable cross-sec-tion, max.	Power cable by the meter
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FT6132-6WB7 ...	95	58	24.3 (32.6)	60	**6SL312■-1TE26-0AA3**	2 × M32 × 1.5	2 × 4 × 16	**6FX■008-1BB61-....**
1FT6134-6WB7 ...	96	73	31.4 (42.1)	85	**6SL312■-1TE28-5AA3**	2 × M40 × 1.5	2 × 4 × 35	**6FX■008-1BB35-....**
1FT6136-6WB7 ...	96	92	37.7 (50.6)	132	**6SL312■-1TE31-3AA3**	2 × M50 × 1.5	2 × 4 × 50	**6FX■008-1BB50-....**
1FT6138-6WB7 ...	96	112	47.1 (63.2)	132	**6SL312■-1TE31-3AA3**	2 × M50 × 1.5	2 × 4 × 50	**6FX■008-1BB50-....**
1FT6132-6WD7 ...	95	92	40.6 (54.4)	85[3]	**6SL312■-1TE28-5AA3**	2 × M40 × 1.5	2 × 4 × 35	**6FX■008-1BB35-....**
1FT6134-6WD7 ...	96	122	52.4 (70.3)	132	**6SL312■-1TE31-3AA3**	2 × M50 × 1.5	2 × 4 × 50	**6FX■008-1BB50-....**
1FT6136-6WD7 ...	96	158	62.8 (84.2)	200	**6SL312■-1TE32-0AA3**	2 × M50 × 1.5	2 × 4 × 50	**6FX■008-1BB50-....**
1FT6138-6WD7 ...	96	167	78.5 (105)	200	**6SL312■-1TE32-0AA3**	2 × M50 × 1.5	2 × 4 × 50	**6FX■008-1BB50-....**

Cooling:		**Power cable:**	
Internal air cooling	**0**	MOTION-CONNECT 800	**8**
External air cooling	**1**	MOTION-CONNECT 500	**5**
Motor Module:		Length code	**....**
Single Motor Module	**1**		

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT

Notes on water cooling for 1FT6 motors:

Inlet temperature of cooling water, max.	30 °C (86 °F)
Cooling water throughput, min.	8 l/min (8 l = 1.76 British gallons/2.11 US gallons)
Pressure at motor inlet	p_{max} = 6 bar
Cooling water connection	G 3/8“
Coolant	Water with up to 25 % corrosion protection (recommendation: Tyfocor)
Loss of pressure between inlet and outlet	< 0.1 bar

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1) Optimum efficiency in continuous duty.

2) With default setting of the pulse frequency.

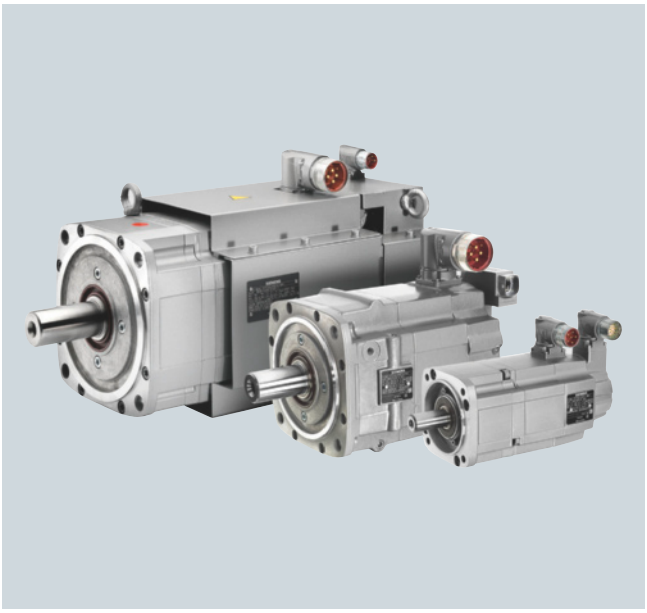
3) With the specified Motor Module, the motor cannot be fully utilized with M_0 at ΔT = 100 K winding temperature rise. If a Motor Module with a higher rating is used, you must check whether the specified power cable can be connected to it.

4) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 motors

Overview



The 1FT7 motors are permanent-magnet synchronous motors with very compact dimensions and an optically attractive design. Due to the well proven cross-profile and the rotatable connectors with quick-release locks, quick and easy mounting of the motors is possible.

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 methods. 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 ≥ 4 × M_0 with natural cooling
- High degree of protection – allows operation even with demanding ambient conditions
- High robustness against vibratory and shock loads thanks to vibration-isolated encoder mounting
- Fast and easy mounting due to cross-profile and rotatable connectors with quick-release locks
- Extremely high efficiency
- Due to their low torque ripple, 1FT7 Compact motors are 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. As 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 response and precision, such as:
  - Packaging machines
  - Foil extractor machines
  - Printing machines
  - Handling equipment

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Technical specifications

Product name	1FT7 Compact motor 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	KTY 84 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 ΔT = 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
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65 core type
Shaft extension on the drive end (DE) in accordance with DIN 748-3 (IEC 60072-1)	Plain shaft
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[1]	Tolerance N
Vibration magnitude 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 EN ISO 1680, max. Tolerance + 3 dB	
• 1FT703 ... 1FT706:	65 dB
• 1FT708 ... 1FT710:	70 dB
Encoder systems, built-in	
• Without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R) • Absolute encoder 2048 S/R single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)
• With DRIVE-CLiQ interface	• 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) + 11 bit commutation position (encoder IC22DQ) • 22 bit absolute encoder (resolution 4194304, 2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)

Technical specifications (continued)

Product name (continued)	1FT7 Compact motor 1FT7 High Dynamic motor
Connection	Connectors for signals and power rotatable
Paint finish	Pearl dark grey RAL 9023
2nd rating plate	Enclosed separately
Approvals, according to	cURus
Options	• Type of construction IM B5 (IM V1, IM V3) with flange 1 (compatible with 1FT6) • Shaft extension on the drive end (DE) with fitted key and keyway (half-key balancing) • Vibration magnitude Grade R • Built-in holding brake (zero-backlash, 24 V) • Degree of protection IP64, IP67 • Shaft and flange accuracy Tolerance R • Planetary gearbox, built-on (1FT7 Compact)

S/R = signals/revolution

Options with order codes

When ordering a motor with options, **-Z** should be added to the order number. The order code should also be specified for each required option. Order codes must not be repeated in plain text in the order.	**Order code**
Paint finish: Jet black RAL 9005	**X01**
Paint finish: Cream white RAL 9001	**X02**
Paint finish: Reseda green RAL 6011	**X03**
Paint finish: Pebble gray RAL 7032	**X04**
Paint finish: Sky blue RAL 5015	**X05**
Paint finish: Light ivory RAL 1015	**X06**
Paint finish: Anthracite RAL 7016	**X09**
Special paint finish for "worldwide" climate : primer and paint finish anthracite RAL 7016	**K23**
Special paint finish for "worldwide" climate: primer and paint finish selectable from X01 to X09	**K23+X..**
Primer (unpainted)	**K24**
Sealing air connection (Only in conjunction with IP67 degree of protection. Not in conjunction with terminal box.)	**Q12**
Mounting of SP+ planetary gearbox (Only for 1FT7 Compact, see gearboxes)	**J..**

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

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1FT7 Compact motors, core type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Core type	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			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)
Natural cooling									
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)	5.0 (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 (4.0)	3.9	**1FT7062-1AF7■-1 ■ ■ 1**	5	7.36 (6.51)	7.1 (15.7)
		2.39 (3.20)	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 (7.60)	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 (1.18)	2.0 (1.5)	1.4 (1.0)	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)

Type of construction IM B5:	IM B5	Flange 0 Flange 1 (compatible with 1FT6)	**0** **1**
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) Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)		**N** **M**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ) 22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ)		**D** **F**
Shaft extension: Plain shaft Plain shaft	**Shaft and flange accuracy:** Tolerance N Tolerance N	**Holding brake:** Without With	**G** **H**
Vibration magnitude: Grade A	**Degree of protection:** IP65		**1**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[4]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[6]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	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 (14.0)	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 (3.80)	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	8.80 (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 core	**D**
Length code	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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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] $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 Compact motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Standard type	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			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)
Natural cooling									
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)
		6.60 (8.85)	50 (36.9)	42 (31.0)	13	**1FT7105-5AB7■-1■ ■ ■**	5	178 (157)	44.2 (97.5)
		9.58 (12.8)	70 (51.6)	61 (45.0)	16	**1FT7108-5AB7■-1■ ■ ■**	5	248 (219)	59.0 (130)
2000	80	2.39 (3.20)	13 (9.6)	11.4 (8.4)	4.9	**1FT7082-5AC7■-1■ ■ ■**	5	26.5 (23.5)	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)	24.0 (17.7)	10	**1FT7102-5AC7■-1■ ■ ■**	5	91.4 (80.9)	26.1 (57.5)
		7.96 (10.7)	50 (36.9)	38.0 (28.0)	15	**1FT7105-5AC7■-1■ ■ ■**	5	178 (157)	44.2 (97.5)
		10.47 (14.0)	70 (51.6)	50.0 (36.9)	18	**1FT7108-5AC7■-1■ ■ ■**	5	248 (219)	59 (130)
3000	48	0.85 (1.14)	3.0 (2.2)	2.7 (2.0)	2.1	**1FT7042-5AF7■-1■ ■ ■**	3	2.81 (2.49)	4.6 (10.1)
		1.35 (1.81)	5.0 (3.7)	4.3 (3.2)	2.6	**1FT7044-5AF7■-1■ ■ ■**	3	5.43 (4.81)	7.2 (15.9)
		1.76 (2.36)	7.0 (5.2)	5.6 (4.1)	3.5	**1FT7046-5AF7■-1■ ■ ■**	3	7.52 (6.66)	9.3 (20.5)
	63	1.70 (2.28)	6.0 (4.4)	5.4 (4.0)	3.9	**1FT7062-5AF7■-1■ ■ ■**	5	7.36 (6.51)	7.1 (15.7)
		2.39 (3.20)	9.0 (6.6)	7.6 (5.6)	5.2	**1FT7064-5AF7■-1■ ■ ■**	5	11.9 (10.5)	9.7 (21.4)
		2.92 (3.92)	12.0 (8.9)	9.3 (6.9)	7.2	**1FT7066-5AF7■-1■ ■ ■**	5	16.4 (14.5)	12.3 (27.1)
		3.42 (4.59)	15.0 (11.1)	10.9 (8.0)	6.7	**1FT7068-5AF7■-1■ ■ ■**	5	23.2 (20.5)	16.3 (35.9)
	80	3.24 (4.34)	13.0 (9.6)	10.3 (7.6)	6.6	**1FT7082-5AF7■-1■ ■ ■**	5	26.5 (23.5)	14.0 (30.9)
		4.55 (6.10)	20.0 (14.8)	14.5 (10.7)	8.5	**1FT7084-5AF7■-1■ ■ ■**	5	45.1 (39.9)	20.8 (45.9)
		5.65 (7.58)	28.0 (20.7)	18 (13.3)	11	**1FT7086-5AF7■-1■ ■ ■**	5	63.6 (56.3)	27.5 (60.6)
	100	6.28 (8.42)	30.0 (22.1)	20 (14.8)	12	**1FT7102-5AF7■-1■ ■ ■**	5	91.4 (80.9)	26.1 (57.5)
		8.80 (11.8)	50.0 (36.9)	28 (20.7)	15	**1FT7105-5AF7■-1■ ■ ■**	5	178 (157)	44.2 (97.5)
		6.28 (8.42)	70.0 (51.6)	20 (14.8)	12	**1FT7108-5AF7■-1■ ■ ■**	5	248 (220)	59.0 (130)

Type of construction IM B5:	IM B5	Flange 0	**0**
		Flange 1 (compatible with 1FT6)	**1**
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)		**N**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)		**M**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)		**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ)		**F**

Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Fitted key and keyway	Tolerance R	Without	**D**
Fitted 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 magnitude:	**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 Selection guides.

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Motor type (repeated)	Effi-ciency[1]	Static current	Calculated power P_{calc}[4]	SINAMICS S120 Motor Module: Rated output current[2]	SINAMICS S120 Motor Module: Booksize format. For additional versions and components, see SINAMICS S120 drive system	Power cable with complete shield. Motor connection (and brake connection) via power connector: Power connector	Cable cross-section[3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for 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 (14.0)	18	6SL312■-■TE21-8AA3	1.5	4 × 2.5	6FX■002-5■N31-....
1FT7108-5AC7...	93	25	14.66 (19.7)	30	6SL312■-1TE23-0AA3	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 (3.80)	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	8.80 (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 (21.0)	30	6SL312■-1TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7108-5AF7...	93	36	21.99 (29.5)	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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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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) $P_{calc}\ [kW] = \frac{M_0\ [Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\ [HP] = \frac{M_0\ [lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 Compact motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Standard type	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			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)
Natural cooling									
4500	48	1.32 (1.77)[1]	7.0 (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)	8.0 (5.9)	7.8	**1FT7082-5AH7■-1■■■**	5	26.5 (23.5)	14.0 (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)	2.0 (1.5)	1.4 (1.0)	2.1	**1FT7034-5AK7■-1■■■**	3	0.85 (0.75)	3.8 (8.38)
		1.07 (1.43)	3.0 (2.2)	1.7 (1.3)	2.4	**1FT7036-5AK7■-1■■■**	3	1.33 (1.18)	5.0 (11.0)
	48	1.26 (1.69)	3.0 (2.2)	2.0 (1.5)	3	**1FT7042-5AK7■-1■■■**	3	2.81 (2.49)	4.6 (10.1)
		1.41 (1.89)[3]	5.0 (3.7)	3.0 (2.21)[3]	3.6[3]	**1FT7044-5AK7■-1■■■**	3	5.43 (4.81)	7.2 (15.9)
	63	2.13 (2.86)[4]	6.0 (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]	9.0 (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:	IM B5	Flange 0	**0**
		Flange 1 (compatible with 1FT6)	**1**
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)		**N**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)		**M**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)		**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ)		**F**

Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Fitted key and keyway	Tolerance R	Without	**D**
Fitted 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 magnitude:	**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 Selection guides.

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Motor type (repeated)	Effi-ciency[5]	Static current	Calculated power P_{calc}[8]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[6]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[7]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FT7046-5AH7...	90	8.1	3.30 (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■-1TE23-0AA3**	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 core	**D**
Length code	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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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] $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 Compact motors, standard type Forced ventilation

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Standard type	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			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)
Forced ventilation									
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)
3000	80	7.2 (9.66)	27 (19.9)	23 (17.0)	18.5	**1FT7084-5SF7■-1 ■ ■ ■**	5	45 (39q.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)
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:	IM B5	Flange 0 Flange 1 (compatible with 1FT6)	**1**
Connector outlet direction:	Connector size 1 and 1.5	Connector can be rotated	**1**
	Connector size 3[1]	Transverse right Transverse left Axial NDE Axial DE	**1** **2** **3** **4**
Terminal box/ cable entry:[1]	Top/transverse from right Top/transverse from left Top/axial from NDE Top/axial from DE		**5** **6** **7** **8**
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) Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)		**N** **M**
Encoder systems for motors with DRIVE-CLiQ interface:	Available soon		

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key	Tolerance N	Without	**A**
Fitted key	Tolerance N	With	**B**
Fitted key	Tolerance R	Without	**D**
Fitted 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 magnitude:	Degree of protection:	
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 Selection guides.

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Motor type (repeated)	Effi-ciency[2]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[4]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for 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-....**
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-....**
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 core	**D**
Length code	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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1) Connector size 3 cannot be rotated. Terminal box can be chosen alternatively only for connector size 3.

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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 Compact motors, standard type
Water cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Standard type	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			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)
Water cooling									
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 (60.0)	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:	IM B5	Flange 0	**0**
		Flange 1 (compatible with 1FT6)	**1**
Connector outlet direction:	Connector size 1 and 1.5	Connector can be rotated	**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:	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)		**N**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)		**M**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)		**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ)		**F**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Fitted key and keyway	Tolerance R	Without	**D**
Fitted 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 magnitude:	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 Selection guides.

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Motor type (repeated)	Efficiency[2]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[4]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) Connector size 3 cannot be rotated. Terminal box can be chosen alternatively only for connector size 3.

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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 Compact motors, standard type
Water cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 Compact synchronous motors Standard type	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			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)
Water cooling									
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 (22.0)	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 (60.0)	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 (14.0)	20.8	**1FT7066-5WH7■-1 ■ ■ ■**	5	17.7 (15.7)	16.3 (35.9)
	80	8.95 (12.0)	21 (15.5)	19 (14.0)	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 (60.0)	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 (7.17)	11 (24.3)
		8.9 (11.9)	16 (11.8)	14.2 (10.5)	20	**1FT7064-5WK7■-1 ■ ■ ■**	5	12.9 (11.4)	13.7 (30.2)

| | | | | | | | | |

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Motor type (repeated)	Effi-ciency[2]	Static 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[3]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[4]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	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■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7086-5WF7...	94	34	15.7 (21.1)	45	6SL312■-1 TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....
1FT7102-5WF7...	95	40	15.7 (21.1)	45	6SL312■-1 TE24-5AA3	1.5	4 × 10	6FX■002-5■N64-....
1FT7105-5WF7...	94	53.2	28.3 (38.0)	60	6SL312■-1 TE26-0AA3	3	4 × 16	6FX■002-5■S23-....
1FT7108-5WF7...	95	65	39.3 (52.7)	85	6SL312■-1 TE28-5AA3	3	4 × 16	6FX■002-5■G23-....
1FT7066-5WH7...	91	19.7	9.4 (12.6)	30	6SL312■-1 TE23-0AA3	1	4 × 2.5	6FX■002-5■N11-....
1FT7082-5WH7...	94	24	9.9 (13.3)	30	6SL312■-1 TE23-0AA3	1.5	4 × 4	6FX■002-5■N41-....
1FT7084-5WH7...	94	34.3	16.5 (22.1)	45	6SL312■-1 TE24-5AA3	1.5	4 × 6	6FX■002-5■N54-....
1FT7086-5WH7...	94	40.5	23.6 (31.6)	45	6SL312■-1 TE24-5AA3	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■-1 TE23-0AA3	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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) Connector size 3 cannot be rotated. Terminal box can be chosen alternatively only for connector size 3.

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, 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 it.

6) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FT7 High Dynamic motors, standard type
Forced ventilation/Water cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FT7 High Dynamic synchronous motors Standard type	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			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)
Forced ventilation									
3000	63	3.8 (5.10)	14 (10.3)	12 (8.85)	10.5	**1FT7065-7SF7■-1 ■ ■ ■**	5	6.4 (5.66)	19 (41.9)
		4.4 (5.90)	17 (12.5)	14 (10.3)	13	**1FT7067-7SF7■-1 ■ ■ ■**	5	8.3 (7.35)	23 (50.7)
	80	7.2 (9.66)	34 (25.1)	23 (17.0)	20	**1FT7085-7SF7■-1 ■ ■ ■**	5	20.7 (18.3)	34 (75.0)
		10.4 (13.9)	48 (35.4)	33 (24.3)	29	**1FT7087-7SF7■-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 (11.0)	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)
Water cooling									
3000	63	5.7 (7.64)	19 (14.0)	18 (13.3)	15	**1FT7065-7WF7■-1 ■ ■ ■**	5	6.4 (5.66)	16 (35.3)
		7.4 (9.92)	25 (18.4)	23.5 (17.3)	21	**1FT7067-7WF7■-1 ■ ■ ■**	5	8.3 (7.35)	22 (48.5)
	80	11.9 (16.0)	43 (31.7)	38 (28.0)	32	**1FT7085-7WF7■-1 ■ ■ ■**	5	20.7 (18.3)	32 (70.6)
		16.0 (21.5)	61 (45.0)	51 (37.6)	43	**1FT7087-7WF7■-■ ■ ■ ■**	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 size 1 and 1.5	Connector can be rotated	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:	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)			N		
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)			M		
Encoder systems for motors with DRIVE-CLiQ interface: (Only with water cooling)	22 bit incremental encoder + commutation position (encoder IC22DQ)			D		
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ)			F		
Shaft extension:	**Shaft and flange accuracy:**	**Holding brake:**				
Fitted key and keyway	Tolerance N	Without			A	
Fitted key and keyway	Tolerance N	With			B	
Fitted key and keyway	Tolerance R	Without			D	
Fitted 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 magnitude:	**Degree of protection:**					
Grade A	IP64					0
Grade A	IP65					1
Grade A	IP67 (Only with water cooling)					2
Grade R	IP64					3
Grade R	IP65					4
Grade R	IP67 (Only with water cooling)					5

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Efficiency[2]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[4]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	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■002-5D 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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) Connector size 3 cannot be rotated. Terminal box can be chosen alternatively only for connector size 3.

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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FK7 motors

Overview



1FK7 motors are compact, permanent-magnet synchronous motors. The available options, gearboxes and encoders, together with the expanded product range, mean that 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 due to low rotor moment of inertia

1FK7 High Inertia motors offer:

- Robust closed-loop control properties at medium or high load moment of inertia
- Minimal optimization and commisioning overhead for the compensation of disturbances

Application

- Machine tools
- Robots and handling systems
- Wood, glass, ceramics and stone working
- Packaging, plastics and textile machines
- Auxiliary axes

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Technical specifications

Product name	1FK7 Compact motor 1FK7 High Dynamic motor 1FK7 High Inertia motor
Type of motor	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling
Temperature monitoring	KTY 84 temperature sensor in 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 ΔT = 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)	IP64
Shaft extension on the drive end (DE) in accordance with DIN 748-3 (IEC 60072-1)	Plain shaft
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[1]	Tolerance N
Vibration magnitude 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 EN ISO 1680, max. Tolerance + 3 dB	
• 1FK701 ... 1FK704:	• 55 dB
• 1FK706:	• 65 dB
• 1FK708 ... 1FK710:	• 70 dB
Encoder systems, built-in	
• Without DRIVE-CLiQ interface:	• Incremental encoder • Absolute encoder • Resolver
• With DRIVE-CLiQ interface:	• Incremental encoder • Absolute encoder • Resolver
Connection	Connectors for signals and power, rotatable
Paint finish[2]	Unpainted
2nd rating plate[2] **3rd rating plate**	Attached in the NDE cover Enclosed separately
Approvals, according to	cURus
Options[2]	• Shaft extension on the drive end (DE) with fitted key and keyway (half-key balancing) • Built-in holding brake • Degree of protection IP65, plus DE flange IP67 • Planetary gearbox, built-on (requires: plain shaft extension, degree of protection IP64 for LP+ and IP65 for SP+) • Paint finish: Anthracite RAL 7016

S/R = signals/revolution

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

2) 1FK701 only available in degree of protection IP54 with paint finish, without rating plate in the NDE cover, planetary gearbox not available.
1FK7 High Inertia only available with paint finish and without rating plate in the NDE cover.

Options with order codes

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.	**Order code**
Metal rating plate attached to motor	**Q31**
Permanent magnet brake instead of spring-operated brake (Only for 1FK7 High Dynamic)	**N25**
Paint finish: Jet black RAL 9005	**X01**
Paint finish: Cream white RAL 9001	**X02**
Paint finish: Reseda green RAL 6011	**X03**
Paint finish: Pebble gray RAL 7032	**X04**
Paint finish: Sky blue RAL 5015	**X05**
Paint finish: Light ivory RAL 1015	**X06**
Paint finish: Suitable for food-grade applications White aluminum RAL 9006	**X08**
Paint finish: Pearl dark gray RAL 9023	**X27**
Special paint finish for "worldwide" climate: primer and paint finish anthracite RAL 7016	**K23**
Special paint finish for "worldwide" climate: primer and paint finish selectable from X01 to X27	**K23+X..**
Primer (unpainted)	**K24**
Mounting of SP+ planetary gearbox (Only for 1FK7 Compact/1FK7 High Dynamic, see gearboxes)	**J..**

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1FK7 Compact motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FK7 Compact synchronous motors Standard type	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			J	m
rpm		kW (HP)	Nm (lb_f-in)	Nm (lb_f-in)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)	kg (lb)
Natural cooling									
2000	100	4.29 (5.75)	27 (239)	20.5 (181)	9.6	**1FK7101-5AC71-1■ ■ ■**	4	79.9 (70.7)	21 (46.3)
		5.23 (7.01)	36 (319)	25 (221)	11.5	**1FK7103-5AC71-1■ ■ ■**	4	105 (92.9)	29 (63.9)
		7.75 (10.4)	48 (425)	37 (327)	16	**1FK7105-5AC71-1■ ■ ■**	4	156 (138)	39 (86.0)
3000	48	0.82 (1.10)	3 (26.6)	2.6 (23)	1.95	**1FK7042-5AF71-1■ ■ ■**	4	3.01 (2.66)	4.9 (10.8)
	63	1.48 (1.98)	6 (53.1)	4.7 (41.6)	3.7	**1FK7060-5AF71-1■ ■ ■**	4	7.95 (7.04)	7 (15.4)
		2.29 (3.07)	11 (97.4)	7.3 (64.6)	5.6	**1FK7063-5AF71-1■ ■ ■**	4	15.1 (13.4)	11.5 (25.4)
	80	2.14 (2.87)	8 (70.8)	6.8 (60.2)	4.4	**1FK7080-5AF71-1■ ■ ■**	4	15 (13.3)	10 (22.1)
		3.3 (4.43)	16 (142)	10.5 (92.9)	7.4	**1FK7083-5AF71-1■ ■ ■**	4	27.3 (24.2)	14 (30.9)
	100	3.77 (5.06)	18 (159)	12 (106)	8	**1FK7100-5AF71-1■ ■ ■**	4	55.3 (48.9)	19 (41.9)
		4.87 (6.53)	27 (239)	15.5 (137)	11.8	**1FK7101-5AF71-1■ ■ ■**	4	79.9 (70.7)	21 (46.3)
		5.37 (7.20)[2]	36 (319)	20.5 (181)[2]	16.5[2]	**1FK7103-5AF71-1■ ■ ■**	4	105 (92.9)	29 (63.9)
		8.17 (11.0)	48 (425)	26 (230)	18	**1FK7105-5AF71-1■ ■ ■**	4	156 (138)	39 (86.0)

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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)[1]	**E**
	Absolute encoder EnDat 32 S/R (encoder AM32S/R)[1]	**G**
	Multi-pole resolver	**S**
	2-pole resolver	**T**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)[1]	**F**
	16 bit absolute encoder single-turn +12 bit multi-turn (encoder AM16DQ)[1]	**K**
	15 bit resolver (R15DQ)	**U**
	14 bit resolver (R14DQ)	**P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Plain shaft	Tolerance N	Without	**G**
Plain shaft	Tolerance N	With	**H**

Degree of protection:	IP64 (Not for 1FK701)	**0**
	IP65 and DE flange IP67 (Not for 1FK701)	**2**
	IP64 (IP54 for 1FK701) and anthracite paint finish	**3**
	IP65 and DE flange IP67, anthracite paint finish (Not for 1FK701)	**5**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static current	Calculated power P_{calc}[7]	SINAMICS S120 Motor Module: Rated output current[4]	SINAMICS S120 Motor Module: Booksize format. For additional versions and components, see SINAMICS S120 drive system	Power cable with complete shield. Motor connection (and brake connection) via power connector: Power connector	Cable cross-section[5]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm^2	Order No.
1FK7101-5AC71...	93	12.3	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FK7103-5AC71...	93	14.7	7.5 (10.0)	18	**6SL312■-■TE21-8AA3**	1.5	4 × 1.5	**6FX■002-5■S21-....**
1FK7105-5AC71...	93	20	10 (13.4)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FK7042-5AF71...	89	2.2	0.9 (1.21)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7060-5AF71...	90	4.5	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7063-5AF71...	91	8	3.5 (4.69)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7080-5AF71...	92	4.8	2.5 (3.35)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7083-5AF71...	93	10.4	5.0 (6.71)	9[6]	**6SL312■-1 TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7100-5AF71...	92	11.2	5.7 (7.64)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7101-5AF71...	93	19	8.5 (11.4)	18[6]	**6SL312■-■TE21-8AA3**	1.5	4 × 2.5	**6FX■002-5■S31-....**
1FK7103-5AF71...	93	27.5	11.3 (15.2)	30	**6SL312■-1 TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FK7105-5AF71...	94	31	15 (20.1)	30[6]	**6SL312■-1 TE23-0AA3**	1.5	4 × 6	**6FX■002-5■S51-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) These values refer to n = 2500 rpm.

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency.

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) 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 it.

7) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FK7 Compact motors, standard type
Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FK7 Compact synchronous motors Standard type	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			J	m
rpm		kW (HP)	Nm (lb_f-in)	Nm (lb_f-in)	A	Order No.		10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)	kg (lb)
Natural cooling									
4500	63	1.74 (2.33)	6 (53.1)	3.7 (32.7)	4.1	**1FK7060-5AH71-1■ ■ ■**	4	7.95 (7.04)	7 (15.4)
		2.09 (2.80)[2]	11 (97.4)	5 (44.3)[2]	6.1[2]	**1FK7063-5AH71-1■ ■ ■**	4	15.1 (13.4)	11.5 (25.4)
	80	2.39 (3.20)[2]	8 (70.8)	5.7 (50.5)[2]	5.6[2]	**1FK7080-5AH71-1■ ■ ■**	4	15 (13.3)	10 (22.1)
		3.04 (4.08)[3]	16 (142)	8.3 (73.5)[3]	9[3]	**1FK7083-5AH71-1■ ■ ■**	4	27.3 (24.2)	14 (30.9)
6000	20	0.05 (0.07)	0.18 (1.59)	0.08 (0.71)	0.85	**1FK7011-5AK71-1■ ■ 3**	4	0.064 (0.06)	0.9 (1.98)
		0.10 (0.13)	0.35 (3.10)	0.16 (1.42)	0.85	**1FK7015-5AK71-1■ ■ 3**	4	0.083 (0.07)	1.1 (2.43)
	28	0.38 (0.51)	0.85 (7.52)	0.6 (5.31)	1.4	**1FK7022-5AK71-1■ ■ ■**	3	0.28 (0.25)	1.8 (3.97)
	36	0.50 (0.67)	1.1 (9.74)	0.8 (7.08)	1.3	**1FK7032-5AK71-1■ ■ ■**	3	0.61 (0.54)	2.7 (5.95)
		0.63 (0.84)	1.6 (14.2)	1 (8.85)	1.3	**1FK7034-5AK71-1■ ■ ■**	3	0.9 (0.80)	3.7 (8.16)
	48	0.69 (0.93)	1.6 (14.2)	1.1 (9.74)	1.7	**1FK7040-5AK71-1■ ■ ■**	4	1.69 (1.50)	3.5 (7.72)
		1.02 (1.37)[4]	3 (26.6)	1.95 (17.3)[4]	3.1[4]	**1FK7042-5AK71-1■ ■ ■**	4	3.01 (2.66)	4.9 (10.8)

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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R) (Not for 1FK701 ... 1FK703)[1]	**E**
	Absolute encoder EnDat 512 S/R (encoder AM512S/R) (Only for 1FK702/1FK703)[1]	**H**
	Absolute encoder EnDat 32 S/R (encoder AM32S/R) (Not for 1FK701 ... 1FK703)[1]	**G**
	Absolute encoder EnDat 16 S/R (encoder AM16S/R) (Only for 1FK701 ... 1FK703)[1]	**J**
	Multi-pole resolver	**S**
	2-pole resolver	**T**
Encoder systems for motors with DRIVE-CLiQ interface:[5]	22 bit incremental encoder + commutation position (encoder IC22DQ) (Not for 1FK701)	**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ) (Not for 1FK701 ... 1FK703)[1]	**F**
	20 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM20DQ) (Only for 1FK702/1FK703)[1]	**L**
	16 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM16DQ) (Not for 1FK701 ... 1FK703)[1]	**K**
	15 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM15DQ) (Only for 1FK702/1FK703)[1]	**V**
	15 bit resolver (R15DQ) (Not for 1FK701)	**U**
	14 bit resolver (R14DQ) (Not for 1FK701)	**P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Plain shaft	Tolerance N	Without	**G**
Plain shaft	Tolerance N	With	**H**

Degree of protection:	IP64 (Not for 1FK701)	**0**
	IP65 and DE flange IP67 (Not for 1FK701)	**2**
	IP64 (IP54 with 1FK701) and anthracite paint finish	**3**
	IP65 and DE flange IP67, anthracite paint finish (Not for 1FK701)	**5**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[6]	Static current	Calculated power P_{calc}[9]	SINAMICS S120 Motor Module		Power cable with complete shield Motor connection (and brake connection) via power connector		
				Rated output current[7]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[8]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FK7060-5AH71...	90	6.2	2.8 (3.75)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7063-5AH71...	90	12	5.2 (6.97)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7080-5AH71...	92	7.4	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7083-5AH71...	93	15	7.5 (10.1)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7011-5AK71...	62	1.5	0.11 (0.15)	3	**6SL312■-■TE13-0AA3**	0.5	4 × 1.5	**6FX 5002-5DA20-....**
1FK7015-5AK71...	68	1.5	0.22 (0.30)	3	**6SL312■-■TE13-0AA3**	0.5	4 × 1.5	**6FX 5002-5DA20-....**
1FK7022-5AK71...	86	1.8	0.5 (0.67)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7032-5AK71...	88	1.7	0.7 (0.94)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7034-5AK71...	88	1.9	1 (1.34)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7040-5AK71...	88	2.25	1.0 (1.34)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7042-5AK71...	89	4.4	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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1) If the absolute encoder is used, M_{rated} is reduced by 10 %.
2) These values refer to n = 4000 rpm.
3) These values refer to n = 3500 rpm.
4) These values refer to n = 5000 rpm.
5) 1FK701 motors are not available with a DRIVE-CLiQ interface. The encoder systems are connected via the SMC (Sensor Module Cabinet-Mounted).
6) Optimum efficiency in continuous duty.
7) With default setting of the pulse frequency.
8) 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).
9) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FK7 High Dynamic motors, standard type Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FK7 High Dynamic synchronous motors Standard type	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			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)
Natural cooling									
3000	48	1.1 (1.48)	4.0 (2.9)	3.5 (2.6)	4	**1FK7044-7AF71-1■ ■ ■**	3	1.28 (1.13)	7.7 (17)
	63	1.7 (2.28)	6.4 (4.7)	5.4 (4.0)	5.3	**1FK7061-7AF71-1■ ■ ■**	3	3.4 (3.01)	10 (22.1)
		2.51 (3.37)	12 (8.8)	8.0 (5.9)	7.5	**1FK7064-7AF71-1■ ■ ■**	3	6.5 (5.75)	15.5 (34.2)
	80	3.14 (4.21)[2]	22 (16.2)	12 (8.8)[2]	12.5[2]	**1FK7085-7AF71-1■ ■ ■**	4	23 (20.3)	23.5 (51.8)
		3.77 (5.06)[3]	28 (20.6)	18 (13.3)[3]	14.5[3]	**1FK7086-7AF71-1■ ■ ■**	4	23 (20.3)	23.5 (51.8)
4500	48	1.23 (1.65)	3.1 (2.3)	2.6 (1.9)	4	**1FK7043-7AH71-1■ ■ ■**	3	1.0 (0.89)	6.3 (13.9)
		1.41 (1.89)	4.0 (2.9)	3.0 (2.2)	4.9	**1FK7044-7AH71-1■ ■ ■**	3	1.28 (1.13)	7.7 (17)
	63	2.03 (2.72)	6.4 (4.7)	4.3 (3.2)	5.9	**1FK7061-7AH71-1■ ■ ■**	3	3.4 (3.01)	10 (22.1)
		2.36 (3.16)	12 (8.8)	5.0 (3.7)	7	**1FK7064-7AH71-1■ ■ ■**	3	6.5 (5.75)	15.5 (34.2)
6000	36	0.57 (0.76)	1.3 (1.0)	0.9 (0.7)	1.5	**1FK7033-7AK71-1■ ■ ■**	3	0.27 (0.24)	3.1 (6.8)
	48	1.26 (1.69)	3.1 (2.3)	2.0 (1.5)	4.4	**1FK7043-7AK71-1■ ■ ■**	3	1.0 (0.89)	6.3 (13.9)

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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R) (Not for 1FK703)[1]	**E**
	Absolute encoder EnDat 512 S/R (encoder AM512S/R) (Only for 1FK703)[1]	**H**
	Absolute encoder EnDat 32 S/R (encoder AM32S/R) (Not for 1FK703)[1]	**G**
	Absolute encoder EnDat 16 S/R (encoder AM16S/R) (Only for 1FK703)[1]	**J**
	Multi-pole resolver	**S**
	2-pole resolver	**T**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ) (Not for 1FK703)[1]	**F**
	20 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM20DQ) (Only for 1FK703)[1]	**L**
	16 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM16DQ) (Not for 1FK703)[1]	**K**
	15 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM15DQ) (Only for 1FK703)[1]	**V**
	15 bit resolver (R15DQ)	**U**
	14 bit resolver (R14DQ)	**P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Plain shaft	Tolerance N	Without	**G**
Plain shaft	Tolerance N	With	**H**

Degree of protection:	IP64	**0**
	IP65 and DE flange IP67	**2**
	IP64 and anthracite paint finish	**3**
	IP64 and DE flange IP67, anthracite paint finish	**5**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[4]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[6]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FK7044-7AF71...	91	4.5	1.3 (1.7)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7061-7AF71...	93	6.1	2.0 (2.7)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7064-7AF71...	93	11	3.8 (5.1)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7085-7AF71...	92	22.5	6.9 (9.3)	30	**6SL312■- 1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FK7086-7AF71...	93	21	8.8 (11.8)	30	**6SL312■- 1TE23-0AA3**	1.5	4 × 4	**6FX■002-5■S41-....**
1FK7043-7AH71...	90	4.5	1.5 (2.0)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7044-7AH71...	91	6.3	1.9 (2.6)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7061-7AH71...	93	8	3.0 (4.0)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7064-7AH71...	93	15	5.7 (7.6)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7033-7AK71...	88	2.2	0.8 (1.1)	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**
1FK7043-7AK71...	90	6.4	1.9 (2.6)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■S01-....**

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 **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.
2) These values refer to n = 2500 rpm.
3) These values refer to n = 2000 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) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FK7 Compact/1FK7 High Dynamic motors Natural cooling for Power Modules

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque[1]	Rated current	1FK7 Compact/ 1FK7 High Dynamic synchronous motors Connection to SINAMICS 230 V 1 AC	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			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)
Natural cooling									
3000	36	0.31 (0.42)	1.15 (0.8)	1.0 (0.7)	1.6	**1FK7032-5AF21-1■■■**	3	0.61 (0.54)	2.7 (5.9)
		0.38 (0.51)	1.3 (1.0)	1.2 (0.9)	2.0	**1FK7033-7AF21-1■■■**	3	0.27 (0.24)	3.1 (6.8)
		0.46 (0.62)	1.6 (1.2)	1.45 (1.1)	1.8	**1FK7034-5AF21-1■■■**	3	0.9 (0.8)	3.7 (8.2)
	48	0.82 (1.1)	3.0 (2.2)	2.6 (1.9)	3.5	**1FK7042-5AF21-1■■■**	4	3.01 (2.66)	4.9 (10.8)
		0.79 (1.06)	2.7 (2.0)	2.5 (1.8)	3.8	**1FK7043-7AF21-1■■■**	3	1.0 (0.89)	6.3 (13.9)
6000	20	0.05 (0.1)	0.18 (0.1)	0.08 (0.1)	0.5	**1FK7011-5AK21-1■■3**	4	0.064 (0.06)	0.9 (2.0)
		0.10 (0.1)	0.35 (0.3)	0.16 (0.1)	0.5	**1FK7015-5AK21-1■■3**	4	0.083 (0.08)	1.1 (2.4)
	28	0.38 (0.51)	0.85 (0.6)	0.6 (0.4)	1.4	**1FK7022-5AK21-1■■■**	3	0.28 (0.25)	1.8 (4.0)

Synchronous motor:	1FK7 Compact	**5**
	1FK7 High Dynamic	**7**
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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R) (Only for 1FK704)[1]	**E**
	Absolute encoder EnDat 512 S/R (encoder AM512S/R) (Only for 1FK702/1FK703)[1]	**H**
	Absolute encoder EnDat 32 S/R (encoder AM32S/R) (Only for 1FK704)[1]	**G**
	Absolute encoder EnDat 16 S/R (encoder AM16S/R) (Not for 1FK704)[1]	**J**
	Multi-pole resolver	**S**
	2-pole resolver	**T**
Encoder systems for motors with DRIVE-CLiQ interface:[2]	22 bit incremental encoder + commutation position (encoder IC22DQ) (Not for 1FK701)	**D**
	22 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM22DQ) (Only for 1FK704)[1]	**F**
	20 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM20DQ) (Only for 1FK702/1FK703)[1]	**L**
	16 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM16DQ) (Only for 1FK704)[1]	**K**
	15 bit absolute encoder single-turn + 12 bit multi-turn (encoder AM15DQ) (Only for 1FK702/1FK703)[1]	**V**
	15 bit resolver (R15DQ) (Not for 1FK701)	**U**
	14 bit resolver (R14DQ) (Not for 1FK701)	**P**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key and keyway	Tolerance N	Without	**A**
Fitted key and keyway	Tolerance N	With	**B**
Plain shaft	Tolerance N	Without	**G**
Plain shaft	Tolerance N	With	**H**

Degree of protection:	IP64 (Not for 1FK701)	**0**
	IP65 and DE flange IP67 (Not for 1FK701)	**2**
	IP64 (IP54 for 1FK701) and anthracite paint finish	**3**
	IP65 and DE flange IP67, anthracite paint finish (Not for 1FK701)	**5**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[3]	Static 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[4]	**Booksize format without line filter**			
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}	For additional versions and components, see SINAMICS S120 drive system	Power connector	Cable cross-section[5]	Pre-assembled cable
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FK7032-5AF21...	85	1.7	0.36 (0.5)	2.3	**6SL3210-1SB12-3UA3**	1	4 × 1.5	**6FX■002-5■G01-....**
1FK7033-7AF21...	86	2.2	0.41 (0.6)	2.3	**6SL3210-1SB12-3UA3**	1	4 × 1.5	**6FX■002-5■G01-....**
1FK7034-5AF21...	85	1.9	0.50 (0.7)	2.3	**6SL3210-1SB12-3UA3**	1	4 × 1.5	**6FX■002-5■G01-....**
1FK7042-5AF21...	89	3.9	0.94 (1.3)	3.9	**6SL3210-1SB14-0UA3**	1	4 × 1.5	**6FX■002-5■G01-....**
1FK7043-7AF21...	88	3.9	0.85 (1.1)	3.9	**6SL3210-1SB14-0UA3**	1	4 × 1.5	**6FX■002-5■G01-....**
1FK7011-5AK21...	62	0.85	0.11 (0.2)	0.9	**6SL3210-1SB11-0UA3**	0.5[6]	4 × 1.5	**6FX5002-5DA30-....**
1FK7015-5AK21...	68	0.85	0.22 (0.3)	0.9	**6SL3210-1SB11-0UA3**	0.5[6]	4 × 1.5	**6FX5002-5DA30-....**
1FK7022-5AK21...	85	1.8	0.53 (0.7)	2.3	**6SL3210-1SB12-3UA3**	1	4 × 1.5	**6FX■002-5■G01-....**

Cooling: Internal air cooling	**0**
Motor Module: Single Motor Module	**1**

Power cable: MOTION-CONNECT 800	**8**
MOTION-CONNECT 500	**5**
Without brake cores	**C**
With brake cores	**D**
Length code	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

1) If the absolute encoder is used, M_{rated} is reduced by 10 %.

2) 1FK701 motors are not available with a DRIVE-CLiQ interface. The encoder systems are connected via the SMC (Sensor Module Cabinet-Mounted).

3) Optimum efficiency in continuous duty.

4) With default setting of the pulse frequency.

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) This power cable is fitted with a connector with M17 thread at the motor end and brake cores as standard (4 × 1.5 mm² + 2 × 1.5 mm²).

7) $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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1FK7 High Inertia motors, standard type Natural cooling

Selection and ordering data

Rated speed	Shaft height	Rated power	Static torque	Rated torque	Rated current	1FK7 High Inertia synchronous motors Standard type	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			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)
Natural cooling									
2000	80	3.1 (4.16)	20 (14.8)	15 (11.1)	7.1	**1FK7084-3BC71-1■ ■ ■**	8	99 (33.8)	22.7 (50.1)
3000	63	1.5 (2.01)	6 (4.43)	4.7 (3.47)	3.7	**1FK7060-3B F71-1■ ■ ■**	8	12.5 (4.27)	7.8 (17.2)
		1.6 (2.15)	8 (5.90)	5.1 (3.76)	3.5	**1FK7062-3B F71-1■ ■ ■**	8	23.6 (8.06)	10.6 (23.4)
	80	2.7 (3.62)	12 (8.85)	8.7 (6.42)	7	**1FK7081-3B F71-1■ ■ ■**	8	49 (16.7)	15.2 (33.5)
		3.1 (4.16)	20 (14.8)	10 (7.38)	6.8	**1FK7084-3B F71-1■ ■ ■**	8	99 (33.8)	22.7 (50.1)
6000	48	0.9 (1.21)	3 (2.21)	1.5 (1.11)	2.45	**1FK7042-3BK71-1■ ■ ■**	8	5.05 (1.73)	5.1 (11.2)

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)	**A**
	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**

Shaft extension:	Shaft and flange accuracy:	Holding brake:	
Fitted key	Tolerance N	Without	**A**
Fitted 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**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Effi-ciency[1]	Static 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 SINAMICS S120 drive system	Power connector	Cable cross-section[3]	Pre-assembled cable
	η	I_0 at M_0 ΔT=100 K	P_{calc} for M_0 ΔT=100 K	I_{rated}				
	%	A	kW (HP)	A	Order No.	Size	mm²	Order No.
1FK7084-3BC7...	93	8.8	4.2 (5.63)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-....**
1FK7060-3BF71...	90	4.5	1.9 (2.55)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-....**
1FK7062-3BF71...	91	5	2.5 (3.35)	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■002-5■N01-....**
1FK7081-3BF71...	93	9	3.8 (5.10)	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■002-5■N01-....**
1FK7084-3BF71...	93	12.5	6.3 (8.45)	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■002-5■N01-....**
1FK7042-3BK7...	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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

7

[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] $P_{calc}\,[kW] = \frac{M_0\,[Nm] \times n_{rated}}{9550}$ $\quad P_{calc}\,[HP] = \frac{M_0\,[lb_f\text{-}in] \times n_{rated}}{63000}$

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Series SP+ planetary gearbox for 1FT6 motors

Overview

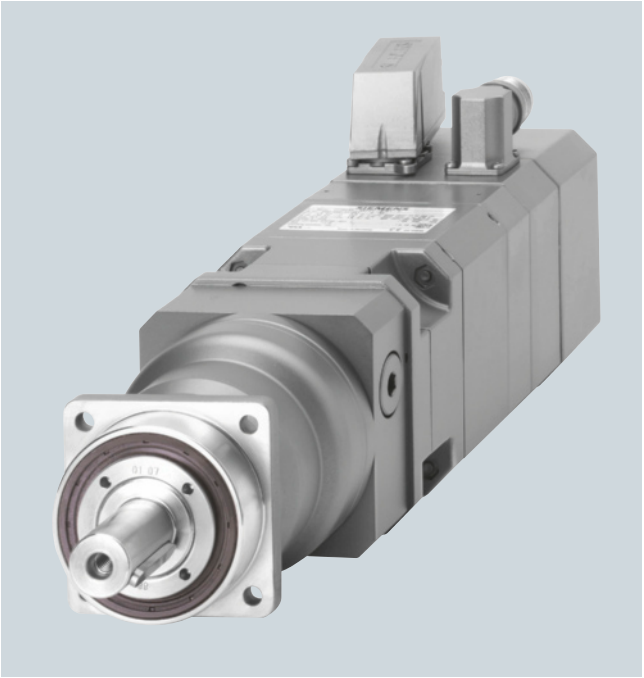
1FT6 motors can be combined with planetary gearboxes to compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

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 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 magnitude 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



1FT6 synchronous motor with mounted planetary gearbox series SP+

Integration

1FT602 to 1FT613 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, note the maximum permissible input speed of the gearbox, which should be equal to 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 gearbox temperature must not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for synchronous motors when assigning gearboxes to the motor.

1FT6 motors must be designed with plain motor shaft extension, shaft and flange accuracy tolerance N and vibration magnitude grade A/degree of protection IP65 (for 1FT602: IP64) for mounting onto the gearbox.

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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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (F_{2Amax})
		arcmin	kg (lb)					rpm	Nm (lb_f-ft)	N (lb_f)	N (lb_f)
1FT6021	SP 060S-MF1	≤ 4	1.9 (4.2)	–	–	–	✔	6000	40 (29.5)	2700 (606)	2400 (540)
1FT6024				✔	✔	✔	✔		(32 for i = 10)		
1FT6031				✔	✔	✔	✔				
1FT6034				✔	✔	✔	–				
1FT6034	SP 075S-MF1	≤ 4	3.9 (8.6)	–	–	–	✔	6000	110 (81.1)	4000 (899)	3350 (753)
1FT6041				✔	✔	✔	✔		(90 for i = 10)		
1FT6044				✔	✔	✔	✔				
1FT6061	SP 100S-MF1	≤ 3	7.7 (17.0)	✔	✔	✔	✔	4500	300 (221)	6300 (1416)	5650 (1270)
1FT6062				✔	✔	✔	✔		(225 for i = 10)		
1FT6064				✔	✔	✔	✔				
1FT6081	SP 140S-MF1	≤ 3	17.2 (37.9)	✔	✔	✔	✔	4000	600 (442)	9450 (2124)	9870 (2218)
1FT6082				✔	✔	✔	✔		(480 for i = 10)		
1FT6084				✔	✔	✔	✔				
1FT6086				✔	✔	✔	–				
1FT6086	SP 180S-MF1	≤ 3	34 (75.0)	–	–	–	✔	3500	1100 (810)	14700 (3304)	14150 (3181)
1FT6102				✔	✔	✔	✔		(880 for i = 10)		
1FT6105				✔	✔	✔	–				
1FT6108				✔	✔	✔	–				
1FT6105	SP 210S-MF1	≤ 3	56 (123)	–	–	–	✔	2500	2500 (1844)	21000 (4721)	30000 (6744)
1FT6108				–	–	–	✔		(2400 for i = 7 1900 for i = 10)		
1FT6132				✔	✔	✔	✔				
1FT6134				✔	✔	✔	–				
1FT6136				✔	✔	✔	–				
1FT6134	SP 240S-MF1	≤ 3	83 (183)	–	–	–	✔	2200	4500 (3319)	30000 (6744)	33000 (7418)
1FT6136				–	–	–	✔		(4300 for i = 7 3400 for i = 10)		
Order codes • Gear shaft with fitted key • Gear shaft without fitted key				**J02** **J22**	**J03** **J23**	**J05** **J25**	**J09** **J29**				

Ordering data **1FT6 . . . -. . . 71-.. ■ 1-Z J..**

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+:
Plain motor shaft extension/shaft and flange accuracy tolerance N and vibration magnitude grade A/IP65 degree of protection[2]

✔ Possible
– Not possible

1) In reference to the output shaft center.

2) IP64 degree of protection with 1FT602.: **1FT602.-6AK71-.. ■ 0-Z J..** (**G** / **H**)

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Series SP+ planetary gearbox, single-stage for 1FT6 motors

Technical specifications

Planetary gearbox with 1FT6 motor

Single-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)						
		Continuous duty S1[1]		1FT602.	1FT603.	1FT604.	1FT606.	1FT608.	1FT610.	1FT613.
		n_{N1}	M_{N2} (T_{2N})	J_1	J_1	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)	kgcm^2 (lb_f-in^2)	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 (38.3)	–	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)	–	–	–	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)	–	–	–	–	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	4	1200	1500 (1106)	–	–	–	–	–	–	94.3 (32.2)
	5	1500	1500 (1106)	–	–	–	–	–	–	76.9 (26.3)
	7	1700	1400 (1033)	–	–	–	–	–	–	61.5 (21.0)
	10	2000	1000 (738)	–	–	–	–	–	53.1 (18.1)	53.1 (18.1)
SP 240S-MF1	10	1700	1300 (959)	–	–	–	–	–	–	70.8 (24.2)

[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).

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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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (F_{2Amax})
		arcmin	kg (lb)						rpm	Nm (lb$_f$-ft)	N (lb$_f$)	N (lb$_f$)
1FT6021	SP 060S-MF2	≤ 6	2 (4.4)	✔	✔	✔	✔	✔	6000	40 (29.5)	2700 (607)	2400 (540)
1FT6024				✔	✔	✔	✔	–				
1FT6031				✔	✔	✔	–	–				
1FT6024	SP 075S-MF2	≤ 6	3.6 (7.9)	–	–	–	–	✔	6000	110 (81.1)	4000 (899)	3350 (753)
1FT6031				–	–	–	✔	✔				
1FT6034				✔	✔	✔	–	–				
1FT6041				✔	✔	–	–	–				
1FT6034	SP 100S-MF2	≤ 5	7.9 (17.4)	–	–	–	✔	✔	4500	300 (221)	6300 (1416)	5650 (1270)
1FT6041				–	–	✔	✔	✔				
1FT6044				✔	✔	✔	–	–				
1FT6061				✔	✔	✔	✔	–				
1FT6062				✔	✔	✔	–	–				
1FT6064				✔	–	–	–	–				
1FT6044	SP 140S-MF2	≤ 5	17 (37.5)	–	–	–	✔	✔	4000	600 (442)	9450 (2124)	9870 (2219)
1FT6061				–	–	–	–	✔				
1FT6062				–	–	–	✔	✔				
1FT6064				–	✔	✔	–	–				
1FT6081				✔	✔	✔	✔	–				
1FT6082				✔	✔	–	–	–				
1FT6084				✔	–	–	–	–				
1FT6064	SP 180S-MF2	≤ 5	36.4 (80.3)	–	–	–	✔	✔	4000	1100 (811)	14700 (3305)	14150 (3181)
1FT6081				–	–	–	–	✔				
1FT6082				–	–	✔	✔	–				
1FT6084				–	✔	✔	–	–				
1FT6086				✔	✔	–	–	–				
1FT6102				✔	✔	–	–	–				
1FT6082	SP 210S-MF2	≤ 5	55.0 (121)	–	–	–	–	✔	3500	2400 (1770) (2500 for i = 20)	21000 (4721)	30000 (6744)
1FT6105				✔	–	–	–	–				
1FT6084	SP 240S-MF2	≤ 5	80.6 (178)	–	–	–	✔	✔	3500	4500 (3319) (4000 for i = 40 4300 for i = 50)	30000 (6744)	30000 (6744)
1FT6086				–	–	✔	✔	✔				
1FT6102				–	–	✔	✔	✔				
1FT6105				–	✔	✔	–	–				
1FT6108				✔	✔	–	–	–				
1FT6132				✔	✔	–	–	–				
1FT6134				✔	–	–	–	–				
1FT6136				✔	–	–	–	–				
Order codes • Gear shaft with fitted key • Gear shaft without fitted key				**J12 J32**	**J13 J33**	**J15 J35**	**J16 J36**	**J17 J37**				

Ordering data **1FT6...-...71-..■ 1-Z J..**

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+:
Plain motor shaft extension/shaft and flange accuracy tolerance N and vibration magnitude grade A/IP65 degree of protection[2]

✔ Possible
– Not possible

1) In reference to the output shaft center.

2) IP64 degree of protection with 1FT602.: **1FT602.-6AK71-..■ 0-Z J..**
G
H

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Series SP+ planetary gearbox, two-stage for 1FT6 motors

Technical specifications

Planetary gearbox with 1FT6 motor

Two-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)						
		Continuous duty S1[1]		1FT602.	1FT603.	1FT604.	1FT606.	1FT608.	1FT610.	1FT613.
		n_{N1}	M_{N2} (T_{2N})	J_1	J_1	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)	kgcm^2 (lb_f-in^2)	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)	0.16 (0.06)	–	–	–	–	–
	40	4400	26 (19.2)	0.06 (0.02)	–	–	–	–	–	–
	50	4800	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)	–	0.17 (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)	1.92 (0.66)	–	–	–
	50	3500	175 (129)	–	0.38 (0.13)	0.54 (0.19)	–	–	–	–
SP 140S-MF2	16	2900	360 (265)	–	–	–	–	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)	–	–	1.40 (0.48)	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)	–	–
	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)	–
	50	2500	1500 (1106)	–	–	–	–	28.3 (9.67)	–	–
SP 240S-MF2	16	2300	2500 (1844)	–	–	–	–	–	39.2 (13.4)	39.2 (13.4)
	20	2500	2500 (1844)	–	–	–	–	–	34.6 (11.8)	34.6 (11.8)
	28	2500	2500 (1844)	–	–	–	–	30.5 (10.4)	30.5 (10.4)	–
	40	2500	2500 (1844)	–	–	–	–	28.2 (9.64)	28.2 (9.64)	–
	50	2500	2500 (1844)	–	–	–	–	27.9 (9.53)	27.9 (9.53)	–

[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).

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Series SP+ planetary gearbox for 1FT7 motors

Overview

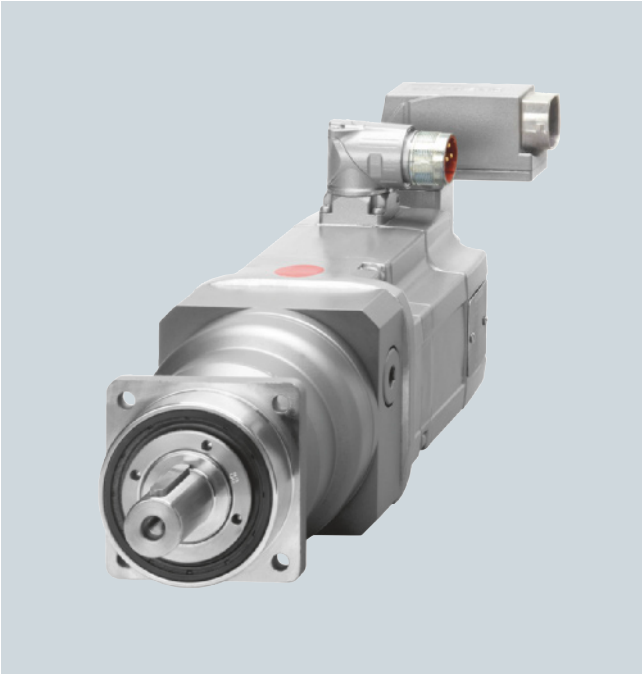
1FT7 motors can be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

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 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 magnitude 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



1FT7 synchronous motor with mounted planetary gearbox series SP+

Integration

1FT703 to 1FT710 naturally-cooled motors can be supplied ex factory (Siemens AG) complete with flange-mounted planetary gear unit.

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, note the maximum permissible input speed of the gearbox, which should be equal to 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). It is not permissible to exceed a gearbox temperature of 90 °C (194 °F).

Follow the instructions contained in the section for synchronous motors in the Configuration Manual when assigning gearboxes to the motor.

1FT7 motors must be designed with flange type 1, with plain motor shaft extension, shaft and flange accuracy tolerance N and vibration magnitude grade A/degree of protection IP65, for mounting onto the gearbox.

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Series SP+ planetary gearbox, single-stage for 1FT7 motors

Selection and ordering data

Motor Natual cooling	**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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (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 (295)	2700 (607)	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				✔	✔	✔	✔				
1FT7066				✔	✔	✔	✔				
1FT7068				✔	✔	✔	–				
1FT7068	SP 140S-MF1	≤ 3	17.2 (37.9)	–	–	–	✔	4000	600 (442)	9450 (2124)	9870 (2219)
1FT7082				✔	✔	✔	✔		(480 for i = 10)		
1FT7084				✔	✔	✔	✔				
1FT7086				✔	✔	✔	–				
1FT7086	SP 180S-MF1	≤ 3	34 (75.0)	–	–	–	✔	3500	1100 (810)	14700 (3305)	14150 (3181)
1FT7102				✔	✔	✔	✔		(880 for i = 10)		
1FT7105				✔	✔	✔	–				
1FT7108				✔	✔	✔	–				
1FT7105	SP 210S-MF1	≤ 3	56 (123)	–	–	–	✔	2500	2500 (1844) (2400 for i = 7 1900 for i = 10)	21000 (4721)	30000 (6744)
1FT7108				–	–	–	✔				
Order codes • Gear shaft with fitted key • Gear shaft without fitted key				**J02 J22**	**J03 J23**	**J05 J25**	**J09 J29**				

Ordering data **1FT7...-...71-..■1-Z J..**

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+:
Plain motor shaft extension/shaft and flange accuracy tolerance N and vibration magnitude grade A/IP65 degree of protection

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

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Technical specifications

Planetary gearbox with 1FT7 motor

Single-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)				
		Continuous duty S1[1]		1FT703.	1FT704.	1FT706.	1FT708.	1FT710.
		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 (38.4)	0.38 (0.13)	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)	–	1.38 (0.47)	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)	–	–	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)

[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).

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Series SP+ planetary gearbox, two-stage for 1FT7 motors

Selection and ordering data

Motor Natural cooling	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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (F_{2Amax})
		arcmin	kg (lb)						rpm	Nm (lb_f-ft)	N (lb_f)	N (lb_f)
1FT7034	SP 075S-MF2	≤ 6	3.6 (7.9)	✔	✔	✔	–	–	6000	110 (81.1)	4 000 (899)	3 350 (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 (2219)
1FT7046				–	–	✔	✔	✔				
1FT7062				–	–	✔	✔	✔				
1FT7064				–	✔	✔	–	–				
1FT7066				✔	✔	–	–	–				
1FT7068				✔	✔	–	–	–				
1FT7082				✔	✔	–	–	–				
1FT7084				✔	–	–	–	–				
1FT7064	SP 180S-MF2	≤ 5	36.4 (80.3)	–	–	–	✔	✔	4000	1100 (811)	14700 (3305)	14150 (3181)
1FT7066				–	–	✔	✔	✔				
1FT7068				–	–	✔	✔	✔				
1FT7082				–	–	✔	✔	✔				
1FT7084				–	✔	✔	–	–				
1FT7086				✔	✔	–	–	–				
1FT7102				✔	✔	–	–	–				
1FT7084	SP 210S-MF2	≤ 5	55 (121)	–	–	–	✔	✔	3500	2400 (1770) (2500 for i = 20)	21000 (4721)	30000 (6744)
1FT7086				–	–	✔	✔	–				
1FT7102				–	–	✔	–	–				
1FT7105				✔	✔	–	–	–				
1FT7108				✔	–	–	–	–				
1FT7086	SP 240S-MF2	≤ 5	80.6 (178)	–	–	–	–	✔	3500	4500 (3319) (4000 for i = 40 4300 for i = 50)	30000 (6744)	33000 (7419)
1FT7102				–	–	–	✔	✔				
1FT7105				–	–	✔	✔	–				
1FT7108				–	✔	✔	–	–				
Order codes • Gear shaft with fitted key • Gear shaft without fitted key				**J12** **J32**	**J13** **J33**	**J15** **J35**	**J16** **J36**	**J17** **J37**				

Ordering data **1FT7...-...71-..■1-Z**
J..

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+:
Plain motor shaft extension/shaft and flange accuracy tolerance N and vibration magnitude grade A/IP65 degree of protection

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

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Technical specifications

Planetary gearbox with 1FT7 motor

Two-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)				
		Continuous duty S1[1]		1FT703.	1FT704.	1FT706.	1FT708.	1FT710.
		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 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 (10.8)
	28	2500	1500 (1106)	–	–	–	30.0 (10.3)	30.0 (10.3)
	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)

[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).

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Series SP+ planetary gearbox for 1FK7 motors

Overview

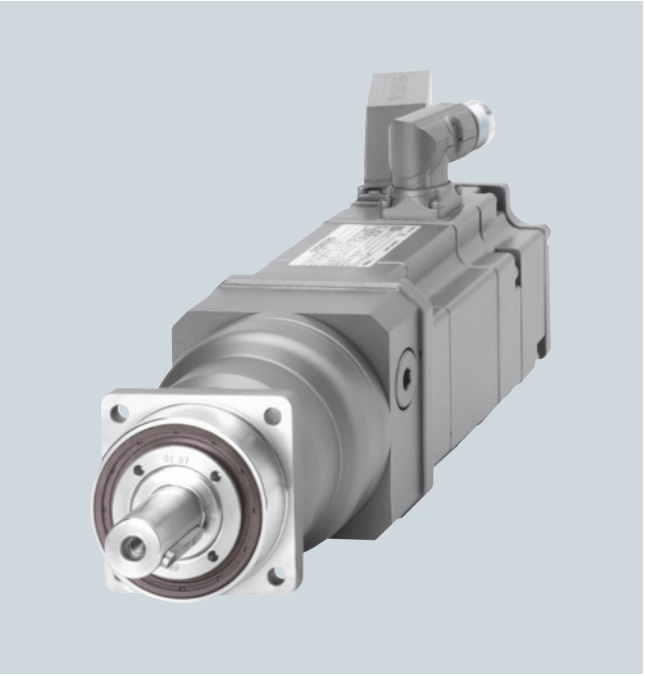
1FK7 motors can be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

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 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 fitted key.

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 magnitude 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



1FK7 synchronous motor with built-in planetary gearbox series SP+

Integration

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, note the maximum permissible input speed of the gearbox, which should be equal to 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 gearbox temperature may not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for synchronous motors when assigning gearboxes to the motor.

1FK7 motors must be designed with plain motor shaft extension/ shaft and flange accuracy tolerance N, degree of protection IP65 and anthracite paint finish for mounting onto the gearbox.

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Selection and ordering data

Motor Natural cooling	**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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (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 (607)	2400 (540)
1FK7032				✔	✔	✔	✔		(32 for *i* = 10)		
1FK7033				✔	✔	✔	✔				
1FK7034				✔	✔	✔	✔				
1FK7040	SP 075S-MF1	≤ 4	3.9 (7.9)	✔	✔	✔	✔	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)		
1FK7063				✔	✔	✔	✔				
1FK7064				✔	✔	✔	✔				
1FK7080	SP 140S-MF1	≤ 3	17.2 (37.9)	✔	✔	✔	✔	4000	600 (442)	9450 (2124)	9870 (2219)
1FK7083				✔	✔	✔	✔		(480 for *i* = 10)		
1FK7085				✔	✔	✔	✔				
1FK7086				✔	✔	✔	✔				
1FK7100	SP 180S-MF1	≤ 3	34 (75.0)	✔	✔	✔	✔	3500	1100 (811) (880 for *i* = 10)	14700 (3305)	14150 (3181)
1FK7101				✔	✔	✔	✔				
1FK7103				✔	✔	✔	✔				
1FK7105				✔	✔	✔	–				
1FK7105	SP 210S-MF1	≤ 3	56 (123)	–	–	–	✔	2500	2500 (1844) (2400 for *i* = 7 1900 for *i* = 10)	21000 (4721)	30000 (6744)
Order codes • Gear shaft with fitted key • Gear shaft without fitted key				**J02 J22**	**J03 J23**	**J05 J25**	**J09 J29**				

Ordering data **1FK7...-.A..1-..■ 5-Z J..**

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+:
Plain motor shaft extension and IP65 degree of protection, anthracite paint finish

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

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Series SP+ planetary gearbox, single-stage for 1FK7 motors

Technical specifications

Planetary gearbox with 1FK7 motor

Single-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)					
		Continuous duty S1[1]		1FK702	1FK703.	1FK704.	1FK706.	1FK708.	1FK710.
		n_{N1}	M_{N2} (T_{2N})	J_1	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)	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 (265)	–	–	–	–	11.0 (3.76)	–
	5	2100	360 (265)	–	–	–	–	9.95 (3.40)	–
	7	2600	360 (265)	–	–	–	–	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)

[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).

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Selection and ordering data

Motor Natural cooling	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} (n_1)	M_{G2} (T_{2B})	F_r (F_{2Rmax})	F_a (F_{2Amax})
		arcmin	kg (lb)						rpm	Nm (lbf-ft)	N (lbf)	N (lbf)
1FK7022	SP 060S-MF2	≤ 6	2 (4.4)	✔	✔	✔	–	–	6000	40 (295)	2700 (607)	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 (1270)
1FK7040				–	–	–	✔	✔				
1FK7042				–	–	✔	✔	✔				
1FK7043				–	✔	✔	✔	✔				
1FK7044				✔	✔	✔	✔	–				
1FK7060				✔	✔	✔	–	–				
1FK7061				✔	✔	–	–	–				
1FK7044	SP 140S-MF2	≤ 5	17 (37.5)	–	–	–	–	✔	4000	600 (442)	9450 (2124)	9870 (2219)
1FK7060				–	–	–	✔	✔				
1FK7061				–	–	✔	✔	✔				
1FK7063				✔	✔	✔	–	–				
1FK7064				✔	✔	✔	–	–				
1FK7080				✔	✔	✔	✔	–				
1FK7083				✔	✔	–	–	–				
Order codes												
• Gear shaft with fitted key				**J12**	**J13**	**J15**	**J16**	**J17**				
• Gear shaft without fitted key				**J32**	**J33**	**J35**	**J36**	**J37**				

Ordering data **1FK7...-.A..1-..■5-Z**
J..

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and
order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+: Plain motor shaft extension and IP65 degree of protection, anthracite paint finish

✔ Possible
– Not possible
[1] Referred to the center of the output shaft at 100 rpm.

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Series SP+ planetary gearbox, two-stage for 1FK7 motors

Selection and ordering data

Motor Natural cooling	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)
1FK7063	SP 180S-MF2	≤ 5	36.4 (80.3)	–	–	–	✔	✔	4000	1100 (811)	14700 (3305)	14150 (3181)
1FK7064				–	–	–	✔	✔				
1FK7080				–	–	–	–	✔				
1FK7083				–	–	✔	–	–				
1FK7085				✔	✔	–	–	–				
1FK7086				✔	✔	–	–	–				
1FK7100				✔	✔	✔	–	–				
1FK7101				✔	✔	–	–	–				
1FK7103				✔	–	–	–	–				
1FK7083	SP 210S-MF2	≤ 6	55 (121)	–	–	–	✔	✔	3500	2400 (1770) (2500 for i = 20)	21000 (4721)	30000 (6744)
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				–	–	✔	–	–				
Order codes												
• Gear shaft with fitted key				**J12**	**J13**	**J15**	**J16**	**J17**				
• Gear shaft without fitted key				**J32**	**J33**	**J35**	**J36**	**J37**				

Ordering data **1FK7...-.A..1-..■5-Z**
J..

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and
order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting planetary gearbox SP+: Plain motor shaft extension and IP65 degree of protection, anthracite paint finish

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

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Technical specifications

Planetary gearbox with 1FK7 motor

Two-stage Type	Gear ratio	Motor speed	Output torque	Moments of inertia of gearbox (referred to the drive)					
		Continuous duty S1[1]		1FK702	1FK703.	1FK704.	1FK706.	1FK708.	1FK710.
		n_{N1}	M_{N2} (T_{2N})	J_1	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)	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 (0.19)	–	–	–
	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 (132)	–	–	0.81 (0.28)	2.18 (0.75)	–	–
	20	3100	180 (132)	–	–	0.70 (0.24)	2.07 (0.71)	–	–
	28	3100	180 (132)	–	–	0.60 (0.20)	1.97 (0.67)	–	–
	40	3100	180 (132)	–	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 (266)	–	–	–	3.19 (1.09)	10.3 (3.52)	–
	20	2900	360 (266)	–	–	–	2.71 (0.93)	9.77 (3.34)	–
	28	2900	360 (266)	–	–	–	2.34 (0.80)	9.41 (3.22)	–
	40	2900	360 (266)	–	–	–	2.10 (0.72)	9.16 (3.13)	–
	50	3200	360 (266)	–	–	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 (10.8)
	28	2500	1500 (1106)	–	–	–	–	30.0 (10.3)	30.0 (10.3)
	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)

[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).

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Series LP+ planetary gearbox for 1FK7 motors

Overview

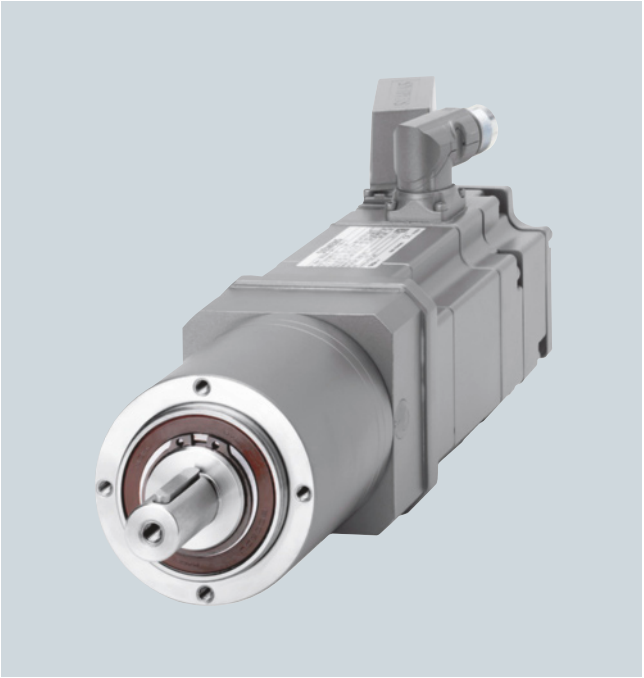
1FK7 motors can be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly to the drive end of the motors.

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 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 fitted 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 magnitude 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 mounting positions.
- The gearboxes are sealed (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



1FK7 synchronous motor with mounted planetary gearbox series LP+

Integration

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, note the maximum permissible input speed of the gearbox, which should be equal to 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 gearbox temperature may not exceed 90 °C (194 °F).

Follow the instructions contained in the Configuration Manual for synchronous motors when assigning gearboxes to the motor.

1FK7 motors must be designed with plain motor shaft extension/shaft and flange accuracy tolerance N, degree of protection IP64 and anthracite paint finish for mounting onto the gearbox.

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Selection and ordering data

Motor Natural cooling	**Planetary gearbox single-stage** Torsion. 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-M01	0.75 (1.65)	✔	–	8000	12 (8.9)	11 (8.1)	650 (146)	0.055 (0.05)
1FK7022	LP 070-M01	2.0 (4.41	–	✔	6000	35 (25.8)	32 (23.6)	1450 (326)	0.28 (0.25)
1FK7032			✔	✔					
1FK7033			✔	✔					
1FK7034			✔	✔					
1FK7040	LP 090-M01	4.0 (8.82)	✔	✔	6000	90 (66.4)	80 (59.0)	1900 (427)	1.77 (1.57)
1FK7042			✔	✔					
1FK7043			✔	✔					
1FK7044			✔	✔					
1FK7060	LP 120-M01	8.6 (19.0)	✔	✔	4800	220 (162)	200 (148)	4000 (899)	5.42 (4.80)
1FK7061			✔	✔					
1FK7063			✔	✔					
1FK7064			✔	–					
1FK7080	LP 155-M01	17 (37.5)	✔	✔	3600	450 (332)	350 (258)	6000 (1349)	25.7 (22.8)
1FK7082			✔	✔					
1FK7083			✔	✔					
1FK7085			✔	✔					
1FK7086			✔	✔					
1FK7100			✔	✔					
1FK7101			✔	–					
1FK7103			✔	–					
1FK7105			✔	–					
Order codes • Gear shaft with fitted key			**V40**	**V42**					

Ordering data **1FK7...-.A..1-..■3-Z V..**

G without holding brake
H with holding brake

Order No. of the motor with identifier **-Z** and order code for mounting the planetary gearbox assigned to the motor
Preconditions for mounting LP+ planetary gearboxes:
Plain motor shaft extension and IP64 degree of protection, anthracite paint finish

Continuous duty

Continuous duty is permissible at the rated speed and rated torque. The gearbox temperature may not exceed 90 °C (194 °F).

Planetary gearbox 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-M01	4000	5.7 (4.2)	–
LP 070-M01	3700	18 (13.3)	16.5 (12.2)
LP 090-M01	3400	45 (33.2)	40 (29.5)
LP 120-M01	2600	110 (81.1)	100 (73.8)
LP 155-M01	2000	320 (236)	190 (140)

✔ Possible
– Not possible
[1] Referred to the center of the output shaft at 100 rpm.

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1FK7-DYA compact geared motors

Overview



The 1FK7-DYA compact geared motor combines electrical and mechanical components in the smallest space possible. This mechatronic unit consists of a permanent-magnet 1FK7 synchronous motor and a directly mounted single-stage planetary gearbox.

The 1FK7-DYA compact geared motors with degree of protection IP64 are designed for operation without external cooling as the heat is dissipated over the motor surface. The integrated planetary gearboxes have high maximum torques and permit high radial and axial forces at the shaft extension.

Benefits

- Space-saving installation due to the high power density of the motor and integration of the planetary gearbox directly into the motor end shield. Mounting to the machine is greatly simplified by this and the logistics are reduced to a minimum.
- Mounting in types of construction IM B5 and IM B14 is possible.
- Highly dynamic due to lower motor moment of inertia; this means shorter cycle times.
- Maintenance-free
- Suitable for S1 continuous duty
- High positioning accuracy thanks to low mechanical torsional backlash of < 8 arcmin
- Mechanical compatibility with regard to IM B14 flange and shaft extension for the LP+ planetary gearbox
- Power connection via plug, signal connection via plug or DRIVE-CLiQ for SINAMICS S120

Applications

In general mechanical engineering, any place where coaxial drive units are used, e.g. in

- Packaging machines
- Wood, glass and ceramic processing machines
- Plastic, injection molding and foil stretching machines
- Handling systems
- Machine tools
- All kinds of auxiliary axes

Integration

1FK7-DYA compact geared motors can be combined with the SINAMICS S120 drive system to create a powerful system with high functionality. The integrated encoder system for speed and position control can be selected depending on the application.

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Technical specifications

Product name	1FK7-DYA compact geared motor
Type of motor	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling
Temperature monitoring	KTY 84 temperature sensor in 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 ΔT = 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) IM B14
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP64
Shaft extension on the drive end (DE) in accordance with DIN 748-3 (IEC 60072-1)	With fitted key
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[1)]	Tolerance N
Vibration magnitude 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 EN ISO 1680, max.	
• 1FK703 • 1FK704 • 1FK706 • 1FK708	72 dB 75 dB 80 dB 82 dB
Encoder systems, built-in	
• Without Drive-CLiQ interface	• Incremental encoder • Absolute encoder • Resolver
• With Drive-CLiQ interface	• Incremental encoder • Absolute encoder • Resolver
Connection	Connectors for signals and power can be rotated by 270°
Paint finish	Anthracite RAL 7016
2nd rating plate **3rd rating plate**	Attached in the NDE cover Enclosed separately
Approvals, according to	cURus
Options	Built-in holding brake

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

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1FK7-DYA compact geared motors
Standard type – natural cooling

Selection and ordering data

Rated speed	Rated power	Speed, max.	Torque, max.	Static torque	Rated torque[1]	Available gear ratio	1FK7-DYA compact geared motors Standard type		Number of pole pairs	Moment of inertia of rotor[2] without brake	with brake
n_{2rated}	P_2	n_{2max}	M_{2max}	M_{20}	M_{2rated}	i				J	J
rpm	kW (HP)	rpm	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)		Order No.	Order code		10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)	10^{-4} kgm^2 (10^{-3} lb_f-in-s^2)
Natural cooling											
370	0.37 (0.50)	600	32 (23.6)	11 (8.1)	9.5 (7.0)	10	**1FK7032-5AK71-1 ■ ■ 3-Z**	**A03**	3	0.75 (0.66)	0.83 (0.73)
740	0.5 (0.67)	1200	32 (23.6)	7.5 (5.5)	6.5 (4.8)	5	**1FK7034-5AK71-1 ■ ■ 3-Z**	**A00**	3	1.04 (0.92)	1.12 (0.99)
340	0.45 (0.60)	600	49 (36.1)	15 (11.1)	12.5 (9.2)	10	**1FK7040-5AK71-1 ■ ■ 3-Z**	**A13**	4	2.3 (2.04)	3.0 (2.66)
680	0.71 (0.95)	1200	51 (37.6)	13 (9.6)	10 (7.4)	5	**1FK7042-5AK71-1 ■ ■ 3-Z**	**A10**	4	3.6 (3.19)	4.3 (3.81)
260	1.25 (1.68)	480	175 (129)	57 (42)	46 (33.9)	10	**1FK7060-5AH71-1 ■ ■ 3-Z**	**A73**	4	10.3 (9.12)	12.5 (11.1)
520	1.74 (2.33)	960	170 (125)	51 (37.6)	32 (23.6)	5	**1FK7063-5AH71-1 ■ ■ 3-Z**	**A70**	4	17.4 (15.4)	19.6 (17.4)
200	1.47 (1.97)	360	242 (179)	76 (56.1)	70 (51.6)	10	**1FK7080-5AH71-1 ■ ■ 3-Z**	**A83**	4	28.7 (25.4)	31.8 (28.2)
400	1.88 (2.52)	720	233 (172)	68 (50.2)	45 (33.2)	5	**1FK7083-5AH71-1 ■ ■ 3-Z**	**A80**	4	41 (36.3)	49.6 (43.9)

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)	**A**	
	Absolute encoder EnDat 2048 S/R[1] single-turn, 4096 revolutions multi-turn with EnDat interface (encoder AM2048S/R) (Not for 1FK703)	**E**	
	Absolute encoder EnDat 512 S/R[1] single-turn, 4096 revolutions multi-turn with EnDat interface (encoder AM512S/R) (Only for 1FK703)	**H**	
	Absolute encoder EnDat 32 S/R[1] single-turn, 4096 revolutions multi-turn with EnDat interface (encoder AM32S/R) (Not for 1FK703)	**G**	
	Absolute encoder EnDat 16 S/R[1] single-turn, 4096 revolutions multi-turn with EnDat interface (encoder AM16S/R) (Only for 1FK703)	**J**	
	Multi-pole resolver	**S**	
	2-pole resolver	**T**	
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder (resolution 4194304, 2048 S/R internal) + 11 bit commutation position (encoder IC22DQ)	**D**	
	22 bit absolute encoder single-turn (resolution 4194304, 2048 S/R internal) +12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)	**F**	
	20 bit absolute encoder single-turn (resolution 1048576, 512 S/R internal) +12 bit multi-turn (traversing range 4096 revolutions) (encoder AM20DQ)	**L**	
	16 bit absolute encoder single-turn (resolution 65536, 32 S/R internal) +12 bit multi-turn (traversing range 4096 revolutions) (encoder AM16DQ)	**K**	
	15 bit absolute encoder single-turn (resolution 32768, 16 S/R internal) +12 bit multi-turn (traversing range 4096 revolutions) (encoder AM15DQ)	**V**	
	15 bit resolver (resolution 32768, multi-pole internal) (R15DQ)	**U**	
	14 bit resolver (resolution 16384, 2-pole internal) (R14DQ)	**P**	
Shaft extension: Fitted key and keyway	**Shaft and flange accuracy:** Tolerance N	**Holding brake:** Without	**U**
Fitted key and keyway	Tolerance N	With	**V**
Degree of protection:	IP64, anthracite paint finish RAL 7016		**3**

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Motor type (repeated)	Weight without brake	with brake	Static current	Maximum current	SINAMICS S120 Motor Module Rated output current[3]	Booksize format For additional versions and components, see SINAMICS S120 drive system	Power cable with complete shield Motor connection (and brake connection) via power connector Power connector	Cable cross-section[4]	Pre-assembled cable
	m	m	I_0 at M_0 ΔT=100 K	I_{max}	I_{rated}		Size	mm²	
	kg (lb)	kg (lb)	A	A	A	Order No.			Order No.
1FK7032-5AK71-...	4.11 (9.06)	4.47 (9.86)	1.7	5	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7034-5AK71-...	5.01 (11.1)	5.37 (11.8)	1.9	7.9	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7040-5AK71-...	6.60 (14.6)	7.61 (16.8)	2.3	7.4	3	**6SL312■-■TE13-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7042-5AK71-...	7.91 (17.4)	8.62 (19.0)	4.4	14.9	5	**6SL312■-■TE15-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7060-5AH71-...	13.9 (30.7)	15 (33.1)	6.2	19	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7063-5AH71-...	17.6 (38.8)	19 (41.9)	12	41	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7080-5AH71-...	23.4 (51.6)	24.6 (54.2)	7.4	24	9	**6SL312■-■TE21-0AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**
1FK7083-5AH71-...	28.6 (63.1)	31.2 (68.8)	15	48	18	**6SL312■-■TE21-8AA3**	1	4 × 1.5	**6FX■ 002-5■S01-....**

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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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[1] If the absolute encoder is used, M_{2rated} is reduced by 10 %.

[2] In reference to the motor shaft.

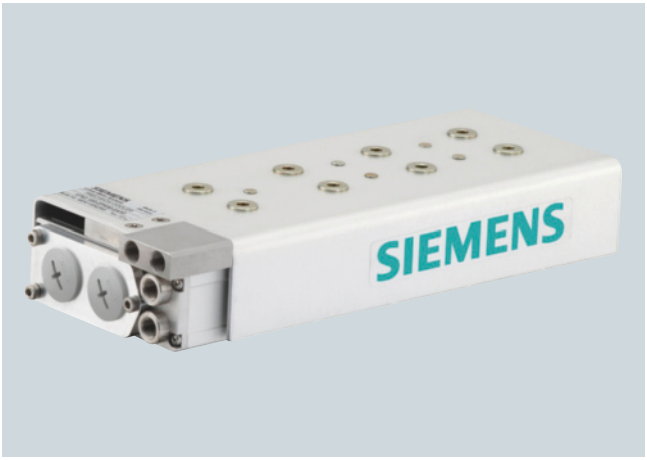
[3] With default setting of the pulse frequency.

[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).

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1FN3 linear motors

Overview



In combination with the SINAMICS S120 drive system, 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
- Easy 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, play, 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 optional 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 ensures 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

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:

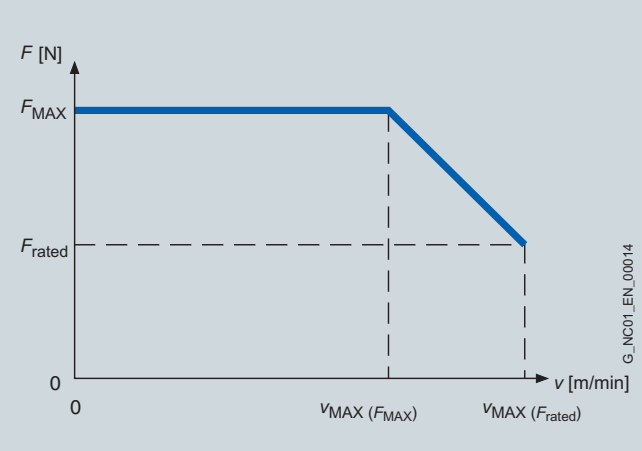
- Grinding
- Non-circular machining (e.g. oscillating applications)
- Z-axes without weight compensation, quills
- Handling, Cartesian robots

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Technical specifications

Product name	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 KTY 84 temperature sensor (for 1FN3050, Temp-S only). Evaluation via SME120/SME125 Sensor Module External (see SINAMICS S120 drive system).	
Insulation of stator winding in accordance with 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 gradations 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. See Overview of measuring systems	
Type of connection	Prepared for separate connection of the power and signal cable	
Approvals, according to	cURus, UR for 1FN3900-4WC00-...	

Characteristic curves



The 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 $v_{MAX(FMAX)}$; up to velocity $v_{MAX(Frated)}$, only the feedrate force F_{rated} is available.

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1FN3 linear motors, standard type
Version for peak load – water cooling

Selection and ordering data

Feedrate force		Maximum velocity[3]		1FN3 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:	
Motors 1FN3100 to 1FN3900	
Connection cover prepared for separate power and signal cables	**B**
Motor 1FN3050	
Permanently connected power and signal cables with exposed core ends Length: 2 m (6.56 ft)	**E**
Motor 1FN3050	
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[8)]	
• Motors 1FN3100/1FN3150	**6FX7002-2SL01-....**
• Motors 1FN3300 to 1FN3900	**6FX7002-2SL02-....**

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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 SINAMICS S120 drive system	Pre-assembled adapter cable for motor	Power connector	Cable cross-section[5]	Pre-assembled basic cable to drive system
	I_{rated}[1]	I_{MAX}	$P_{el, max.}$	I_{rated}/I_{MAX}					
	A	A	kW (HP)	A	Order No.	Order No.	Size	mm^2	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] **....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

[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, see Connection system MOTION-CONNECT.

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1FN3 linear motors, standard type
Version for peak load – water cooling

Selection and ordering data

Feedrate force		Maximum velocity[3]		1FN3 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_N				
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**			
		127 (417)	279 (915)	**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:	
Motors 1FN3100 to 1FN3900	
Connection cover prepared for separate power and signal cables	**B**

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

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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 SINAMICS S120 drive system	Pre-assembled adapter cable for motor	Power connector	Cable cross-section[4]	Pre-assembled basic cable to drive system
	I_{rated}[1]	I_{MAX}	$P_{el, max.}$	I_{rated}/I_{MAX}					
	A	A	kW (HP)	A	Order No.	Order No.	Size	mm^2	Order No.
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■-1TE23-0AA3**	**6FX7002-5LM62-....**	1	4 × 2.5	**6FX8002-5CS11-....**
1FN3450-2WE00-...	33.8	99.7	32.6 (43.7)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM82-....**	1.5	4 × 6	**6FX8002-5CS54-....**
1FN3450-3WB00-...	17.9	52.7	27.5 (36.9)	30/56	**6SL312■-1TE23-0AA3**	**6FX7002-5LM62-....**	1	4 × 2.5	**6FX8002-5CS11-....**
1FN3450-3WB50-...	22.8	67.3	31.1 (41.7)	45/85	**6SL312■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3450-3WC00-...	28.1	83.0	34.6 (46.4)	45/85	**6SL312■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3450-3WE00-...	50.7	149.0	49.0 (65.7)	132/210	**6SL312■-1TE31-3AA3**	**6FX7002-5LM02-....**	1.5	4 × 16	**6FX8002-5CS24-....**
1FN3450-4WB00-...	23.8	70.3	36.7 (49.2)	45/85	**6SL312■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3450-4WB50-...	30.4	89.8	41.4 (55.5)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM82-....**	1.5	4 × 6	**6FX8002-5CS54-....**
1FN3450-4WC00-...	37.5	110.6	46.2 (61.9)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3450-4WE00-...	67.6	199.5	65.3 (87.5)	132/210	**6SL312■-1TE31-3AA3**	**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■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3600-3WC00-...	35.7	105.9	44.6 (59.8)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM82-....**	1.5	4 × 6	**6FX8002-5CS54-....**
1FN3600-4WA30-...	22.3	64.9	41.9 (56.2)	45/85	**6SL312■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3600-4WB00-...	30.9	89.8	47.2 (63.3)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM82-....**	1.5	4 × 6	**6FX8002-5CS54-....**
1FN3600-4WB50-...	40.8	118.5	53.2 (71.3)	85/141	**6SL312■-1TE28-5AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3600-4WC00-...	46.9	136.5	55.5 (74.4)	85/141	**6SL312■-1TE28-5AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3900-2WB00-...	24.7	69.5	34.5 (46.3)	45/85	**6SL312■-1TE24-5AA3**	**6FX7002-5LM72-....**	1.5	4 × 4	**6FX8002-5CS54-....**
1FN3900-2WC00-...	36.7	103.3	40.9 (54.8)	60/113	**6SL312■-1TE26-0AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3900-3WB00-...	40.6	114.0	54.5 (73.1)	85/141	**6SL312■-1TE28-5AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3900-4WB00-...	49.4	138.9	68.9 (92.4)	132/210	**6SL312■-1TE31-3AA3**	**6FX7002-5LM32-....**	1.5	4 × 10	**6FX8002-5CS64-....**
1FN3900-4WB50-...	60.6	170.3	76.3 (102.3)	132/210	**6SL312■-1TE31-3AA3**	**6FX7002-5LM02-....**	1.5	4 × 16	**6FX8002-5CS24-....**
1FN3900-4WC00-...	73.5	206.5	81.9 (109.8)	132/210	**6SL312■-1TE31-3AA3**	**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]	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

[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 mm^2). Connected to primary section with 16 mm^2 (< 1.5 m (4.92 ft)) then routed onwards through terminal box with 25 mm^2.

[6] Sold by the meter only (4 × 25 mm^2).

[7] For length code, see Connection system MOTION-CONNECT.

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1FN3 linear motors, standard type
Version for continuous load – water cooling

Selection and ordering data

Feedrate force		Maximum velocity[3]		1FN3 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_N				
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**		42.3/44.4 (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:

Motors 1FN3100 to 1FN3900

Connection cover prepared for separate power and signal cables — **B**

Motor 1FN3050

Permanently connected power and signal cables with exposed core ends
Length: 2 m (6.56 ft) — **E**

Motor 1FN3050

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)]	
• Motors1FN3100/1FN3150	**6FX7002-2SL01-....**
• Motors1FN3300 to 1FN3900	**6FX7002-2SL02-....**

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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 SINAMICS S120 drive system	Pre-assembled adapter cable for motor	Power connector	Cable cross-section[5]	Pre-assembled basic cable to drive system
	I_{rated}[1]	I_{MAX}	$P_{el, max.}$	I_{rated}/I_{MAX}					
	A	A	kW (HP)	A	Order No.	Order No.	Size	mm^2	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] ....

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

[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 feedrate force F_{rated}. If feedrate 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, see Connection system MOTION-CONNECT.

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1FN3 linear motors, standard type
Water cooling

Selection and ordering data

1FN3 linear motors	Optional components		
	Secondary section cover		Cover end pieces for secondary section cover[2]
Type	Integrated[1]	Segmented	Retaining of the integrated cover without heat sink profiles
	Order No.	Order No.	Order No.
1FN3050-...	**1FN3050-0TB00-1 ■ ■ 0**	**1FN3050-4TP00-1A ■ ■**	**1FN3050-0TC00-0AA0**
1FN3100-...	**1FN3100-0TB00-1 ■ ■ 0**	**1FN3100-4TP00-1A ■ ■**	**1FN3100-0TC00-0AA0**
1FN3150-...	**1FN3150-0TB00-1 ■ ■ 0**	**1FN3150-4TP00-1A ■ ■**	**1FN3150-0TC00-0AA0**
1FN3300-...	**1FN3300-0TB00-1 ■ ■ 0**	**1FN3300-4TP00-1A ■ ■**	**1FN3300-0TC00-0AA0**
1FN3450-...	**1FN3450-0TB00-1 ■ ■ 0**	**1FN3450-4TP00-1A ■ ■**	**1FN3450-0TC00-0AA0**
1FN3600-...	**1FN3600-0TB00-1 ■ ■ 0**	**1FN3600-4TP00-1A ■ ■**	–
1FN3900-...	**1FN3900-0TB00-1 ■ ■ 0**	**1FN3900-4TP00-1A ■ ■**	–

Number of secondary sections	0	**A**
	10	**B**
	20	**C**
	30	**D**
	40	**E**
	50	**F**
	0	**A**
	1	**B**
	2	**C**
	3	**D**
	4	**E**
	5	**F**
	6	**G**
	7	**H**
	8	**J**
	9	**K**

Number of secondary sections for all motors	2.5	**C**	**5**
	3	**D**	**0**
	3.5	**D**	**5**
	4	**E**	**0**
	5	**F**	**0**
Number of secondary sections for motors 1FN3600/1FN3900	5.5	**F**	**5**
	6.5	**G**	**5**

7

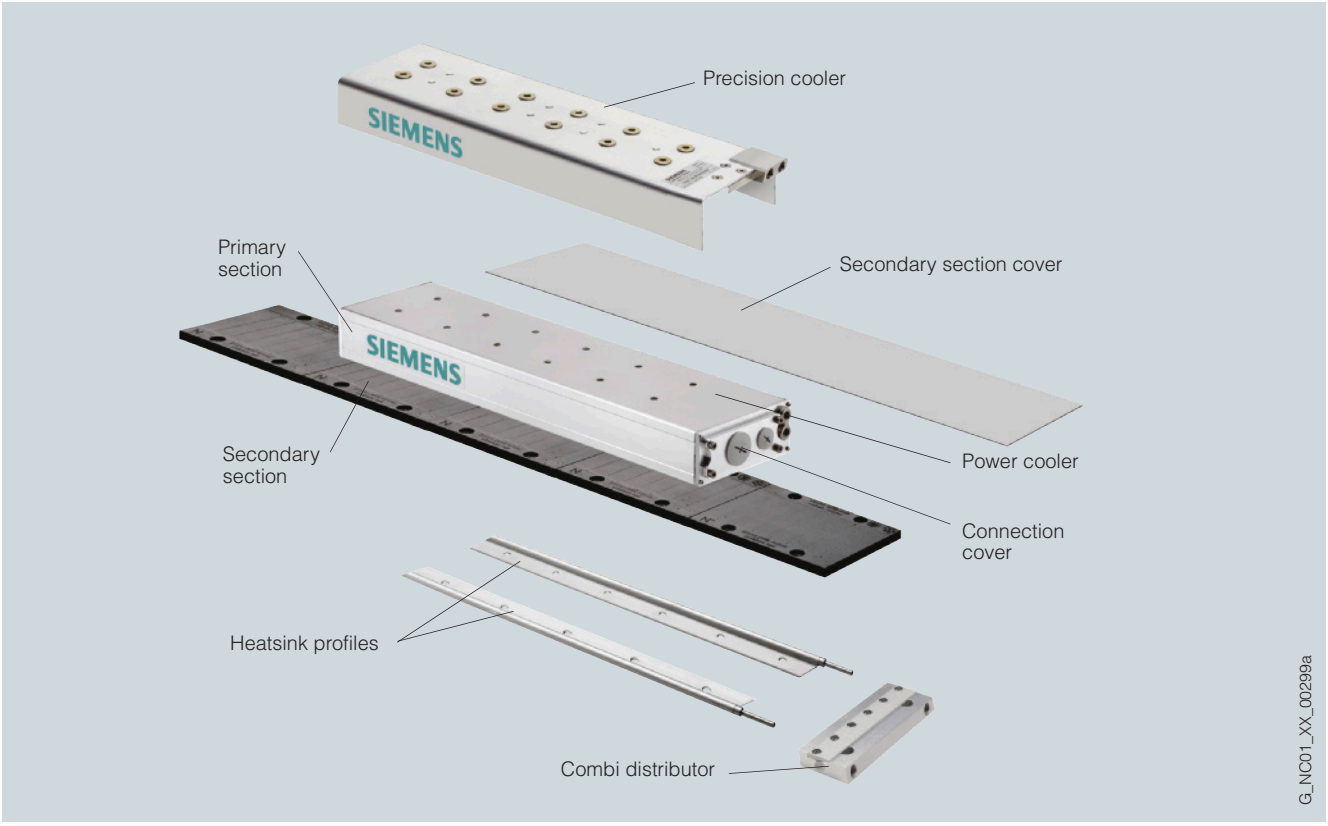
1FN3 linear motors Version for peak load	Optional components Precision cooler
Type	Order No.
1FN3050-2W...	**1FN3050-2PK00-0AA0**
1FN3100-2W...	**1FN3100-2PK00-0AA0**
1FN3100-3W...	**1FN3100-3PK00-0AA0**
1FN3100-4W...	**1FN3100-4PK00-0AA0**
1FN3100-5W...	**1FN3100-5PK00-0AA0**
1FN3150-2W...	**1FN3150-2PK00-0AA0**
1FN3150-3W...	**1FN3150-3PK00-0AA0**
1FN3150-4W...	**1FN3150-4PK00-0AA0**
1FN3150-5W...	**1FN3150-5PK00-0AA0**
1FN3300-2W...	**1FN3300-2PK00-0AA0**
1FN3300-3W...	**1FN3300-3PK00-0AA0**
1FN3300-4W...	**1FN3300-4PK00-0AA0**
1FN3450-2W...	**1FN3450-2PK00-0AA0**
1FN3450-3W...	**1FN3450-3PK00-0AA0**
1FN3450-4W...	**1FN3450-4PK00-0AA0**
1FN3600-2W...	**1FN3600-2PK00-0AA0**
1FN3600-3W...	**1FN3600-3PK00-0AA0**
1FN3600-4W...	**1FN3600-4PK00-0AA0**
1FN3900-2W...	**1FN3900-2PK00-0AA0**
1FN3900-3W...	**1FN3900-3PK00-0AA0**
1FN3900-4W...	**1FN3900-4PK00-0AA0**

1FN3 linear motors Version for continuous load	Optional components Precision cooler
Type	Order No.
1FN3050-1N...	**1FN3050-1PK10-0AA0**
1FN3050-2N...	**1FN3050-2PK10-0AA0**
1FN3100-1N...	**1FN3100-1PK10-0AA0**
1FN3100-2N...	**1FN3100-2PK10-0AA0**
1FN3100-3N...	**1FN3100-3PK10-0AA0**
1FN3100-4N...	**1FN3100-4PK10-0AA0**
1FN3150-1N...	**1FN3150-1PK10-0AA0**
1FN3150-2N...	**1FN3150-2PK10-0AA0**
1FN3150-3N...	**1FN3150-3PK10-0AA0**
1FN3150-4N...	**1FN3150-4PK10-0AA0**
1FN3300-1N...	**1FN3300-1PK10-0AA0**
1FN3300-2N...	**1FN3300-2PK10-0AA0**
1FN3300-3N...	**1FN3300-3PK10-0AA0**
1FN3300-4N...	**1FN3300-4PK10-0AA0**
1FN3450-2N...	**1FN3450-2PK10-0AA0**
1FN3450-3N...	**1FN3450-3PK10-0AA0**
1FN3450-4N...	**1FN3450-4PK10-0AA0**
1FN3600-2N...	**1FN3600-2PK10-0AA0**
1FN3600-3N...	**1FN3600-3PK10-0AA0**
1FN3600-4N...	**1FN3600-4PK10-0AA0**
1FN3900-2N...	**1FN3900-2PK10-0AA0**
1FN3900-3N...	**1FN3900-3PK10-0AA0**
1FN3900-4N...	**1FN3900-4PK10-0AA0**

[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.

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Selection and ordering data

Linear motors Type	Optional components			
	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 heat-sink profile with cable grommet nipple	**4**			**Number of secondary sections**
		A		0
		B		10
		C		20
			A	0
			B	1
			C	2
			D	3
			E	4
			F	5
			G	6
			H	7
			J	8
			K	9
Motors 1FN3050 to 1FN3450[4]: **Grommet nipple only on right end** of secondary section track	**6**			
Motors 1FN3600/1FN3900: **Grommet nipple on both ends** of secondary section track	**6**			
Motors 1FN3050 to 1FN3450[4]: **Grommet nipple only on left end** of secondary section track	**7**			

[3] Motors 1FN3050 to 1FN3450:
2 units required per secondary section track.
1FN3600 to 1FN3900:
3 units required per secondary section track.
The maximal 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

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1FN3 linear motors
Hall-effect sensor box

Overview



The motor position can be identified with an incremental linear measuring system using an additional hall-effect sensor box, or also motion-based if certain supplementary conditions are taken into account.

Selection and ordering data

Linear motor	Hall-effect sensor box	
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**

1FN3 linear motors
Connector box

Overview



A connector box is required to connect a hall-effect sensor box (option).

Technical specifications

Product name	Connector box
Degree of protection in accordance with EN 60529-5 (IEC 60529)	IP65
Air humidity in accordance with DIN 40040	95 % (without condensation)
Dimensions (without sockets or cable glands)	
• Width	69.6 mm (2.74 in)
• Height	54 mm (2.13 in)
• Depth	25 mm (0.98 in)
Weight, approx.	0.26 kg (0.57 lb)

Selection and ordering data

Description	Order No.
Connector box For connecting an incremental encoder	**1FN1910-0AA00-0AA0**

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Overview

Recommended linear measuring systems for 1FN3/1FN6 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}

[1)] Refers to the measuring head.

Overview

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
Phone: +49 70 22 50 03 - 0
Fax: +49 70 22 50 03 - 30
E-mail: info@bkw-kuema.de
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Helmut Schimpke und Team Industriekühlanlagen GmbH + Co. KG

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E-mail: info@schimpke.de
www.schimpke.com

Hydac System GmbH

Contact person:
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Rittal GmbH & Co. KG

Contact person:
Mr. Cieslar

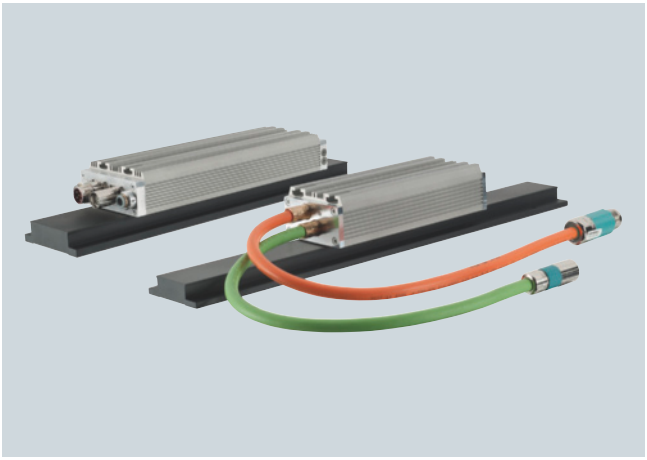
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35726 HERBORN, Germany
Phone: +49 27 72 5 05 - 20 63
Fax: +49 27 72 5 05 - 29 66
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www.rittal.com

For design of the coolers, see Configuration Manual (see documentation for order number).

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1FN6 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 1FN6 linear 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

- Outstanding 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 advantage of linear direct drive technology is the extensive avoidance of

- Effects of elasticity, play, 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 ensures 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

1FN6 linear motors are available as single-sided motors. The primary section is mounted parallel to the associated secondary section. Several primary sections can traverse on one secondary section track.

Application

Typical applications:

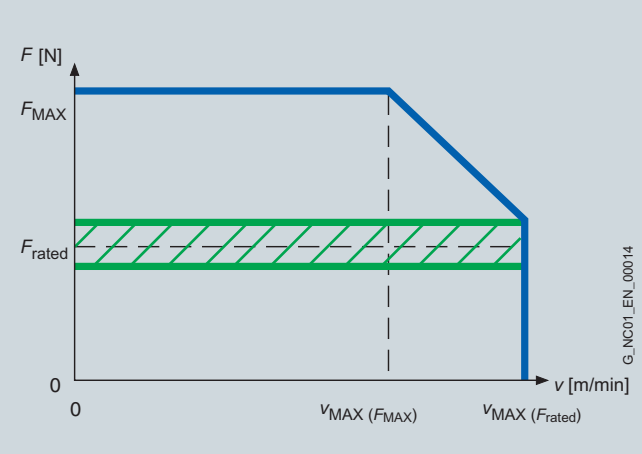
- Linear axes with traverse paths of approximately 4 m (13.1 ft) or more
- Handling and concatenated axes in machine tools and production machines
- High-dynamic and high-precision feed axes in water jet and laser cutting machines
- Applications which require a non-magnetic secondary section track

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Technical specifications

Product name	1FN6 linear motors
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 temperature sensor
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 delivery)	Select according to basic conditions specific to the application and the drive. See 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 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 $v_{MAX(FMAX)}$; up to velocity $v_{MAX(Frated)}$, only the feedrate force F_{rated} is available.

[1)] Evaluation via Sensor Module External SME120/SME125, see SINAMICS S120 drive system.

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1FN6 linear motors, standard type
Natural cooling

Selection and ordering data

Continuous thermal feed-rate force range[1)3)]	Rated feedrate force, typ.[2)3)]	Feedrate force, max.	Maximum velocity[4)]		1FN6 linear motors Standard type		Weight, approx.	
$F_{rated, th}$	F_{rated}	F_{MAX}	v_{MAX} at F_{MAX}	v_{MAX} at F_N	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	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)
(11 ... 27)			503 (1650)	1080 (3543)	**1FN6003-1LC84-0FA1**			
98 ... 239	133 (29.9)	315 (70.8)	226 (742)	515 (1690)	**1FN6003-1LE38-0FA1**		4.99 (11.0)	
(22 ... 54)			572 (1877)	1280 (4200)	**1FN6003-1LE88-0FA1**			
147 ... 358	199 (44.7)	472 (106)	141 (463)	333 (1093)	**1FN6003-1LG24-0FA1**		6.79 (15.0)	
(33 ... 80)			366 (1201)	836 (2743)	**1FN6003-1LG61-0FA1**			
196 ... 477	265 (59.6)	630 (142)	99.6(327)	243 (797)	**1FN6003-1LJ17-0FA1**		8.59 (18.9)	
(44 ... 107)			267 (876)	618 (2028)	**1FN6003-1LJ44-0FA1**			
245 ... 597	332 (74.6)	787 (177)	74.7(245)	190 (623)	**1FN6003-1LL12-0FA1**		10.4 (22.9)	
(55 ... 134)			208 (682)	488 (1601)	**1FN6003-1LL35-0FA1**			
294 ... 716	398 (89.5)	945 (212)	57.9(190)	155 (509)	**1FN6003-1LN10-0FA1**		12.2 (26.9)	
(66 ... 161)			169 (554)	402 (1319)	**1FN6003-1LN28-0FA1**			
98 ... 239	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)
(22 ... 54)			276 (906)	562 (1844)	**1FN6007-1LC46-0KA1**			
196 ... 477	265 (59.6)	630 (142)	120 (394)	265 (869)	**1FN6007-1LE20-0KA1**		8.39 (18.5)	
(44 ... 107)			315 (1034)	668 (2192)	**1FN6007-1LE53-0KA1**			
294 ... 716	398 (89.5)	945 (212)	71.7(235)	169 (554)	**1FN6007-1LG12-0KA1**		11.7 (25.8)	
(66 ... 161)			200 (656)	435 (1427)	**1FN6007-1LG33-0KA1**			
392 ... 955	531 (119)	1260 (283)	47.4(156)	122 (400)	**1FN6007-1LJ08-0KA1**		15 (33.1)	
(88 ... 215)			143 (469)	320 (1050)	**1FN6007-1LJ24-0KA1**			
490 ... 1190	663 (149)	1570 (353)	32.4(106)	93.9 (308)	**1FN6007-1LL05-0KA1**		18.3 (40.4)	
(110 ... 268)			110 (361)	251 (824)	**1FN6007-1LL18-0KA1**			
588 ... 1430	796 (179)	1890 (425)	87.9(288)	206 (676)	**1FN6007-1LN15-0KA1**		21.6 (47.6)	
(132 ... 321)			194 (637)	429 (1408)	**1FN6007-1LN32-0KA1**			

Type of connection:	
Motors 1FN6003	
Permanently connected power and signal cables pre-assembled, with connectors Length: 0.5 m (1.64 ft)	**F**
Motors 1FN6007	
Two separate integrated sockets, for power and signal cables	**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 1FN6 linear motors	**6FX7002-2SL10-....**

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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 SINAMICS S120 drive system	Pre-assembled cable to the drive system		
							Power connector	Cable cross-section[6)]	
	$I_{rated, th}$	I_{rated}	I_{MAX}	$P_{el, max}$	I_{rated}/ I_{MAX}				
		A	A	kW (HP)	A	Order No.	Size	mm²	Order No.
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)	8/18	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)] ....

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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, see Connection system MOTION-CONNECT.

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1FN6 linear motors, standard type
Natural cooling

Selection and ordering data

Continuous thermal feed-rate force range[1)3)]	Rated feedrate force, typ.[2)3)]	Feedrate force, max.	Maximum velocity[4)]		1FN6 linear motors Standard type		Weight, approx.	
$F_{rated, th}$	F_{rated}	F_{MAX}	v_{MAX} at F_{MAX}	v_{MAX} at F_N	**Primary section**	**Secondary section**	Primary section	Secondary section 200 mm (7.87 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								
309 ... 572	374 (84.1)	898 (202)	98.5 (323)	218 (715)	**1FN6008-1LC17-0KA1**	**1FN6008-1SC00-0AA0**	16.3 (35.9)	2.81 (6.20)
(69 ... 129)			224 (735)	473 (1552)	**1FN6008-1LC37-0KA1**			
617 ... 1140	749 (168)	1800 (405)	96.8 (318)	221 (725)	**1FN6008-1LE16-0KA1**		27.9 (61.5)	
(139 ... 256)			207 (679)	456 (1496)	**1FN6008-1LE34-0KA1**			
926 ... 1720	1120 (252)	2690 (605)	96.7 (317)	224 (735)	**1FN6008-1LG16-0KA1**		39.6 (87.3)	
(208 ... 387)			200 (656)	449 (1473)	**1FN6008-1LG33-0KA1**			
543 ... 1140	692 (156)	1800 (405)	110 (361)	241 (791)	**1FN6016-1LC18-0KA1**	**1FN6016-1SC00-0AA0**	27.6 (60.9)	5.42 (11.9)
(122 ... 256)			176 (577)	377 (1237)	**1FN6016-1LC30-0KA1**			
1090 ... 2290	1380 (310)	3590 (807)	101 (331)	233 (764)	**1FN6016-1LE17-0KA1**		48.2 (106)	
(245 ... 515)			162 (532)	365 (1198)	**1FN6016-1LE27-0KA1**			
1630 ... 3430	2070 (465)	5390 (1212)	98.2 (322)	230 (755)	**1FN6016-1LG16-0KA1**		68.5 (151)	
(366 ... 771)			156 (512)	360 (1181)	**1FN6016-1LG26-0KA1**			
758 ... 1720	1000 (225)	2690 (605)	70.1 (230)	160 (525)	**1FN6024-1LC12-0KA1**	**1FN6024-1SC00-0AA0**	39.9 (88.0)	7.96 (17.6)
(170 ... 387)			115 (377)	252 (827)	**1FN6024-1LC20-0KA1**			
1520 ... 3430	2000 (450)	5390 (1212)	64.8 (213)	155 (509)	**1FN6024-1LE11-0KA1**		69.5 (153)	
(342 ... 771)			106 (348)	244 (801)	**1FN6024-1LE18-0KA1**			
2270 ... 5140	3000 (674)	8080 (1816)	62.8 (206)	153 (502)	**1FN6024-1LG10-0KA1**		99.2 (219)	
(510 ... 1156)			102 (335)	241 (791)	**1FN6024-1LG17-0KA1**			

Type of connection: Motors 1FN6008 to 1FN6024	
Two separate integrated sockets, for power and signal cables	**K**

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

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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 SINAMICS S120 drive system	Pre-assembled cable to the drive system		
							Power connector	Cable cross-section[6)]	
	$I_{rated, th}$	I_{rated}	I_{MAX}	$P_{el, max}$	I_{rated} / I_{MAX}				
		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 External air cooling	**0** **1**
Motor Module: Single Motor Module Double Motor Module	**1** **2**

Length code[7)]	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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[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, see Connection system MOTION-CONNECT.

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1FN6 linear motors, standard type
Water cooling

Selection and ordering data

Feedrate force[1)2)]		Maximum velocity[3)]		1FN6 linear motors Standard type		Weight, approx.	
F_{rated}	F_{MAX}	v_{MAX} at F_{MAX}	v_{MAX} at F_N	**Primary section**	**Secondary section**	Primary section	Secondary section 200 mm (7.87 in)/ 500 mm (19.69 in)
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:	
Motors 1FN6003	
Permanently connected power and signal cables pre-assembled, with connectors Length: 0.5 m (1.64 ft)	**F**
Motors 1FN6007	
Two separate integrated sockets, for power and signal cables	**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 1FN6 linear motors	**6FX7002-2SL10-....**

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Motor type Primary section (repeated)	Rated current typ.[1]	Maximum current	Calculated power	SINAMICS S120 Motor Module		Power cable with complete shield		
				Required rated current	Booksize format For additional versions and components, see SINAMICS S120 drive system	Pre-assembled cable to the drive system		
						Power connector	Cable cross-section[4]	
	I_{rated}	I_{MAX}	$P_{el, max}$	I_{rated} / I_{MAX}				
	A	A	kW (HP)	A	Order No.	Size	mm^2	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 (3.50)	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 (4.00)	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 (7.60)	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 (13.5)	30/56	6SL312■-1 TE23-0AA3	1	4 × 2.5	6FX8002-5CN11-....

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Length code[5] ....

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

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.

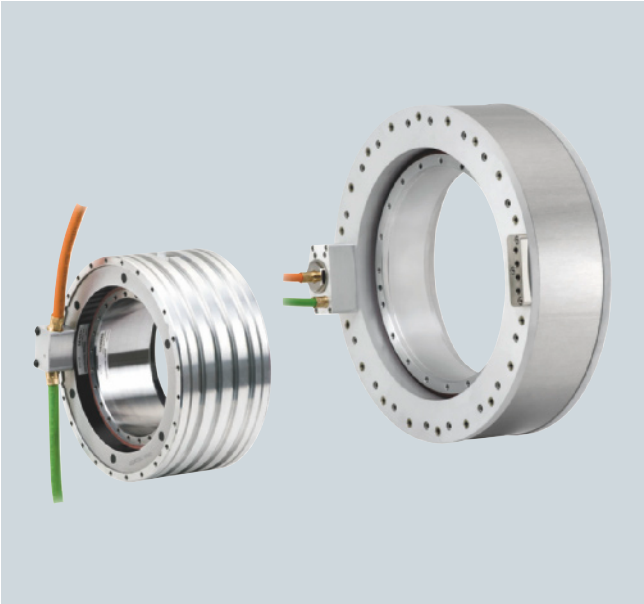
4) The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, for continuous duty at an ambient air temperature of 40 °C (104 °F).

5) For length code, see Connection system MOTION-CONNECT.

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1FW6 built-in torque motors

Overview



1FW6 built-in torque motors are liquid-cooled, multi-pole permanent-magnet AC synchronous motors with hollow-shaft rotor. The 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. The stator and rotor are equipped with flanges at each end with centering surfaces and threaded holes for installation in the machine.

Please note that when 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.

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

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

Design

The 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 heat exchanger, a cooling connection adapter (accessory) can be ordered separately for simpler connection.

Cooler types

The design of the cooler system is dependent on the size (external diameter) of the motor.

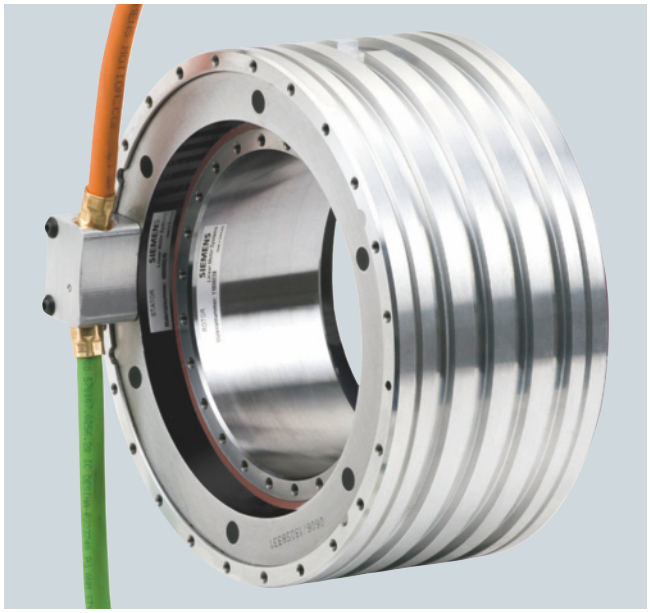
Motor 1FW6 Type	**Type of cooling**
1FW6090 to 1FW6150	Jacket cooling
1FW6160 to 1FW6290	Integrated cooling

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Design (continued)

Motors with jacket cooling

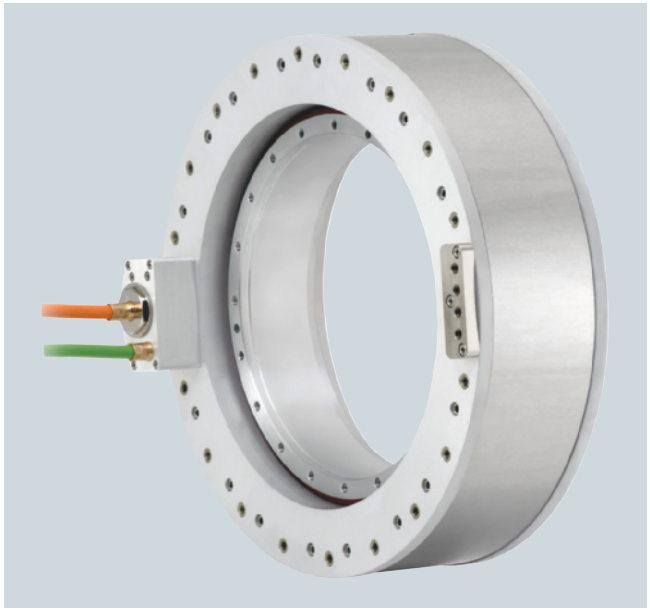
The coolant inlet and outlet must be provided by the machine manufacturer in the surrounding construction.



Motor components of sizes 1FW6090 to 1FW6150 with jacket cooling (rotor, stator)

Motors with integrated 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 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 converter system must not exceed 50 m (164 ft).

Technical specifications

Product name	1FW6 built-in torque motors
Type of motor	Synchronous motor with permanent magnet rotor, multi-pole (number of rotor poles 44 ... 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	2 × PTC thermistor drilled hole with response threshold 130/150 °C (266/302 °F) (in accordance with DIN 44081/DIN 44082) and 1 × KTY84 thermistor (in accordance with IEC 60034-11) in the stator. Evaluation via SME120/SME125 Sensor Module External (see SINAMICS S120 drive system).
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F)
Type of construction	Individual components: Stator, rotor
Degree of protection in accordance with IEC 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	cURus

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1FW6 built-in torque motors, standard type 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)]	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)
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)
		444 (327)	230	450	**1FW6150-0■B07-4F■2**		
1420 (1047)	720 (531)	668 (493)	76	170	**1FW6150-0■B10-2J■2**	20.9 (1.8498)	46.5 (103)
		663 (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 only 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)] 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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Motor type (repeated)	Static current [1)3)]	Rated current [2)3)]	Maximum current [2)]	Calculated power	SINAMICS S120 Motor Module: Required rated current	SINAMICS S120 Motor Module: Booksize format. For additional versions and components, see SINAMICS S120 drive system	Power cable with complete shield. Motor connection via power connector [5)]: Power connector	Cable cross-section [6)]	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				
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..	29	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	42.8 (57.4)	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	....

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ± 10 % (DC link voltage of the drive system 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 power module. The next higher power 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, they 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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1FW6 built-in torque motors, standard type
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)]	**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)
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**		

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

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Motor type (repeated)	Static current [1)3)]	Rated current [2)3)]	Maximum current [2)]	Calculated power	SINAMICS S120 Motor Module: Required rated current	SINAMICS S120 Motor Module: Booksize format. For additional versions and components, see SINAMICS S120 drive system	Power cable with complete shield. Motor connection via power connector [4)]: 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	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**	–	–	–

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Length code	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ± 10 % (DC link voltage of the drive system 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, they 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).

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1FW6 built-in torque motors, standard type 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)]	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)
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■B07-8FB2**		
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■B10-8FB2**		
		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■B15-8FB2**		
		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■B20-8FB2**		
		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 Radially outwards Tangential (Only for types of connection C and D)	**W** **V** **T**
Type of connection: Permanently connected power and signal cables with exposed core ends[4)] Length: 2 m (6.56 ft) Permanently connected power and signal cables pre-assembled with connectors Length: 0.5 m (1.64 ft)	**C** **D**
Type of connection only for specific motors (Not configurable): Permanently connected power and signal cables with exposed core ends[4)] Length: 1 m (3.28 ft)	**B**

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Motor type (repeated)	Static current [1)3)]	Rated current [2)3)]	Maximum 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 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	mm^2	Order No.
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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ± 10 % (DC link voltage of the drive system 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, they 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).

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1FW6 built-in torque motors, standard type
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)]	**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)
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 for1FW6160 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)	Static current [1)3)]	Rated current [2)3)]	Maximum 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 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	mm^2	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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

[1)] Torque and current at low speeds.

[2)] The values refer to a supply voltage of 400 V 3 AC ± 10 % (DC link voltage of the drive system 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, they 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).

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1FW6 built-in torque motors, standard type 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)]	**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)
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■B07-0LB2**		
		1810 (1335)	150	270	**1FW6290-0■B07-2PB2**		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■B11-0LB2**		
		3100 (2287)	93	170	**1FW6290-0■B11-2PB2**		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■B15-0LB2**		
		4390 (3238)	67	120	**1FW6290-0■B15-2PB2**		219.8 (485)
10900 (8040)	6030 (4448)	5760 (4249)	38	68	**1FW6290-0■B20-0LB2**	546 (48.3)	260.6 (575)
		5670 (4182)	51	91	**1FW6290-0■B20-2PB2**		265.8 (586)

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

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Motor type (repeated)	Static current 1)3)	Rated current 2)3)	Maximum 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 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}		Size	mm^2	
	A	A	A	kW (HP)	A	Order No.			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	**....**

Information about application, configuration and cable extensions can be found under Connection system MOTION-CONNECT.

Accessories

Description	Order No.
Cooling connection adapter for	
• Torque motors 1FW6160 to 1FW6230	**1FW6160-1BA00-0AA0**
• Torque motors 1FW6290	**1FW6290-1BA00-0AA0**
Power connector 4)	
• Size 1 for 4 x 2.5 mm^2	**6FX2003-0LA00**
• Size 1.5 for 4 x 4/4 x 10/4 x 16 mm^2	**6FX2003-0LA10**
Signal connector 4)	
• M17 (socket) for 6 x 0.5 + 1 x 1.0 mm^2	**6FX2003-0SU07**

1) Torque and current at low speeds.

2) The values refer to a supply voltage of 400 V 3 AC ± 10 % (DC link voltage of the drive system 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, they 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).

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1FE1 built-in motors

Overview



The 1FE1 built-in motors are water-cooled, synchronous motors that are supplied as stator and rotor components. When the rotor has 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 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 1PH2
- Extremely short ramp-up and braking times (50 %) thanks to higher torque compared to 1PH2
- Cold rotor due to excitation using permanent magnets, this means significantly less power loss in the rotor in the lower speed range 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 spindle main bearings
- Less cooling capacity required for the same power compared to 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 120 and motor, therefore fast commissioning is ensured
- Higher machine productivity:
  The permanent-magnet motor spindles (PE spindles) increase the power density and economic efficiency of CNC machines. The optimized combination of 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 1FE1 built-in water-cooled synchronous motors are used in combination with the SINAMICS 120 drive system where there is a requirement for excellent machining quality, accuracy and running smoothness, and very short ramp-up times.

The 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. A VPM Voltage Protection Module is required for these motors when they are operated up to the maximum speed.

Design

The 1FE1 built-in motor comprises:

- A laminated, permanent-magnet 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 of 0.5 m/1.5 m (1.64 ft/4.92 ft)
  - 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 play 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.

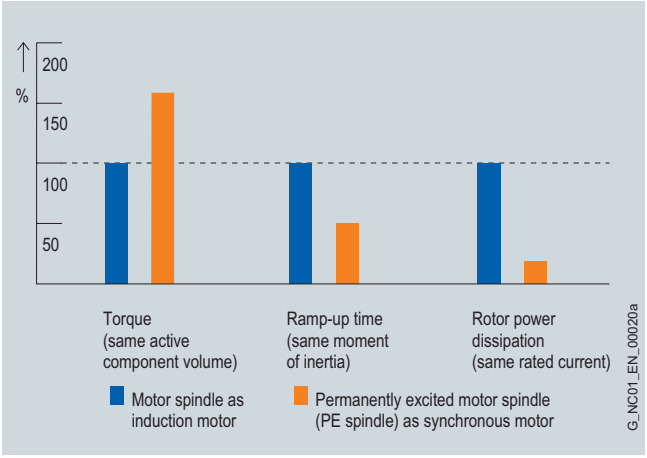
Rotor without sleeve

Torque is transmitted to the spindle mechanically without play 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.

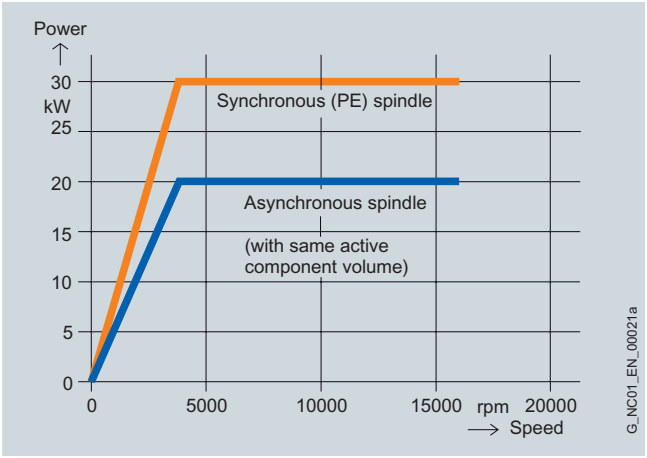
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Characteristic curves

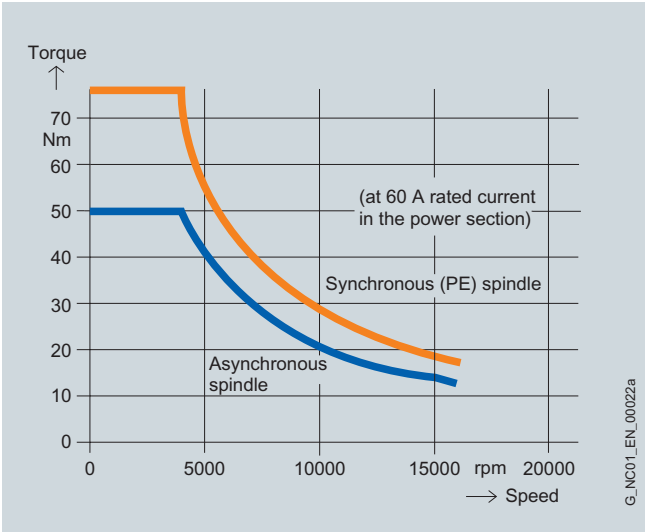
Comparison of synchronous/asynchronous spindle



Advantages of 1FE1 synchronous spindle over asynchronous spindle



Comparison of power/speed characteristics



Comparison of torque/speed characteristics

Power/speed and torque/speed characteristics of PE spindles compared to the asynchronous version under the following supplementary conditions: identical active part volume and identical rated current (60 A) of the Motor Module.

Technical specifications

Product name	1FE1 built-in motors
Type of motor	Synchronous spindle with permanent-magnet 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 as spare
Full protection optional Application example: processing at motor standstill	In addition to standard protection 3 × PTC thermistor drilling 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	Depending on the design - Pre-balanced, balance quality G 2.5 Reference speed 3600 rpm - Unbalanced for complete balancing after mounting
• Rotor without sleeve	Not pre-balanced
Encoder system (Not included in scope of supply)	Hollow-shaft measuring system with sinusoidal voltage signals 1 V_{pp} and with zero mark
Motor connection	Free cable ends with l = 0.5/1.5 m (1.64 ft/4.92 ft) length
Rating plate	2 units enclosed separately

More information

For a list of heat exchanger manufacturers, please refer to Asynchronous motors – Liquid cooling.

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1FE1 built-in motors, standard type
Water cooling

Selection and ordering data

Rated power for duty type[1] P_{rated} S1	S6-40 %	Rated torque[1] M_{rated} S1	S6-40 %	Rated speed n_{rated}	Speed, max n_{max}	1FE1 built-in motors Standard type	Moment of inertia of rotor without sleeve[8] J	Weight, approx. Stator + rotor without sleeve m
kW (HP)	kW (HP)	Nm (lb_f-in)	Nm (lb_f-in)	rpm	rpm	Order No.	kgm^2 (lb_f-in-s^2)	kg (lb)
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)
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)
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)
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)
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
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)
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)
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)
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)
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)
31 (41.6)	42 (56.3)	130 (1151)	175 (1549)	2300	9000	**1FE1084-6WR ■ 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)	20 (44.1)
6.3 (8.5)	7.5 (10.1)	30 (266)	36 (319)	2000	4000	**1FE1091-6WS ■ 0- 1 B ■ ■**	0.00814 (0.0720)	20 (44.1)
24.2 (32.4)	31 (41.6)	66 (584)	85 (752)	3500	7000	**1FE1092-6WN ■ 0- 1 B ■ ■**	0.01566 (0.1386)	30.5 (67.3)
22 (29.5)	28.5 (38.2)	66 (584)	85 (752)	3200	7000	**1FE1092-6WR ■ 1- 1 B ■ ■**	0.01566 (0.1386)	30.5 (67.3)
36.6 (49.1)	47 (63)	100 (885)	128 (1133)	3500	7000	**1FE1093-6WN ■ 0- 1 B ■ ■**	0.02317 (0.2051)	41 (90.4)
21 (28.2)	27 (36.2)	100 (885)	128 (1133)	2000	4000	**1FE1093-6WS ■ 0- 1 B ■ ■**	0.02317 (0.2051)	41 (90.4)
16.8 (22.5)	21.5 (28.8)	100 (885)	128 (1133)	1600	7000	**1FE1093-6WV ■ 1- 1 B ■ ■**	0.02317 (0.2051)	41 (90.4)

• Standard protection: 2 × KTY[2]	**1**
• Full protection: 2 × KTY + 3 × PTC thermistor drilling[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 1FE1061/1FE1082/1FE1084/1FE1091/1FE1092/1FE1093)	**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

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Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module[10]	SINAMICS S120 Motor Module	
				Required rated current	Booksize format For additional versions and components, see SINAMICS S120 drive system
	I_{rated} S1 A	S6-40 % A		I_{rated} S1 to n_{max} A	Order No.
1FE1041-6WM...	13	17.5	–	30	6SL312 ■-1TE23-0AA3
1FE1042-6WN...	24	32	–	45	6SL312 ■-1TE24-5AA3
1FE1042-6WR...	19	26	–	30	6SL312 ■-1TE23-0AA3
1FE1051-6WN...	15	22	–	18	6SL312 ■-■TE21-8AA3
1FE1051-6WK...	20	29	–	45	6SL312 ■-1TE24-5AA3
1FE1052-6WN...	30	44	–	30	6SL312 ■-1TE23-0AA3
1FE1052-6WK...	37	54	–	60	6SL312 ■-1TE26-0AA3
1FE1054-6WN...	60	89	–	60	6SL312 ■-1TE26-0AA3
1FE1061-6WH...	21	30	–	30	6SL312 ■-1TE23-0AA3
1FE1061-6WY...	8	11.5	–	9	6SL312 ■-■TE21-0AA3
1FE1064-6WN...	56	80	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1064-6WQ...	43	61	VPM 120	45	6SL312 ■-1TE24-5AA3
1FE1082-6WP...	65	91	–	85	6SL312 ■-1TE28-5AA3
1FE1082-6WS...	45	62	–	45	6SL312 ■-1TE24-5AA3
1FE1082-6WQ...	60	84	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1082-6WW...	30	42	VPM 120	30	6SL312 ■-1TE23-0AA3
1FE1084-6WU...	45	64	VPM 120	45	6SL312 ■-1TE24-5AA3
1FE1084-6WR...	60	84	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1084-6WX...	30	42	VPM 120	30	6SL312 ■-1TE23-0AA3
1FE1091-6WN...	24	35	–	30	6SL312 ■-1TE23-0AA3
1FE1091-6WS...	15	19	–	18	6SL312 ■-■TE21-8AA3
1FE1092-6WN...	58	84	–	60	6SL312 ■-1TE26-0AA3
1FE1092-6WR...	41	58	VPM 120	45	6SL312 ■-1TE24-5AA3
1FE1093-6WN...	83	120	–	85	6SL312 ■-1TE28-5AA3
1FE1093-6WS...	53	76	–	60	6SL312 ■-1TE26-0AA3
1FE1093-6WV...	43	60	VPM 120	45	6SL312 ■-1TE24-5AA3

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
10) IVP Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 Motor Modules in booksize format, see SINAMICS S120 Function Manual.

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1FE1 built-in motors, standard type
Water cooling

Selection and ordering data

Rated power for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	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-in)	Nm (lb_f-in)	rpm	rpm	Order No.	kgm^2 (lb_f-in-s^2)	kg (lb)
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)	57 (126)
22 (29.5)	24 (32.2)	150 (1328)	190 (1682)	1400	5700	**1FE1113-6WX ■ 1- 1 B ■ ■**	0.0470 (0.4160)	57 (126)
41.9 (56.2)	53.6 (71.9)	200 (1770)	257 (2275)	2000	6500	**1FE1114-6WR ■ 1- 1 B ■ ■**	0.06239 (0.5522)	80 (176)
29.3 (39.3)	37.5 (50.3)	200 (1770)	257 (2275)	1400	6500	**1FE1114-6WT ■ 1- 1 B ■ ■**	0.06239 (0.5522)	80 (176)
20.9 (28.0)	26.8 (35.9)	200 (1770)	257 (2275)	1000	6000	**1FE1114-6WW ■ 1- 1 B ■ ■**	0.06239 (0.5522)	80 (176)
41.6 (55.8)	45.0 (60.4)	265 (2345)	340 (3009)	1500	6500	**1FE1115-6WT ■ 1- 1 B C ■**	0.10503 (0.9296)[11]	90 (198)
37.7 (50.5)	48.3 (64.8)	300 (2655)	385 (3408)	1200	6500	**1FE1116-6WR ■ 1- 1 B ■ ■**	0.09285 (0.8218)	103 (227)
28.3 (37.9)	36.2 (48.5)	300 (2655)	385 (3408)	900	5500	**1FE1116-6WT ■ 1- 1 B ■ ■**	0.09285 (0.8218)	103 (227)
22 (29.5)	28 (37.5)	300 (2655)	385 (3408)	700	4000	**1FE1116-6WW ■ 1- 1 B ■ ■**	0.09285 (0.8218)	103 (227)
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)	117 (258)
79.6 (106.7)	97 (130)	585 (5188)	795 (7036)	1300	6000	**1FE1145-8WQ ■ 1- 1 B ■ ■**	0.21636 (1.9148)	117 (258)
67.4 (90.4)	80 (107)	585 (5188)	795 (7036)	1100	5000	**1FE1145-8WS ■ 1- 1 B ■ ■**	0.21636 (1.9148)	117 (258)
103 (138.1)	124 (166)[2]	820 (7258)	1110 (9824)[2]	1200	5500	**1FE1147-8WN ■ 1- 1 B ■ ■**	0.28823 (2.5508)	155 (342)
81.6 (109.4)	96 (129)	820 (7258)	1110 (9824)	950	4200	**1FE1147-8WQ ■ 1- 1 B ■ ■**	0.28823 (2.5508)	155 (342)
64.4 (86.3)	80 (107)	820 (7258)	1110 (9824)	750	3500	**1FE1147-8WS ■ 1- 1 B ■ ■**	0.28823 (2.5508)	155 (342)

• Standard protection: 2 × KTY[3] • Full protection: 2 × KTY + 3 × PTC thermistor drilling[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 (Only for 1FE1113/1FE1114/1FE1116/1FE1144) • With rotor sleeve, for d^* see dimensions table (Only for 1FE1114/1FE1116) • With rotor sleeve, for d^{**} see dimensions table (Not for 1FE1113) • With rotor sleeve, for d^{**} see dimensions table (Only for 1FE1113/1FE1145/1FE1147) • With rotor sleeve, for d^{**} see dimensions table (Only for 1FE1113/1FE1145)			**A** **B** **C** **D** **E**	
• 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) • Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant) Cable outlet at larger outer diameter of cooling jacket Cable outlet at smaller outer diameter of cooling jacket (on request)				**0** **1** **2** **3**

S1 = continuous duty
S6 = intermittent duty:
Type 1FE111/1FE114: duty cycle time 2 min

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Motor type (repeated)	Rated current for duty type[1)]		Voltage Protection Module[12)]	SINAMICS S120 Motor Module	
				Required rated current	Booksize format For additional versions and components, see SINAMICS S120 drive system
	I_{rated} S1 A	S6-40 % A		I_{rated} S1 A	Order No.
1FE1113-6WU...	60	91	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1113-6WX...	43	62	VPM 120	45	6SL312 ■-1TE24-5AA3
1FE1114-6WR...	108	160	VPM 120	132	6SL312 ■-1TE31-3AA3
1FE1114-6WT...	84	123	VPM 120	85	6SL312 ■-1TE28-5AA3
1FE1114-6WW...	58	85	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1115-6WT...	85	123	VPM 120	85	6SL312 ■-1TE28-5AA3
1FE1116-6WR...	109	160	VPM 120	132	6SL312 ■-1TE31-3AA3
1FE1116-6WT...	84	123	VPM 120	85	6SL312 ■-1TE28-5AA3
1FE1116-6WW...	60	87	VPM 120	60	6SL312 ■-1TE26-0AA3
1FE1144-8WL...	133	193	VPM 200	200	6SL312 ■-1TE32-0AA3
1FE1145-8WN...	200	290[2)]	VPM 200	200	6SL312 ■-1TE32-0AA3
1FE1145-8WQ...	158	230	VPM 200	200	6SL312 ■-1TE32-0AA3
1FE1145-8WS...	130	188	VPM 200	132	6SL312 ■-1TE31-3AA3
1FE1147-8WN...	200	290[2)]	VPM 200	200	6SL312 ■-1TE32-0AA3
1FE1147-8WS...	158	230	VPM 200	200	6SL312 ■-1TE32-0AA3
1FE1147-8WS...	130	190	VPM 200	132	6SL312 ■-1TE31-3AA3

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

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1) Data for ΔT = 105 K, special windings on request.
2) Observe limit for Motor Module.
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 of rotor with rotor sleeeve *d***.
12) IVP Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 Motor Modules in booksize format, see SINAMICS S120 Function Manual.

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1FE1 built-in motors, standard type
Water cooling

Selection and ordering data

Rated power for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	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-in)	Nm (lb_f-in)	rpm	rpm	Order No.	kgm^2 (lb_f-in-s^2)	kg (lb)
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)
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)
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)
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)
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)
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)
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)
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)
41 (55)	41 (55)	56 (496)	79 (699)	7000	20000	**1FE1074-4WN ■ 1- 1 B A ■**	0.00573 (0.0507)	21 (46.3)
48 (64)	51 (68.4)	60 (531)	86 (761)	7700	20000	**1FE1074-4WM ■ 1- 1 B A ■**	0.00573 (0.0507)	21 (46.3)
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)
24 (32)	24 (32.2)	105 (929)	140 (1239)	2200	12000	**1FE1085-4WT ■ 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)

• Standard protection: 2 × KTY[2]	1			
• Full protection: 2 × KTY + 3 × PTC thermistor drilling[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]				0
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)				2
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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Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module[10]	SINAMICS S120 Motor Module	
				Required rated current	Booksize format For additional versions and components, see SINAMICS S120 drive system
	I_{rated} S1 A	S6-40 % A		I_{rated} S1 to n_{max} A	Order No.
1FE1051-4HC...	25	34.5	–	45	**6SL312 ■-1TE24-5AA3**
1FE1051-4WN...	12	17	VPM 120	30	**6SL312 ■-1TE23-0AA3**
1FE1052-4HD...	57	75	–	132	**6SL312 ■-1TE31-3AA3**
1FE1052-4HG...	44	59	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1052-4WN...	20	26	VPM 120	45	**6SL312 ■-1TE24-5AA3**
1FE1052-4WK...	30	39	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1053-4HH...	46	63	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1053-4WJ...	36	49	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1053-4WN...	29	38	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1072-4WN...	36	54	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1072-4WL...	45	68	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1072-4WH...	64	96	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1073-4WN...	65	97	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1073-4WT...	30	44	VPM 120	30	**6SL312 ■-1TE23-0AA3**
1FE1074-4WN...	91	136	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1074-4WM...	97	144	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1074-4WT...	53	77	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1082-4WN...	42	60	VPM 120	45	**6SL312 ■-1TE24-5AA3**
1FE1082-4WR...	24	34	VPM 120	30	**6SL312 ■-1TE23-0AA3**
1FE1083-4WN...	77	110	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1084-4WN...	105	150	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1084-4WP...	79	120	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1084-4WQ...	83	119	VPM 120	85	**6SL312 ■-1TE28-5AA3**
1FE1084-4WT...	60	85	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1085-4WN...	105	150	VPM 120	132	**6SL312 ■-1TE31-3AA3**
1FE1085-4WT...	60	85	VPM 120	60	**6SL312 ■-1TE26-0AA3**
1FE1085-4WQ...	85	120	VPM 120	85	**6SL312 ■-1TE28-5AA3**

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 x 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
[10] IVP Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 Motor Modules in booksize format, see SINAMICS S120 Function Manual.

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1FE1 built-in motors, standard type
Water cooling

Selection and ordering data

Rated power for duty type[1]		Rated torque[1]		Rated speed	Speed, max.	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-in)	Nm (lb_f-in)	rpm	rpm	Order No.	kgm^2 (lb_f-in-s^2)	kg (lb)
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)	35 (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)	64 (566)	92 (814)	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)
40 (54)	40 (54)	100 (885)	137 (1213)	3800	18000	**1FE1094-4WL ■ 1- 1 B ■ ■**	0.01808 (0.1600)[9]	48.5 (107)
46 (62)	46 (62)	100 (885)	137 (1213)	4400	18000	**1FE1094-4WK ■ 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 drilling[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) • Free cable ends, flexible, 0.5 m (1.64 ft) in length (preferred variant) Cable outlet at larger outer diameter of cooling jacket Cable outlet at smaller outer diameter of cooling jacket (on request)				**0** **1** **2** **3**

S1 = continuous duty
S6 = intermittent duty:
Type 1FE109/1FE110/1FE112: duty cycle time 2 min

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Motor type (repeated)	Rated current for duty type[1]		Voltage Protection Module[11]	SINAMICS S120 Motor Module	
				Required rated current	Booksize format For additional versions and components, see SINAMICS S120 drive system
	I_{rated} S1 A	S6-40 % A		I_{rated} S1 A	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
1FE1094-4WL...	90	130	VPM 120	132	6SL312 ■-1TE31-3AA3
1FE1094-4WK...	108	156	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

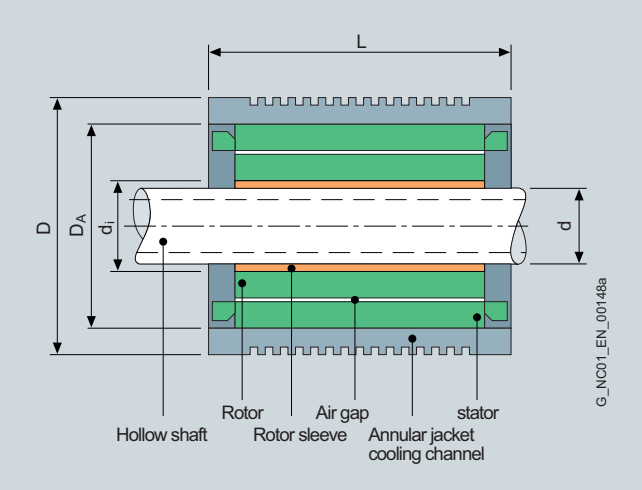
Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

[1] Data for ΔT = 105 K, special windings on request.
[2] Observe limit for Motor Module.
[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 jacket d_i = 80 mm (3.15 in), see Configuration Manual.
[10] For cable design, see Configuration Manual
[11] IVP Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 Motor Modules in booksize format, see SINAMICS S120 Function Manual.

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1FE1 built-in motors

Dimensional drawing



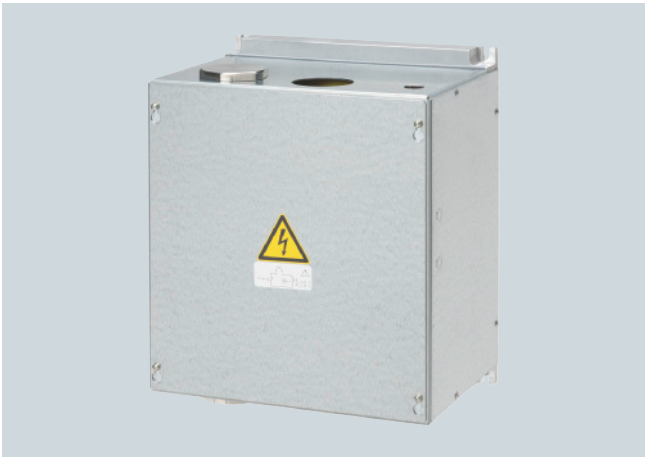
1FE1 motor Type	*L* mm (in)	*D* mm (in)	D_A mm (in)	d_i mm (in)
High-Speed series				
1FE1051-4....-1BA.	130 (5.12)	120 (4.72)	106 (4.17)	46 (1.81)
1FE1052-4....-1BA.	180 (7.09)			
1FE1053-4....-1BA.	230 (9.06)			
1FE1072-4W...-1BA.	185 (7.28)	155 (6.10)	135 (5.31)	58 (2.28)
1FE1073-4W...-1BA.	235 (9.25)			
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)			

7

1FE1 motor					Internal rotor diameter with sleeve			
	L	*D*	D_A	d_i -..A.	*d** -..B.	*d*** -..C.	*d*** -..D.	*d*** -..E.
Type	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
High-Torque series								
1FE1041-6W...-1BA.	107 (4.21)	95 (3.74)	85 (3.35)	44 (1.73)	–	–	–	–
1FE1042-6W...-1BA.	157 (6.20)	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 (11.0)	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 (3.15)	–
1FE1084-6W...-1B..	295 (11.61)	190 (7.48)	170 (6.69)	93 (3.66)	67 (2.64)	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 (3.15)	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 (14.20)	250 (9.84)	220 (8.66)	–	–	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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Overview



The Voltage Protection function is used with motors 1FE1...-....**1**-.... and with 2SP1 motor spindles with EMF of $\hat{V}$ > 820 V to 2000 V (V_{eff} 570 V to 1400 V) to limit the DC link voltage at the drive system in the event of a fault.

If the line voltage fails at maximum motor speed or if the drive system pulses are canceled as a result of the power failure, the synchronous motor regenerates at high voltage back into the DC link.

The VPM detects a DC link voltage that is too high (> 820 V DC) and short-circuits the three motor supply cables, decelerating the motor. The power remaining in the motor is converted to heat via the short circuit in the VPM and motor.

Integration

Voltage Protection Module VPM as an externally mounted module

The VPM can be used in conjunction with SINAMICS 120 and 1FE1 motors as well as 2SP1 motor spindles.

The VPM must be installed between motor and drive system (at a maximum distance from the drive system of 1.5 m (4.92 ft)). 6FX8 shielded motor supply cables must be used with the VPM.

Preconditions:

- SINAMICS S120
- SINUMERIK 840D sl software version 1.3 and higher

Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 in booksize format

The SINAMICS S120 drive system in booksize format features Internal Voltage Protection IVP.

This places specific constraints on the drive configuration, e.g.:

- Motor Modules matched to the motor short-circuit current
- Line Modules with regenerative feedback capability
- Redundant electronics power supply, Control Supply Module for the relevant Motor Module
- Braking Module with pulsed resistor, dimensioned for the energy of the drive line-up that is present in the DC link in the event of a fault.
- SINUMERIK 840D sl software version 1.5 or 2.5 or higher/drive firmware version 2.5 SP1 or higher

The instructions in the SINAMICS S120 function manual must be observed.

Technical specifications

Product name	6SN1113-1AA00-1JA1 Voltage Protection Module VPM 120	6SN1113-1AA00-1KA1 VPM 200	6SN1113-1AA00-1KC1 VPM 200 DYNAMIK
Rated current, perm.	120 A	200 A	200 A
Short-circuit current, perm.	90 A	200 A	200 A
Degree of protection in accordance with EN 60529 (IEC 60529)	IP20		
Humidity rating based on EN 60721-3-3	3K5, condensation and icing not allowed. Low air temperature 0 °C (32 °F).		
Ambient temperature			
• Storage/transport • Operation	-25 ... +55 °C (-13 ... +131 °F) 0 ... 55 °C (32 ... 131 °F)		
Dimensions			
• Height • Width • Depth	300 mm (11.8 in) 150 mm (5.91 in) 180 mm (7.09 in)	300 mm (11.8 in) 250 mm (9.84 in) 190 mm (7.48 in)	300 mm (11.8 in) 250 mm (9.84 in) 260 mm (10.2 in)
Weight, approx.	6 kg	11 kg	12 kg
Approvals, according to	cULus		

Selection and ordering data

Description	Order No.
Voltage Protection Module	
• VPM 120	**6SN1113-1AA00-1JA1**
• VPM 200	**6SN1113-1AA00-1KA1**
• VPM 200 DYNAMIK For large conductor cross-sections (up to 50 mm²)	**6SN1113-1AA00-1KC1**

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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 motorized 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 start-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

With 2SP1 motor spindles in synchronous design, a VPM Voltage Protection Module must be used as external module, or the IVP Internal Voltage Protection must be used as integrated SINAMICS function, see VPM Voltage Protection Module.

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Technical specifications

	2SP120	2SP125
Product name	Motor spindles	Motor spindles
Standard functions		
Speed, max.	15000 rpm	10000 rpm
Enclosure	Cartridge with flange mounting	Cartridge with flange mounting
Working position	Horizontal/vertical	Horizontal/vertical
Tool holder	HSK A63	SK 40 for tools with asymmetrical T sliding blocks
Tool clamping device	• Release using pneumatic cylinder, 6 bar • Clamping using cup-spring assembly	• Release using pneumatic cylinder, 6 bar • Clamping using cup-spring assembly
Tool taper cleaning	Compressed air through draw-bar 5 ... 6 bar	Compressed air through draw-bar 5 ... 6 bar
Cooling with water	• Max. 5 bar, 10 l/min • Max. 25 % corrosion protection agent Clariant Antifrogen N or Tyfocor • Filter grade 100 µm	• Max. 5 bar, 10 l/min • Max. 25 % corrosion protection agent Clariant Antifrogen N or Tyfocor • Filter grade 100 µm
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
Seal, bearing front	Sealing air 1 ... 1.5 m^3/h, filter grade 8 µm	Sealing air 1 ... 1.5 m^3/h, filter grade 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		
• Sensors analog	• Tool clamped • Draw-bar in the release position • Clamped without tool	–
• Sensors digital	• Position of release piston	• Tool clamped • Draw-bar in the release position • Clamped without tool
Connections for the media		
• Cooling	2 × hose plug-in connector, Ø 12/10 mm (0.47/0.39 in)	2 × G 1/2" (Ø 9 mm (0.35 in))
• Sealing air	1 × G 1/8" radial/Ø 5 mm (0.20 in) axial	1 × G 1/8" (Ø 8 mm (0.31 in))
• Air purge	1 × G 1/4"	1 × G 1/4"
• Release tool	1 × G 1/4"	1 × M16 × 1.5
• Clamp tool	1 × G 1/8"	1 × G 1/8"
Electrical connections	• Power through cable 1.5 m (4.92 ft) • Sensors through signal plug	• Power through cable 1.5 m (4.92 ft) • Sensors through signal plug
Options		
Increased max. speed	18000 rpm	15000 rpm (with HSK A63)
Internal tool cooling	• 50 bar, up to 54 l/min • Filter grade 50 µm according to -/16/13 ISO 4406 • 1 × G 1/4" coolant • 1 × G 1/8" leakage	• 50 bar, up to 54 l/min • Filter grade 50 µm according to -/16/13 ISO 4406 • 1 × G 1/4" coolant • 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 • Clamping using cup-spring assembly • 1 × G 1/4", release tool • 1 × G 1/4", clamp tool	–
Tool interface	–	BT 40, CAT 40, HSK A63

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2SP1 motor spindles, standard type
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-in)	Nm (lb_f-in)	rpm	rpm	Order No.
Synchronous – Water cooling							
200	12.0/– (16.1/–)	12.0/– (16.1/–)	42/– (372/–)	55/– (487/–)	2700/–	15000	**2SP1202-1HA■ ■-1D ■ ■**
	15.5/– (20.8/–)	15.5/– (20.8/–)	42/– (372/–)	55/– (487/–)	3500/–	18000	**2SP1202-1HB■ ■-2D ■ ■**
	26.4/– (35.4/–)	26.4/– (35.4/–)	84/– (744/–)	110/– (974/–)	3000/–	15000	**2SP1204-1HA■ ■-1D ■ ■**
	35.0/– (46.9/–)	35.0/– (46.9/–)	78/– (690/–)	110/– (974/–)	4300/–	18000	**2SP1204-1HB■ ■-2D ■ ■**
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 ■-1D ■ 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 ■-1D ■ 2**
Synchronous – Water cooling							
250	26.0/– (34.9/–)	29.0/– (38.9/–)	100/– (885/–)	130/– (1151/–)	2500/–	10000	**2SP1253-1HA 0 ■-0■ ■ 2**
	35.0/– (46.9/–)	38.0/– (50.9/–)	100/– (885/–)	130/– (1151/–)	3300/–	15000	**2SP1253-1HB 0 ■-1D ■ 2**
	46.3/– (62.1/–)	55.0/– (73.7/–)	170/– (1505/–)	236/– (2089/–)	2600/–	10000	**2SP1255-1HA 0 ■-0■ ■ 2**
	53.4/– (71.6/–)	64.0/– (85.8/–)	170/– (1505/–)	236/– (2089/–)	3000/–	15000	**2SP1255-1HB 0 ■-1D ■ 2**

Tool clamping and release mechanism:	
Pneumatic (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 HSK A63, latching (Only for 2SP120)	R
Sensors:	
Sensor: Tool clamped/Draw-bar in the release position/Clamped without tool	D
As with D + Sensor: Position of 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 exposed core ends	2
Power cable with connector (2SP1202: Connector size 1.5/2SP1204: Connector size 3)	6

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Motor type (repeated)	Moment of inertia	Weight,[1] approx.	Rated current Star/delta for duty type		Voltage Protection Module[2]	SINAMICS S120 Motor Module	
						Required rated current for S1 duty	Booksize format For additional versions and components, see SINAMICS S120 drive system
	J	m	I_{rated}			I_{rated}	
			S1	S6-40 %			
	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A		A	Order No.
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**
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**
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**

7

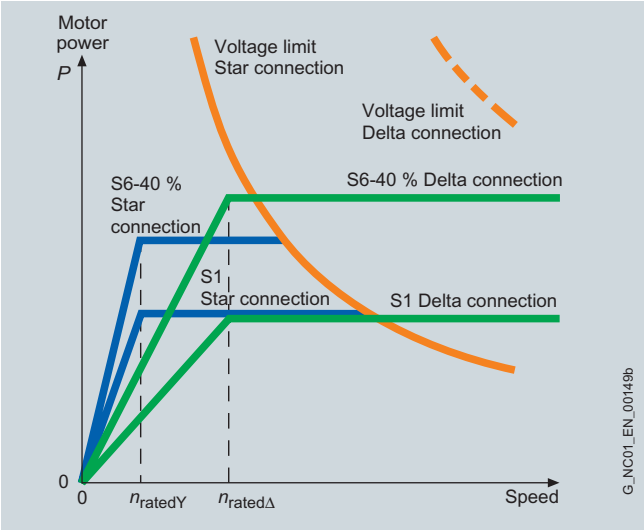
[1] No options included.
Internal tool cooling: + 1 kg (2.21 lb)
External tool cooling: + 8 kg (17.6 lb).

[2] IVP Internal Voltage Protection as integrated SINAMICS function for SINAMICS S120 Motor Modules in booksize format, see SINAMICS S120 Function Manual.

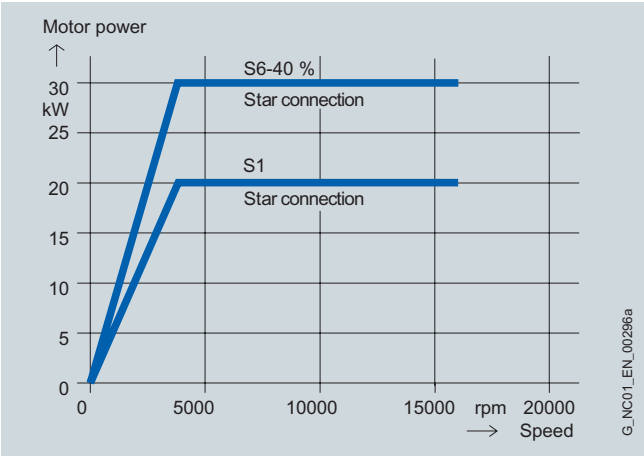
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2SP1 motor spindles

Characteristic curves



2SP1 motor spindles in asynchronous design with star-delta changeover



2SP1 motor spindles in synchronous design

More information

Please refer to Asynchronous motors – Liquid cooling for a list of heat exchanger 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:

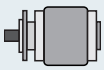
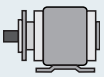
WEISS Spindeltechnologie GmbH
A Siemens Company
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97424 SCHWEINFURT, Germany

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Type of construction/mounting position

More information

Type of construction/ mounting position	Designation	Type of construction/ mounting position	Designation	Type of construction/ mounting position	Designation
	IM B3		IM B5 IM B14		IM B35
	IM V5		IM V1 IM V18		IM V15
	IM V6		IM V3 IM V19		IM V35

Degree of protection

More information

The degree of protection designation in accordance with EN 60034-5 (IEC 60034-5) is made using the letters "IP" and two digits (e.g., IP64). The second digit in the degree of protection designation represents the protection against water, the first digit the protection against penetration of foreign matter.

Since coolants used for machine tools and transfer machines usually contain oil, are able to creep, and may also be corrosive, protection against water alone is insufficient. The indicated degree of protection should only be considered here as a guideline. The motors must 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.

The table can serve as a decision aid for selecting the proper degree of protection for motors. For a mounting position with vertical shaft end IM V3/IM V19, static fluid on the flange is only permitted with degree of protection IP67/IP68 and recessed DE flange in some cases.

Liquids / Effect	General workshop environment	Water; gen. cooling lubricant (95 % water, 5 % oil); oil	Creep oil; petroleum; aggressive cooling lubricants
Dry	IP64	–	–
Water-enriched environment	–	IP64	IP67[1)]
Mist	–	IP65	IP67
Spray	–	IP65	IP68
Jet	–	IP67	IP68
Surge, brief immersion; constant inundation	–	IP67	IP68

[1)] IP64 with dry run at shaft exit.

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1PH8 motors
SH 132 – Forced ventilation

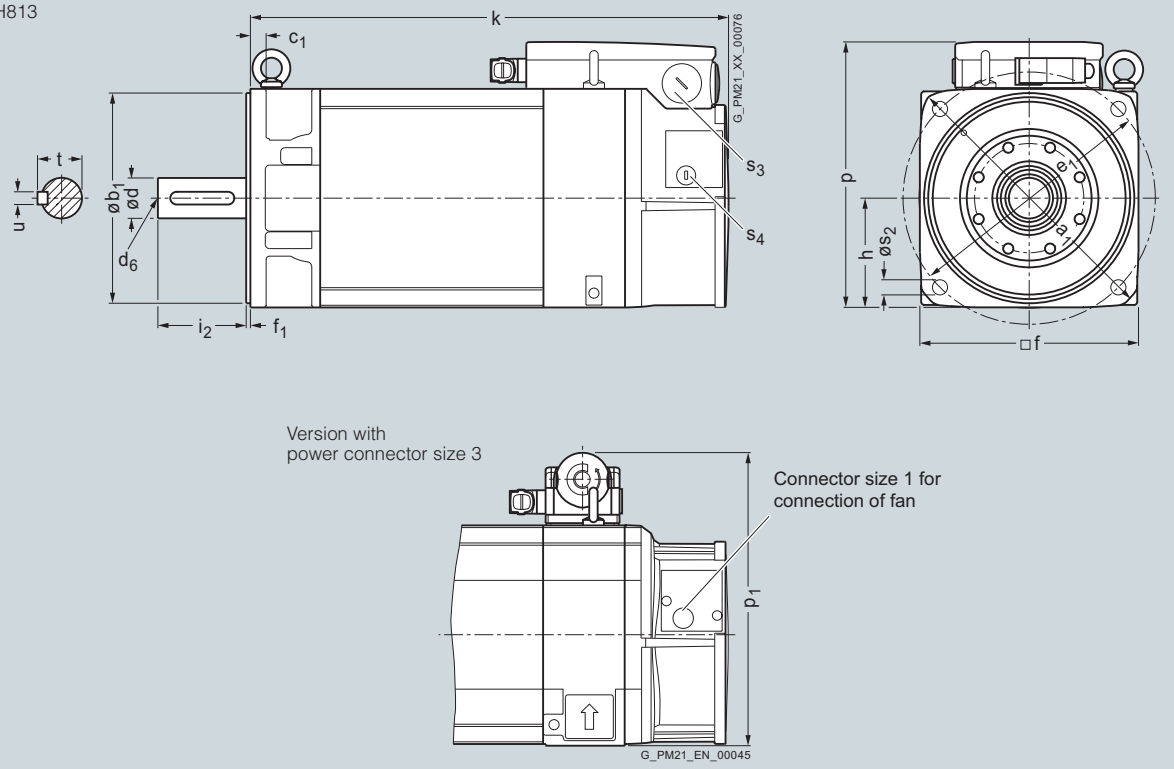
Dimensional drawings

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 B3, forced ventilation																	
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	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	s_4 –	w_1 C	DE shaft extension **d D**	d_6 –	l L	t GA	u F
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



7

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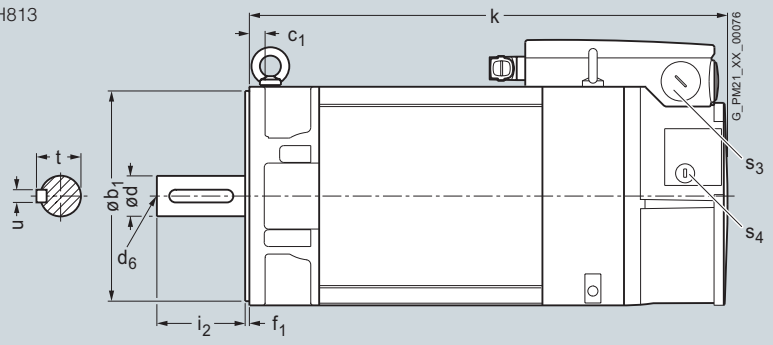
Dimensional drawings

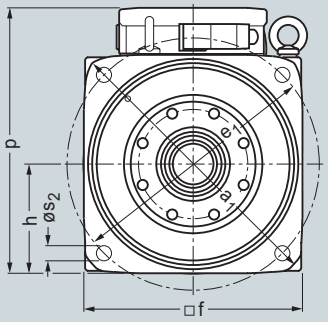
For motor — Dimensions in mm (inches)

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, 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 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	s_4 –	w_1 C	DE shaft extension d D	d_6 –	i_2 E	t GA	u F
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															

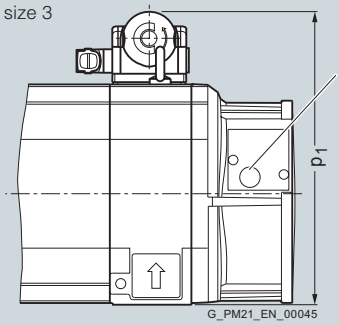
1PH813





Version with power connector size 3

Connector size 1 for connection of fan



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1PH8 motors
SH 132 – Forced ventilation

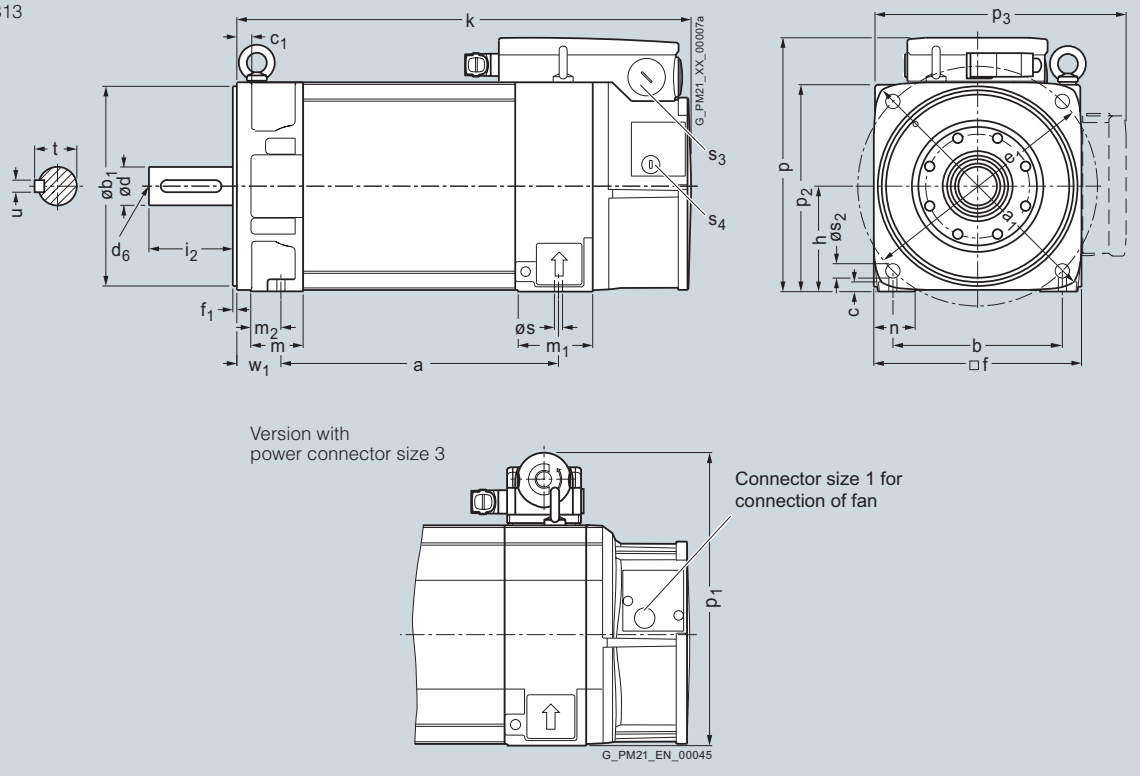
Dimensional drawings

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 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	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	s_4 –	w_1 C	DE shaft extension **d** **D**	d_6 –	i_2 E	t GA	u F
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



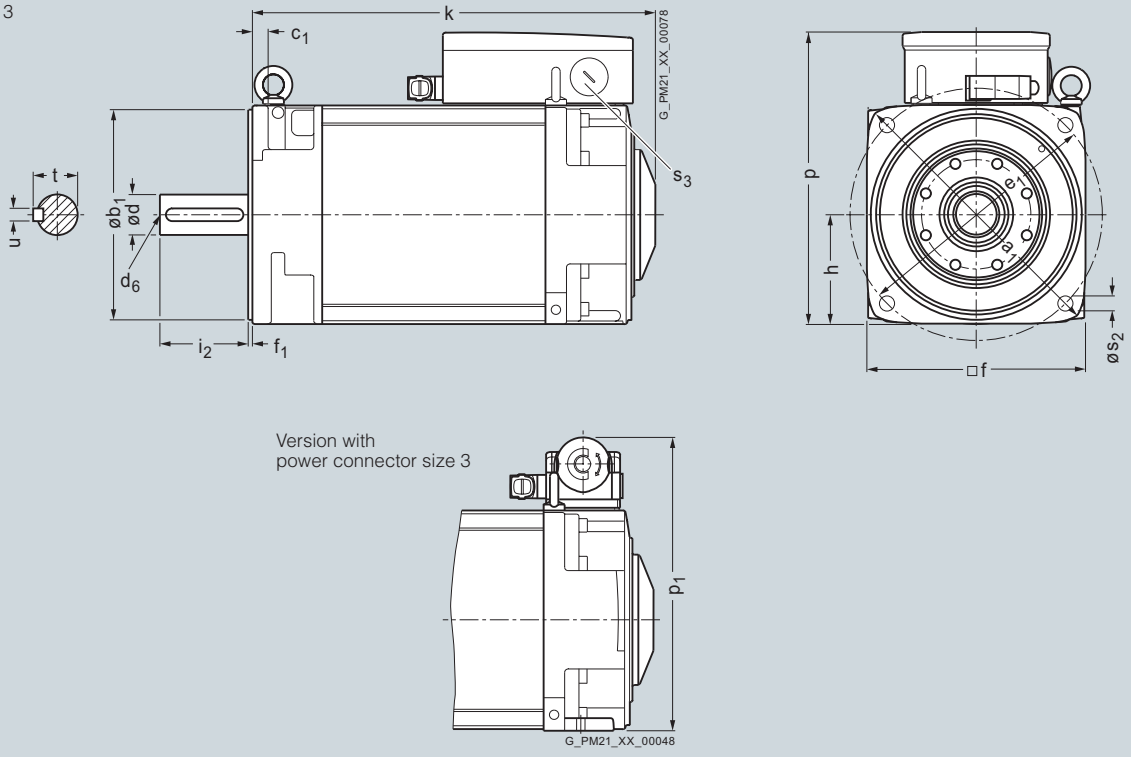
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Dimensional drawings

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 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)					

											DE shaft extension					
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 –	l L	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



Version with power connector size 3

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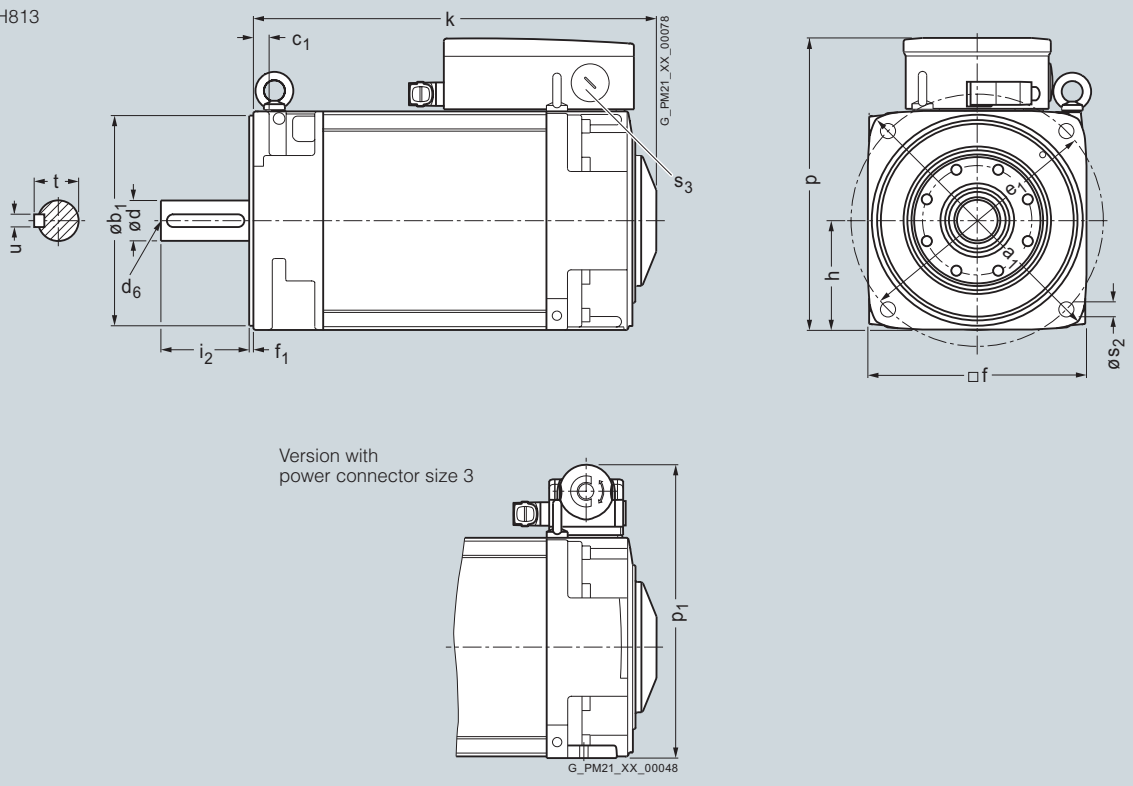
1PH8 motors
SH 132 – Water cooling

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)						

											DE shaft extension					
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



Version with power connector size 3

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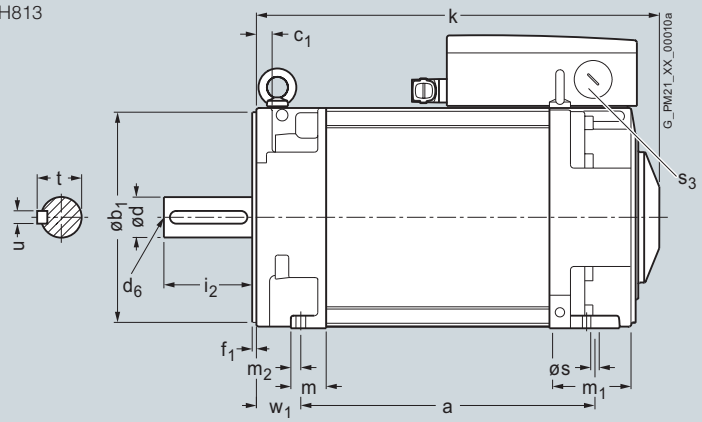
Dimensional drawings

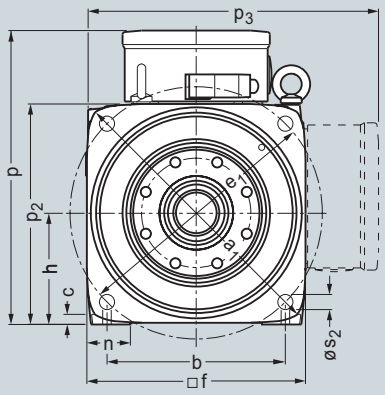
For motor — Dimensions in mm (inches)

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 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)				

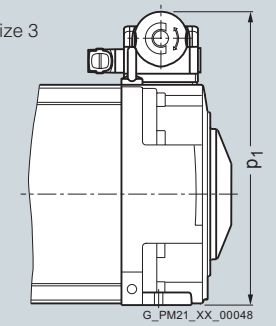
Shaft height	Type	DIN IEC	p HD	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	w_1 C	DE shaft extension **d** **D**	d_6 –	i_2 E	t GA	u F
132	1PH8131		347.5 (13.68)	347 (13.66)	262 (10.31)	357.5 (14.07)	12 (0.47)	18 (0.71)	M50 × 1.5	53 (2.09)	**48 (1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)
	1PH8133														
	1PH8135														
	1PH8137														

1PH813





Version with
power connector size 3



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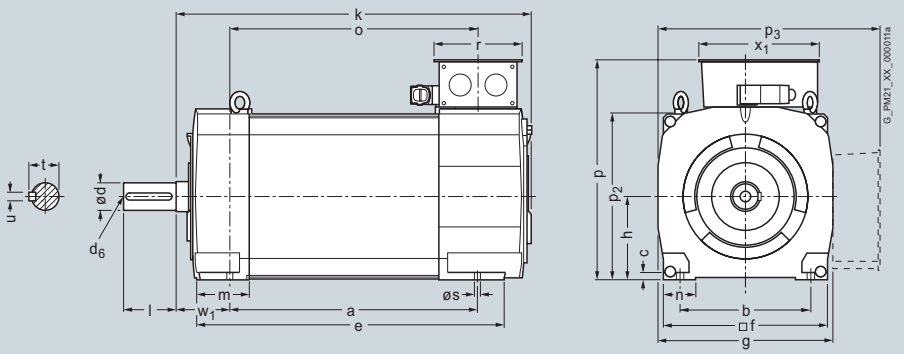
1PH8 motors
SH 180/SH 225 – Water cooling

Dimensional drawings

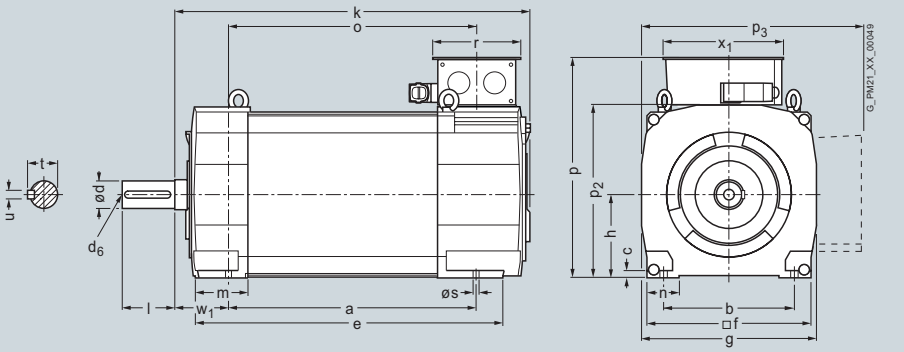
For motor		Dimensions in mm (inches)														
Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	g AC	h H	i_2 EB	k LB	m BA	n AA	p_2 –	s K	w_1 C	
1PH8, types of construction IM B3/IM V5, water cooling																
180	1PH8184		430 (16.93)	279 (10.98)	15 (0.59)	356 (14.02)	384 (15.12)	180 (7.09)	125 (4.92)	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)						
225	1PH8224		445 (17.52)	356 (14.02)	18 (0.71)	446 (17.56)	474 (18.66)	225 (8.86)	125 (4.92)	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 (25.00)							965 (37.99)						

							Terminal box											
		DE shaft extension					1XB7322				1XB7422				1XB7700			
Shaft height	Type	**d** **D**	d_6 –	l E	t GA	u F	p HD	p_3 –	r LL	x1 AG	p HD	p_3 –	r LL	x1 AG	p HD	p_3 –	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																	
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 (25.12)	666 (26.22)	310 (12.20)	295 (11.61)
	1PH8226																	
	1PH8228																	

1PH818



1PH822



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Dimensional drawings

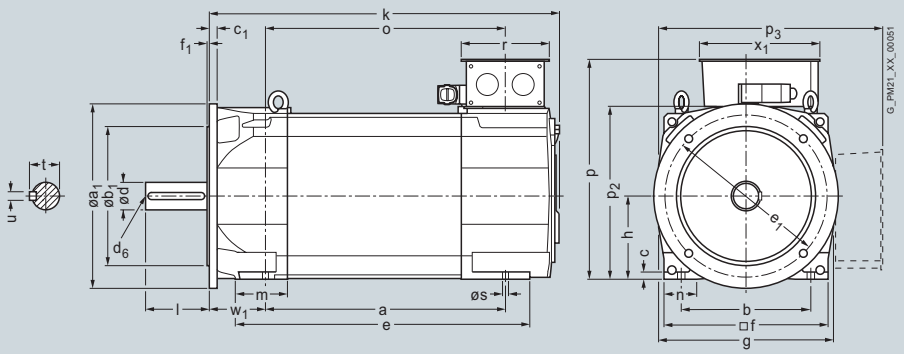
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a B	a_1 P D400	a_1 P D450	a_1 P D550	b A	b_1 N D400	b_1 N D450	b_1 N D550	c HA	c_1 LA	e_1 M D400	e_1 M D450	e_1 M D550	f AB	f_1 T	g AC
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)
	1PH8186		520 (20.47)															
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)
	1PH8226		545 (21.46)															
	1PH8228		635 (25.00)															

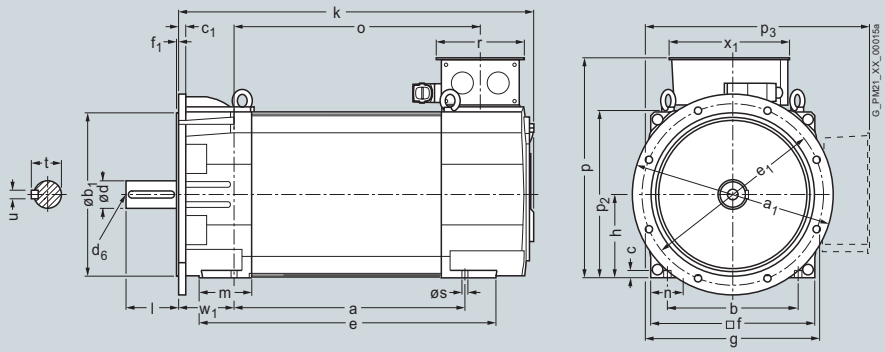
Shaft height	Type	DIN IEC	h H	i_2 EB	k LB	m BA	n AA	p_2 –	s K	w_1 C	**d D**	d_6 –	l E	t GA	u F
											DE shaft extension				
180	1PH8184		180 (7.09)	125 (4.92)	670 (26.38)	123 (4.84)	73 (2.87)	372 (14.65)	14.5 (0.57)	121 (4.76)	**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)
	1PH8186				760 (29.92)										
225	1PH8224		225 (8.86)	125 (4.92)	770 (30.31)	144 (5.67)	88 (3.46)	462 (18.19)	18.5 (0.73)	149 (5.87)	**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH8226				872 (34.33)										
	1PH8228				962 (37.87)										

Terminal box
Dimensions as with types of construction IM B3/IM V5

1PH818



1PH822



7

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1FT6 motors without/with DRIVE-CLiQ
Natural cooling

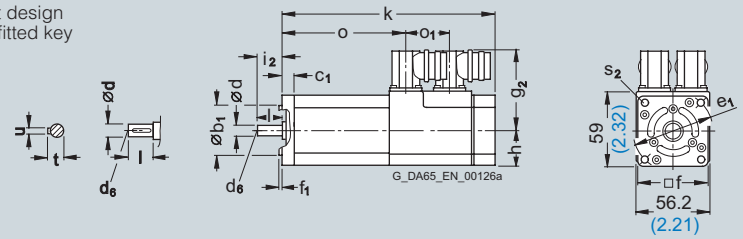
Dimensional drawings

For motor			Dimensions in mm (inches)															
									Without DRIVE-CLiQ	With DRIVE-CLiQ					Encoder system: Resolver			
															without brake		with brake	
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	h H	i_2 –	s_2 S	o_1	k LB	o –	k LB	o –
1FT6, type of construction IM B5, natural cooling, with connector, without/with brake																		
28	1FT6021		–	40 (1.57)	9.8 (0.39)	63 (2.48)	55 (2.17)	2.5 (0.10)	64 (2.52)	73.5 (2.89)	28 (1.10)	20 (0.79)	5.8 (0.23)	34.5 (1.36)	193 (7.60)	122 (4.80)	218 (8.58)	147 (5.79)
	1FT6024														233 (9.17)	162 (6.38)	258 (10.16)	187 (7.36)
36	1FT6031		92 (3.62)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	76 (2.99)	86 (3.39)	36 (1.42)	30 (1.18)	5.5 (0.22)	–	180 (7.09)	151 (5.94)	200 (7.87)	171 (6.73)
	1FT6034														220 (8.66)	191 (7.52)	240 (9.45)	211 (8.31)

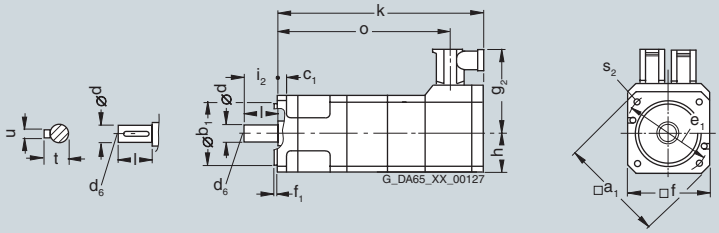
			Encoder system: Incremental encoder Absolute encoder				DE shaft extension				
			without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
28	1FT6021		193 (7.60)	122 (4.80)	218 (8.58)	147 (5.79)	**9 (0.35)**	M3	20 (0.79)	10.2 (0.40)	3 (0.12)
	1FT6024		233 (9.17)	162 (6.38)	258 (10.16)	187 (7.36)					
36	1FT6031		220 (8.66)	151 (5.94)	240 (9.45)	171 (6.73)	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
	1FT6034		260 (10.24)	191 (7.52)	280 (11.02)	211 (8.31)					

1FT602

Shaft design with fitted key



1FT603



7

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Dimensional drawings

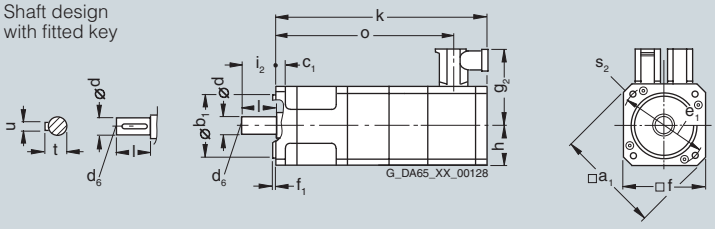
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 – Without DRIVE-CLiQ	g_2 – With DRIVE-CLiQ	h H	i_2 –	s_2 [1] S	s_2 [2] S	Encoder system: Resolver without brake k LB	Encoder system: Resolver without brake o –	Encoder system: Resolver with brake k LB	Encoder system: Resolver with brake o –
1FT6, type of construction IM B5, natural cooling, with connector, without/with brake																		
48	1FT6041		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	80 (3.15)	90 (3.54)	48 (1.89)	40 (1.57)	7 (0.28)	M6	185 (7.28)	159 (6.26)	220 (8.66)	194 (7.64)
	1FT6044														235 (9.25)	209 (8.23)	270 (10.63)	244 (9.61)
63	1FT6061		146 (5.75)	110 (4.33)	10 (0.39)	130 (5.12)	116 (4.57)	3.5 (0.14)	90 (3.54)	100 (3.94)	58 (2.28)	50 (1.97)	9 (0.35)	M8	194 (7.64)	172 (6.77)	224 (8.82)	202 (7.95)
	1FT6062														219 (8.62)	197 (7.76)	249 (9.80)	227 (8.94)
	1FT6064														269 (10.59)	247 (9.72)	299 (11.77)	277 (10.91)

Shaft height	Type	DIN IEC	Encoder system: Incremental encoder Absolute encoder without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** D	d_6 –	l E	t GA	u F
48	1FT6041		228 (8.98)	157 (6.18)	263 (10.35)	192 (7.56)	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
	1FT6044		278 (10.94)	207 (8.15)	313 (12.32)	242 (9.53)					
63	1FT6061		228 (8.98)	172 (6.77)	258 (10.16)	202 (7.95)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT6062		253 (9.96)	197 (7.76)	283 (11.14)	227 (8.94)					
	1FT6064		303 (11.93)	247 (9.72)	333 (13.11)	277 (10.91)					

1FT604
1FT606

Shaft design with fitted key



[1] IM B5.
[2] IM B14.

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1FT6 motors without/with DRIVE-CLiQ
Natural cooling

Dimensional drawings

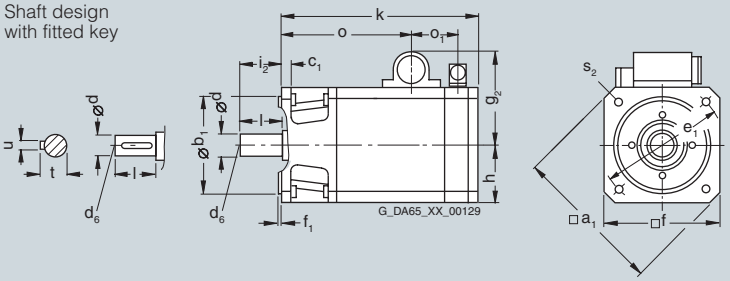
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	s_2 [1] S	s_2 [2] S	o_1 –	Encoder system: Resolver, without brake k LB	without brake o –	with brake k LB	with brake o –
1FT6, type of construction IM B5, natural cooling, with connector, without/with brake																		
80	1FT6081		194 (7.64)	130 (5.12)	12 (0.47)	165 (6.50)	155 (6.10)	3.5 (0.14)	127.5 (5.02)	77.5 (3.05)	58 (2.28)	11 (0.43)	M10	76 (2.99)	221 (8.70)	113 (4.45)	248 (9.76)	140 (5.51)
	1FT6082														246 (9.69)	138 (5.43)	273 (10.75)	165 (6.50)
	1FT6084														296 (11.65)	188 (7.40)	342 (13.46)	234 (9.21)
	1FT6086														346 (13.62)	238 (9.37)	392 (15.43)	284 (11.18)

Shaft height	Type	DIN IEC	Encoder system: Incremental encoder Absolute encoder, without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
80	1FT6081		221 (8.70)	113 (4.45)	248 (9.76)	140 (5.51)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT6082		246 (9.69)	138 (5.43)	273 (10.75)	165 (6.50)					
	1FT6084		296 (11.65)	188 (7.40)	342 (13.46)	234 (9.21)					
	1FT6086		346 (13.62)	238 (9.37)	392 (15.43)	284 (11.18)					

1FT608

Shaft design with fitted key



[1] IM B5.
[2] IM B14.

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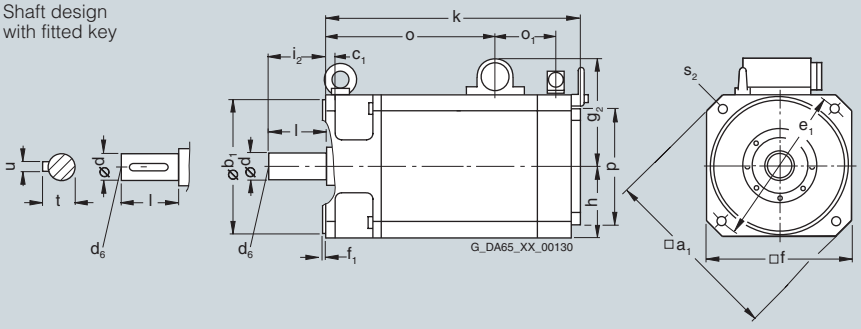
Dimensional drawings

For motor		Dimensions in mm (inches)														
									Connector Size							
									1.5	3						
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	o_1 –
1FT6, type of construction IM B5, natural cooling, with connector, without/with brake																
100	1FT6102 1FT6105 1FT6108		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	146 (5.75)	172 (6.77)	96 (3.78)	80 (3.15)	155 (6.10)	14 (0.55)	M12	76 (2.99)
132	1FT6132 1FT6134 1FT6136		–	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	172.5 (6.79)	198.5 (7.81)	132 (5.20)	82 (3.23)	245 (9.65)	18 (0.71)	–	66 (2.60)

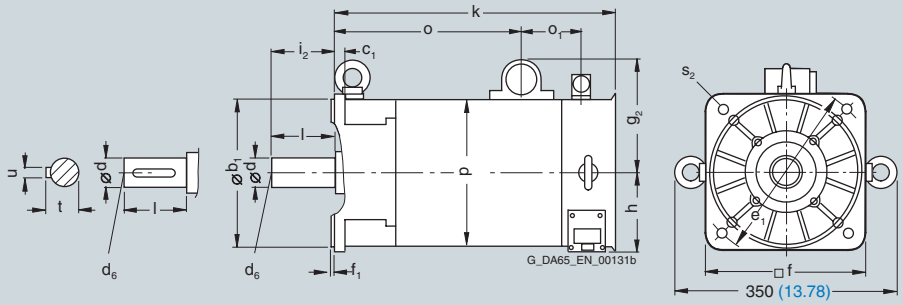
			Encoder system: Resolver				Incremental encoder Absolute encoder				DE shaft extension				
			without brake		with brake		without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o –	k LB	o –	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
100	1FT6102		295 (11.61)	186 (7.32)	341 (13.43)	232 (9.13)	295 (11.61)	186 (7.32)	341 (13.43)	232 (9.13)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6105		370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)	370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)					
	1FT6108		470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)	470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)					
132	1FT6132		423 (16.65)	288 (11.34)	473 (18.62)	338 (13.31)	423 (16.65)	288 (11.34)	473 (18.62)	338 (13.31)	**48** **(1.89)**	M16	82 (3.23)	52.5 (2.07)	14 (0.55)
	1FT6134		473 (18.62)	338 (13.31)	523 (20.59)	388 (15.28)	473 (18.62)	338 (13.31)	523 (20.59)	388 (15.28)					
	1FT6136		523 (20.59)	388 (15.28)	573 (22.56)	438 (17.24)	523 (20.59)	388 (15.28)	573 (22.56)	438 (17.24)					

1FT610

Shaft design with fitted key



1FT613



[1] IM B5.

[2] IM B14.

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1FT6 motors without/with DRIVE-CLiQ
Natural cooling

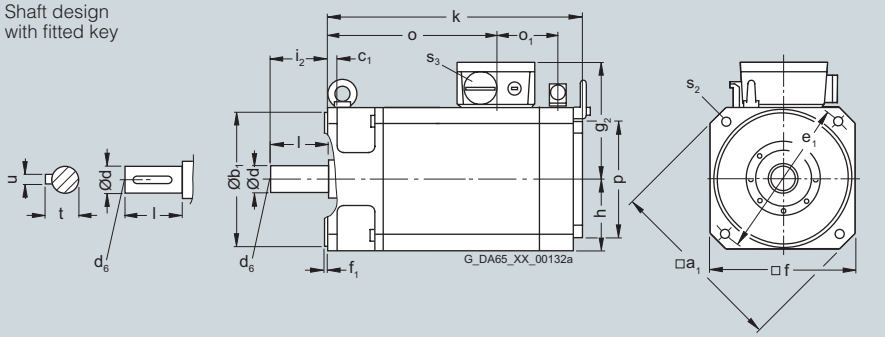
Dimensional drawings

For motor			Dimensions in mm (inches)							Terminal box Type gk130	Terminal box Type gk230							
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	s_3 –	o_1 –
1FT6, type of construction IM B5, natural cooling, with terminal box, without/with brake																		
100	1FT6102 1FT6105 1FT6108		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	155 (6.10)	160 (6.30)	96 (3.78)	80 (3.15)	155 (6.10)	14 (0.55)	M12	PG29	76 (2.99)
132	1FT6132 1FT6134 1FT6136		–	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	–	194 (7.64)	132 (5.20)	82 (3.23)	245 (9.65)	18 (0.71)	–	PG29/ PG36	–

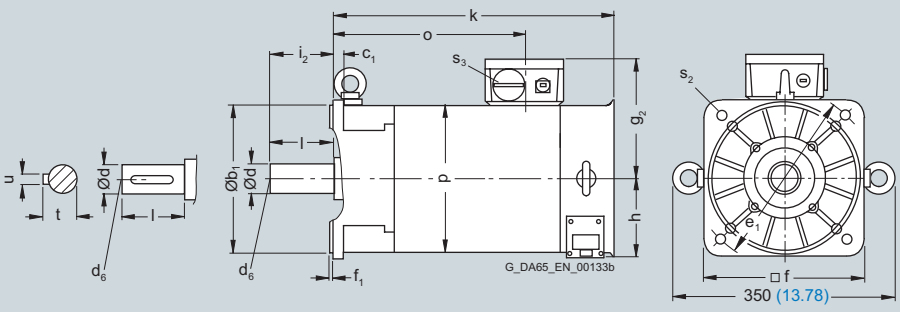
			Encoder system: Resolver				Incremental encoder Absolute encoder				DE shaft extension				
			without brake		with brake		without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o –	k LB	o –	k LB	o –	k LB	o –	**d** **D**	d_6 –	l E	t GA	u F
100	1FT6102		295 (11.61)	186 (7.32)	341 (13.43)	232 (9.13)	295 (11.61)	186 (7.32)	341 (13.43)	232 (9.13)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6105		370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)	370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)					
	1FT6108		470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)	470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)					
132	1FT6132		423 (16.65)	288 (11.34)	473 (18.62)	338 (13.31)	423 (16.65)	288 (11.34)	473 (18.62)	338 (13.31)	**48** **(1.89)**	M16	82 (3.23)	51.5 (2.03)	14 (0.55)
	1FT6134		473 (18.62)	338 (13.31)	523 (20.59)	388 (15.28)	473 (18.62)	338 (13.31)	523 (20.59)	388 (15.28)					
	1FT6136		523 (20.59)	388 (15.28)	573 (22.56)	438 (17.24)	523 (20.59)	388 (15.28)	573 (22.56)	438 (17.24)					

1FT610

Shaft design with fitted key



1FT613



[1] IM B5.

[2] IM B14.

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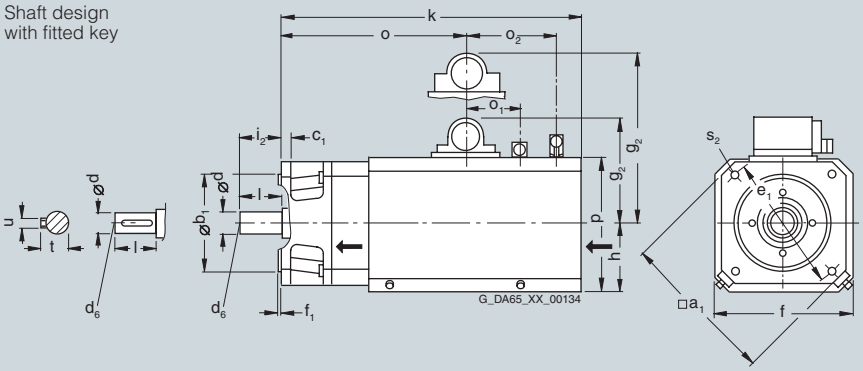
Dimensional drawings

For motor		Dimensions in mm (inches)								Connector Size 1.5	Connector Size 3						
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	o_1 –	o_2 –
1FT6, type of construction IM B5, forced ventilation, with connector, without/with brake																	
80	1FT6084 1FT6086		194 (7.64)	130 (5.12)	12 (0.47)	165 (6.50)	185 (7.28)	3.5 (0.14)	140 (5.51)	154 (6.06)	93 (3.66)	58 (2.28)	175 (6.89)	11 (0.43)	M10	76 (2.99)	169 (6.65)
100	1FT6105 1FT6108		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	221 (8.70)	4 (0.16)	158 (6.22)	172 (6.77)	111 (4.37)	80 (3.15)	212 (8.35)	14 (0.55)	M12	76 (2.99)	170 (6.69)

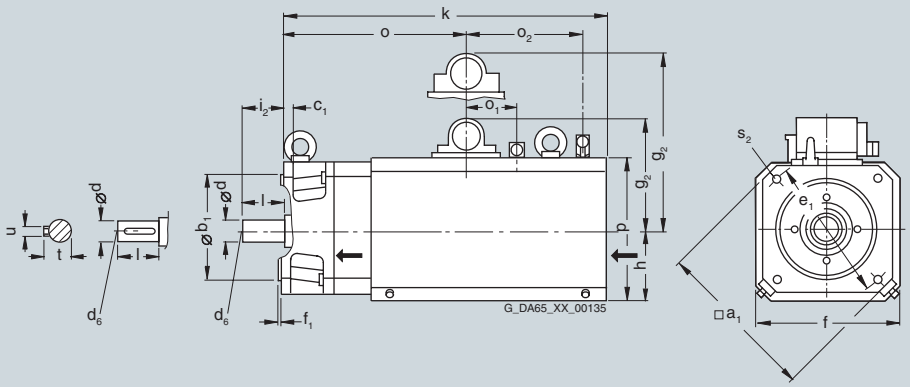
			Encoder system: Resolver / Incremental encoder / Absolute encoder				DE shaft extension				
			without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o –	k LB	o –	**d** **D**	d_6 –	l E	t GA	u F
80	1FT6084		399 (15.71)	188 (7.40)	445 (17.52)	234 (9.21)	**32** **(1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT6086		449 (17.68)	238 (9.37)	495 (19.49)	284 (11.18)					
100	1FT6105		473 (18.62)	261 (10.28)	519 (20.43)	307 (12.09)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6108		573 (22.56)	361 (14.21)	619 (24.37)	407 (16.02)					

1FT608

Shaft design with fitted key



1FT610



[1] IM B5.
[2] IM B14.

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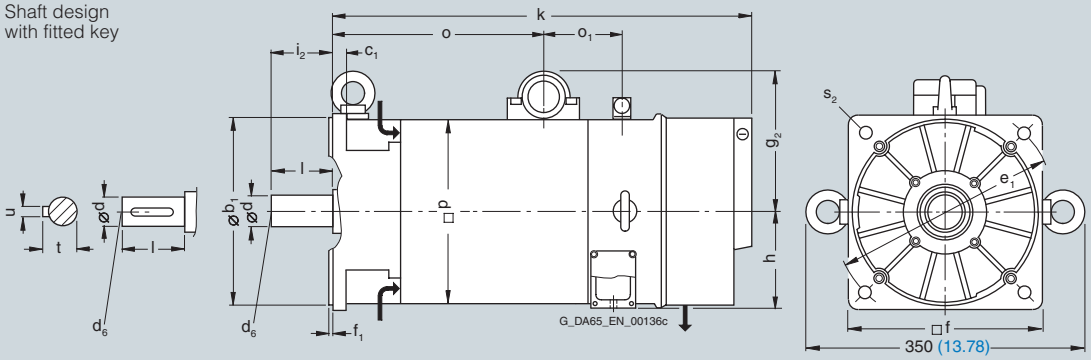
1FT6 motors without/with DRIVE-CLiQ
Forced ventilation

Dimensional drawings

For motor		Dimensions in mm (inches)														
									Connector Size 3							
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	o_1 –	o_2 –
1FT6, type of construction IM B5, forced ventilation, with connector, without/with brake																
132	1FT6132 1FT6134 1FT6136		–	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	198.5 (7.81)	132 (5.20)	82 (3.23)	245 (9.65)	18 (0.71)	–	66 (2.60)	–

			Encoder system: Resolver Incremental encoder Absolute encoder				DE shaft extension				
			without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
132	1FT6132		541 (21.30)	288 (11.34)	591 (23.27)	338 (13.31)	**48 (1.89)**	M16	82 (3.23)	51.5 (2.03)	14 (0.55)
	1FT6134		591 (23.27)	338 (13.31)	641 (25.24)	388 (15.28)					
	1FT6136		641 (25.24)	388 (15.28)	691 (27.20)	438 (17.24)					

1FT613 Shaft design with fitted key



[1] IM B5.
[2] IM B14.

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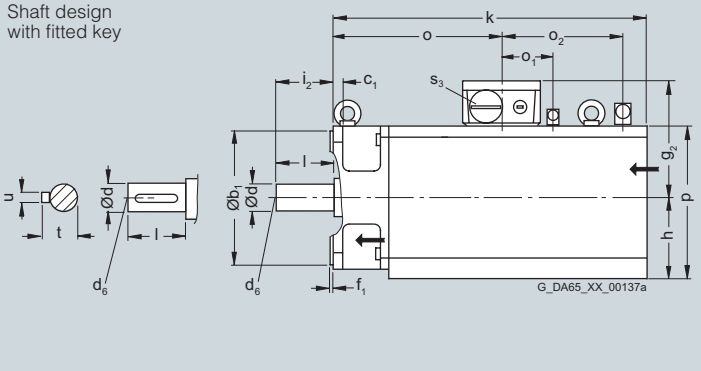
Dimensional drawings

For motor — Dimensions in mm (inches)

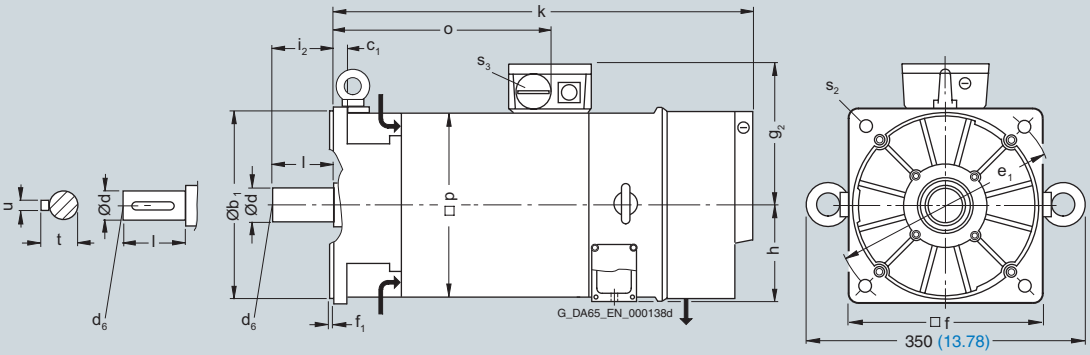
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	Terminal box Type gk130 g_2 –	gk230 g_2 –	gk420 g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	s_3 –
1FT6, type of construction IM B5, forced ventilation, with terminal box, without/with brake																	
100	1FT6105 1FT6108		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	221 (8.70)	4 (0.16)	167 (6.57)	172 (6.77)	–	111 (4.37)	80 (3.15)	212 (8.35)	14 (0.55)	M12	PG29
132	1FT6132 1FT6134 1FT6136		–	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	–	186.5 (7.34)	202 (7.95)	132 (5.20)	82 (3.23)	245 (9.65)	18 (0.71)	–	PG29/ PG36

Shaft height	Type	DIN IEC	o_1 –	o_2 –	Encoder system: Resolver / Incremental encoder / Absolute encoder — without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
100	1FT6105		76 (2.99)	170 (6.69)	473 (18.62)	261 (10.28)	519 (20.43)	307 (12.09)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6108				573 (22.56)	361 (14.21)	619 (24.37)	407 (16.02)					
132	1FT6132 1FT6134 1FT6136		–	–	541 (21.30) 591 (23.27) 641 (25.24)	288 (11.34) 338 (13.31) 388 (15.28)	591 (23.27) 641 (25.24) 691 (27.20)	338 (13.31) 388 (15.28) 438 (17.24)	**48** **(1.89)**	M16	82 (3.23)	51.5 (2.03)	14 (0.55)

1FT610 — Shaft design with fitted key



1FT613



[1] IM B5.
[2] IM B14.

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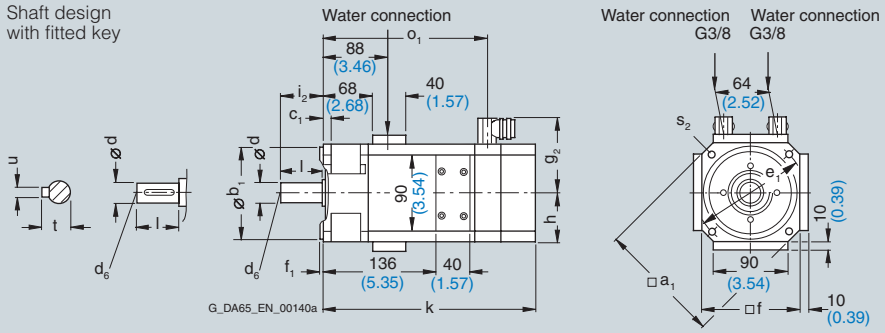
1FT6 motors without/with DRIVE-CLiQ
Water cooling

Dimensional drawings

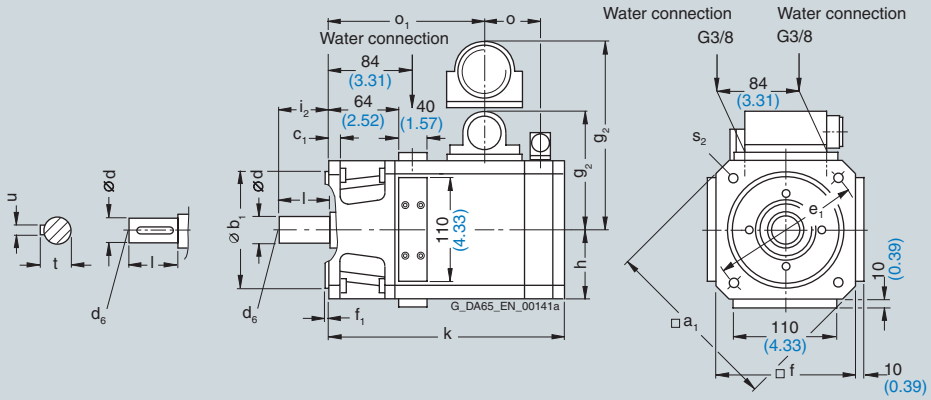
For motor		Dimensions in mm (inches)															
									Connector Size								
									With DRIVE-CLiQ	Without DRIVE-CLiQ							
									1	1	1.5	3					
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	g_2 –	g_2 –	h H	i_2 –	p HD	s_2 1) S	s_2 2) S
1FT6, type of construction IM B5, water cooling, with connector, without/with brake																	
63	1FT6062 1FT6064		146 (5.75)	110 (4.33)	10 (0.39)	130 (5.12)	116 (4.57)	3.5 (0.14)	100 (3.94)	99 (3.90)	–	–	58 (2.28)	50 (1.97)	–	9 (0.35)	M8
80	1FT6084 1FT6086		194 (7.64)	130 (5.12)	12 (0.47)	165 (6.50)	155 (6.10)	3.5 (0.14)	–	–	139.5 (5.49)	153.5 (6.04)	77.5 (3.05)	58 (2.28)	–	11 (0.43)	M10

			Encoder system: Resolver / Incremental encoder / Absolute encoder					Resolver		Incremental encoder / Absolute encoder		DE shaft extension				
			without brake		with brake			without/with brake		without/with brake						
Shaft height	Type	DIN IEC	o –	k LB	o_1 –	k LB	o_1 –	k LB	o_1 –	k LB	o_1 –	**d D**	d_6 –	l E	t GA	u F
63	1FT6062 1FT6064		–	–	–	–	–	253 (9.96) 303 (11.93)	227 (8.94) 277 (10.91)	283 (11.14) 333 (13.11)	227 (8.94) 277 (10.91)	**24** **(0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
80	1FT6084 1FT6086		76 (2.99)	296 (11.65) 346 (13.62)	188 (7.40) 238 (9.37)	342 (13.46) 392 (15.43)	234 (9.21) 284 (11.18)	– –	– –	– –	– –	**32** **(1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)

1FT606



1FT608



1) IM B5.
2) IM B14.

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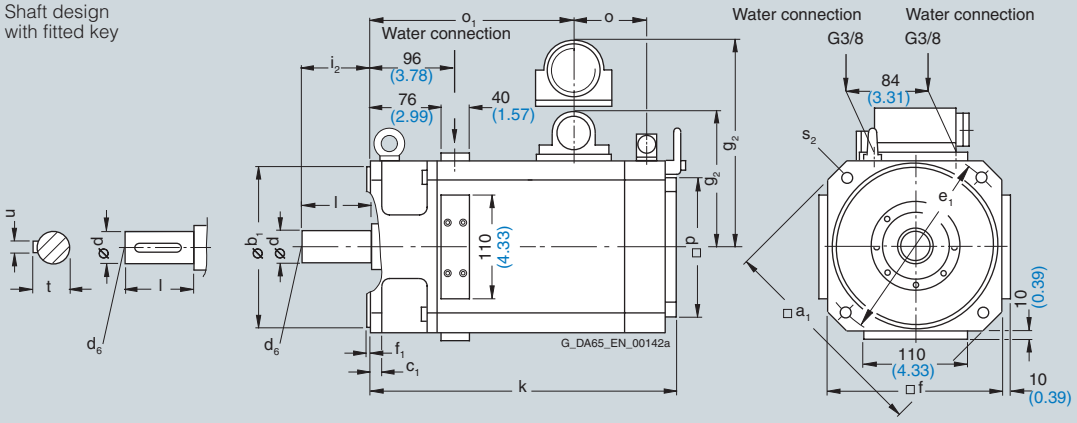
Dimensional drawings

For motor			Dimensions in mm (inches)						Connector Size 1.5	Connector Size 3						
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	g_2 –	h H	i_2 –	p HD	s_2 [1] S	s_2 [2] S	o –
1FT6, type of construction IM B5, water cooling, with connector, without/with brake																
100	1FT6105 1FT6108		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	158 (6.22)	172 (6.77)	96 (3.78)	80 (3.15)	155 (6.10)	14 (0.55)	M12	76 (2.99)

			Encoder system: Resolver, Incremental encoder, Absolute encoder				DE shaft extension				
			without brake		with brake						
Shaft height	Type	DIN IEC	k LB	o_1 –	k LB	o_1 –	**d** **D**	d_6 –	l E	t GA	u F
100	1FT6105		370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6108		470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)					

1FT610

Shaft design with fitted key



[1] IM B5.
[2] IM B14.

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1FT6 motors without/with DRIVE-CLiQ
Water cooling

Dimensional drawings

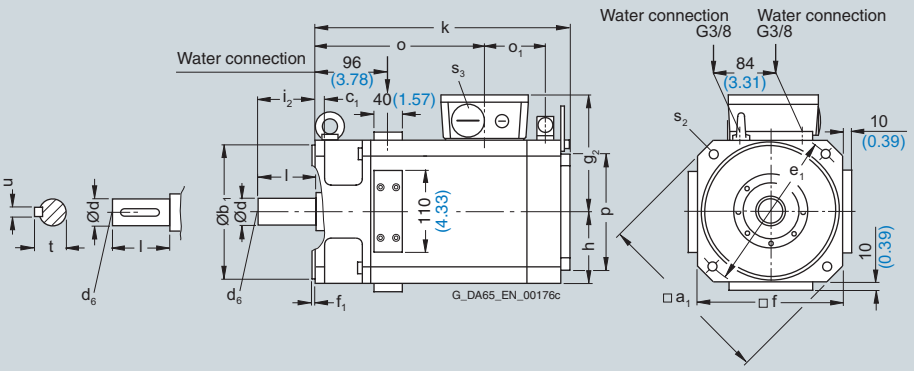
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	Encoder system: Resolver / Incremental encoder / Absolute encoder — without brake: k LB	without brake: o –	with brake: k LB	with brake: o –	o_1 –	p HD	s_2 S	s_3 -
1FT6, type of construction IM B5, water cooling, with terminal box gk230 for $n_{rated} \leq$ 2000 rpm, without/with brake																			
100	1FT6105		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	161 (6.34)	96 (3.78)	80 (3.15)	370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)	76 (2.99)	155 (6.10)	14 (0.55)	PG29
	1FT6108											470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)				
1FT6, type of construction IM B5, water cooling, with terminal box gk420 for $n_{rated} \leq$ 3000 rpm, without/with brake																			
	1FT6105		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	176 (6.93)	96 (3.78)	80 (3.15)	370 (14.57)	261 (10.28)	416 (16.38)	307 (12.09)	–	155 (6.10)	14 (0.55)	PG36
	1FT6108											470 (18.50)	361 (14.21)	516 (20.31)	407 (16.02)				

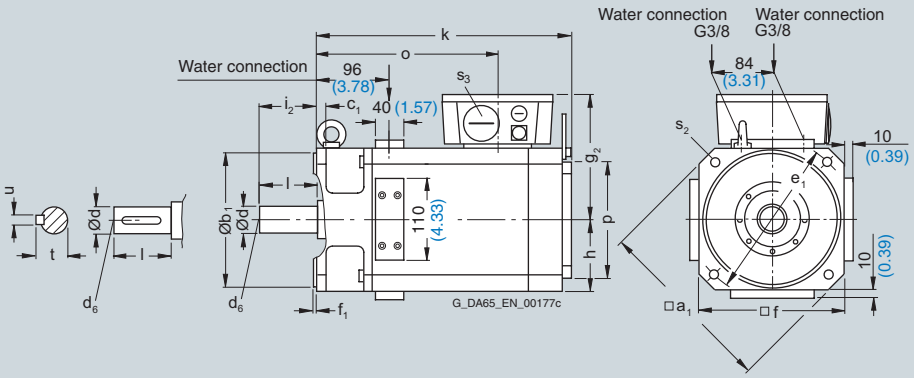
DE shaft extension

Shaft height	Type	DIN IEC	**d** **D**	d_6 –	l E	t GA	u F
100	1FT6105 1FT6108		**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT6105 1FT6108		**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

1FT610 with terminal box gk230



1FT610 with terminal box gk420



7

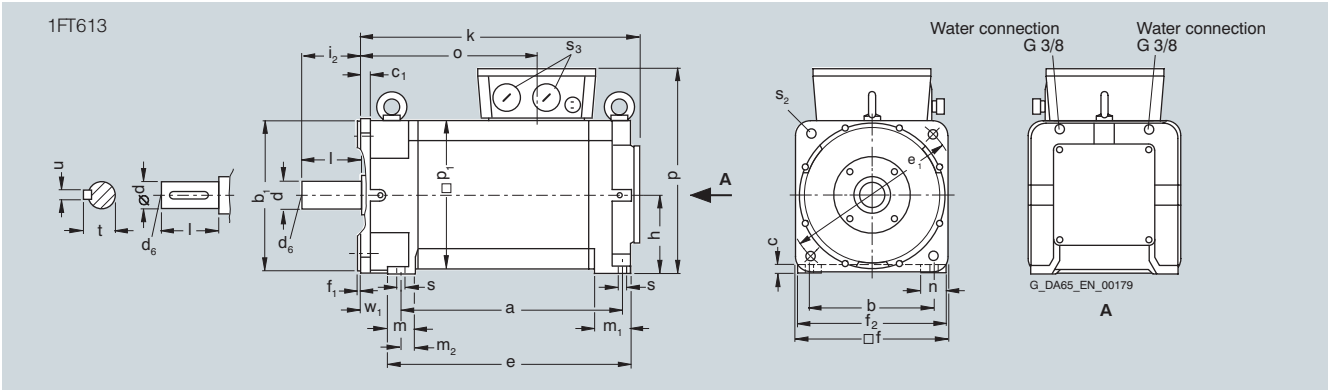
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Dimensional drawings

For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a B	b A	b_1 N	c LA	c_1 –	e BB	e_1 M	f AB	f_1 T	f_2 –	h H	i_2 –	k LB	m BA	m_1 –	m_2 –
1FT6, type of construction IM B35, water cooling, with terminal box																		
132	1FT6132		342 (13.46)	216 (8.50)	250 (9.84)	14 (0.55)	16 (0.63)	366 (14.41)	300 (11.81)	260 (10.24)	5 (0.20)	245 (9.65)	132 (5.20)	82 (3.23)	423 (16.65)	36 (1.42)	53 (2.09)	23 (0.91)
	1FT6134		392 (15.43)					416 (16.38)							473 (18.62)			
	1FT6136		442 (17.40)					466 (18.35)							523 (20.59)			
	1FT6138		517 (20.35)					541 (21.30)							598 (23.54)			

Shaft height	Type	DIN IEC	n AA	o –	p HD	p_1 AC	s K	s_2 K	s_3 – (n_{rated}=1500 rpm)	s_3 – (n_{rated}=2500 rpm)	w_1 C	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
132	1FT6132		14 (0.55)	255.5 (10.06)	350.5 (13.80)	245 (9.65)	12 (0.47)	18 (0.71)	M32 × 1.5	M40 × 1.5	53 (2.09)	**48 (1.89)**	M16	82 (3.23)	51.5 (2.03)	14 (0.55)
	1FT6134			305.5 (12.03)					M40 × 1.5	M50 × 1.5						
	1FT6136			355.5 (14.00)					M50 × 1.5	M50 × 1.5						
	1FT6138			430.5 (16.95)					M50 × 1.5	M50 × 1.5						



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1FT7 Compact motors without/with DRIVE-CLiQ
Natural cooling

Dimensional drawings

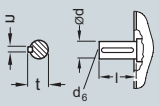
For motor — Dimensions in mm (inches)

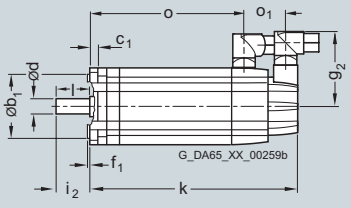
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	o_1 –	s_2 S	Flange 1 (1FT6-compatible) i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –
1FT7 Compact, type of construction IM B5, natural cooling with connector, without/with brake																
36	1FT7034		90 (3.54)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	80 (3.15)	48 (1.89)	6.5 (0.26)	30 (1.18)	195 (7.68)	133 (5.24)	222 (8.74)	160 (6.30)
	1FT7036												243 (9.57)	181 (7.13)	270 (10.63)	208 (8.19)
48	1FT7042		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	93 (3.66)	53 (2.09)	6.5 (0.26)	40 (1.57)	169 (6.65)	102 (4.02)	201 (7.91)	134 (5.28)
	1FT7044												219 (8.62)	152 (5.98)	251 (9.88)	184 (7.24)
	1FT7046												259 (10.20)	192 (7.56)	291 (11.46)	224 (8.82)
63	1FT7062		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	108 (4.25)	53 (2.09)	9 (0.35)	50 (1.97)	173 (6.81)	106 (4.17)	208 (8.19)	141 (5.55)
	1FT7064												205 (8.07)	137 (5.39)	240 (9.45)	173 (6.81)
	1FT7066												236 (9.29)	169 (6.65)	272 (10.71)	204 (8.03)
	1FT7068												284 (11.18)	216 (8.50)	319 (12.56)	252 (9.92)

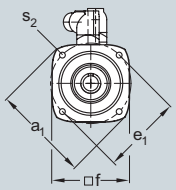
Shaft height	Type	DIN IEC	Flange 0 b_2 –	f_2 –	i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** D	d_6 –	l E	t GA	u F
36	1FT7034		36 (1.42)	5.5 (0.22)	36.5 (1.44)	189 (7.44)	127 (5.00)	216 (8.50)	154 (6.06)	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
	1FT7036					237 (9.33)	175 (6.89)	264 (10.39)	202 (7.95)					
48	1FT7042		46 (1.81)	5.5 (0.22)	46 (1.81)	163 (6.42)	96 (3.78)	195 (7.68)	128 (5.04)	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
	1FT7044					213 (8.39)	146 (5.75)	245 (9.65)	178 (7.01)					
	1FT7046					253 (9.96)	186 (7.32)	285 (11.22)	218 (8.58)					
63	1FT7062		51 (2.01)	6 (0.24)	56.5 (2.22)	167 (6.57)	99 (3.90)	202 (7.95)	135 (5.31)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT7064					198 (7.80)	131 (5.16)	233 (9.17)	166 (6.54)					
	1FT7066					230 (9.06)	162 (6.38)	265 (10.43)	198 (7.80)					
	1FT7068					277 (10.91)	210 (8.27)	312 (12.28)	245 (9.65)					

Flange 1
(1FT6-compatible)
1FT703
1FT704
1FT706

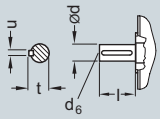
Shaft design
with fitted key

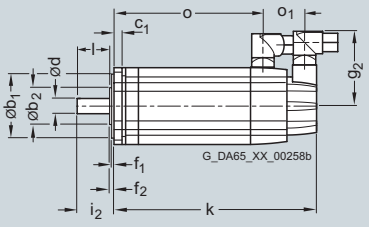


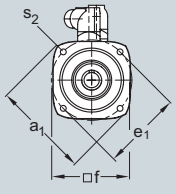




Flange 0
1FT703
1FT704
1FT706







7

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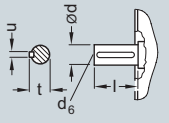
Dimensional drawings

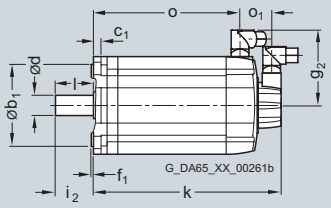
For motor			Dimensions in mm (inches)										Flange 1 (1FT6-compatible)			
													without brake		with brake	
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	o_1 –	s_2 S	i_2 –	k LB	o –	k LB	o –
1FT7 Compact, type of construction IM B5, natural cooling with connector, without/with brake																
80	1FT7082		195 (7.68)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	141 (5.55)	51 (2.01)	11 (0.43)	58 (2.28)	196 (7.72)	130 (5.12)	248 (9.76)	183 (7.20)
	1FT7084												247 (9.72)	182 (7.17)	299 (11.77)	234 (9.21)
	1FT7086												299 (11.77)	234 (9.21)	351 (13.82)	286 (11.26)
100	1FT7102		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	161 (6.34)	56 (2.20)	14 (0.55)	80 (3.15)	221 (8.70)	151 (5.94)	273 (10.75)	203 (7.99)
	1FT7105												307 (12.09)	238 (9.37)	360 (14.17)	290 (11.42)
	1FT7108												377 (14.84)	307 (12.09)	429 (16.89)	359 (14.13)

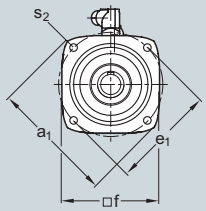
			Flange 0							DE shaft extension				
						without brake		with brake						
Shaft height	Type	DIN IEC	b_2 –	f_2 –	i_2 –	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
80	1FT7082		66 (2.60)	6 (0.24)	64.5 (2.54)	189 (7.44)	124 (4.88)	241 (9.49)	176 (6.93)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7084					241 (9.49)	175 (6.89)	293 (11.54)	228 (8.98)					
	1FT7086					292 (11.50)	227 (8.94)	345 (13.58)	279 (10.98)					
100	1FT7102		81 (3.19)	6.5 (0.26)	87 (3.43)	214 (8.43)	144 (5.67)	266 (10.47)	196 (7.72)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FT7105					301 (11.85)	231 (9.09)	353 (13.90)	283 (11.14)					
	1FT7108					370 (14.57)	300 (11.81)	422 (16.61)	352 (13.86)					

Flange 1
(1FT6-compatible)
1FT708
1FT710

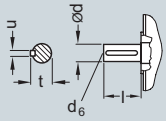
Shaft design
with fitted key

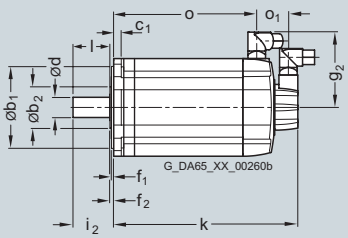


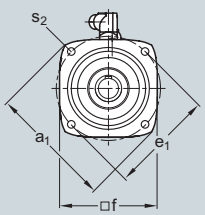




Flange 0
1FT708
1FT710







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1FT7 Compact motors without/with DRIVE-CLiQ
Forced ventilation

Dimensional drawings

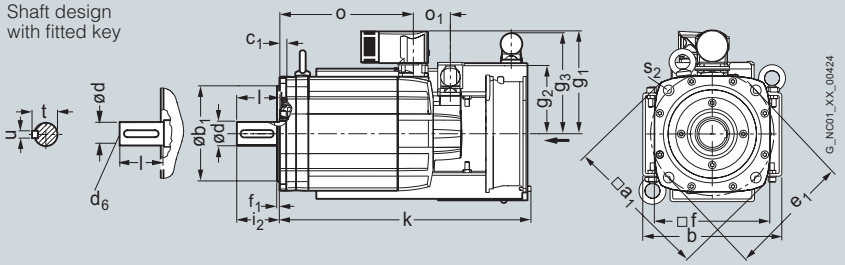
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	b –	Connector Size 1.5 g_1 –	Connector Size 3 g_2 –	Fan g_3 –	h H	h_1 –	h_2 –	o_1 –	s_2 S
1FT7 Compact, type of construction IM B5, forced ventilation, with connector, without/with brake																	
80	1FT7084		194 (7.64)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	186 (7.32)	139 (5.47)	93 (3.66)	137.5 (5.41)	27 (1.06)	177 (6.97)	186.5 (7.34)	50 (1.97)	11 (0.43)
	1FT7086																
100	1FT7105		245 (9.65)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	224 (8.82)	159 (6.26)	93 (3.66)	151 (5.94)	27 (1.06)	220 (8.66)	222 (8.74)	55 (2.17)	14 (0.55)

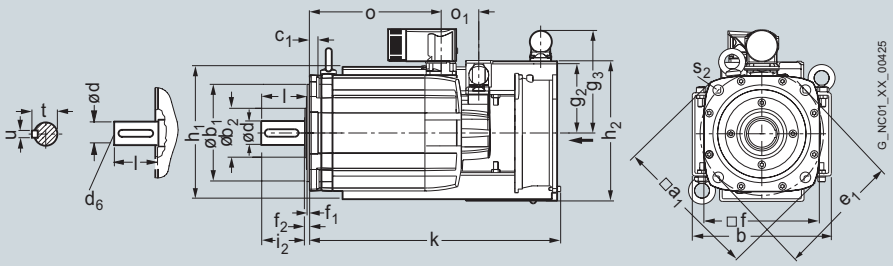
Shaft height	Type	DIN IEC	Flange 1 (1FT6-compatible) i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –	Flange 0 b_2 –	f_2 –	i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** D	d_6 –	l E	t GA	u F
80	1FT7084		58 (2.28)	342 (13.46)	182 (7.17)	394 (15.51)	234 (9.21)	66 (2.60)	6 (0.24)	64.5 (2.54)	335.5 (13.21)	175 (6.89)	387.5 (15.26)	228 (8.98)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7086			393.5 (15.49)	234 (9.21)	446 (17.56)	286 (11.26)				387 (15.24)	227 (8.94)	439.5 (17.30)	279 (10.98)					
100	1FT7105		80 (3.15)	403.5 (15.89)	238 (9.37)	455.5 (17.93)	290 (11.42)	81 (3.19)	6.5 (0.26)	87 (3.43)	396.5 (15.61)	231 (9.09)	448.5 (17.66)	283 (11.14)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)

Flange 1
(1FT6-compatible)
1FT708
1FT710

Shaft design
with fitted key



Flange 0
1FT708
1FT710



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Dimensional drawings

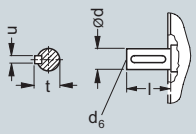
For motor — Dimensions in mm (inches)

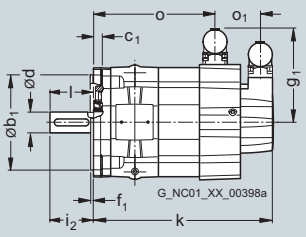
Shaft height	Type	DIN IEC	a_1 P	b –	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	Connector Size 1 g_1 –	Connector Size 1.5 g_1 –	Connector Size 3 g_1 –	Connector Size 1 o_1 –	Connector Size 1.5 o_1 –	Connector Size 3 o_1 –	s_2 S
1FT7 Compact, type of construction IM B5, water cooling, with connector, without/with brake																
63	1FT7062 1FT7064 1FT7066 1FT7068		155 (6.10)	135 (5.31)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	108 (4.25)	–	–	52 (2.05)	–	–	9 (0.35)
80	1FT7082 1FT7084 1FT7086		195 (7.68)	165 (6.50)	130 (5.12)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	–	140 (5.51)	–	–	50 (1.97)	–	11 (0.43)
100	1FT7102		245 (9.65)	206 (8.11)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	–	160 (6.30)	–	–	55 (2.17)	–	14 (0.55)
	1FT7105 1FT7108										–	187 (7.36)		–	72 (2.83)	

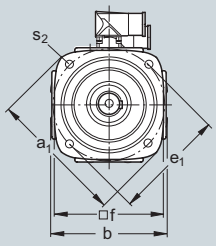
Shaft height	Type	DIN IEC	Flange 1 (1FT6-compatible) without/with brake Connector Size 1 i_2 –	k LB	o –	Size 1.5 o –	Size 3 o –	Flange 0 b_2 –	f_2 –	i_2 –	without/with brake Connector Size 1 k LB	o –	Size 1.5 o –	Size 3 o –	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
63	1FT7062		50 (1.97)	208 (8.19)	141 (5.55)	–	–	51 (2.01)	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)	–	–					
	1FT7066			272 (10.71)	204 (8.03)	–	–				265 (10.43)	198 (7.80)	–	–					
	1FT7068			319 (12.56)	252 (9.92)	–	–				312 (12.28)	245 (9.65)	–	–					
80	1FT7082		58 (2.28)	248 (9.76)	–	183 (7.20)	–	66 (2.60)	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)	–					
	1FT7086			351 (13.82)	–	286 (11.26)	–				345 (13.58)	–	279 (10.98)	–					
100	1FT7102		80 (3.15)	273 (10.75)	–	203 (7.99)	–	81 (3.19)	6.5 (0.26)	87 (3.43)	266 (10.47)	–	196 (7.72)	–	**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)
1FT706
1FT708
1FT710

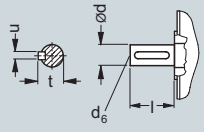
Shaft design
with fitted key

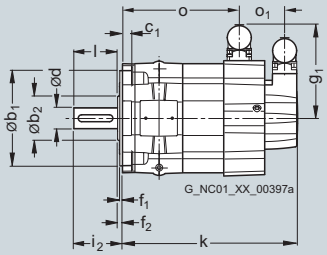


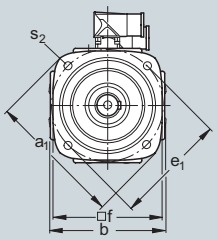




Flange 0
1FT706
1FT708
1FT710







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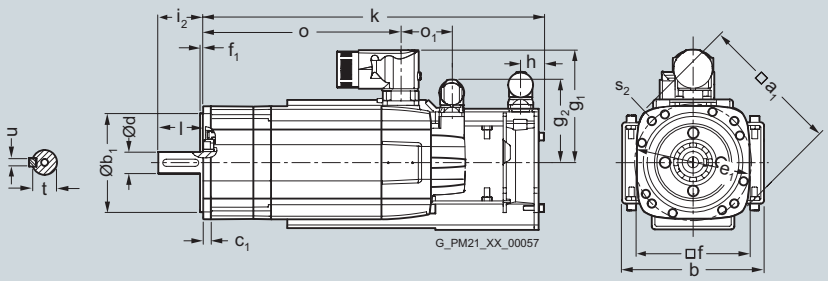
1FT7 High Dynamic motors without/with DRIVE-CLiQ
Forced ventilation

Dimensional drawings

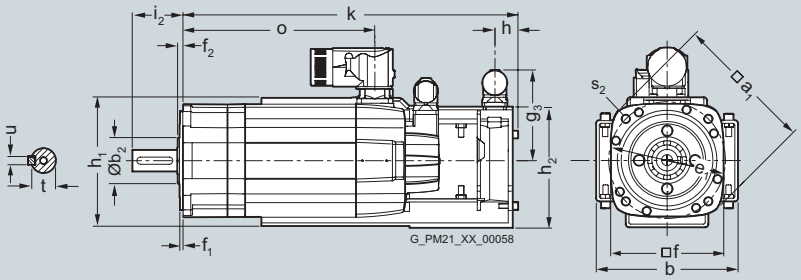
For motor		Dimensions in mm (inches)																	
											Connector Size 1.5		Fan						
Shaft height	Type	DIN IEC	a_1 P	b A	b_1 N	b_2 –	c_1 LA	e_1 M	f AB	f_1 T	g_1 –	g_2 –	g_3 –	h H	h_1 –	h_2 –	o_1 –	s_2 S
1FT7 High Dynamic, forced ventilation, with connector, without/with brake																			
63	1FT7065		155 (6.10)	158 (6.22)	110 (4.33)	51 (2.01)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	125 (4.92)	93 (3.66)	101.5 (4.00)	26 (1.02)	143 (5.63)	135 (5.31)	57 (2.24)	9 (0.35)
	1FT7067																		

			Flange 1 (1FT6-compatible)					Flange 0						DE shaft extension				
				without brake		with brake				without brake		with brake						
Shaft height	Type	DIN IEC	i_2 –	k LB	o –	k LB	o –	f_2 –	i_2 –	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
63	1FT7065		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			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)					

Flange 1
(1FT6-compatible)
1FT706



Flange 0
1FT706



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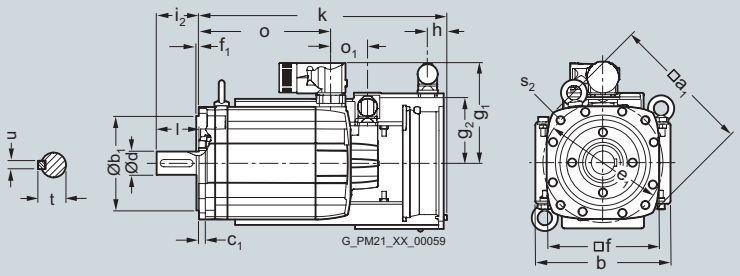
Dimensional drawings

For motor — Dimensions in mm (inches)

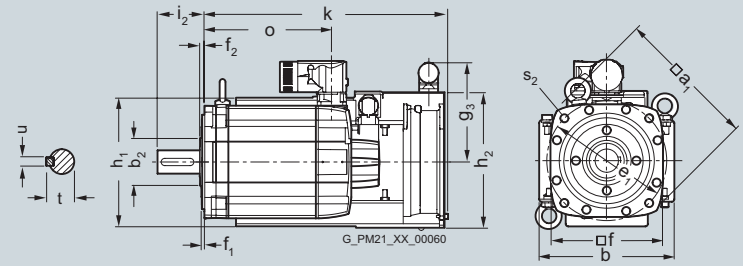
Shaft height	Type	DIN IEC	a_1 P	b A	b_1 N	b_2 –	c_1 LA	e_1 M	f AB	f_1 T	Connector Size 1 g_1 –	Connector Size 3 g_1 –	g_2 –	g_3 –	h H	h_1 –	h_2 –	o_1 –	s_2 S
1FT7 High Dynamic, forced ventilation, with connector, without/with brake																			
80	1FT7085		194 (7.64)	186 (7.32)	130 (5.12)	66 (2.60)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	139 (5.47)	166.5 (6.56)	93 (3.66)	137.5 (5.41)	27 (1.06)	177 (6.97)	186.5 (7.34)	50 (1.97)	11 (0.43)
	1FT7087											166.5 (6.56)							

Shaft height	Type	DIN IEC	Flange 1 (1FT6-compatible) i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –	Flange 0 f_2 –	i_2 –	without brake k LB	without brake o –	with brake k LB	with brake o –	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
80	1FT7085		58 (2.28)	414 (16.30)	254 (10.00)	414 (16.30)	254 (10.00)	6 (0.24)	64.5 (2.54)	407.5 (16.04)	247 (9.72)	407.5 (16.04)	247 (9.72)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7087			474 (18.66)	314 (12.36)	474 (18.66)	314 (12.36)			467.5 (18.41)	307 (12.09)	467.5 (18.41)	307 (12.09)					

Flange 1
(1FT6-compatible)
1FT708



Flange 0
1FT708



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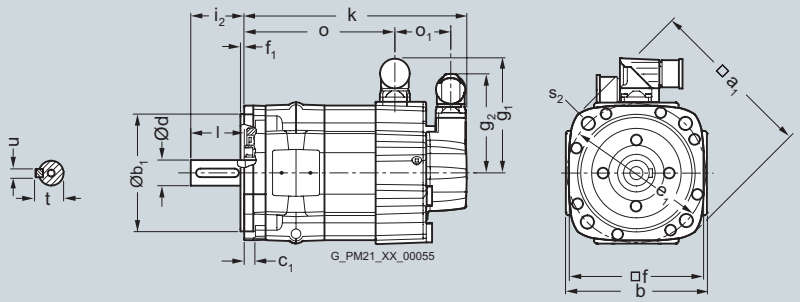
1FT7 High Dynamic motors without/with DRIVE-CLiQ
Water cooling

Dimensional drawings

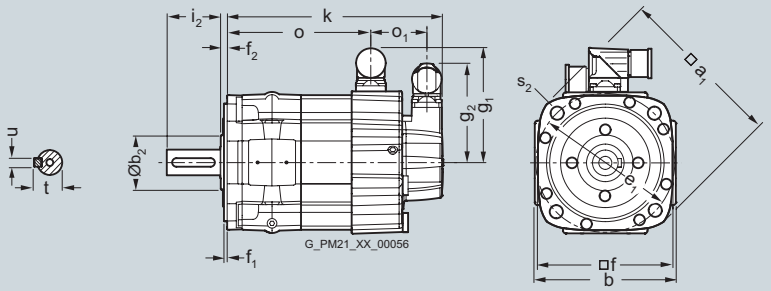
For motor		Dimensions in mm (inches)									Connector				
											Size 1.5	Size 3			
Shaft height	Type	DIN IEC	a_1 P	b A	b_1 N	b_2 –	c_1 LA	e_1 M	f AB	f_1 T	g_1 –	g_1 –	g_2 –	o_1 –	s_2 S
1FT7 High Dynamic, water cooling, with connector, without/with brake															
63	1FT7065		155 (6.10)	135 (5.31)	110 (4.33)	51 (2.01)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	132.5 (5.22)	–	93 (3.66)	57 (2.24)	9 (0.35)
	1FT7067														
80	1FT7085		194 (7.64)	165 (6.50)	130 (5.12)	66 (2.60)	11.5 (0.45)	165 (6.50)	155 (6.10)	3.5 (0.14)	140.5 (5.53)	168.5 (6.63)	93 (3.66)	50 (1.97)	11 (0.43)
	1FT7087														

			Flange 1 (1FT6-compatible)				Flange 0						DE shaft extension				
				without brake		with brake				without brake		with brake					
Shaft height	Type	DIN IEC	i_2 –	k LB	o –	k LB	o –	f_2 –	i_2 –	k LB	o –	k LB	o –	**d D**	d_6 –	l E	t GA	u F
63	1FT7065		50 (1.97)	292 (11.50)	220 (8.66)	292 (11.50)	220 (8.66)	6 (0.24)	56.5 (2.22)	285.5 (11.24)	214 (8.43)	285.5 (11.24)	214 (8.43)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FT7067			332 (13.07)	260 (10.24)	332 (13.07)	260 (10.24)			325.5 (12.81)	254 (10.00)	325.5 (12.81)	254 (10.00)					
80	1FT7085		58 (2.28)	319 (12.56)	254 (10.00)	319 (12.56)	254 (10.00)	6 (0.24)	64.5 (2.54)	312.5 (12.30)	247 (9.72)	312.5 (12.30)	247 (9.72)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FT7087			379 (14.92)	314 (12.36)	379 (14.92)	314 (12.36)			372.5 (14.67)	307 (12.09)	372.5 (14.67)	307 (12.09)					

Flange 1
(1FT6-compatible)
1FT706
1FT708



Flange 0
1FT706
1FT708



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Dimensional drawings

For motor — Dimensions in mm (inches)

Encoder system: Resolver
Absolute encoder EnDat 16 S/R / 15 bit (16 S/R)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	s_2 S	without brake: k LB	without brake: o_1 –	without brake: o_2 –	with brake: k LB	with brake: o_1 –	with brake: o_2 –
1FK7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake																		
20	1FK7011-5		–	30 (1.18)	7 (0.28)	46 (1.81)	40 (1.57)	2.5 (0.10)	65.5 (2.58)	20 (0.79)	18 (0.71)	4.5 (0.18)	140 (5.51)	89 (3.50)	118 (4.65)	140 (5.51)	89 (3.50)	118 (4.65)
	1FK7015-5												165 (6.50)	114 (4.49)	143 (5.63)	165 (6.50)	114 (4.49)	143 (5.63)
28	1FK7022-5		–	40 (1.57)	10 (0.39)	63 (2.48)	55 (2.17)	2.5 (0.10)	75 (2.95)	27.5 (1.08)	20 (0.79)	5.4 (0.21)	153 (6.02)	95 (3.74)	128 (5.04)	175 (6.89)	95 (3.74)	150 (5.91)
36	1FK7032-5		92 (3.62)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	81 (3.19)	36 (1.42)	30 (1.18)	6.5 (0.26)	150 (5.91)	90 (3.54)	125 (4.92)	175 (6.89)	90 (3.54)	149 (5.87)
	1FK7034-5												175 (6.89)	115 (4.53)	150 (5.91)	200 (7.87)	115 (4.53)	174 (6.85)
48	1FK7040-5		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	90 (3.54)	48 (1.89)	40 (1.57)	7 (0.28)	134 (5.28)	73 (2.87)	106 (4.17)	163 (6.42)	73 (2.87)	135 (5.31)
	1FK7042-5												162 (6.38)	101 (3.98)	134 (5.28)	191 (7.52)	101 (3.98)	163 (6.42)
63	1FK7060-5		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	105 (4.13)	63 (2.48)	50 (1.97)	9 (0.35)	157 (6.18)	94 (3.70)	126 (4.96)	200 (7.87)	94 (3.70)	169 (6.65)
	1FK7063-5												202 (7.95)	139 (5.47)	171 (6.73)	245 (9.65)	139 (5.47)	214 (8.43)

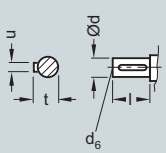
Encoder system:
Incremental encoder sin/cos 1 V_{pp} / 22 bit (2048 S/R)
Absolute encoder EnDat 2048 S/R / 22 bit (2048 S/R)
EnDat 512 S/R / 20 bit (512 S/R)
EnDat 32 S/R / 16 bit (32 S/R)

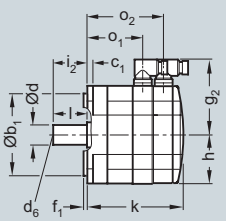
DE shaft extension

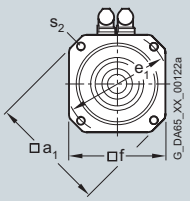
Shaft height	Type	without brake: k LB	without brake: o_1 –	without brake: o_2 –	with brake: k LB	with brake: o_1 –	with brake: o_2 –	**d** **D**	d_6 –	l E	t GA	u F
20	1FK7011-5	155 (6.10)	89 (3.50)	118 (4.65)	155 (6.10)	89 (3.50)	118 (4.65)	**8** **(0.31)**	–	18 (0.71)	8.8 (0.35)	2 (0.08)
	1FK7015-5	180 (7.09)	114 (4.49)	143 (5.63)	180 (7.09)	114 (4.49)	143 (5.63)					
28	1FK7022-5	178 (7.01)	95 (3.74)	128 (5.04)	200 (7.87)	95 (3.74)	150 (5.91)	**9** **(0.35)**	M3	20 (0.79)	10.2 (0.40)	3 (0.12)
36	1FK7032-5	175 (6.89)	90 (3.54)	125 (4.92)	200 (7.87)	90 (3.54)	149 (5.87)	**14** **(0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
	1FK7034-5	200 (7.87)	115 (4.53)	150 (5.91)	225 (8.86)	115 (4.53)	174 (6.85)					
48	1FK7040-5	155 (6.10)	73 (2.87)	106 (4.17)	184 (7.24)	73 (2.87)	135 (5.31)	**19** **(0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
	1FK7042-5	182 (7.17)	101 (3.98)	134 (5.28)	211 (8.31)	101 (3.98)	163 (6.42)					
63	1FK7060-5	180 (7.09)	94 (3.70)	126 (4.96)	223 (8.78)	94 (3.70)	169 (6.65)	**24** **(0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FK7063-5	225 (8.86)	139 (5.47)	171 (6.73)	268 (10.55)	139 (5.47)	214 (8.43)					

1FK701.-5
1FK702.-5
1FK703.-5
1FK704.-5
1FK706.-5

Shaft design with fitted key







7

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1FK7 Compact motors without/with DRIVE-CLiQ
Natural cooling

Dimensional drawings

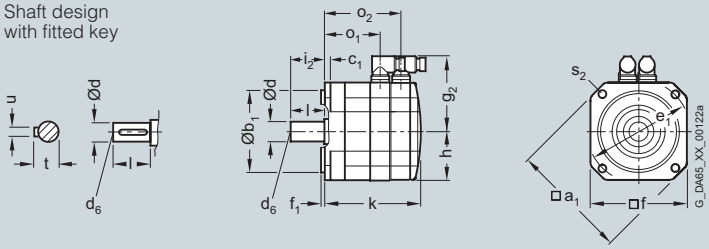
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	s_2 S	Encoder system: Resolver without brake k LB	o_1 –	o_2 –	with brake k LB	o_1 –	o_2 –
1FK7 Compact, type of construction IM B5, natural cooling, with connector, without/with brake																		
80	1FK7080-5		186 (7.32)	130 (5.12)	13 (0.51)	165 (6.50)	155 (6.10)	3.5 (0.14)	119.5 (4.70)	77.5 (3.05)	58 (2.28)	11 (0.43)	156 (6.14)	91 (3.58)	124 (4.88)	184 (7.24)	91 (3.58)	151 (5.94)
	1FK7083-5												194 (7.64)	129 (5.08)	162 (6.38)	245 (9.65)	129 (5.08)	207 (8.15)
100	1FK7100-5		240 (9.45)	180 (7.09)	13 (0.51)	215 (8.46)	192 (7.56)	4 (0.16)	138 (5.43)	96 (3.78)	80 (3.15)	14 (0.55)	185 (7.28)	113 (4.45)	153 (6.02)	204 (8.03)	113 (4.45)	172 (6.77)
	1FK7101-5												211 (8.31)	139 (5.47)	179 (7.05)	240 (9.45)	139 (5.47)	208 (8.19)
	1FK7103-5												237 (9.33)	165 (6.50)	205 (8.07)	266 (10.47)	165 (6.50)	234 (9.21)
	1FK7105-5												289 (11.38)	217 (8.54)	257 (10.12)	318 (12.52)	217 (8.54)	286 (11.26)

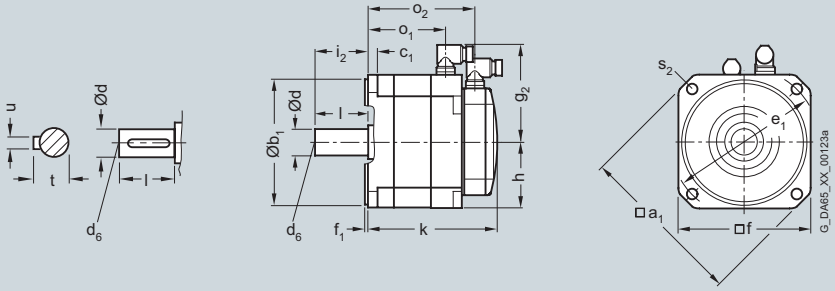
Shaft height	Type	Encoder system: Incremental encoder / Absolute encoder sin/cos 1 V_{pp} / 22 bit (2048 S/R) / EnDat 2048 S/R / 22 bit (2048 S/R) / EnDat 32 S/R / 16 bit (32 S/R) without brake k LB	o_1 –	o_2 –	with brake k LB	o_1 –	o_2 –	DE shaft extension **d** **D**	d_6 –	l E	t GA	u F
80	1FK7080-5	179 (7.05)	91 (3.58)	124 (4.88)	206 (8.11)	91 (3.58)	151 (5.94)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FK7083-5	217 (8.54)	129 (5.08)	162 (6.38)	268 (10.55)	153 (6.02)	213 (8.39)					
100	1FK7100-5	208 (8.19)	113 (4.45)	153 (6.02)	227 (8.94)	113 (4.45)	172 (6.77)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1FK7101-5	234 (9.21)	139 (5.47)	179 (7.05)	263 (10.35)	139 (5.47)	208 (8.19)					
	1FK7103-5	260 (10.24)	165 (6.50)	205 (8.07)	289 (11.38)	165 (6.50)	234 (9.21)					
	1FK7105-5	312 (12.28)	217 (8.54)	257 (10.12)	341 (13.43)	217 (8.54)	286 (11.26)					

1FK708.-5

Shaft design with fitted key



1FK7100-5
1FK7101-5
1FK7103-5
1FK7105-5



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Dimensional drawings

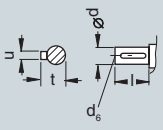
For motor — Dimensions in mm (inches)

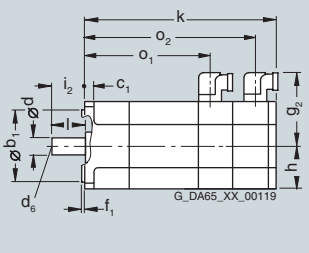
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_2 –	h H	i_2 –	s_2 S	Encoder system: Resolver / Absolute encoder without/with brake: k LB	o_1 –	Encoder system: EnDat 16 S/R / 15 bit (16 S/R) without/with brake: o_2 –
1FK7 High Dynamic, type of construction IM B5, natural cooling, with connector, without/with brake															
36	1FK7033-7		92 (3.62)	60 (2.36)	8 (0.31)	75 (2.95)	72 (2.83)	3 (0.12)	78 (3.07)	36 (1.42)	30 (1.18)	6.5 (0.26)	170/195 (6.69/7.68)	108/108 (4.25/4.25)	145/170 (5.71/6.69)
48	1FK7043-7		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	90 (3.54)	48 (1.89)	40 (1.57)	7 (0.28)	191/220 (7.52/8.66)	130/130 (5.12/5.12)	163/192 (6.42/7.56)
	1FK7044-7												216/245 (8.51/9.65)	155/155 (6.10/6.10)	188/217 (7.40/8.54)
63	1FK7061-7		155 (6.10)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	105 (4.13)	63 (2.48)	50 (1.97)	9 (0.35)	185/228 (7.28/8.98)	121/121 (4.76/4.76)	153/196 (6.02/7.72)
	1FK7064-7												249/292 (9.80/11.50)	185/185 (7.28/7.28)	217/260 (8.54/10.24)
80	1FK7085-7		186 (7.32)	130 (5.12)	13 (0.51)	165 (6.50)	155 (6.10)	3.5 (0.14)	141.5 (5.57)	77.5 (3.05)	58 (2.28)	11 (0.43)	261/303 (10.28/11.93)	192/192 (7.56/7.56)	229/272 (9.02/10.71)
	1FK7086-7								140.5 (5.53)						

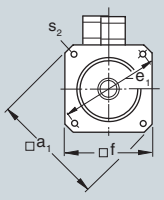
Shaft height	Type	DIN IEC	Encoder system: Incremental encoder / Absolute encoder (sin/cos 1 V_{pp} / 22 bit (2048 S/R), EnDat 2048 S/R / 22 bit (2048 S/R), EnDat 512 S/R / 20 bit (512 S/R), EnDat 32 S/R / 16 bit (32 S/R)) without/with brake: k LB	o_1 –	o_2 –	DE shaft extension: **d D**	d_6 –	l E	t GA	u F
36	1FK7033-7		194/219 (7.64/8.62)	109/109 (4.29/4.29)	144/168 (5.67/6.61)	**14 (0.55)**	M5	30 (1.18)	16 (0.63)	5 (0.20)
48	1FK7043-7		212/241 (8.35/9.49)	130/130 (5.12/5.12)	163/192 (6.42/7.56)	**19 (0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
	1FK7044-7		237/266 (9.33/10.47)	155/155 (6.10/6.10)	188/217 (7.40/8.54)					
63	1FK7061-7		208/251 (8.19/9.88)	121/121 (4.76/4.76)	154/197 (6.06/7.76)	**24 (0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FK7064-7		272/315 (10.71/12.40)	185/185 (7.28/7.28)	218/261 (8.58/10.28)					
80	1FK7085-7		283/326 (11.14/12.83)	192/192 (7.56/7.56)	229/272 (9.02/10.71)	**32 (1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.39)
	1FK7086-7									

1FK703.-7
1FK704.-7
1FK706.-7
1FK708.-7

Shaft design
with fitted key







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1FK7 High Inertia motors without/with DRVE-CLiQ
Natural cooling

Dimensional drawings

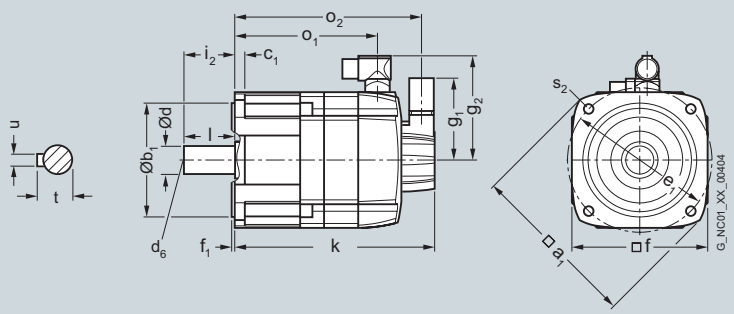
For motor — Dimensions in mm (inches)

Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	g_1 –	g_2 –	i_2 –	s_2 S	Encoder system: Incremental encoder Absolute encoder — without brake: k LB	o_1 –	o_2 –	with brake: k LB	o_1 –	o_2 –
1FK7 High Inertia, natural cooling, with connector, without/with brake																		
48	1FK7042-3B		120 (4.72)	80 (3.15)	10 (0.39)	100 (3.94)	96 (3.78)	3 (0.12)	94 (3.7)	90 (3.54)	40 (1.57)	6.5 (0.26)	192 (7.56)	125 (4.92)	177 (6.97)	224 (8.82)	157 (6.18)	209 (8.23)
63	1FK7060-3B		155 (6.1)	110 (4.33)	10 (0.39)	130 (5.12)	126 (4.96)	3.5 (0.14)	102 (4.02)	104 (4.09)	50 (1.97)	9 (0.35)	187 (7.36)	120 (4.72)	172 (6.77)	222 (8.74)	155 (6.1)	207 (8.15)
	1FK7062-3B												221 (8.7)	153 (6.02)	205 (8.07)	256 (10.08)	189 (7.44)	241 (9.49)
80	1FK7081-3B		194 (7.64)	130 (5.12)	11.5 (0.45)	165 (6.5)	155 (6.1)	3.5 (0.14)	94 (3.7)	119 (4.69)	58 (2.28)	11 (0.43)	216 (8.5)	151 (5.94)	201 (7.91)	269 (10.59)	203 (7.99)	253 (9.96)
	1FK7084-3B												275 (10.8)	209 (8.23)	259 (10.2)	327 (12.87)	262 (10.3)	312 (12.28)

DE shaft extension

Shaft height	Type	**d** **D**	d_6 –	l E	t GA	u F
48	1FK7042-3B	**19** **(0.75)**	M6	40 (1.57)	21.5 (0.85)	6 (0.24)
63	1FK7060-3B	**24** **(0.94)**	M8	50 (1.97)	27 (1.06)	8 (0.31)
	1FK7062-3B					
80	1FK7081-3B	**32** **(1.26)**	M12	58 (2.28)	35 (1.38)	10 (0.38)
	1FK7084-3B					

1FK7042-3B
1FK706.-3B
1FK708.-3B

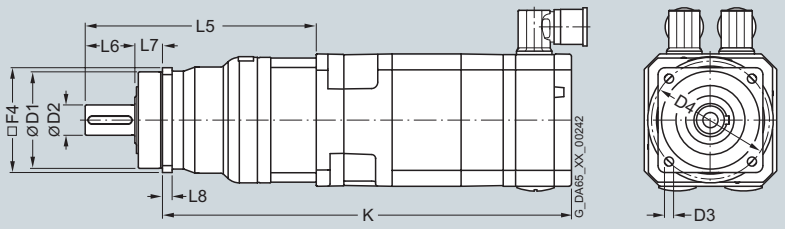


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Dimensional drawings

For motors				Dimensions in mm (inches)								Encoder system: Resolver		Increm. encoder Absolute encoder	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FT6 with SP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
28	1FT6021	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	138 (5.43)	28 (1.10)	20 (0.79)	6 (0.24)	283 (11.14)	308 (12.13)	283 (11.14)	308 (12.13)
	1FT6024											323 (12.72)	348 (13.70)	323 (12.72)	348 (13.70)
36	1FT6031	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	142 (5.59)	28 (1.10)	20 (0.79)	6 (0.24)	274 (10.79)	294 (11.57)	314 (12.36)	334 (13.15)
	1FT6034											314 (12.36)	334 (13.15)	354 (13.94)	374 (14.72)
	1FT6034	76 (2.99)	SP075S-MF1	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	164 (6.46)	36 (1.42)	20 (0.79)	7 (0.28)	328 (12.91)	348 (13.70)	368 (14.49)	388 (15.28)
48	1FT6041	76 (2.99)	SP075S-MF1	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	168 (6.61)	36 (1.42)	20 (0.79)	7 (0.28)	297 (11.69)	332 (13.07)	340 (13.39)	375 (14.76)
	1FT6044											347 (13.66)	382 (15.04)	390 (15.35)	425 (16.73)
63	1FT6061	101 (3.98)	SP100S-MF1	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	217 (8.54)	58 (2.28)	30 (1.18)	10 (0.39)	327 (12.87)	357 (14.06)	357 (14.06)	387 (15.24)
	1FT6062											352 (13.86)	382 (15.04)	382 (15.04)	412 (16.22)
	1FT6064											402 (15.83)	432 (17.01)	432 (17.01)	462 (18.19)
80	1FT6081	141 (5.55)	SP140S-MF1	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	283 (11.14)	82 (3.23)	30 (1.18)	12 (0.47)	392 (15.43)	419 (16.50)	392 (15.43)	419 (16.50)
	1FT6082											417 (16.42)	444 (17.48)	417 (16.42)	444 (17.48)
	1FT6084											467 (18.39)	513 (20.20)	467 (18.39)	513 (20.20)
	1FT6086											517 (20.35)	563 (22.17)	517 (20.35)	563 (22.17)
	1FT6086	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	544 (21.42)	590 (23.23)	544 (21.42)	590 (23.23)

1FT602
1FT603
1FT604
1FT606
1FT608



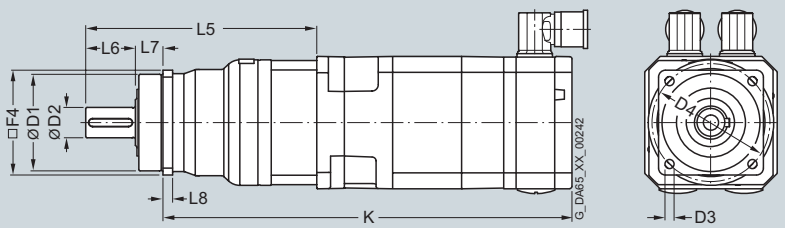
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1FT6 motors without/with DRIVE-CLiQ with SP+ planetary gearbox, single-stage

Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver		Increm. encoder Absolute encoder	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FT6 with SP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
100	1FT6102	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	493 (19.41)	539 (21.22)	493 (19.41)	539 (21.22)
	1FT6105											568 (22.36)	614 (24.17)	568 (22.36)	614 (24.17)
	1FT6105	215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	612 (24.09)	658 (25.91)	612 (24.09)	658 (25.91)
	1FT6108	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	668 (26.30)	714 (28.11)	668 (26.30)	714 (28.11)
		215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	712 (28.03)	758 (29.84)	712 (28.03)	758 (29.84)
132	1FT6132	215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	665 (26.18)	715 (28.15)	665 (26.18)	715 (28.15)
	1FT6134											715 (28.15)	765 (30.12)	715 (28.15)	765 (30.12)
	1FT6134	242 (9.53)	SP240S-MF1	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	443 (17.44)	130 (5.12)	40 (1.57)	20 (0.79)	746 (29.37)	796 (31.34)	746 (29.37)	796 (31.34)
	1FT6136	215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	765 (30.12)	815 (32.09)	765 (30.12)	815 (32.09)
		242 (9.53)	SP240S-MF1	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	443 (17.44)	130 (5.12)	40 (1.57)	20 (0.79)	796 (31.34)	846 (33.31)	796 (31.34)	846 (33.31)

1FT610
1FT613

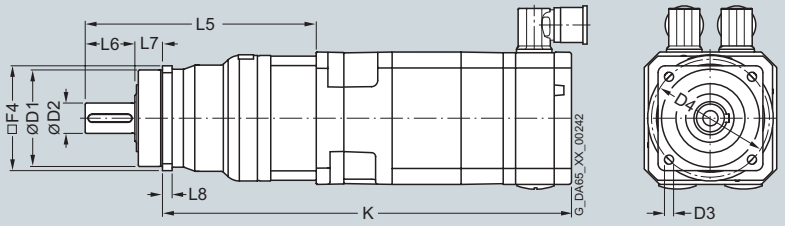


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Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver		Increm. encoder Absolute encoder	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FT6 with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
28	1FT6021	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	156 (6.14)	28 (1.10)	20 (0.79)	6 (0.24)	301 (11.85)	326 (12.83)	301 (11.85)	326 (12.83)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	175 (6.89)	36 (1.42)	20 (0.79)	7 (0.28)	312 (12.28)	337 (13.27)	312 (12.28)	337 (13.27)
	1FT6024	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	156 (6.14)	28 (1.10)	20 (0.79)	6 (0.24)	341 (13.43)	366 (14.41)	341 (13.43)	366 (14.41)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	175 (6.89)	36 (1.42)	20 (0.79)	7 (0.28)	352 (13.86)	377 (14.84)	352 (13.86)	377 (14.84)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	375 (14.76)	400 (15.75)	375 (14.76)	400 (15.75)
36	1FT6031	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	164 (6.46)	28 (1.10)	20 (0.79)	6 (0.24)	296 (11.65)	316 (12.44)	336 (13.23)	356 (14.02)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179 (7.05)	36 (1.42)	20 (0.79)	7 (0.28)	303 (11.93)	323 (12.72)	343 (13.50)	363 (14.29)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	322 (12.68)	342 (13.46)	362 (14.25)	382 (15.04)
	1FT6034	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179 (7.05)	36 (1.42)	20 (0.79)	7 (0.28)	343 (13.50)	363 (14.29)	383 (15.08)	403 (15.87)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	362 (14.25)	382 (15.04)	402 (15.83)	422 (16.61)
		141 (5.56)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	406 (15.98)	426 (16.77)	446 (17.56)	466 (18.35)
48	1FT6041	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	192 (7.56)	36 (1.42)	20 (0.79)	7 (0.28)	321 (12.64)	356 (14.02)	364 (14.33)	399 (15.71)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	331 (13.03)	366 (14.41)	374 (14.72)	409 (16.10)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	371 (14.61)	406 (15.98)	414 (16.30)	449 (17.68)
	1FT6044	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	381 (15.00)	416 (16.38)	424 (16.69)	459 (18.07)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	421 (16.57)	456 (17.95)	464 (18.27)	499 (19.65)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	469 (18.46)	504 (19.84)	512 (20.16)	547 (21.54)

1FT602
1FT603
1FT604



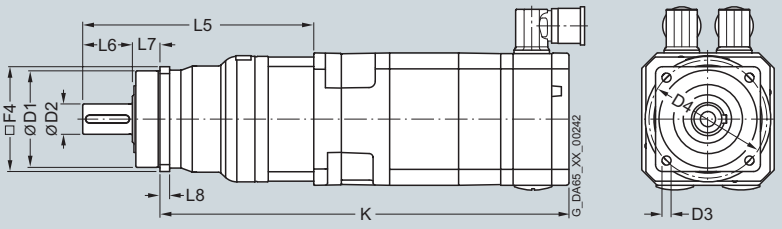
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1FT6 motors without/with DRIVE-CLiQ with SP+ planetary gearbox, two-stage

Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver		Increm. encoder Absolute encoder	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FT6 with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
63	1FT6061	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	362 (14.25)	392 (15.43)	392 (15.43)	422 (16.61)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	391 (15.39)	421 (16.57)	421 (16.57)	451 (17.76)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	432 (17.01)	462 (18.19)	462 (18.19)	492 (19.37)
	1FT6062	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	387 (15.24)	417 (16.42)	417 (16.42)	447 (17.60)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	416 (16.38)	446 (17.56)	446 (17.56)	476 (18.74)
	1FT6064	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	437 (17.20)	467 (18.39)	467 (18.39)	497 (19.57)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	466 (18.35)	496 (19.53)	496 (19.53)	526 (20.71)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	507 (19.96)	537 (21.14)	537 (21.14)	567 (22.32)
80	1FT6081	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	332 (13.07)	82 (3.23)	30 (1.18)	12 (0.47)	441 (17.36)	468 (18.43)	441 (17.36)	468 (18.43)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	464 (18.27)	491 (19.33)	464 (18.27)	491 (19.33)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	493 (19.41)	520 (20.47)	493 (19.41)	520 (20.47)
	1FT6082	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	332 (13.07)	82 (3.23)	30 (1.18)	12 (0.47)	466 (18.35)	493 (19.41)	466 (18.35)	493 (19.41)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	489 (19.25)	516 (20.31)	489 (19.25)	516 (20.31)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	518 (20.39)	545 (21.46)	518 (20.39)	545 (21.46)
	1FT6084	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	332 (13.07)	82 (3.23)	30 (1.18)	12 (0.47)	516 (20.31)	562 (22.13)	516 (20.31)	562 (22.13)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	539 (21.22)	585 (23.03)	539 (21.22)	585 (23.03)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	594 (23.39)	640 (25.20)	594 (23.39)	640 (25.20)
	1FT6086	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	589 (23.19)	635 (25.00)	589 (23.19)	635 (25.00)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.55)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	644 (25.35)	690 (27.17)	644 (25.35)	690 (27.17)

1FT606
1FT608

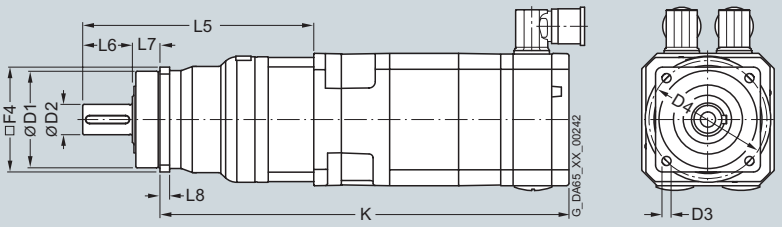


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Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver		Increm. encoder Absolute encoder	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FT6 with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
100	1FT6102	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	538 (21.18)	584 (22.99)	538 (21.18)	584 (22.99)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.17)	40 (1.57)	20 (0.79)	593 (23.35)	639 (25.16)	593 (23.35)	639 (25.16)
	1FT6105	215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	642 (25.28)	688 (27.09)	642 (25.28)	688 (27.09)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	668 (26.30)	714 (28.11)	668 (26.30)	714 (28.11)
	1FT6108	245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	768 (30.24)	814 (32.05)	768 (30.24)	814 (32.05)
132	1FT6132	245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	721 (28.39)	771 (30.35)	721 (28.39)	771 (30.35)
	1FT6134											771 (30.35)	821 (32.32)	771 (30.35)	821 (32.32)
	1FT6136											821 (32.32)	871 (34.29)	821 (32.32)	871 (34.29)

1FT610
1FT613



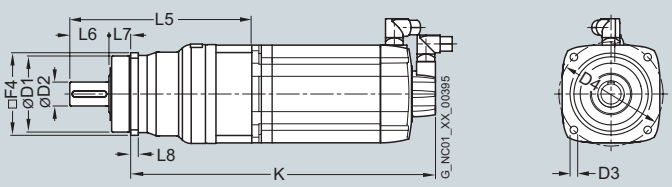
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1FT7 Compact motors without/with DRIVE-CLiQ with SP+ planetary gearbox, single-stage

Dimensional drawings

For motors				Dimensions in mm (inches)								Encoder system: Incremental encoder Absolute encoder	
			Planetary gearbox									without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K
1FT7 with SP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake													
36	1FT7034	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	142 (5.59)	28 (1.10)	20 (0.79)	6 (0.24)	347 (13.66)	374 (14.72)
	1FT7034	76 (2.99)	SP075S-MF1	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	163.8 (6.45)	36 (1.42)	20 (0.79)	7 (0.28)	361 (14.21)	388 (15.28)
	1FT7036											297 (11.69)	324 (12.76)
48	1FT7042							167.5 (6.59)				275 (10.83)	307 (12.09)
	1FT7044											325 (12.80)	357 (14.06)
	1FT7046											365 (14.37)	397 (15.63)
	1FT7046	101 (3.98)	SP100S-MF1	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	210 (8.27)	58 (2.28)	30 (1.18)	10 (0.39)	375 (14.76)	407 (16.02)
63	1FT7062							217 (8.54)				296 (11.65)	331 (13.03)
	1FT7064											327 (12.87)	362 (14.25)
	1FT7066											359 (14.13)	394 (15.51)
	1FT7068											406 (15.98)	441 (17.36)
	1FT7068	141 (5.55)	SP140S-MF1	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	274.3 (10.80)	82 (3.23)	30 (1.18)	12 (0.47)	439 (17.28)	474 (18.66)
80	1FT7082							283.3 (11.15)				361 (14.21)	413 (16.26)
	1FT7084											412 (16.22)	464 (18.27)
	1FT7086											464 (18.27)	516 (20.31)
	1FT7086	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	491 (19.33)	543 (21.38)
100	1FT7102											412 (16.22)	464 (18.27)
	1FT7105											498 (19.61)	550 (21.65)
	1FT7108											568 (22.36)	620 (24.41)
	1FT7105	215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	542 (21.34)	594 (23.39)
	1FT7108											612 (24.09)	664 (26.14)

1FT703
1FT704
1FT706
1FT708
1FT710

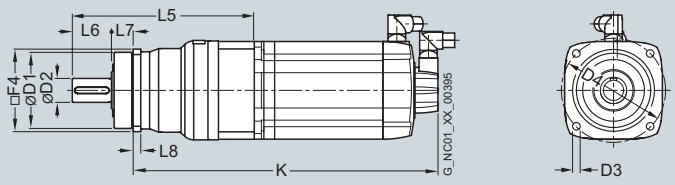


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Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Incremental encoder Absolute encoder	
			Planetary gearbox									without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K
1FT7 with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake													
36	1FT7034	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179.4 (7.06)	36 (1.42)	20 (0.79)	7 (0.28)	376 (14.80)	403 (15.87)
	1FT7036											312 (12.28)	339 (13.35)
48	1FT7042							192 (7.56)				331 (13.03)	331 (13.03)
36	1FT7034	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230.3 (9.07)	58 (2.28)	30 (1.18)	10 (0.39)	395 (15.55)	422 (16.61)
	1FT7036											331 (13.03)	358 (14.09)
48	1FT7042							234 (9.21)				341 (13.43)	341 (13.43)
	1FT7044											359 (14.13)	391 (15.39)
	1FT7046											431 (16.97)	431 (16.97)
	1FT7044	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.58)	11 (0.43)	165 (6.50)	298.3 (11.74)	82 (3.23)	30 (1.18)	12 (0.47)	399 (15.71)	431 (16.97)
	1FT7046											471 (18.54)	471 (18.54)

1FT703
1FT704



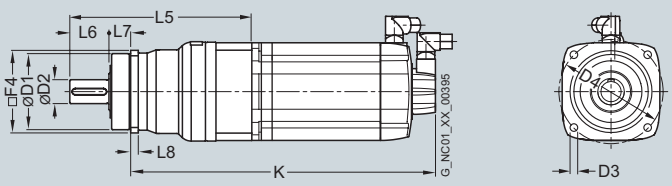
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1FT7 Compact motors without/with DRIVE-CLiQ with SP+ planetary gearbox, two-stage

Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Incremental encoder Absolute encoder	
			Planetary gearbox									without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K
1FT7 with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake													
63	1FT7062	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	331 (13.03)	366 (14.41)
	1FT7064											362 (14.25)	397 (15.63)
	1FT7062	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	360 (14.17)	395 (15.55)
	1FT7064											391 (15.39)	426 (16.77)
	1FT7066											458 (18.03)	458 (18.03)
	1FT7068											505 (19.88)	505 (19.88)
80	1FT7082							332 (13.07)				410 (16.14)	462 (18.19)
	1FT7084											461 (18.15)	513 (20.20)
63	1FT7064	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	432 (17.01)	467 (18.39)
	1FT7066											499 (19.65)	499 (19.65)
	1FT7068											546 (21.50)	546 (21.50)
80	1FT7082							355 (13.98)				433 (17.05)	485 (19.09)
	1FT7084											536 (21.10)	536 (21.10)
	1FT7086											536 (21.10)	588 (23.15)
100	1FT7102											457 (17.99)	509 (20.04)
80	1FT7084	215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	565 (22.24)	565 (22.24)
	1FT7086											617 (24.29)	617 (24.29)
100	1FT7102											538 (21.18)	538 (21.18)
	1FT7105											572 (22.52)	624 (24.57)
	1FT7108											694 (27.32)	694 (27.32)
80	1FT7086	245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	643 (25.31)	643 (25.31)
100	1FT7102											512 (20.16)	564 (22.20)
	1FT7105											598 (23.54)	650 (25.59)
	1FT7108											668 (26.30)	720 (28.35)

1FT706
1FT708
1FT710

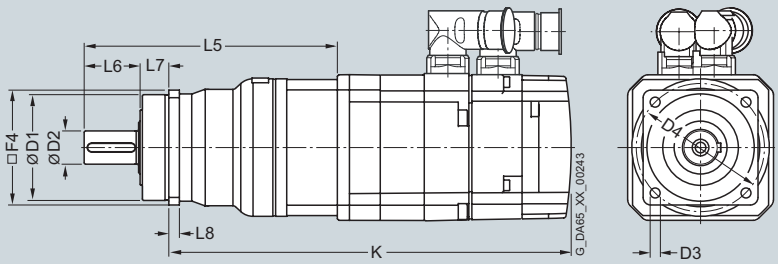


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Dimensional drawings

For motor				Dimensions in mm (inches)											
												Encoder system: Resolver Absolute encoder EnDat 16 S/R / 15 bit (16 S/R)		Incremental encoder Absolute encoder	sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FK7 Compact with SP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
28	1FK7022-5	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	137 (5.39)	28 (1.10)	20 (0.79)	6 (0.24)	242 (9.53)	264 (10.39)	267 (10.51)	289 (11.38)
36	1FK7032-5	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	142 (5.59)	28 (1.10)	20 (0.79)	6 (0.24)	244 (9.61)	269 (10.59)	269 (10.59)	294 (11.57)
	1FK7034-5											269 (10.59)	294 (11.57)	294 (11.57)	319 (12.56)
48	1FK7040-5	76 (2.99)	SP075S-MF1	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	168 (6.61)	36 (1.42)	20 (0.79)	7 (0.28)	246 (9.69)	275 (10.83)	267 (10.51)	296 (11.65)
	1FK7042-5											274 (10.79)	303 (11.93)	294 (11.57)	323 (12.72)
63	1FK7060-5	101 (3.98)	SP100S-MF1	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	217 (8.54)	58 (2.28)	30 (1.18)	10 (0.39)	286 (11.26)	329 (12.95)	309 (12.17)	352 (13.86)
	1FK7063-5											331 (13.03)	374 (14.72)	354 (13.94)	397 (15.63)
80	1FK7080-5	141 (5.55)	SP140S-MF1	130 (5.12)	40 (1.58)	11 (0.43)	165 (6.50)	283 (11.14)	82 (3.23)	30 (1.18)	12 (0.47)	327 (12.87)	355 (13.98)	350 (13.78)	377 (14.84)
	1FK7083-5											365 (14.37)	416 (16.38)	388 (15.28)	439 (17.28)
100	1FK7100-5	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.47)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	383 (15.08)	402 (15.83)	406 (15.98)	425 (16.73)
	1FK7101-5											409 (16.10)	438 (17.24)	432 (17.01)	461 (18.15)
	1FK7103-5											435 (17.13)	464 (18.27)	458 (18.03)	487 (19.17)
	1FK7105-5	182 (7.17)	SP180S-MF1	160 (6.30)	55 (2.17)	13.5 (0.55)	215 (8.47)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	487 (19.17)	516 (20.31)	510 (20.08)	539 (21.22)
	1FK7105-5	215 (8.46)	SP210S-MF1	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	385 (15.16)	105 (4.13)	38 (1.50)	17 (0.67)	531 (20.91)	560 (22.05)	554 (21.81)	583 (22.95)

1FK702.-5
1FK703.-5
1FK704.-5
1FK706.-5
1FK708.-5
1FK710.-5



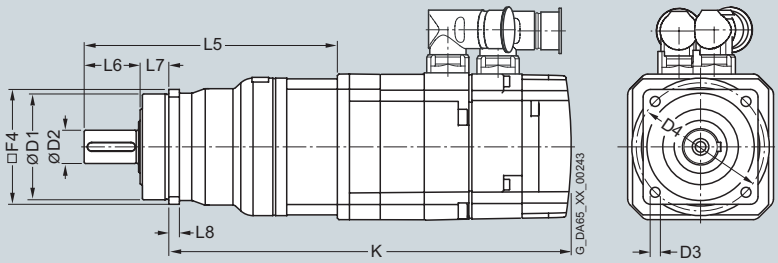
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1FK7 High Dynamic motors without/with DRIVE-CLiQ with SP+ planetary gearbox, single-stage

Dimensional drawings

For motor				Dimensions in mm (inches)											
												Encoder system: Resolver Absolute encoder EnDat 16 S/R / 15 bit (16 S/R)		Incremental encoder Absolute encoder	sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FK7 High Dynamic with SP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
36	1FK7033-7	62 (2.44)	SP060S-MF1	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	142 (5.59)	28 (1.10)	20 (0.79)	6 (0.24)	263 (10.35)	288 (11.34)	288 (11.34)	313 (12.32)
48	1FK7043-7	76 (2.99)	SP075S-MF1	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	168 (6.61)	36 (1.42)	20 (0.79)	7 (0.28)	303 (11.93)	332 (13.07)	324 (12.76)	353 (13.90)
	1FK7044-7											328 (12.91)	357 (14.06)	349 (13.74)	378 (14.88)
63	1FK7061-7	101 (3.98)	SP100S-MF1	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	217 (8.54)	58 (2.28)	30 (1.18)	10 (0.39)	314 (12.36)	357 (14.06)	337 (13.27)	380 (14.96)
	1FK7064-7											378 (14.88)	421 (16.57)	401 (15.79)	444 (17.48)
80	1FK7085-7 1FK7086-7	141 (5.55)	SP140S-MF1	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	283 (11.14)	82 (3.23)	30 (1.18)	12 (0.47)	432 (17.01)	474 (18.66)	454 (17.87)	497 (19.57)

1FK703.-7
1FK704.-7
1FK706.-7
1FK708.-7

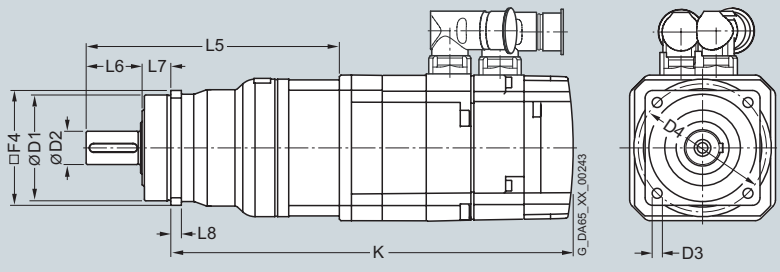


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Dimensional drawings

For motor				Dimensions in mm (inches)											
												Encoder system: Resolver Absolute encoder EnDat 16 S/R / 15 bit (16 S/R)		Incremental encoder Absolute encoder	sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FK7 Compact with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
28	1FK7022-5	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	156 (6.14)	28 (1.10)	20 (0.79)	6 (0.24)	261 (10.28)	283 (11.14)	286 (11.26)	308 (12.13)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	175 (6.89)	36 (1.42)	20 (0.79)	7 (0.28)	272 (10.71)	294 (11.57)	297 (11.69)	319 (12.56)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	295 (11.61)	317 (12.48)	320 (12.60)	342 (13.46)
36	1FK7032-5	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	164 (6.46)	28 (1.10)	20 (0.79)	6 (0.24)	266 (10.47)	291 (11.46)	291 (11.46)	316 (12.44)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179 (7.05)	36 (1.42)	20 (0.79)	7 (0.28)	273 (10.75)	298 (11.73)	298 (11.73)	323 (12.72)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	292 (11.50)	317 (12.48)	317 (12.48)	342 (13.46)
	1FK7034-5	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179 (7.05)	36 (1.42)	20 (0.79)	7 (0.28)	298 (11.73)	323 (12.72)	323 (12.72)	348 (13.70)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	317 (12.48)	342 (13.46)	342 (13.46)	367 (14.45)
48	1FK7040-5	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	192 (7.56)	36 (1.42)	20 (0.79)	7 (0.28)	270 (10.63)	299 (11.77)	291 (11.46)	320 (12.60)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	280 (11.02)	309 (12.17)	301 (11.85)	330 (12.99)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	320 (12.60)	349 (13.74)	341 (13.43)	370 (14.57)
	1FK7042-5	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	192 (7.56)	36 (1.42)	20 (0.79)	7 (0.28)	298 (11.73)	327 (12.87)	298 (11.73)	347 (13.66)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	308 (12.13)	337 (13.27)	308 (12.13)	357 (14.06)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	348 (13.71)	377 (14.84)	368 (14.49)	397 (15.63)
63	1FK7060-5	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	321 (12.64)	364 (14.33)	344 (13.54)	387 (15.24)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	350 (13.78)	393 (15.47)	373 (14.69)	416 (16.38)
	1FK7063-5	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	395 (15.55)	438 (17.24)	418 (16.46)	461 (18.15)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	436 (17.17)	479 (18.86)	459 (18.07)	502 (19.76)

1FK702.-5
1FK703.-5
1FK704.-5
1FK706.-5



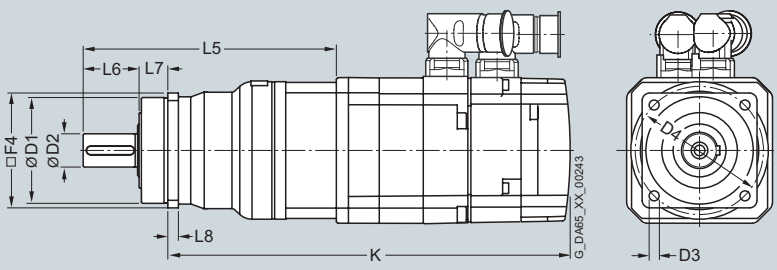
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1FK7 Compact motors without/with DRIVE-CLiQ with SP+ planetary gearbox, two-stage

Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver		Incremental encoder sin/cos 1 V_{pp} / 22 bit (2048 S/R) Absolute encoder EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 32 S/R / 16 bit (32 S/R)	
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FK7 Compact with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
80	1FK7080-5	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	332 (13.07)	82 (3.23)	30 (1.18)	12 (0.47)	376 (14.80)	404 (15.91)	399 (15.71)	426 (16.77)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	399 (15.71)	427 (16.81)	422 (16.61)	449 (17.68)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	428 (16.85)	456 (17.95)	451 (17.76)	478 (18.82)
	1FK7083-5	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	332 (13.07)	82 (3.23)	30 (1.18)	12 (0.47)	414 (16.30)	465 (18.31)	437 (17.20)	488 (19.21)
		182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	437 (17.20)	488 (19.21)	460 (18.11)	511 (20.12)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	466 (18.35)	517 (20.35)	489 (19.25)	540 (21.26)
100	1FK7100-5	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	383 (15.08)	402 (15.83)	406 (15.98)	425 (16.73)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	457 (17.99)	476 (18.74)	480 (18.90)	499 (19.65)
	1FK7101-5	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	409 (16.10)	438 (17.24)	432 (17.01)	461 (18.15)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	483 (19.02)	512 (20.16)	506 (19.92)	535 (21.06)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	509 (20.04)	538 (21.18)	531 (20.91)	561 (22.09)
	1FK7103-5	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	310 (12.20)	82 (3.23)	30 (1.18)	15 (0.59)	435 (17.13)	464 (18.27)	458 (18.03)	487 (19.19)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	509 (20.04)	538 (21.18)	532 (20.94)	561 (22.09)
		245 (9.56)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	535 (21.06)	564 (22.20)	557 (21.93)	587 (23.11)
	1FK7105-5	215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	561 (22.09)	590 (23.23)	584 (22.99)	613 (24.13)
		245 (9.65)	SP240S-MF2	200 (7.87)	85 (3.35)	17 (0.67)	290 (11.42)	467.5 (18.41)	130 (5.12)	40 (1.57)	20 (0.79)	587 (23.11)	616 (24.25)	610 (24.02)	639 (25.16)

1FK708.-5
1FK710.-5

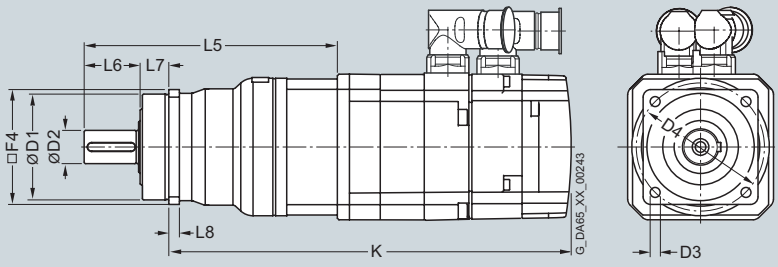


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Dimensional drawings

For motor				Dimensions in mm (inches)								Encoder system: Resolver Absolute encoder EnDat 16 S/R / 15 bit (16 S/R)		Incremental encoder Absolute encoder	sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)
			Planetary gearbox									without brake	with brake	without brake	with brake
Shaft height	Type	F4	Type	D1	D2	D3	D4	L5	L6	L7	L8	K	K	K	K
1FK7 High Dynamic with SP+ planetary gearbox, two-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
36	1FK7033-7	62 (2.44)	SP060S-MF2	60 (2.36)	16 (0.63)	5.5 (0.22)	68 (2.68)	164 (6.46)	28 (1.10)	20 (0.79)	6 (0.24)	285 (11.22)	310 (12.20)	310 (12.20)	335 (13.19)
		76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	179 (7.05)	36 (1.42)	20 (0.79)	7 (0.28)	292 (11.50)	317 (12.48)	317 (12.48)	342 (13.46)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	230 (9.06)	58 (2.28)	30 (1.18)	10 (0.39)	311 (12.24)	336 (13.23)	336 (13.23)	361 (14.21)
48	1FK7043-7	76 (2.99)	SP075S-MF2	70 (2.76)	22 (0.87)	6.6 (0.26)	85 (3.35)	192 (7.56)	36 (1.42)	20 (0.79)	7 (0.28)	327 (12.87)	356 (14.02)	348 (13.70)	377 (14.84)
		101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	337 (13.27)	366 (14.41)	358 (14.09)	387 (15.24)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.74)	82 (3.23)	30 (1.18)	12 (0.47)	377 (14.84)	406 (15.98)	398 (15.67)	427 (16.81)
	1FK7044-7	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	234 (9.21)	58 (2.28)	30 (1.18)	10 (0.39)	362 (14.25)	391 (15.39)	383 (15.08)	412 (16.22)
		141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	298 (11.73)	82 (3.23)	30 (1.18)	12 (0.47)	402 (15.83)	431 (16.97)	432 (17.01)	452 (17.80)
63	1FK7061-7	101 (3.98)	SP100S-MF2	90 (3.54)	32 (1.26)	9 (0.35)	120 (4.72)	252 (9.92)	58 (2.28)	30 (1.18)	10 (0.39)	349 (13.74)	392 (15.43)	372 (14.65)	415 (16.34)
	1FK7061-7	141 (5.55)	SP140S-MF2	130 (5.12)	40 (1.57)	11 (0.43)	165 (6.50)	305 (12.01)	82 (3.23)	30 (1.18)	12 (0.47)	378 (14.88)	421 (16.57)	401 (15.79)	444 (17.48)
	1FK7064-7											442 (17.40)	485 (19.09)	465 (18.31)	508 (20.00)
	1FK7064-7	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	14 (0.55)	215 (8.46)	346 (13.62)	82 (3.23)	30 (1.18)	15 (0.59)	483 (19.02)	526 (20.71)	506 (19.92)	549 (21.61)
80	1FK7085-7	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	504 (19.84)	546 (21.50)	526 (20.71)	569 (22.40)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	533 (20.98)	575 (22.64)	555 (21.85)	598 (23.54)
	1FK7086-7	182 (7.17)	SP180S-MF2	160 (6.30)	55 (2.17)	13.5 (0.53)	215 (8.46)	355 (13.98)	82 (3.23)	30 (1.18)	15 (0.59)	504 (19.84)	546 (21.50)	526 (20.71)	569 (22.40)
		215 (8.46)	SP210S-MF2	180 (7.09)	75 (2.95)	17 (0.67)	250 (9.84)	415 (16.34)	105 (4.13)	38 (1.50)	17 (0.67)	533 (20.98)	575 (22.64)	555 (21.85)	598 (23.54)

1FK703.-7
1FK704.-7
1FK706.-7
1FK708.-7



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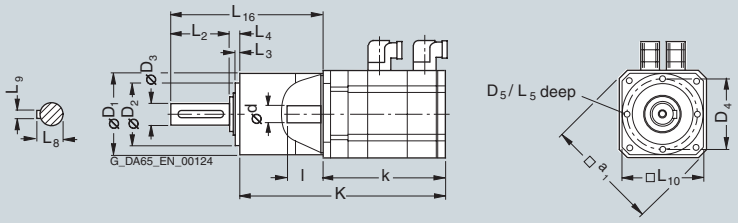
1FK7 Compact motors without/with DRIVE-CLiQ with LP+ planetary gearbox, single-stage

Dimensional drawings

For motor		Dimensions in mm (inches)													
		Planetary gearbox													
Shaft height	Type	Type	D_1 –	D_2 –	D_3 –	D_4 –	D_5 –	L_2 –	L_3 –	L_4 –	L_5 –	L_8 –	L_9 –	L_{10} –	L_{16} –
1FK7 Compact with LP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
28	1FK7022-5	LP050-M01	50 (1.97)	35 (1.38)	12 (0.47)	44 (1.73)	M4	18 (0.71)	4 (0.16)	7 (0.28)	8 (0.31)	14 (0.55)	4 (0.16)	50 (1.97)	88 (3.46)
	1FK7022-5	LP070-M01	70 (2.76)	52 (2.05)	16 (0.63)	62 (2.44)	M5	28 (1.10)	5 (0.20)	8 (0.31)	10 (0.39)	18 (0.71)	5 (0.20)	70 (2.76)	119 (4.69)
36	1FK7032-5	LP070-M01	70 (2.76)	52 (2.05)	16 (0.63)	62 (2.44)	M5	28 (1.10)	5 (0.20)	8 (0.31)	10 (0.39)	18 (0.71)	5 (0.20)	70 (2.76)	126 (4.96)
	1FK7034-5														
48	1FK7040-5	LP090-M01	90 (3.54)	68 (2.68)	22 (0.87)	80 (3.15)	M6	36 (1.42)	5 (0.20)	10 (0.39)	12 (0.47)	25 (0.98)	6 (0.24)	90 (3.54)	158 (6.22)
	1FK7042-5														
63	1FK7060-5	LP120-M01	120 (4.72)	90 (3.54)	32 (1.26)	108 (4.25)	M8	58 (2.28)	6 (0.24)	12 (0.47)	16 (0.63)	35 (1.38)	10 (0.39)	120 (4.72)	210 (8.27)
	1FK7063-5														
80	1FK7080-5	LP155-M01	155 (6.10)	120 (4.72)	40 (1.57)	140 (5.51)	M10	82 (3.23)	8 (0.31)	15 (0.59)	20 (0.79)	43 (1.69)	12 (0.47)	150 (5.91)	266 (10.47)
	1FK7083-5														

			Encoder system: ~~Resolver~~ Absolute encoder		EnDat 16 S/R / 15 bit (16 S/R)		Incremental encoder Absolute encoder		sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)				
			without brake		with brake		without brake		with brake				
Shaft height	Type	DIN IEC	k LB	K –	k LB	K –	k LB	K –	k LB	K –	l E	d D	a_1 P
28	1FK7022-5		153 (6.02)	216 (8.50)	175 (6.89)	238 (9.37)	178 (7.01)	241 (9.49)	200 (7.87)	263 (10.35)	20 (0.79)	9 (0.35)	-
	1FK7022-5			236 (9.29)		258 (10.16)		261 (10.28)		283 (11.14)			
36	1FK7032-5		150 (5.91)	240 (9.45)	175 (6.89)	265 (10.43)	175 (6.89)	265 (10.43)	200 (7.87)	290 (11.42)	30 (1.18)	14 (0.55)	92 (3.62)
	1FK7034-5		175 (6.89)	265 (10.43)	200 (7.87)	290 (11.42)	200 (7.87)	290 (11.42)	225 (8.86)	315 (12.40)			
48	1FK7040-5		135 (5.31)	247 (9.72)	164 (6.46)	276 (10.87)	155 (6.10)	267 (10.51)	184 (7.24)	296 (11.65)	40 (1.57)	19 (0.75)	120 (4.72)
	1FK7042-5		162 (6.38)	274 (10.79)	191 (7.52)	303 (11.93)	183 (7.20)	295 (11.61)	212 (8.35)	324 (12.76)			
63	1FK7060-5		157 (6.18)	297 (11.69)	200 (7.87)	340 (13.39)	180 (7.09)	320 (12.60)	223 (8.78)	363 (14.29)	50 (1.97)	24 (0.94)	155 (6.10)
	1FK7063-5		202 (7.95)	342 (13.46)	245 (9.65)	385 (15.16)	225 (8.86)	365 (14.37)	268 (10.55)	408 (16.06)			
80	1FK7080-5		156 (6.14)	325 (12.80)	184 (7.24)	353 (13.90)	179 (7.05)	347 (13.66)	206 (8.11)	375 (14.76)	58 (2.28)	32 (1.26)	186 (7.32)
	1FK7083-5		194 (7.64)	363 (14.29)	245 (9.65)	414 (16.30)	217 (8.54)	385 (15.16)	268 (10.55)	436 (17.17)			

1FK702.-5
1FK703.-5
1FK704.-5
1FK706.-5
1FK708.-5



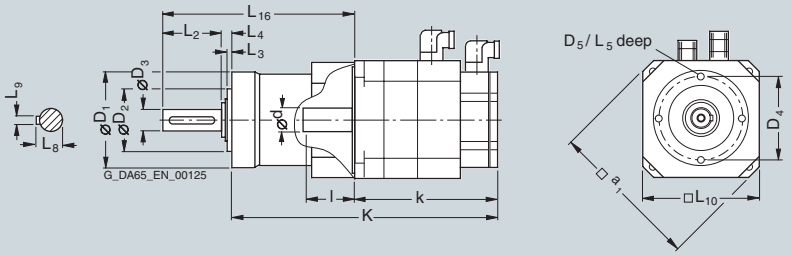
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Dimensional drawings

For motor		Dimensions in mm (inches)													
		Planetary gearbox													
Shaft height	Type	Type	D_1 –	D_2 –	D_3 –	D_4 –	D_5 –	L_2 –	L_3 –	L_4 –	L_5 –	L_8 –	L_9 –	L_{10} –	L_{16} –
1FK7 Compact with LP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
100	1FK710.-5	LP155-M01	155 (6.10)	120 (4.72)	40 (1.57)	140 (5.51)	M10	82 (3.23)	8 (0.31)	15 (0.59)	20 (0.79)	43 (1.69)	12 (0.47)	150 (5.91)	286 (11.26)

			Encoder system: Resolver				Incremental encoder sin/cos 1 V_{pp} / 22 bit (2048 S/R) Absolute encoder EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 32 S/R / 16 bit (32 S/R)						
			without brake		with brake		without brake		with brake				
Shaft height	Type	DIN IEC	k LB	K –	k LB	K –	k LB	K –	k LB	K –	l E	d D	a_1 P
100	1FK7100-5		185 (7.28)	374 (14.72)	204 (8.03)	393 (15.47)	208 (8.19)	396 (15.59)	227 (8.94)	415 (16.34)	80 (3.15)	38 (1.50)	240 (9.45)
	1FK7101-5		211 (8.31)	400 (15.75)	240 (9.45)	429 (16.89)	234 (9.21)	422 (16.61)	263 (10.35)	452 (17.80)			
	1FK7103-5		237 (9.33)	426 (16.77)	266 (10.47)	455 (17.91)	260 (10.24)	448 (17.64)	289 (11.38)	478 (18.82)			
	1FK7105-5		289 (11.38)	478 (18.82)	318 (12.52)	507 (19.96)	312 (12.28)	500 (19.69)	341 (13.43)	530 (20.87)			

1FK710.-5



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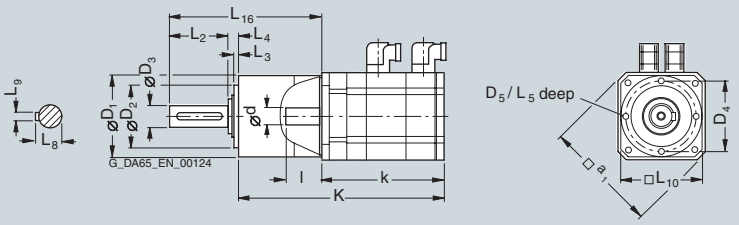
1FK7 High Dynamic motors without/with DRIVE-CLiQ with LP+ planetary gearbox, single-stage

Dimensional drawings

For motor		Dimensions in mm (inches) Planetary gearbox													
Shaft height	Type	Type	D_1 –	D_2 –	D_3 –	D_4 –	D_5 –	L_2 –	L_3 –	L_4 –	L_5 –	L_8 –	L_9 –	L_{10} –	L_{16} –
1FK7 High Dynamic with LP+ planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake															
36	1FK7033-7	LP070-M01	70 (2.76)	52 (2.05)	16 (0.63)	62 (2.44)	M5	28 (1.10)	5 (0.20)	8 (0.31)	10 (0.39)	18 (0.71)	5 (0.20)	70 (2.76)	126 (4.96)
48	1FK7043-7 1FK7044-7	LP090-M01	90 (3.54)	68 (2.68)	22 (0.87)	80 (3.15)	M6	36 (1.42)	5 (0.20)	10 (0.39)	12 (0.47)	25 (0.98)	6 (0.24)	90 (3.54)	158 (6.22)
63	1FK7061-7 1FK7064-7	LP120-M01	120 (4.72)	90 (3.54)	32 (1.26)	108 (4.25)	M8	58 (2.28)	6 (0.24)	12 (0.47)	16 (0.63)	35 (1.38)	10 (0.39)	120 (4.72)	210 (8.27)
80	1FK7085-7 1FK7086-7	LP155-M01	155 (6.10)	120 (4.72)	40 (1.57)	140 (5.51)	M10	82 (3.23)	8 (0.31)	15 (0.59)	20 (0.79)	43 (1.69)	12 (0.47)	150 (5.91)	266 (10.47)

			Encoder system: Resolver Absolute encoder EnDat 16 S/R / 15 bit (16 S/R) Incremental encoder Absolute encoder sin/cos 1 V_{pp} / 22 bit (2048 S/R) EnDat 2048 S/R / 22 bit (2048 S/R) EnDat 512 S/R / 20 bit (512 S/R) EnDat 32 S/R / 16 bit (32 S/R)										
			without brake		with brake		without brake		with brake				
Shaft height	Type	DIN IEC	k LB	K –	k LB	K –	k LB	K –	k LB	K –	l E	d D	a_1 P
36	1FK7033-7		170 (6.69)	260 (10.24)	195 (7.68)	285 (11.22)	195 (7.68)	285 (11.22)	220 (8.66)	310 (12.20)	30 (1.18)	14 (0.55)	92 (3.62)
48	1FK7043-7		191 (7.52)	303 (11.93)	220 (8.66)	332 (13.07)	212 (8.35)	324 (12.76)	240 (9.45)	352 (13.86)	40 (1.57)	19 (0.75)	120 (4.72)
	1FK7044-7		216 (8.50)	328 (12.91)	245 (9.65)	357 (14.06)	237 (9.33)	349 (13.74)	265 (10.43)	377 (14.84)			
63	1FK7061-7		185 (7.28)	325 (12.80)	228 (8.98)	368 (14.49)	208 (8.19)	348 (13.70)	251 (9.88)	391 (15.39)	50 (1.97)	24 (0.94)	155 (6.10)
	1FK7064-7		249 (9.80)	389 (15.31)	292 (11.50)	432 (17.01)	272 (10.71)	412 (16.22)	315 (12.40)	455 (17.91)			
80	1FK7085-7 1FK7086-7		261 (10.28)	430 (16.93)	304 (11.97)	473 (18.62)	284 (11.18)	453 (17.83)	326 (12.83)	495 (19.49)	58 (2.28)	32 (1.26)	186 (7.32)

1FK7033-7
1FK704.-7
1FK706.-7
1FK708.-7



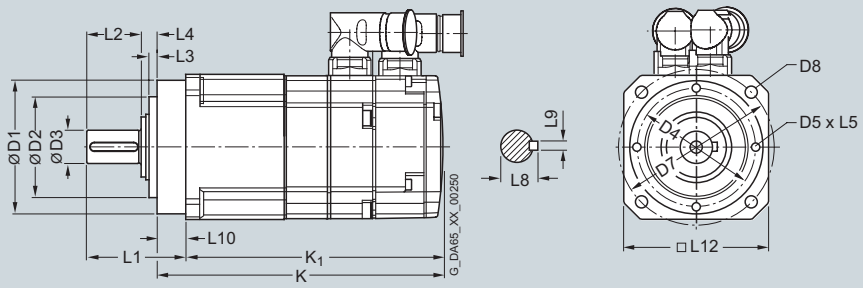
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Dimensional drawings

For motor		Dimensions in mm (inches)																
		Planetary gearbox																
Shaft height	Type	Type	D1	D2	D3	D4	D5	D7	D8	L1	L2	L3	L4	L5	L8	L9	L10	L12
1FK7-DYA with planetary gearbox, single-stage, type of construction IM B5, natural cooling, with connector, without/with brake																		
36	1FK7032-5	DYA70-10	70 (2.76)	52 (2.05)	16 (0.63)	62 (2.44)	M5	82 (3.23)	5.5 (0.22)	56 (2.20)	28 (1.10)	5 (0.20)	8 (0.31)	10 (0.39)	18 (0.71)	5 (0.20)	20 (0.79)	76 (2.99)
	1FK7034-5	DYA70-5																
48	1FK7040-5	DYA90-10	90 (3.54)	68 (2.68)	22 (0.87)	80 (3.15)	M6	105 (4.13)	7 (0.28)	66 (2.60)	36 (1.42)	5 (0.20)	10 (0.39)	12 (0.47)	24.5 (0.96)	6 (0.24)	20 (0.79)	101 (3.98)
	1FK7042-5	DYA90-5																
63	1FK7060-5	DYA120-10	120 (4.72)	90 (3.54)	32 (1.26)	108 (4.25)	M8	140 (5.51)	9 (0.35)	95 (3.74)	58 (2.28)	6 (0.24)	12 (0.47)	16 (0.63)	35 (1.38)	10 (0.39)	25 (0.98)	128 (5.04)
	1FK7063-5	DYA120-5																
80	1FK7080-5	DYA155-10	155 (6.10)	120 (4.72)	40 (1.57)	140 (5.51)	M10	170 (6.69)	11 (0.43)	127 (5.00)	82 (3.23)	8 (0.31)	15 (0.59)	20 (0.79)	43 (1.69)	12 (0.47)	30 (1.18)	161 (6.34)
	1FK7083-5	DYA155-5																

		Encoder system:											
		Resolver Absolute encoder		EnDat 16 S/R 15 bit (16 S/R)		Incremental encoder Absolute encoder		sin/cos 1 V_{pp} 22 bit (2048 S/R) EnDat 32 S/R 16 bit (32 S/R)		Absolute encoder		EnDat 2048 S/R 22 bit (2048 S/R) EnDat 512 S/R 20 bit (512 S/R)	
		without brake		with brake		without brake		with brake		without brake		with brake	
Shaft height	Type	K	K1	K	K1	K	K1	K	K1	K	K1	K	K1
36	1FK7032-5	197 (7.76)	177 (6.97)	222 (8.74)	202 (7.95)	222 (8.74)	202 (7.95)	247 (9.72)	227 (8.94)	222 (8.74)	202 (7.95)	247 (9.72)	227 (8.94)
	1FK7034-5	222 (8.74)	202 (7.95)	247 (9.72)	227 (8.94)	247 (9.72)	227 (8.94)	272 (10.71)	252 (9.92)	247 (9.72)	227 (8.94)	272 (10.71)	252 (9.92)
48	1FK7040-5	194 (7.64)	174 (6.85)	223 (8.78)	203 (7.99)	214 (8.43)	194 (7.64)	243 (9.57)	223 (8.78)	223 (8.78)	203 (7.99)	252 (9.92)	232 (9.13)
	1FK7042-5	221 (8.70)	201 (7.91)	250 (9.84)	230 (9.06)	242 (9.53)	222 (8.74)	271 (10.67)	251 (9.88)	250 (9.84)	230 (9.06)	279 (10.98)	259 (10.20)
63	1FK7060-5	233 (9.17)	208 (8.19)	261 (10.28)	236 (9.29)	256 (10.08)	231 (9.09)	284 (11.18)	259 (10.20)	264 (10.39)	239 (9.41)	292 (11.50)	267 (10.51)
	1FK7063-5	278 (10.94)	253 (9.96)	306 (12.05)	281 (11.06)	301 (11.85)	276 (10.87)	329 (12.95)	304 (11.97)	309 (12.17)	284 (11.18)	337 (13.27)	312 (12.28)
80	1FK7080-5	250 (9.84)	220 (8.66)	278 (10.94)	248 (9.76)	273 (10.75)	243 (9.57)	300 (11.81)	270 (10.63)	281 (11.06)	251 (9.88)	309 (12.17)	279 (10.98)
	1FK7083-5	288 (11.34)	258 (10.16)	339 (13.35)	309 (12.17)	311 (12.24)	281 (11.06)	362 (14.25)	332 (13.07)	319 (12.56)	289 (11.38)	370 (14.57)	340 (13.39)

1FK703.-5
1FK704.-5
1FK706.-5
1FK708.-5

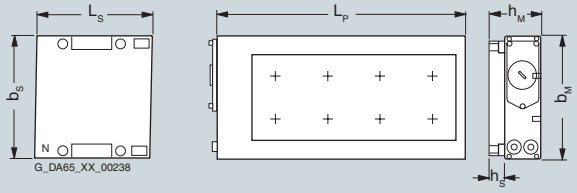


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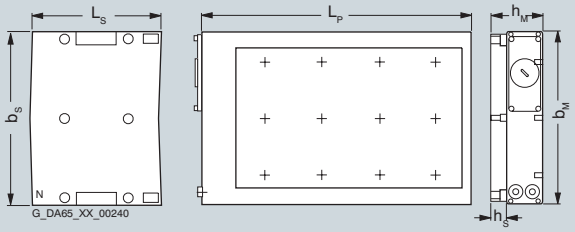
1FN3 linear motors
Version for peak load – water cooling

Dimensional drawings

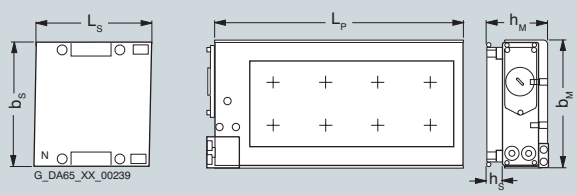
Primary section	Dimensions in mm (inches)					Secondary section	Dimensions in mm (inches)				
	without precision cooling		with precision cooling		Primary section length		without precision cooling		with precision cooling and cover		Secondary section length
Type	b_M	h_M	b_M	h_M	L_P	Type	b_S	h_S	b_S	h_S	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)						



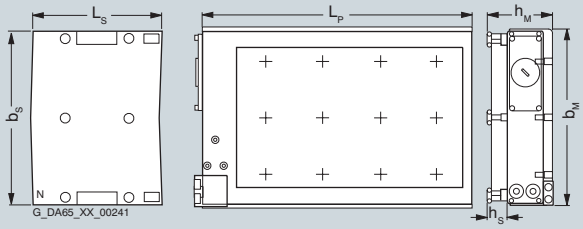
1FN3050 to 1FN3450 without precision cooling



1FN3600 to 1FN3900 without precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section



1FN3050 to 1FN3450 with precision cooling

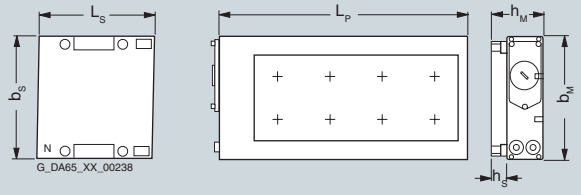


1FN3600 to 1FN3900 with precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

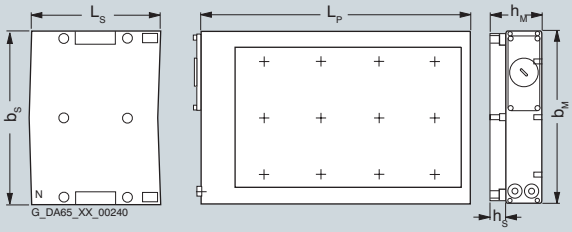
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Dimensional drawings

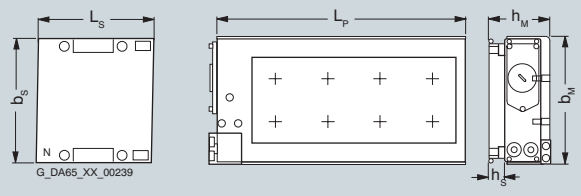
Primary section	Dimensions in mm (inches)					Secondary section	Dimensions in mm (inches)				
	without precision cooling		with precision cooling		Primary section length		without precision cooling		with precision cooling		Secondary section length
Type	b_M	h_M	b_M	h_M	L_P	Type	b_S	h_S	b_M	h_M	L_S
1FN3, 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)						



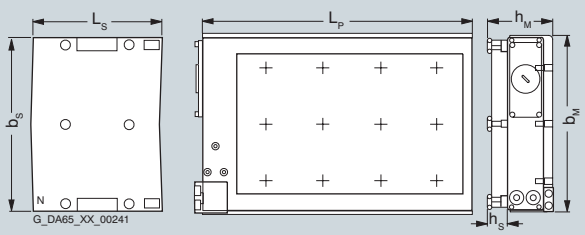
1FN3050 to 1FN3450 without precision cooling



1FN3600 to 1FN3900 without precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section



1FN3050 to 1FN3450 with precision cooling



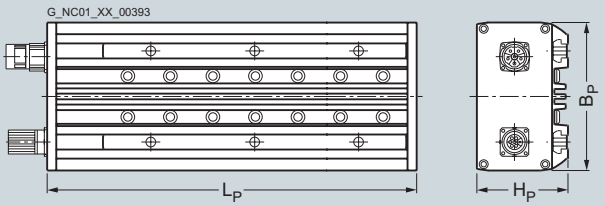
1FN3600 to 1FN3900 with precision cooling
Note: 4-row drill pattern with 1FN3900 for fixing the primary section

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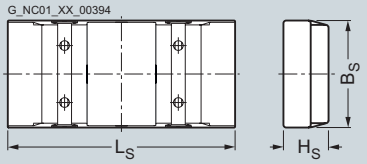
1FN6 linear motors
Natural cooling

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 1FN6003-1SF00-0AA0	75 (2.95)	20 (0.79)	200 (7.87) 500 (19.69)
1FN6003-1LE			328 (12.91)				
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 1FN6007-1SF00-0AA0	110 (4.33)	26 (1.02)	200 (7.87) 500 (19.69)
1FN6007-1LE			328 (12.91)				
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)				



Primary section 1FN6

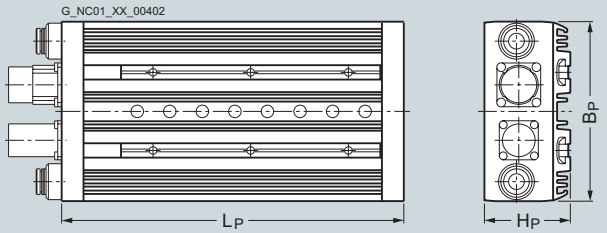


Secondary section 1FN6

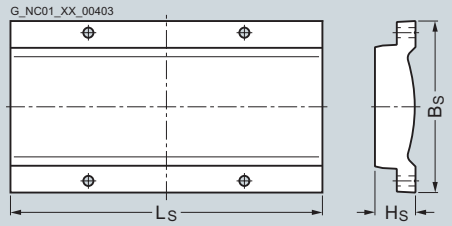
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Dimensional drawings

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, water cooling							
1FN6003-1WC	80 (3.15)	49.4 (1.94)	219 (8.62)	1FN6003-1SC00-0AA0 1FN6003-1SF00-0AA0	75 (2.95)	20 (0.79)	200 (7.87) 500 (19.69)
1FN6003-1WE			344 (13.54)				
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 1FN6007-1SF00-0AA0	110 (4.33)	26 (1.02)	200 (7.87) 500 (19.69)
1FN6007-1WE			344 (13.54)				
1FN6007-1WG			469 (18.46)				
1FN6007-1WJ			594 (23.39)				
1FN6007-1WL			719 (28.31)				
1FN6007-1WN			844 (33.23)				



Primary section 1FN6



Secondary section 1FN6

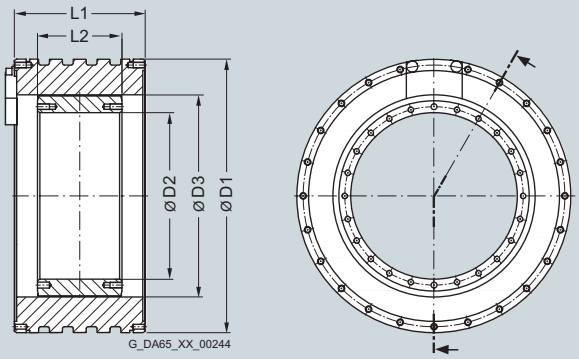
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1FW6 built-in torque motors
Water cooling

Dimensional drawings

For motor Type	Dimensions in mm (inches) D_1	D_2	D_3	L_1	L_2
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

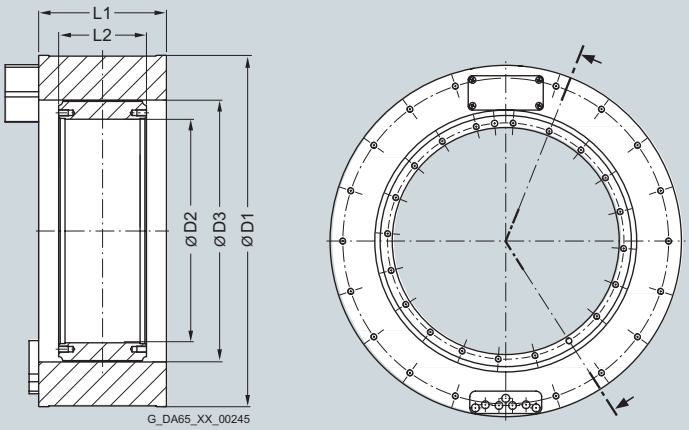


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Dimensional drawings

For motor Type	Dimensions in mm (inches) D_1	D_2	D_3	L_1	L_2
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



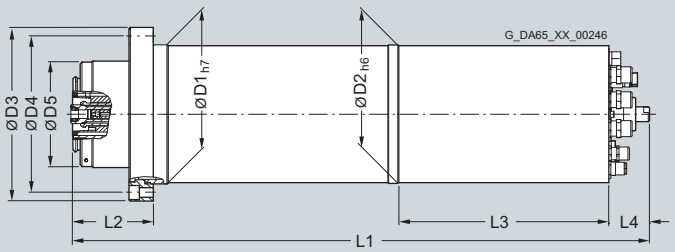
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2SP1 motor spindles
Water cooling

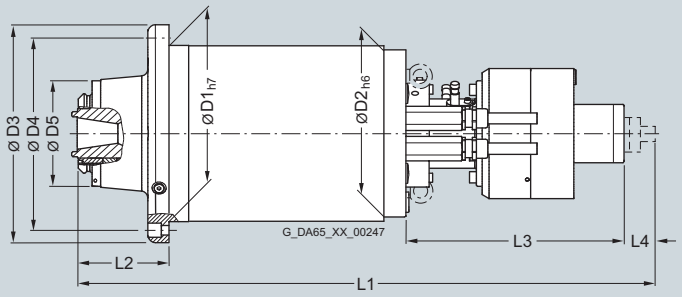
Dimensional drawings

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



2SP125



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[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.

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Asynchronous motors

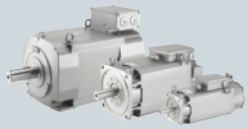
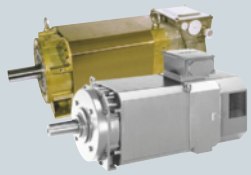
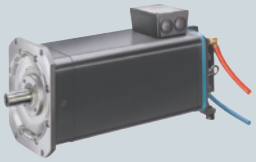
8



8/2	**Introduction**
8/4	**1PH8 motors** With solid shaft/hollow shaft Forced ventilation/Water cooling
8/18	**1PH7 motors** With solid shaft Forced ventilation
8/34	**1PH4 motors** With solid shaft Water cooling
8/38	**1PH2 built-in motors** For direct drive Water cooling
8/42	**Liquid cooling** Cooling principle Cooling unit manufacturers
8/43	**Gearboxes** Two-speed gearboxes for 1PH7/1PH4 motors
8/45	**Selection guides** Type of construction/ mounting position Degree of protection
8/46	**Dimensional drawings**
8/46	1PH8 motors
8/64	1PH7 motors
8/72	1PH4 motors
8/74	1PH7 motors with gearbox
8/75	1PH4 motors with gearbox
8/76	1PH2 motors
Part 11	**CAD CREATOR** Dimension drawing and 2D/3D CAD generator www.siemens.com/cadcreator

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Type overview and rated data

Motor type	Designation	Degree of protection	Cooling method
 **1PH8**	Asynchronous motor Three-phase squirrel-cage motor without casing Main spindle motor Solid shaft/hollow shaft	IP55[1)] IP55/IP65[2)]	Forced ventilation Water cooling
 **1PH7**	Asynchronous motor Three-phase squirrel-cage motor without casing Main spindle motor Solid shaft	IP55[3)]	Forced ventilation
 **1PH4**	Asynchronous motor Three-phase squirrel-cage motor Main spindle motor Solid shaft	IP65[4)]	Water cooling
 **1PH2**	Asynchronous built-in motor Three-phase squirrel-cage motor Individual components Main spindle motor for direct drives	IP00[5)]	Water cooling

Application

The areas of application for the 1PH asynchronous motors are extremely varied.

In machine tools, they are usually used as main spindle motors.

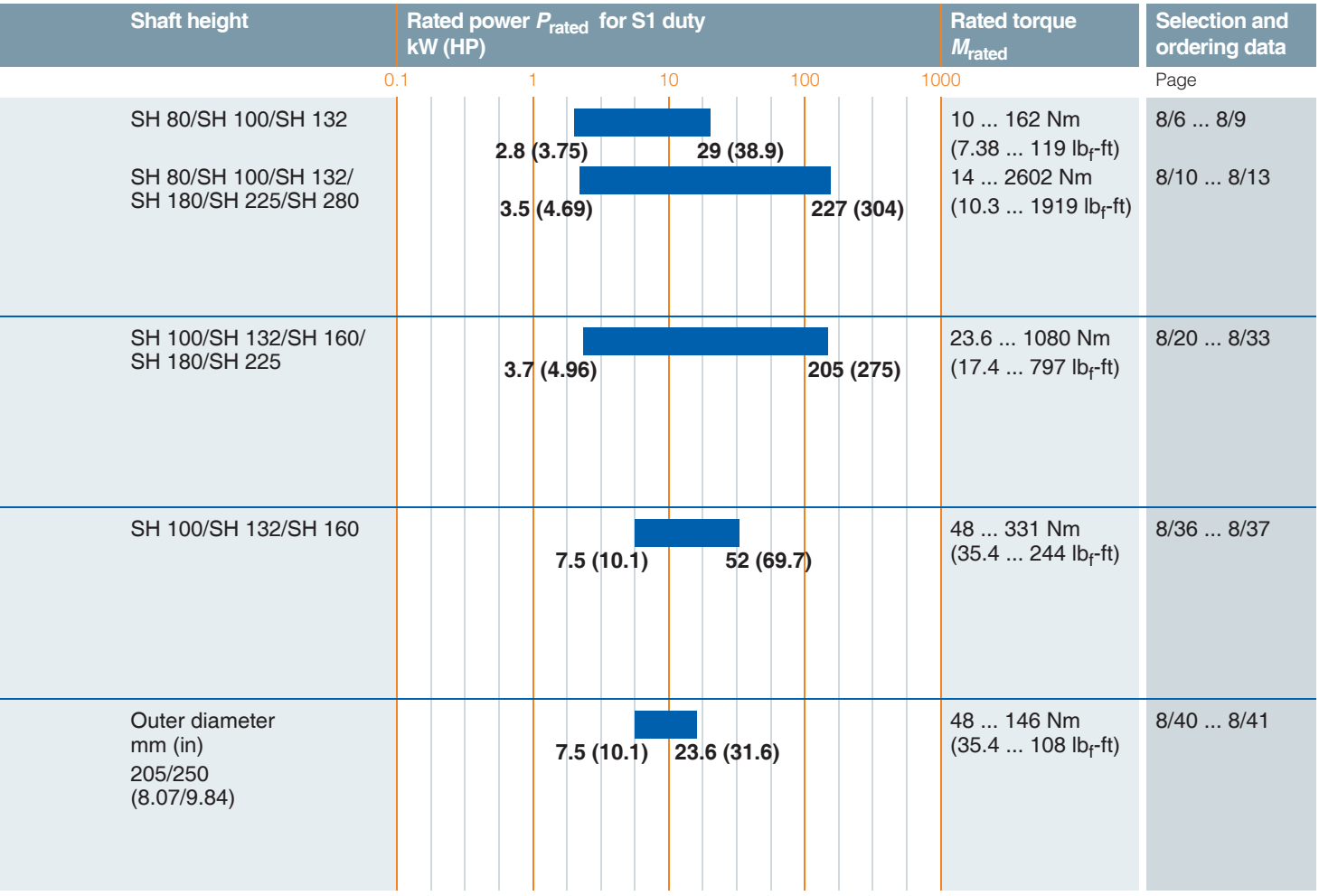
In production machines, such as printing, packaging and re-forming machines, they are used as high-output asynchronous servo motors.

The motors are referred to generally in this documentation as asynchronous motors, due to their principle of operation.

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[1)] Fan IP55, optional: IP66.
[2)] SH 180 and higher: IP55.
[3)] Fan IP54.
[4)] IP55 at shaft exit.
[5)] As specified by spindle manufacturer.

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Application (continued)

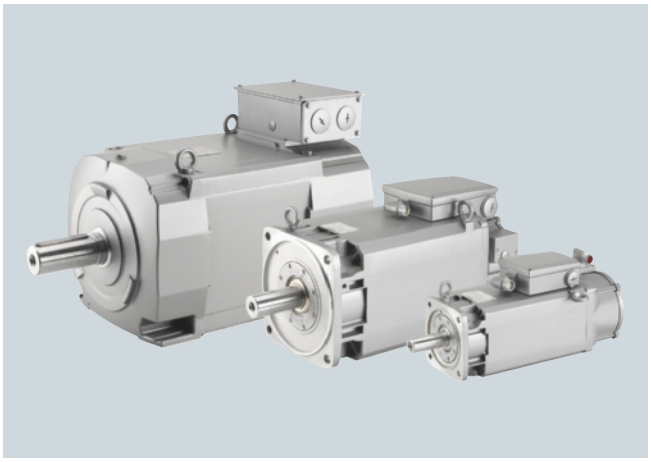
Core types can be supplied for certain motor types. These core types can be express delivered as replacement motors in the event of plant outages and offer the advantage of a quicker spare parts supply. For this reason, core types should be used for configuration wherever possible.

The selection and ordering data for the SINAMICS S120 Motor Modules are based on the booksize format by way of example. Blocksize and chassis formats are also possible. The SIZER configuration tool is available for detailed configuration.

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1PH8 motors

Overview



The 1PH8 motors are compact asynchronous motors with a squirrel-cage rotor and degree of protection IP55/IP65. They extend and replace the current power spectrum of our proven 1PH/1PM series. The 1PH8 motors are available in two different cooling types:

- Forced ventilation
- Water cooling

These 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.

As a standard, the encoder system for machine tools is C axis capable, an additional encoder for C axis mode is not necessary.

Benefits

- Broad power spectrum
- The right design for any application
  - Forced ventilation or water cooling
  - Solid shaft or hollow shaft
  - Diverse bearing concepts
  - Different encoder types for closed-loop speed control and high-precision positioning mode
- Excellent performance features
  - Maximum speeds of up to 20000 rpm
  - Excellent rotational accuracy of up to 10 µm
  - Excellent vibration magnitudes
  - High dynamic performance (short ramp-up times)
- Low noise emission
- Simple, flexible connection system
- Commissioning with electronic rating plate and DRIVE-CLiQ interface

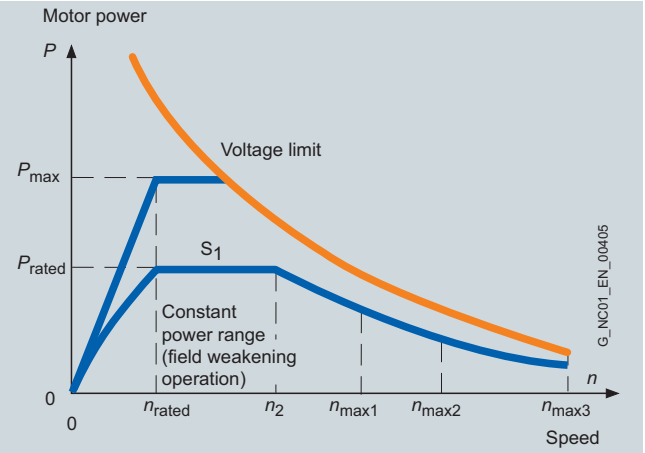
Water cooling is advantageous:

- Wherever 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

Application

- Compact machine tools
- Complex machining centers and turning machines
- Fully encapsulated milling machines
- High-load milling spindles
- Counterspindles or driven tools for turning machines
- Directly driven tools with internal cooling
- Special machines

Characteristic curves



Typical speed/power graph for 1PH8 asynchronous motors[1)]

The graph shows the typical relationship between motor speed and drive power for 1PH8 motors for S1 duty (continuous duty) in accordance with IEC 60034-1.

Data for S2 short-time duty and S6 continuous duty can be found in the 1PH8 Motors Configuration Manual.

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

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Technical specifications

Product name	1PH8 motor		
Cooling	Forced ventilation	Water cooling	
• Cooling water pressure at inlet, max.	–	6 bar	
		Cooling water 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"
- 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, admissible	-15 ... +40 °C (5 ... 104 °F)		
Coolant inlet temperature	–	< 30 °C (86 °F)	
Temperature monitoring	KTY 84 temperature sensor in the stator winding		
• 1PH818/1PH822/1PH828	–	Additional KTY 84 as spare	
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)		
• 1PH808/1PH810/1PH813	Temperature class 155 (F)		
• 1PH818/1PH822/1PH828	Temperature class 180 (H)		
Motor fan ratings		–	
• 1PH808	230 V ± 10 %, 50 Hz 265 V ± 10 %, 60 Hz	–	
• 1PH810/1PH813	400 V 3 AC ± 10 %, 50 Hz 480 V 3 AC ± 10 %, 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 EN ISO 1680 Tolerance + 3 dB	Rated pulse frequency 4 kHz	Rated pulse frequency 4 kHz/2 kHz[2]	
• 1PH808/1PH810	70 dB	68 dB	
• 1PH813	72 dB	68 dB	
• 1PH818/1PH822	–	70 dB	
• 1PH828	–	72 dB	
Connection			
• 1PH808/1PH810/1PH813	Power connector or terminal box		
• 1PH818/1PH822/1PH828	–	Terminal box	
• Fan			
- 1PH808	Power connector	–	
- 1PH810/1PH813	Power connector or terminal box	–	
• Encoder system	Connector for signals (without mating connector) or DRIVE-CLiQ		
Vibration magnitude	In accordance with Siemens/EN 60034-14 (IEC 60034-14)		
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[3]	Tolerance R		
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)			
• 1PH808/1PH810/1PH813	IP55	IP65	
• 1PH818/1PH822/1PH828	–	IP55	
• Fan	IP55, optional: IP66	–	
Rating plate	1 unit attached to motor 1 unit supplied loose in terminal box		
Paint finish	Anthracite RAL 7016		
Approvals, according to	cURus		

S/R = signals/revolution

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

[2] SINAMICS S120 booksize format: 4 kHz/chassis format: 2 kHz.

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

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Selection and ordering data

Rated speed	Continuous speed, max.[1]				Rated power for S1 duty	Rated torque	Static torque	1PH8 asynchronous motor Standard type
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2[5]	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 SH 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 SH 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 SH 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**

For versions, see Order number supplement and options.

The values in the selection and ordering data are applicable when using an Active Line Module with 400 V 3 AC line connection. 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 for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current for S1 duty	Booksize format For additional versions and components, see SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8083-1.F...	80.9	0.0064 (0.06)	32 (70.6)	7.5	8	9	**6SL312■-■TE21-0AA3**
1PH8083-1.G...	83.2			11.6	12	18	**6SL312■-■TE21-8AA3**
1PH8083-1.M...	86.9			13.6	17	18	**6SL312■-■TE21-8AA3**
1PH8083-1.N...	86.4			17	23	18	**6SL312■-■TE21-8AA3**
1PH8087-1.F...	81.7	0.0089 (0.08)	39 (86.0)	10	11	18	**6SL312■-■TE21-8AA3**
1PH8087-1.G...	85.3			14.1	15	18	**6SL312■-■TE21-8AA3**
1PH8087-1.M...	87.1			17.3	23	18	**6SL312■-■TE21-8AA3**
1PH8087-1.N...	86.8			19.5	28	30	**6SL312■-1TE23-0AA3**
1PH8101-1.F...	83.5	0.0138 (0.12)	42 (92.6)	12.5	14	18	**6SL312■-■TE21-8AA3**
1PH8103-1.D...	81.4	0.0172 (0.15)	51 (112)	10	11	18	**6SL312■-■TE21-8AA3**
1PH8103-1.F...	85.2			13.5	14	18	**6SL312■-■TE21-8AA3**
1PH8103-1.G...	87.7			17.5	19	18	**6SL312■-■TE21-8AA3**
1PH8103-1.M...	88.0			25.7	31	30	**6SL312■-■TE23-0AA3**
1PH8105-1.F...	86.7	0.0252 (0.22)	65 (143)	17.5	20	18	**6SL312■-■TE21-8AA3**
1PH8107-1.D...	83.4	0.0289 (0.26)	73 (161)	17.5	25	18	**6SL312■-■TE21-8AA3**
1PH8107-1.F...	86.9			23.5	25	30	**6SL312■-1TE23-0AA3**
1PH8107-1.G...	89.7			26	29	30	**6SL312■-1TE23-0AA3**
1PH8107-1.M...	88.0			38	48	45	**6SL312■-1TE24-5AA3**
1PH8131-1.F...	89.9	0.059 (0.52)	89 (196)	24	30	30	**6SL312■-1TE23-0AA3**
1PH8133-1.D...	87.1	0.076 (0.67)	106 (234)	30	32	30	**6SL312■-1TE23-0AA3**
1PH8133-1.F...	89.9			34	42	45	**6SL312■-1TE24-5AA3**
1PH8133-1.G...	91.9			45	54	45	**6SL312■-1TE24-5AA3**
1PH8135-1.F...	89.8	0.094 (0.83)	125 (276)	43	53	45	**6SL312■-1TE24-5AA3**
1PH8137-1.D...	88.1	0.109 (0.96)	141 (311)	43	47	45	**6SL312■-1TE24-5AA3**
1PH8137-1.F...	90.4			56	68	60	**6SL312■-1TE26-0AA3**
1PH8137-1.G...	92.4			60	73	60	**6SL312■-1TE26-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

[1] Observe maximum speed of encoders.
[2] Bearing version for standard.
[3] Bearing version for performance.
[4] Bearing version for high performance.
[5] Maximum permissible thermal speed at constant power or speed which is at the voltage limit when $P = P_{rated}$.
[6] Additional weight for version with hollow shaft: 2.5 kg (5.51 lb).

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1PH8 motors, standard type
SH 100/SH 132 – Forced ventilation

Selection and ordering data

Rated Speed	Continuous speed, max.[1]				Rated power for S1 duty	Rated torque	Static torque	1PH8 asynchronous motor Standard type
Y/Δ				Y/Δ	Y/Δ	Y/Δ	Y/Δ	
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2[5]	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 SH 100 – Forced ventilation – Star/delta connection – 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 SH 132 – Forced ventilation – Star/delta connection – 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 number supplement and options.

The values in the selection and ordering data are applicable when using an Active Line Module with 400 V 3 AC line connection. 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 for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current for S1 duty	**Booksize format** For additional versions and components, see SINAMICS S120 drive system
	Y/Δ			Y/Δ	Y/Δ		
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8101-1.S...	87.2/90.2	0.0138 (0.12)	42 (92.6)	13.2/13.5	15/20	18	**6SL312■-■TE21-8AA3**
1PH8105-1.S...	89.1/91.4	0.0252 (0.22)	65 (143)	23/24	25/34	30	**6SL312■-1TE23-0AA3**
1PH8107-1.S...	89.4/90.9	0.0289 (0.26)	73 (161)	26.7/28	30/40	30	**6SL312■-1TE23-0AA3**
1PH8131-1.S...	90.8/89.7	0.059 (0.52)	89 (196)	39/40	47/56	45	**6SL312■-1TE24-5AA3**
1PH8135-1.S...	91.7/93.9	0.094 (0.83)	125 (276)	51/52	62/78	60	**6SL312■-1TE26-0AA3**
1PH8137-1.S...	93.1/91.9	0.109 (0.96)	141 (311)	56/56	68/87	60	**6SL312■-1TE26-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

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1) Observe maximum speed of encoders.
2) Bearing version for standard.
3) Bearing version for performance.
4) Bearing version for high performance.
5) Maximum permissible thermal speed at constant power or speed which is at the voltage limit when $P = P_{rated}$.
6) Additional weight for version with hollow shaft: 2.5 kg (5.51 lb).

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1PH8 motors, standard type
SH 80 to SH 132 – Water cooling

Selection and ordering data

Rated speed	Continuous speed, max.[1]				Rated power for S1 duty	Rated torque	Static torque	1PH8 asynchronous motor Standard type
n_{rated}	n_{max1}[2]	n_{max2}[3]	n_{max3}[4]	n_2[5]	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 SH 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 SH 100 – Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module								
2000	9000	12000	–	6800	6.4 (8.58)	31 (22.9)	34 (25.1)	**1PH8101-1■G2■-■■■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	18000	18 (24.1)	57 (42.0)	175 (129)	**1PH8107-1■M2■-■■■1**
Shaft height SH 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**

For versions, see Order number supplement and options.

The values in the selection and ordering data are applicable when using an Active Line Module with 400 V 3 AC line connection. 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 for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current for S1 duty	Booksize format For additional versions and components, see SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8083-1.F2...	78.4	0.0064 (0.06)	36 (79.4)	8.9	9	9	**6SL312■-■TE21-0AA3**
1PH8083-1.G2...	83.3			12.0	13	18	**6SL312■-■TE21-8AA3**
1PH8083-1.N2...	87.7			18.0	23	18	**6SL312■-■TE21-8AA3**
1PH8087-1.F2...	81.4	0.0089 (0.08)	44 (97.0)	13.7	15	18	**6SL312■-■TE21-8AA3**
1PH8087-1.G2...	84.3			17.5	19	18	**6SL312■-■TE21-8AA3**
1PH8087-1.N2...	89.1			24.0	31	30	**6SL312■-1TE23-0AA3**
1PH8101-1.G2...	85.7	0.0138 (0.12)	51 (113)	16.8	18	18	**6SL312■-■TE21-8AA3**
1PH8103-1.G2...	85.7	0.0172 (0.15)	60 (132)	23	24	30	**6SL312■-1TE23-0AA3**
1PH8103-1.M2...	90.0			30	35	30	**6SL312■-1TE23-0AA3**
1PH8105-1.F2...	84.3	0.0252 (0.22)	74 (163)	28.5	29	30	**6SL312■-1TE23-0AA3**
1PH8105-1.G2...	87.9			34.5	38	45	**6SL312■-1TE24-5AA3**
1PH8105-1.M2...	90.0			45	52	45	**6SL312■-1TE24-5AA3**
1PH8107-1.F2...	82.9	0.0289 (0.26)	83 (183)	43.7	44	45	**6SL312■-1TE24-5AA3**
1PH8107-1.M2...	90.0			60	73	60	**6SL312■-1TE26-0AA3**
1PH8131-1.F2...	88.3	0.059 (0.52)	105 (232)	30	30	30	**6SL312■-1TE23-0AA3**
1PH8131-1.G2...	90.8			40	44	45	**6SL312■-1TE24-5AA3**
1PH8133-1.F2...	89.7	0.076 (0.67)	123 (271)	38	45	45	**6SL312■-1TE24-5AA3**
1PH8133-1.G2...	90.9			52	61	60	**6SL312■-1TE26-0AA3**
1PH8135-1.F2...	90.1	0.094 (0.83)	141 (311)	51	58	60	**6SL312■-1TE26-0AA3**
1PH8135-1.G2...	92.4			64	73	85	**6SL312■-1TE28-5AA3**
1PH8137-1.F2...	90.0	0.1090 (0.96)	157 (346)	67	73	85	**6SL312■-1TE28-5AA3**
1PH8138-1.F2...	88.2	0.1090 (0.96)	160 (353)	80	88	85	**6SL312■-1TE28-5AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

8

[1] Observe maximum speed of encoders.
[2] Bearing version for standard.
[3] Bearing version for performance.
[4] Bearing version for high performance.
[5] Maximum permissible thermal speed at constant power or speed which is at the voltage limit when $P = P_{rated}$.
[6] Additional weight for version with hollow shaft: 2.5 kg (5.51 lb).

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Selection and ordering data

Rated speed	Continuous speed, max.			Rated power for duty type S1	Rated torque	Static torque	1PH8 asynchronous motor Standard type
n_{rated}	n_{max1} [1]	n_{max2} [2]	n_2 [3]	P_{rated}	M_{rated}	M_0	
rpm	rpm	rpm	rpm	kW (HP)	Nm (lb_f-ft)	Nm (lb_f-ft)	Order No.
Shaft height SH 180 – Water cooling – Line voltage 380 V 3 AC, operation on Smart Line Module							
400	5000	7500	1500	17 (22.8)	406 (299)	406 (299)	**1PH8184-1■B2■-■■■1**
700	5000	7500	2500	33 (44.3)	450 (332)	450 (332)	**1PH8184-1■C2■-■■■1**
1000	5000	7500	5000	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	5000	95 (127)	363 (268)	363 (268)	**1PH8184-1■L2■-■■■1**
400	5000	7500	1800	23 (30.8)	549 (405)	549 (405)	**1PH8186-1■B2■-■■■1**
700	5000	7500	3000	43 (57.7)	587 (433)	587 (433)	**1PH8186-1■C2■-■■■1**
1000	5000	7500	5000	64 (85.8)	611 (451)	611 (451)	**1PH8186-1■D2■-■■■1**
1500	5000	7500	5000	93 (125)	592 (437)	592 (437)	**1PH8186-1■F2■-■■■1**
2500	5000	7500	5000	120 (161)	458 (338)	458 (338)	**1PH8186-1■L2■-■■■1**
Shaft height SH 225 – Water cooling – Line voltage 380 V 3 AC, operation on Smart Line Module							
400	4500	5500	1400	36 (48.3)	860 (634)	860 (634)	**1PH8224-1■B2■-■■■1**
700	4500	5500	2100	61 (81.8)	832 (614)	832 (614)	**1PH8224-1■C2■-■■■1**
1000	4500	5500	2800	89 (119)	850 (627)	850 (627)	**1PH8224-1■D2■-■■■1**
1500	4500	5500	3500	119 (160)	758 (559)	758 (559)	**1PH8224-1■F2■-■■■1**
2500	4500	5500	3200	153 (205)	584 (431)	584 (431)	**1PH8224-1■L2■-■■■1**
400	4500	–	1600	47 (63)	1122 (828)	1122 (828)	**1PH8226-1■B2■-■■■1**
700	4500	–	2300	81 (109)	1105 (815)	1105 (815)	**1PH8226-1■C2■-■■■1**
1000	4500	–	2400	115 (154)	1098 (810)	1098 (810)	**1PH8226-1■D2■-■■■1**
1500	4500	–	3700	145 (194)	923 (681)	923 (681)	**1PH8226-1■F2■-■■■1**
2500	4500	–	3200	185 (248)	707 (521)	707 (521)	**1PH8226-1■L2■-■■■1**
400	4500	–	1700	58 (77.8)	1385 (1022)	1385 (1022)	**1PH8228-1■B2■-■■■1**
700	4500	–	2500	96 (129)	1310 (966)	1310 (966)	**1PH8228-1■C2■-■■■1**
1000	4500	–	2300	141 (189)	1347 (994)	1347 (994)	**1PH8228-1■D2■-■■■1**
1500	4500	–	3700	192 (257)	1222 (901)	1222 (901)	**1PH8228-1■F2■-■■■1**
2500	4500	–	3200	226 (303)	863 (637)	863 (637)	**1PH8228-1■L2■-■■■1**
Shaft height SH 280 – Water cooling – Line voltage 380 V 3 AC, operation on Smart Line Module							
400	3300	–	2200	71 (95.2)	1695 (1250)	1695 (1250)	**1PH8284-1■B2■-■■■1**
700	3300	–	2200	123 (165)	1678 (1238)	1678 (1238)	**1PH8284-1■C2■-■■■1**
1000	3300	–	2200	172 (231)	1643 (1212)	1643 (1212)	**1PH8284-1■D2■-■■■1**
1500	3300	–	2200	227 (304)	1445 (1066)	1445 (1066)	**1PH8284-1■F2■-■■■1**
400	3300	–	2200	89 (119)	2125 (1567)	2125 (1567)	**1PH8286-1■B2■-■■■1**
700	3300	–	2200	153 (205)	2087 (1539)	2087 (1539)	**1PH8286-1■C2■-■■■1**
1000	3300	–	2200	214 (287)	2044 (1508)	2044 (1508)	**1PH8286-1■D2■-■■■1**
400	3300	–	2200	109 (146)	2602 (1919)	2602 (1919)	**1PH8288-1■B2■-■■■1**
700	3300	–	2200	188 (252)	2565 (1892)	2565 (1892)	**1PH8288-1■C2■-■■■1**

For versions, see Order number supplement and options.

The values in the selection and ordering data are applicable when using a Smart Line Module with 380 V 3 AC line connection. When using an Active Line Module, proceed according to 1PH8 Motors Configuration Manual.

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Motor type (repeated)	Efficiency	Moment of inertia	Weight, approx.	Rated current for S1 duty	Static current	SINAMICS S120 Motor Module	
						Rated output current for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	η	J	m	I_{rated}	I_0	I_{rated}	
	%	kgm^2 (lb$_f$-in-s^2)	kg (lb)	A	A	A	Order No.
1PH8184-1.B2...	83.1	0.50 (4.43)	340 (750)	50	50	60	**6SL312■-1TE26-0AA3**
1PH8184-1.C2...	87.2			77	77	85	**6SL312■-1TE28-5AA3**
1PH8184-1.D2...	90.4			114	114	132	**6SL312■-1TE31-3AA3**
1PH8184-1.F2...	92.9			150	150	200	**6SL312■-1TE32-0AA3**
1PH8184-1.L2...	94.5			196	196	200	**6SL312■-1TE32-0AA3**
1PH8186-1.B2...	84.5	0.65 (5.75)	410 (904)	68	68	85	**6SL312■-1TE28-5AA3**
1PH8186-1.C2...	89.8			97	97	132	**6SL312■-1TE31-3AA3**
1PH8186-1.D2...	92.0			148	148	200	**6SL312■-1TE32-0AA3**
1PH8186-1.F2...	93.5			198	198	200	**6SL312■-1TE32-0AA3**
1PH8186-1.L2...	94.8			250	250	260	**6SL3320-1TE32-6AA3**
1PH8224-1.B2...	85.8	1.45 (12.83)	610 (1345)	100	100	132	**6SL312■-1TE31-3AA3**
1PH8224-1.C2...	91.4			128	128	132	**6SL312■-1TE31-3AA3**
1PH8224-1.D2...	93.7			188	188	200	**6SL312■-1TE32-0AA3**
1PH8224-1.F2...	95.1			240	240	260	**6SL3320-1TE32-6AA3**
1PH8224-1.L2...	96.1			310	310	310	**6SL3320-1TE33-1AA3**
1PH8226-1.B2...	87.5	1.90 (16.82)	740 (1632)	130	130	132	**6SL312■-1TE31-3AA3**
1PH8226-1.C2...	92.8			184	184	200	**6SL312■-1TE32-0AA3**
1PH8226-1.D2...	93.8			235	235	260	**6SL3320-1TE32-6AA3**
1PH8226-1.F2...	95.7			295	295	310	**6SL3320-1TE33-1AA3**
1PH8226-1.L2...	96.3			380	380	380	**6SL3320-1TE33-8AA3**
1PH8228-1.B2...	88.6	2.35 (20.8)	870 (1918)	154	154	200	**6SL312■-1TE32-0AA3**
1PH8228-1.C2...	93.0			210	210	210	**6SL3320-1TE32-1AA3**
1PH8228-1.D2...	94.3			280	280	310	**6SL3320-1TE33-1AA3**
1PH8228-1.F2...	95.9			390	390	380[4]	**6SL3320-1TE33-8AA3**
1PH8228-1.L2...	96.4			455	455	490	**6SL3320-1TE35-0AA3**
1PH8284-1.B2...	91.4	4.42 (39.1)	1280 (2822)	170	170	200	**6SL312■-1TE32-0AA3**
1PH8284-1.C2...	94.5			260	260	260	**6SL3320-1TE32-6AA3**
1PH8284-1.D2...	95.7			350	350	380	**6SL3320-1TE33-8AA3**
1PH8284-1.F2...	96.4			445	445	490	**6SL3320-1TE35-0AA3**
1PH8286-1.B2...	91.6	5.42 (48.0)	1490 (3285)	210	210	210	**6SL3320-1TE32-1AA3**
1PH8286-1.C2...	94.8			320	320	380	**6SL3320-1TE33-8AA3**
1PH8286-1.D2...	96.0			460	460	490	**6SL3320-1TE35-0AA3**
1PH8288-1.B2...	92.5	6.61 (58.5)	1750 (3859)	260	260	260	**6SL3320-1TE32-6AA3**
1PH8288-1.C2...	95.2			400	400	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) Bearing version for standard.
2) Bearing version for performance.
3) Maximum permissible thermal speed at constant power or speed which is at the voltage limit when $P = P_{rated}$.
4) With the specified Motor Module, the motor cannot be fully utilized with M_0.

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1PH8 motors, standard type
Forced ventilation/water cooling

Order number supplement for shaft heights 80/100/132

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**

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 single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)[1]	**E**

Encoder systems for motors with DRIVE-CLiQ interface[4]

22 bit incremental encoder (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)[1]	**D**
20 bit incremental encoder (resolution 1048576, internal 512 S/R)[2] without commutation position (encoder IN20DQ)	**U**
19 bit incremental encoder (resolution 524288, internal 256 S/R) without commutation position (encoder IN19DQ)[3]	**V**
22 bit absolute encoder single-turn (resolution 4194304, internal 2048 S/R) with 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)[1]	**F**

Rated speed (winding version)

Cooling

Forced ventilation DE → NDE	**0**
Forced ventilation NDE → DE	**1**
Water cooling	**2**

Type of construction

IM B3 (IM V5, IM V6)	**0**
IM B5 (IM V1, IM V3)	**2**
IM B35 (IM V15, IM V35) (Only possible for 1PH810/1PH813)	**3**

Shaft extension DE	**Balancing**	
Plain shaft	–	**0**
Fitted key (Not possible if 14th data position: M)	Full-key	**1**
Fitted key (Not possible if 14th data position: M)	Half-key	**2**
Plain hollow shaft[3]	–	**3**

Bearing version	**Vibration magnitude acc. to Siemens[5]/EN 60034-14**	**Shaft and flange accuracy**	
Standard	R/A	R	**B**
Standard	S/A	R	**C**
Standard	SR/A	R	**D**
Performance	SPECIAL/B	SPECIAL	**L**
High performance[6]	SPECIAL/B	SPECIAL	**M**
Advanced lifetime[4]	S/A	R	**Q**

Power connection (view of DE)	**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[4][7]	Right	DE	**E**
Power connector top[4][7]	Left	DE	**F**
Power connector top[4][7]	NDE	Left	**G**
Power connector top[4][7]	DE	Right	**H**

Version status — **1**

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

[1] Maximum speed n_{max} = 12000 rpm.

[2] Maximum speed n_{max} = 15000 rpm.

[3] Only possible if 14th data position: L, M.

[4] Not possible for motors with star/delta connection.

[5] For a definition of vibration magnitude according to Siemens, please see 1PH8 Motors Configuration Manual.

[6] With 1PH808/1PH810, only possible if 9th data position: L or V
With 1PH813, only possible if 9th data position: L, T, U or V

[7] With 1PH810, power connector is only possible up to a maximum static current of I_0 = 36 A.
With 1PH813, power connector is only possible up to a maximum static current of I_0 = 85 A.

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Order number supplement for shaft heights 180/225/280

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**	■	**.**	**2**	■	**–**	■	■	■	**1**	**–**	**Z**
Shaft height 225	**1**	**P**	**H**	**8**	**2**	**2**	**.**	**–**	**1**	■	**.**	**2**	■	**–**	■	■	■	**1**	**–**	**Z**
Shaft height 280	**1**	**P**	**H**	**8**	**2**	**8**	**.**	**–**	**1**	■	**.**	**2**	■	**–**	■	■	■	**1**	**–**	**Z**
Overall length									**1**											
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**										
Absolute encoder 2048 S/R single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)[1]										**E**										
Encoder systems for motors with DRIVE-CLiQ interface																				
22 bit incremental encoder (resolution 4194304, internal 2048 S/R) + commutation position 11 bit (encoder IC22DQ)[1]										**D**										
22 bit absolute encoder single-turn (resolution 4194304, internal 2048 S/R) with 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)[1]										**F**										
Rated speed (winding version)																				
Cooling																				
Water cooling												**2**								
Type of construction																				
IM B3 (IM B6, IM B7, IM B8, IM V6) (IM B6/IM B7/IM B8 not possible for 1PH828)													**0**							
IM V5													**1**							
IM B5 (IM V3)[2] (Not possible if 14th data position: L)													**2**							
IM B35 (IM V35)													**3**							
IM V15													**5**							

Shaft extension DE	**Balancing**		
Plain shaft	–		**0**
Fitted key	Full-key		**1**
Fitted key	Half-key		**2**

Bearing version	**Vibration magnitude acc. to Siemens[3]/EN 60034-14**	**Shaft and flange accuracy**	
Standard	R/A	R	**B**
Standard (Only for 1PH818/1PH822)	S/A	R	**C**
Standard (Only for 1PH818/1PH822)	SR/A	R	**D**
Increased radial forces	R/A	R	**F**
Performance[4] (Not possible if 12th data position: 2)	SR/A	R	**L**

Power connection (view of DE)	**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] Maximum speed n_{max} = 12000 rpm.

[2] With 1PH818, continuous speed n_{max} = 3000 min.
With 1PH822, continuous speed n_{max} = 2500 rpm.
With 1PH828, continuous speed n_{max} = 2000 rpm.

[3] For a definition of vibration magnitude according to Siemens, please see 1PH8 Motors Configuration Manual.

[4] Only possible with 1PH818/1PH8224.
With 1PH818, continuous speed n_{max} = 7500 rpm.
With 1PH8224, continuous speed n_{max} = 5500 rpm.

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1PH8 motors, standard type
Forced ventilation/water cooling

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.	Used with motors 1PH808 1PH810 1PH813	 1PH818 1PH822 1PH828
A12	Additional PTC thermistor chain for alarm and tripping (Only possible for versions with terminal box.)	✔	✔
K08	Encoder connector mounted opposite	–	✔
K09	Terminal box or power connector NDE right (For terminal box type, see Selection guides or CAD CREATOR)	✔ 1) Only with 1PH810/1PH813	–
	Terminal box NDE right, cable entry 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) Only with 1PH810/1PH813	–
	Terminal box NDE left, cable entry DE/signal connection top (Only possible if 15th data position: A)	–	✔
K18	Radial shaft sealing ring DE[2] (Not possible if 14th data position: F, L or M)	✔	✔
K40	Regreasing system DE and NDE (standard with 1PH828)	–	✔
K83	Terminal box[3] rotated through + 90°	–	✔
K84	Terminal box[3] rotated through - 90°	–	✔
K85	Terminal box[3] rotated through + 180°	–	✔
K90	Version with flange size A400 (Only possible if 12th data position: 2, 3 or 5)	–	✔ With 1PH818 only
V90	1PH7-compatible shaft extension ($d \times l$: 42 mm × 110 mm (1.65 in × 4.33 in)) (Note reduced radial forces)	✔ With 1PH813 only	–
L00	Replace terminal box (standard) with the next largest terminal box (Note dimension implications in CAD CREATOR.)	–	✔
P00	Undrilled cable entry plate	–	✔
P01	Cable entry plate 3 × M63 × 1.5 (Only with terminal box type 1XB7700-P02/1XB7712-P03)	–	✔
P02	Cable entry plate 3 × M75 × 1.5 (Only with terminal box type 1XB7712-P03)	–	✔
P04	Cable entry plate 4 × M63 × 1.5 (Only with terminal box type 1XB7712-P03)	–	✔
L74	Fan in IP66 degree of protection	✔	–
	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, another terminal box type is used for side mounting.
gk823 is used instead of gk813. gk843 is used instead of gk833. Only possible for types of construction IM B3 or IM B35.

2) Only appropriate if oil spray or oil vapor is occasionally deposited on the sealing ring.

3) Only possible in conjunction with option K09 or K10.

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Terminal box assignment, max. connectable conductor cross-sections

1PH8 motor Type		Terminal box Type	Cable entry Power	Cable entry External signals	Outer cable diameter, max.[1] mm	Number of main terminals	Cross-section per terminal, max. mm²	Rated current, max.[2] A
1PH808	Forced ventilation/ Water cooling	gk803	1 × M25 × 1.5	1 × Ø 22 mm[3]	20	Phases: 3 × M5 Grounding: 2 × M5	1 × 10	50
1PH810	Forced ventilation	gk813	1 × M32 × 1.5	1 × Ø 22 mm[3]	24.2	Phases: 3 × M5 Grounding: 2 × M5	1 × 16	66
	Water cooling/ forced ventilation with hollow shaft with options K09 or K10	gk823	1 × M32 × 1.5	1 × Ø 22 mm[3]	24.2	Phases: 3 × M5 Grounding: 2 × M5	1 × 16	66
	Star/delta	gk826	1 × M32 × 1.5	1 × Ø 22 mm[3]	24.2	Phases: 6 × M5 Grounding: 2 × M5	1 × 10	50
1PH813	Forced ventilation	gk833	1 × M40 × 1.5	1 × Ø 22 mm[3]	32	Phases: 3 × M6 Grounding: 2 × M6	1 × 35	104
	Water cooling/ forced ventilation with hollow shaft with options K09 or K10	gk843	1 × M50 × 1.5	1 × Ø 22 mm[3]	38	Phases: 3 × M6 Grounding: 2 × M6	1 × 50	125
	Star/delta	gk846	1 × M50 × 1.5	1 × Ø 22 mm[3]	38	Phases: 6 × M6 Grounding: 2 × M6	1 × 25	84
1PH818 1PH822 1PH828		1XB7322-P05[5]	2 × M50 × 1.5	1 × PG 13.5[4]	38	Phases: 3 × M12 Grounding: 2 × fixing eyelet	2 × 50	210
		1XB7422-P06[6]	2 × M63 × 1.5	1 × PG 13.5[4]	53	Phases: 3 × M12 Grounding: 2 × fixing eyelet	2 × 70	270
		1XB7700-P02[7]	2 × M75 × 1.5	1 × PG 13.5[4]	68	Phases: 3 × 2 × M12 Grounding: 2 × fixing eyelet	3 × 150	700
1PH828 (option)		1XB7712-P03	3 × M75 × 1.5	1 × PG 13.5[4]	68	Phases: 3 × 4 × M16 Grounding: 4 × M16	4 × 185	1150

For terminal box type 1XB7, other cable entries can be ordered for the power depending on the standard, see options.

Ordering example

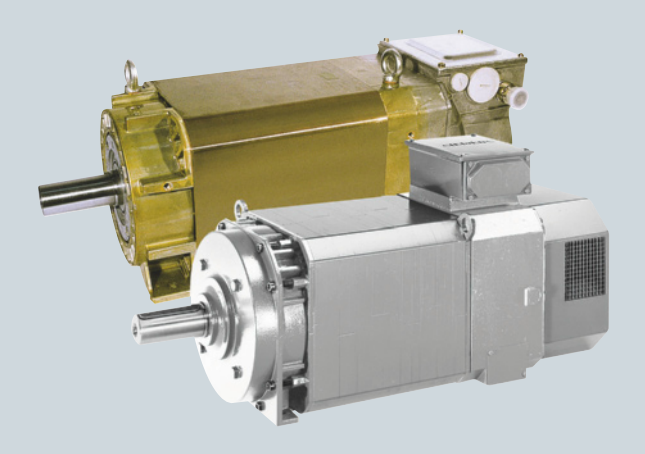
Selection criteria	Version	Structure of the order number
1PH8 motor	Shaft height 80 Rated power 3.5 kW Version status 1	**1PH8083-. . . . . - . . . 1**
	Asynchronous version without brake	**1PH8083-1 . . . . - . . . 1**
Encoder system	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**1PH8083-1M . . .- . . . 1**
Rated speed	1500 rpm	**1PH8083-1MF . .- . . . 1**
Cooling	Water cooling	**1PH8083-1MF2 .- . . . 1**
Type of construction	IM B3 (IM V5, IM V6)	**1PH8083-1MF20- . . . 1**
Shaft extension DE	Plain shaft	**1PH8083-1MF20-0 . . 1**
Bearing version	Standard Vibration magnitude R/A Shaft and flange accuracy R	**1PH8083-1MF20-0B.1**
Connection	Power connection terminal box top Cable entry right Signal connection DE	**1PH8083-1MF20-0BA1**
Options		**1PH8083-1MF20-0BA1-Z**
	Additional PTC thermistor chain for alarm and tripping	**1PH8083-1MF20-0BA1-Z A12**
	Special paint finish worldwide: Primer and paint finish sky blue RAL 5015	**1PH8083-1MF20-0BA1-Z A12 K23 X05**

[1] Dependent on the design of the metric cable gland.
[2] Current carrying capacity based on EN 60204-1 and IEC 60364-5-52 according to installation type C.
[3] Hole with Ø 22 mm (0.87 in), 90 ° to signal connection
[4] Arranged opposite of signal connection (sideways from cable entry plate).
[5] Standard for motors with rated currents less than 210 A.
[6] Standard for motors with rated currents greater than 210 A to 270 A.
[7] Standard for motors with rated currents greater than 270 A to 700 A.

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1PH7 motors

Overview



1PH7 motors (SH 100 to SH 160 and SH 180/SH 225)

Air-cooled 1PH7 motors are rugged and low-maintenance 4-pole asynchronous motors with squirrel-cage rotors.

A fan for providing forced ventilation is mounted axially on the rear of the motor. The normal direction of air flow is from the drive end (DE) to the non-drive end (NDE) in order to keep the exhaust heat of the motor away from the machine. The reverse direction of air flow can be ordered as an option.

The motors are equipped with a built-in encoder system for sensing the motor speed and indirect position. In machine tools, the encoder system is capable of C-axis operation as standard – that is, an additional encoder is not required for C-axis operation.

Benefits

- Short overall length of motor
- Minimal overall dimension thanks to the integrated terminal box (SH 100 to SH 160)
- Maximum speeds of up to 9000 rpm (optional: 12000 rpm)
- Full rated torque is continuously available, even at standstill
- Optimum matching to the SINAMICS S120 power levels

Application

- Small, compact machine tools
- Complex machining centers and turning machines
- Special machines
- Printing industry:
  - Single drives for printing units
- Rubber, plastic, wire, and glass manufacturing:
  - Drives for extruders, calenders, rubber injection machines, film machines, fleece machines
  - Wire-drawing machines, wire-stranding machines, etc.
- General applications such as coiler and winder drives

Technical specifications (general)

Product name	1PH7 motor
Coolant temperature, permissible	- 15 ... + 40 °C (+ 5 ... + 104 °F)
Temperature monitoring	KTY 84 temperature sensor in stator winding
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant temperature of up to 40 °C (104 °F)
Motor fan ratings	400 V 3 AC ± 10 %, 50 Hz/60 Hz 480 V 3 AC + 5 %/- 10 %, 60 Hz
Encoder system, built-in	
• Without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R without C and D tracks (encoder IN2048S/R) • Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R) • Absolute encoder EnDat 2048 S/R single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)
• With DRIVE-CLiQ interface	• 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) + 11 bit commutation position (encoder IC22DQ) • 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) without commutation position (encoder IN22DQ) • 22 bit absolute encoder single-turn (resolution 4194304, 2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)
Type of construction in accordance with EN 60034-7 (IEC 60034-7)	IM B3 IM B35 IM B5 (only SH 100 and SH 132)
Sound pressure level L_{pA} (1 m) in accordance with EN ISO 1680 Tolerance + 3 dB	From DE to NDE (with the fan operating on a 50 Hz supply system)
• 1PH710/1PH713	70 dB
• 1PH716	75 dB[1]
• 1PH718	73 dB[2]
• 1PH722	76 dB[2]
Terminal box connection type	
• Motor/fan	Terminals in terminal box
• Encoder system and PTC thermistor	17-pin circular socket (without mating connector) or DRIVE-CLiQ
Rating plate	1 supplied separately with terminal box
Approvals, according to	cURus

Technical specifications (core type)

Type of construction in acc. with EN 60034-7 (IEC 60034-7)[3]	
• 1PH710/1PH713	IM B5 (IM V1, IM V3)
• 1PH716	IIM B35 (IM V15, IM V35)
Terminal box location View DE[4]	Top, cable entry from right
Bearing version on DE[5]	Bearing for belt or coupling output
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade S
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[6]	Tolerance R (reduced)
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	Motor IP55, fan IP54
Paint finish	Unpainted Optional: anthracite

S/R = signals/revolution

1) The sound pressure level can be reduced if the fan is operated on a 60 Hz supply system with option K44.

2) The sound pressure level can be reduced if the air flow is from the drive end to the non-drive end with option G15.

3) For type of construction, see Selection guides.

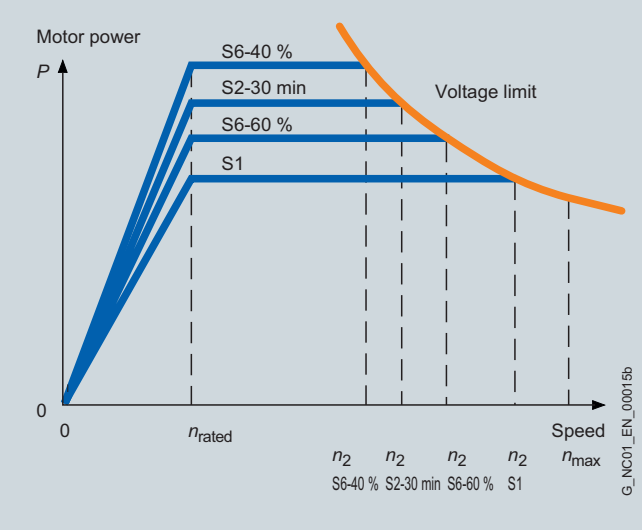
4) DE is the drive end with shaft. NDE is the non-drive end.

5) For maximum permissible load, see the 1PH7 Motors Configuration Manual.

6) Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

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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 in 1PH7 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60 % (S6-60 %) or 40 % (S6-40 %) with a maximum duty cycle time of 10 minutes.

S2: Short-time duty with duty period of 30 min (S2-30 min) and subsequent standstill.

1PH7 motor Type	Rated speed n_{rated}	Attainable speed for rated power in duty type n_2[2)]			
		S1	S6-60 %	S6-40 %	S2-30 min
	rpm	rpm	rpm	rpm	rpm
1PH7101-..F	1500	8200	7000	6000	6500
1PH7103-..D	1000	3750	3750	3100	3350
1PH7103-..F	1500	5000	4600	3900	4500
1PH7103-..G	2000	9000	7500	6400	6900
1PH7105-..F	1500	7900	6750	5750	6150
1PH7107-..D	1000	5800	4800	4100	4650
1PH7107-..F	1500	6500	6200	5250	5650
1PH7107-..G	2000	7000	7000	6900	7000
1PH7131-..F	1500	6700	5500	4500	5000
1PH7133-..D	1000	4700	3700	2800	3450
1PH7133-..F	1500	6800	5600	4500	5100
1PH7133-..G	2000	6500	6500	5900	6450
1PH7135-..F	1500	7500	6200	5200	5650
1PH7137-..D	1000	5400	4500	3600	4100
1PH7137-..F	1500	7000	7000	6200	6800
1PH7137-..G	2000	6000	6000	5800	6000
1PH7163-..B	500	2500	1900	1500	1730
1PH7163-..D	1000	5800	4800	4000	4400
1PH7163-..F	1500	5500	5500	5500	5500
1PH7163-..G	2000	3500	3500	3500	3500
1PH7167-..B	500	2100	1600	1250	1400
1PH7167-..D	1000	6250	5200	4300	4700
1PH7167-..F	1500	4500	4500	4500	4500
1PH7167-..G	2000	3250	3250	3250	3250
1PH7184-..T	500	4500	3800	3350	3350
1PH7184-..D	1000	5000	4400	3600	3600
1PH7184-..E	1250	5000	4680	4190	3600
1PH7184-..F	1500	5000	5000	5000	5000
1PH7184-..L	2500	5000	5000	5000	5000
1PH7186-..T	500	4800	4100	3580	4000
1PH7186-..D	1000	5000	4650	3850	3850
1PH7186-..E	1250	5000	4260	3780	3580
1PH7224-..C	700	3020	2570	2290	2170
1PH7224-..D	1000	4500	4500	4100	3730
1PH7224-..F	1500	4500	4330	4000	3890

[1)] For further configuration information, see the 1PH7 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. It you are using a Smart Line Module, proceed in accordance with the 1PH7 Motors Configuration Manual.

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1PH7 motors, core type
SH 100 to SH 160 – Forced ventilation

Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Core type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module										
100	2000	5500	–	9000	–	7 (9.39)	8.5 (11.4)	10 (13.4)	9.25 (12.4)	**1PH7103-■ ■G02-0C■ ■**
	1500	5500	–	9000	–	9 (12.1)	11 (14.8)	13 (17.4)	12 (16.1)	**1PH7107-■ ■F02-0C■ ■**
132	1000	4500	–	8000	–	12 (16.1)	15 (20.1)	18.5 (24.8)	16 (21.5)	**1PH7133-■ ■D02-0C■ ■**
	2000					20 (26.8)	25 (33.5)	30 (40.2)	27.5 (36.9)	**1PH7133-■ ■G02-0C■ ■**
	1000	4500	–	8000	–	17 (22.8)	20.5 (27.5)	25 (33.5)	22.5 (30.2)	**1PH7137-■ ■D02-0C■ ■**
	2000					28 (37.6)	35 (46.9)	43 (57.7)	39 (52.3)	**1PH7137-■ ■G02-0C■ ■**
160	1000	3700	–	6500	–	22 (29.5)	27 (36.2)	33 (44.3)	30 (40.2)	**1PH7163-■ ■D03-0C■ ■**
	1500					30 (40.2)	37 (49.6)	45 (60.4)	41 (55.0)	**1PH7163-■ ■F03-0C■ ■**
	1500	3700	–	6500	–	37 (49.6)	46 (61.7)	56 (75.1)	51 (68.4)	**1PH7167-■ ■F03-0C■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Incremental encoder sin/cos 1 V_{pp} 2048 S/R without C and D tracks (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit incremental encoder (encoder IN22DQ)	**Q**
Type of construction:[5]	IM B5 (IM V1, IM V3)	**2**
	IM B35 (IM V15, IM V35)[6]	**3**

Shaft extension DE:[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Plain shaft	–	DE → NDE	Axial	**J**

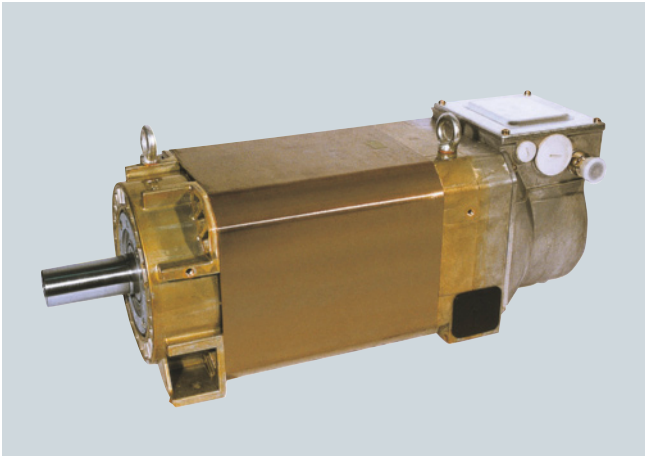
Degree of protection:	**Paint finish:**	
IP55, fan IP54	Unpainted	**0**
IP55, fan IP54	Anthracite	**3**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	**Booksize format** For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7103-..G02-...	33.4 (24.6)	0.017 (0.15)	43 (94.8)	17.5	20.5	23.5	21.5	18	**6SL312■-■TE21-8AA3**
1PH7107-..F02-...	57.3 (43.3)	0.029 (0.26)	64 (141)	23.5	27.5	31	29	30	**6SL312■-1TE23-0AA3**
1PH7133-..D02-...	114.6 (84.5)	0.076 (0.67)	102 (225)	30	36	43	37.5	30	**6SL312■-1TE23-0AA3**
1PH7133-..G02-...	95.5 (70.4)			45	54	63	59	45	**6SL312■-1TE24-5AA3**
1PH7137-..D02-...	162.3 (119.7)	0.109 (0.96)	129 (284)	43	50	60	54	45	**6SL312■-1TE24-5AA3**
1PH7137-..G02-...	133.7 (98.6)			60	73	87	80	60	**6SL312■-1TE26-0AA3**
1PH7163-..D03-...	210.1 (155)	0.19 (1.68)	198 (437)	55	65	77	71	60	**6SL312■-1TE26-0AA3**
1PH7163-..F03-...	191.0 (141)			72	86	102	94	85	**6SL312■-1TE28-5AA3**
1PH7167-..F03-...	235.5 (174)	0.23 (2.04)	231 (509)	82	97	115	104	85	**6SL312■-1TE28-5AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**



1PH7 motor (SH 100 to SH 160)

8

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min.
For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
- Shaft seal.

5) For preconditions for gearbox mounting, please refer to Gearboxes.

6) Motors of shaft height 160 and higher require foot support.

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Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module										
100	1500	5500	10000	9000	12000	3.7 (4.96)	4.5 (6.03)	5.25 (7.04)	4.9 (6.57)	**1PH7101-■ ■ F■ ■-0■ ■ ■**
	1000	5500	10000	9000	12000	3.7 (4.96)	4.5 (6.03)	5.25 (7.04)	4.7 (6.30)	**1PH7103-■ ■ D■ ■-0■ ■ ■**
	1500					5.5 (7.38)	6.7 (8.98)	7.7 (10.3)	7 (9.39)	**1PH7103-■ ■ F■ ■-0■ ■ ■**
	2000					7 (9.39)	8.5 (11.4)	10 (13.4)	9.25 (12.4)	**1PH7103-■ ■ G■ ■-0■ ■ ■**
	1500	5500	10000	9000	12000	7 (9.39)	8.5 (11.4)	10 (13.4)	9.25 (12.4)	**1PH7105-■ ■ F■ ■-0■ ■ ■**
	1000	5500	10000	9000	12000	6.25 (8.38)	7.5 (10.1)	8.8 (11.8)	7.75 (10.4)	**1PH7107-■ ■ D■ ■-0■ ■ ■**
	1500					9 (12.1)	11 (14.8)	13 (17.4)	12 (16.1)	**1PH7107-■ ■ F■ ■-0■ ■ ■**
	2000					10.5 (14.1)	12.5 (16.8)	14.5 (19.4)	13.5 (18.1)	**1PH7107-■ ■ G■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**
	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit incremental encoder (encoder IN22DQ)	**Q**
Terminal box/ cable entry:	Top/from right	**0**
	Top/from NDE	**2**
	Top/from left	**3**
Type of construction:[5]	IM B3 (IM V5, IM V6)	**0**
	IM B5 (IM V1, IM V3)	**2**
	IM B35 (IM V15, IM V35)	**3**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	**B**
Coupling/belt output	Grade S	Tolerance R	**C**
Coupling/belt output Increased speed (coupling/belt output)	Grade SR	Tolerance R	**D**
	Grade SR	Tolerance R	**L**

Shaft extension DE:[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Axial	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Axial	**J**
Plain shaft	–	NDE → DE	Axial	**K**

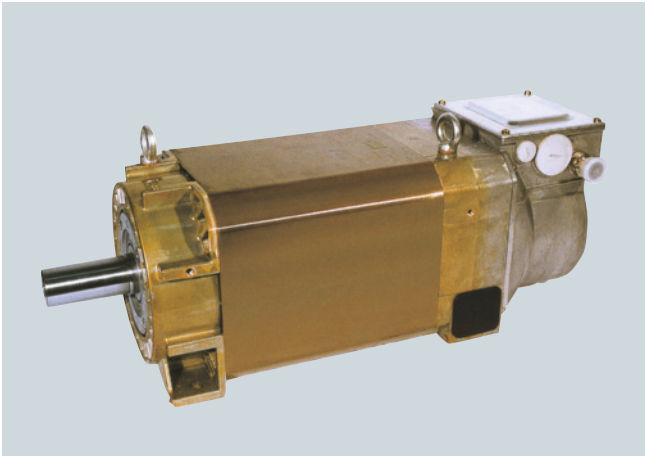
Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	**Booksize format** For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7101-..F...	23.6 (17.4)	0.017 (0.15)	43 (94.8)	10	11.5	12.5	12	18	**6SL312■-■TE21-8AA3**
1PH7103-..D...	35.3 (26.0)	0.017 (0.15)	43 (94.8)	10	11.5	13	12	18	**6SL312■-■TE21-8AA3**
1PH7103-..F...	35.0 (25.8)			13	16	18	16.5	18	**6SL312■-■TE21-8AA3**
1PH7103-..G...	33.4 (24.6)			17.5	20.5	23.5	21.5	18	**6SL312■-■TE21-8AA3**
1PH7105-..F...	44.6 (32.9)	0.029 (0.26)	64 (141)	17.5	21	23.5	22	18	**6SL312■-■TE21-8AA3**
1PH7107-..D...	59.7 (44.0)	0.029 (0.26)	64 (141)	17.5	20.5	23	21	18	**6SL312■-■TE21-8AA3**
1PH7107-..F...	57.3 (43.3)			23.5	27.5	31	29	30	**6SL312■-1TE23-0AA3**
1PH7107-..G...	50.1 (37.0)			26	28.5	33	31	30	**6SL312■-1TE23-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**



1PH7 motor (SH 100 to SH 160)

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min.
For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
• Shaft sealing ring.

5) For preconditions for gearbox mounting, please refer to Gearboxes.

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

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1PH7 motors, standard type
SH 132 – Forced ventilation

Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module										
132	1500	4500	8500	8000	10000	11 (14.8)	13.5 (18.1)	16.5 (22.1)	15 (20.1)	**1PH7131-■ ■F■ ■-0■ ■ ■**
	1000	4500	8500	8000	10000	12 (16.1)	15 (20.1)	18.5 (24.8)	16 (21.5)	**1PH7133-■ ■D■ ■-0■ ■ ■**
	1500					15 (20.1)	18.5 (24.8)	23 (30.8)	20.5 (27.5)	**1PH7133-■ ■F■ ■-0■ ■ ■**
	2000					20 (26.8)	25 (33.5)	30 (40.2)	27.5 (36.9)	**1PH7133-■ ■G■ ■-0■ ■ ■**
	1500	4500	8500	8000	10000	18.5 (24.8)	23 (30.8)	28 (37.6)	25.5 (34.2)	**1PH7135-■ ■F■ ■-0■ ■ ■**
	1000	4500	8500	8000	10000	17 (22.8)	20.5 (27.5)	25 (33.5)	22.5 (30.2)	**1PH7137-■ ■D■ ■-0■ ■ ■**
	1500					22 (29.5)	27.5 (36.9)	33 (44.3)	30 (40.2)	**1PH7137-■ ■F■ ■-0■ ■ ■**
	2000					28 (37.6)	35 (46.9)	43 (57.7)	39 (52.3)	**1PH7137-■ ■G■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**
	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit incremental encoder (encoder IN22DQ)	**Q**
Terminal box/ cable entry:	Top/from right	**0**
	Top/from NDE	**2**
	Top/from left	**3**
Type of construction:[5]	IM B3 (IM V5, IM V6)	**0**
	IM B5 (IM V1, IM V3)	**2**
	IM B35 (IM V15, IM V35)	**3**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	**B**
Coupling/belt output	Grade S	Tolerance R	**C**
Coupling/belt output Increased speed (coupling/belt output)	Grade SR	Tolerance R	**D**
	Grade SR	Tolerance R	**L**

Shaft extension DE:[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Axial	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Axial	**J**
Plain shaft	–	NDE → DE	Axial	**K**

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

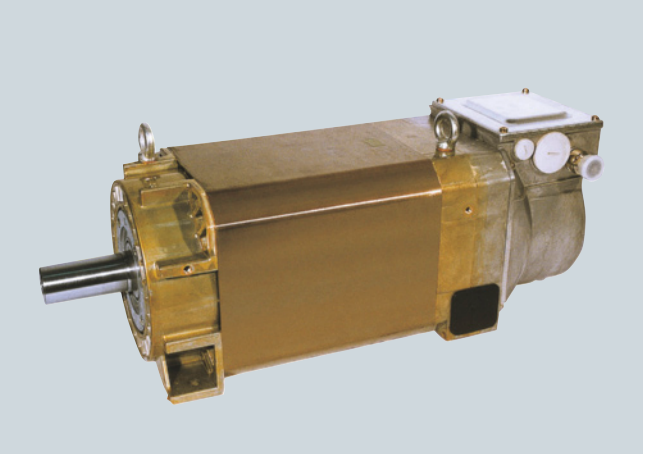
To select the type of construction and degree of protection, see Selection guides.

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1PH7 motors, standard type
SH 132 – Forced ventilation

Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	**Booksize format** For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7131-..F...	70.0 (51.6)	0.076 (0.67)	102 (225)	24	29	34	31.5	30	**6SL312■-1TE23-0AA3**
1PH7133-..D...	114.6 (84.5)	0.076 (0.67)	102 (225)	30	36	43	37.5	30	**6SL312■-1TE23-0AA3**
1PH7133-..F...	95.5 (70.4)			34	41	49	43.5	45	**6SL312■-1TE24-5AA3**
1PH7133-..G...	95.5 (70.4)			45	54	63	59	45	**6SL312■-1TE24-5AA3**
1PH7135-..F...	117.8 (86.9)	0.109 (0.96)	129 (284)	42	50	58	54	45	**6SL312■-1TE24-5AA3**
1PH7137-..D...	162.3 (119.7)	0.109 (0.96)	129 (284)	43	50	60	54	45	**6SL312■-1TE24-5AA3**
1PH7137-..F...	140.1 (103.3)			57	68	79	73	60	**6SL312■-1TE26-0AA3**
1PH7137-..G...	133.7 (98.6)			60	73	87	80	60	**6SL312■-1TE26-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**



1PH7 motors (SH 100 to SH 160)

8

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min.
For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
• Shaft sealing ring.

5) For preconditions for gearbox mounting, please refer to Gearboxes.

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

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Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module										
160	500	3700	7000	6500	8000	12 (16.1)	15 (20.1)	18 (24.1)	16.5 (22.1)	**1PH7163-■ ■B■ ■-0■ ■ ■**
	1000					22 (29.5)	27 (36.2)	33 (44.3)	30 (40.2)	**1PH7163-■ ■D■ ■-0■ ■ ■**
	1500					30 (40.2)	37 (49.6)	45 (60.4)	41 (55.0)	**1PH7163-■ ■F■ ■-0■ ■ ■**
	2000					36 (48.3)	44 (59.0)	52 (69.7)	48 (64.4)	**1PH7163-■ ■G■ ■-0■ ■ ■**
	500	3700	7000	6500	8000	16 (21.5)	19.5 (26.1)	24 (32.2)	21.5 (28.8)	**1PH7167-■ ■B■ ■-0■ ■ ■**
	1000					28 (37.5)	34.5 (46.3)	42 (56.3)	38 (51.0)	**1PH7167-■ ■D■ ■-0■ ■ ■**
	1500					37 (49.6)	46 (61.7)	56 (75.1)	51 (68.4)	**1PH7167-■ ■F■ ■-0■ ■ ■**
	2000					41 (55.0)	51 (68.4)	61 (81.8)	56 (75.1)	**1PH7167-■ ■G■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**
	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit incremental encoder (encoder IN22DQ)	**Q**
Terminal box/ cable entry:	Top/from right	**0**
	Top/from NDE	**2**
	Top/from left	**3**
Type of construction:[5]	IM B3 (IM V5, IM V6)	**0**
	IM B35 (IM V15, IM V35)[7]	**3**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	**B**
Coupling/belt output	Grade S	Tolerance R	**C**
Coupling/belt output Increased speed (coupling/belt output)	Grade SR	Tolerance R	**D**
	Grade SR	Tolerance R	**L**

Shaft extension DE:[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Axial	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Axial	**J**
Plain shaft	–	NDE → DE	Axial	**K**

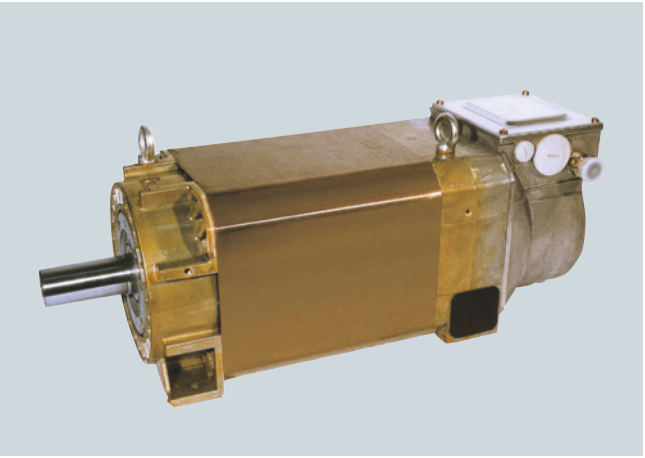
Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

To select the type of construction and degree of protection, see Selection guides

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	**Booksize format** For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7163-..B...	229.2 (169)	0.19 (1.68)	198 (437)	30	36	42	39	30	**6SL312■ -1TE23-0AA3**
1PH7163-..D...	210.1 (155)			55	65	77	71	60	**6SL312■ -1TE26-0AA3**
1PH7163-..F...	191.0 (141)			72	86	102	94	85	**6SL312■ -1TE28-5AA3**
1PH7163-..G...	171.9 (127)			85	100	114	107	85	**6SL312■ -1TE28-5AA3**
1PH7167-..B...	305.5 (225)	0.23 (2.04)	231 (509)	37	44	53	48	45	**6SL312■ -1TE24-5AA3**
1PH7167-..D...	267.4 (197)			71	85	100	92	85	**6SL312■ -1TE28-5AA3**
1PH7167-..F...	235.5 (174)			82	97	115	104	85	**6SL312■ -1TE28-5AA3**
1PH7167-..G...	195.8 (144)			89	106	124	115	132	**6SL312■ -1TE31-3AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**



1PH7 motor (SH 100 to SH 160)

8

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min.
For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
• Shaft sealing ring.

5) For preconditions for gearbox mounting, please refer to Gearboxes.

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

7) Motors of shaft height 160 and higher require foot support.

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1PH7 motors, standard type
SH 180 – Forced ventilation

Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}	n_{max}[5]	P_{rated}				
	rpm	rpm	rpm	rpm	rpm	rpm	S1 kW (HP)	S6-60 % kW (HP)	S6-40 % kW (HP)	S2-30 min kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module											
180	500	3500	3000	4500	5000	7000	21.5 (28.8)	26.5 (35.5)	30.5 (40.9)	30 (40.2)	**1PH7184-■ ■T■ ■-0■ ■ ■**
	1000						39 (52.3)	48 (64.4)	58 (77.8)	58 (77.8)	**1PH7184-■ ■D■ ■-0■ ■ ■**
	1250						40 (53.6)	50 (67.1)	56 (75.1)	66 (88.5)	**1PH7184-■ ■E■ ■-0■ ■ ■**
	1500						51 (68.4)	68 (91.2)	81 (109)	81 (109)	**1PH7184-■ ■F■ ■-0■ ■ ■**
	2500						78 (105)	97 (130)	115 (154)	115 (154)	**1PH7184-■ ■L■ ■-0■ ■ ■**
	500	3500	3000	4500	5000	7000	29.6 (39.7)	36.5 (48.9)	43 (57.7)	38 (51.0)	**1PH7186-■ ■T■ ■-0■ ■ ■**
	1000						51 (68.4)	65 (87.2)	77 (103)	77 (103)	**1PH7186-■ ■D■ ■-0■ ■ ■**
	1250						60 (80.5)	71 (95.2)	80 (107)	84 (113)	**1PH7186-■ ■E■ ■-0■ ■ ■**
	1500						74 (99.2)	94 (126)	113 (152)	113 (152)	**1PH7186-■ ■F■ ■-0■ ■ ■**
	2500						106 (142)	131 (176)	157 (211)	165 (221)	**1PH7186-■ ■L■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	External fan unit, metric cable entry in terminal box	7
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	E
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	M
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	N
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	F
	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit incremental encoder (encoder IN22DQ)	Q
Terminal box/ cable entry:	Top/from right	0
	Top/from DE	1
	Top/from NDE	2
	Top/from left	3
Type of construction:	IM B3	0
	IM B3 (IM V5, IM V6) (hoisting system for vertical types of construction)	1
	IM B35[9]	3
	IM B35 (Only for 1PH7184 with 450 mm (17.7 in) flange)[9]	4
	IM B35 (IM V15, IM V35) (hoisting system for vertical types of construction)[9]	5
	IM B35 (IM V15, IM V35) (Only for 1PH7184 with 450 mm (17.7 in) flange)[9]	6

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling output	Grade R	Tolerance N	A
Coupling output	Grade R	Tolerance R	B
Coupling output	Grade S	Tolerance R	C
Coupling output	Grade SR	Tolerance R	D
Belt output	Grade R	Tolerance N	E
Belt output	Grade R	Tolerance R	F
Increased cantilever force (belt output)	Grade R	Tolerance N	G
Increased cantilever force (belt output)	Grade R	Tolerance R	H
Increased speed (coupling output)	Grade S	Tolerance R	J

Shaft extension DE:[7]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Right	A
Fitted key	Half-key	NDE → DE	Axial	B
Fitted key	Full-key	DE → NDE	Right	C
Fitted key	Full-key	NDE → DE	Axial	D
Plain shaft	–	DE → NDE	Right	J
Plain shaft	–	NDE → DE	Axial	K

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Primed	0
IP55, fan IP54	DE flange with shaft sealing ring[6]	Primed	2
IP55, fan IP54	–	Anthracite	3
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	5
IP55, fan IP54	–	Anthracite, two coats	6
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	8

To select the type of construction and degree of protection, see Selection guides

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.[8]	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	S1 A	S6-60 % A	S6-40 % A	S2-30 min A	A	Order No.
1PH7184-..T...	410 (302)	0.5 (4.43)	390 (860)	76	90	103	102	85	**6SL312■-1TE28-5AA3**
1PH7184-..D...	372 (274)			90	106	126	126	132	**6SL312■-1TE31-3AA3**
1PH7184-..E...	305 (225)			85	100	114	128	85	**6SL312■-1TE28-5AA3**
1PH7184-..F...	325 (240)			120	149	174	174	132	**6SL312■-1TE31-3AA3**
1PH7184-..L...	298 (220)			172	204	237	237	200	**6SL312■-1TE32-0AA3**
1PH7186-..T...	565 (417)	0.67 (5.93)	460 (1014)	105	126	147	130	132	**6SL312■-1TE31-3AA3**
1PH7186-..D...	487 (359)			118	141	164	164	132	**6SL312■-1TE31-3AA3**
1PH7186-..E...	458 (338)			120	135	150	156	132	**6SL312■-1TE31-3AA3**
1PH7186-..F...	471 (347)			170	210	250	266	200	**6SL312■-1TE32-0AA3**
1PH7186-..L...	405 (299)			235	290	345	355	260	**6SL332■-1TE32-1AA3**

Format:	
Booksize	**1**
Chassis	**3**
Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**



1PH7 motor (SH 180 and SH 225)

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased cantilever force.

4) Bearing version for increased maximum speed.

5) Version for increased maximum speed only possible with vibration magnitude grade S. The following options are not possible:
- Shaft sealing ring

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible for type of construction IM B3 (IM V5, IM V6), version with increased cantilever force or increased maximum speed.

7) For preconditions for gearbox mounting, please refer to Gearboxes.

8) Applies to type of construction IM B35, as type of construction IM B3, the motor is 20 kg (44 lb) lighter.

9) Motors of shaft height 160 and higher require foot support.

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Main spindle motors for SINAMICS S120

1PH7 motors, standard type
SH 225 – Forced ventilation

Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}	n_{max}[5]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – Line voltage 400 V 3 AC, operation on Active Line Module											
225	700	3100	2700	3600	4500	5500	55 (73.8)	66 (88.5)	75 (101)	78 (105)	**1PH7224-■ ■C■ ■-0■ ■ ■**
	1000						71 (95.2)	88 (118)	105 (141)	114 (153)	**1PH7224-■ ■D■ ■-0■ ■ ■**
	1500						100 (134)	126 (169)	136 (182)	140 (188)	**1PH7224-■ ■F■ ■-0■ ■ ■**
	2500						142 (190)	176 (236)	210 (282)	220 (295)	**1PH7224-■ ■L■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	External fan unit, metric cable entry in terminal box	7
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	E
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	M
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	N
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	F
	22 bit incremental encoder + commutation position (encoder IC22DQ)	D
	22 bit incremental encoder (encoder IN22DQ)	Q
Terminal box/ cable entry:	Top/from right	0
	Top/from DE	1
	Top/from NDE	2
	Top/from left	3
Type of construction:	IM B3	0
	IM B3 (IM V5, IM V6) (hoisting system for vertical types of construction)	1
	IM B35[9]	3
	IM B35 (IM V15, IM V35) (hoisting system for vertical types of construction)[9]	5

Bearing version for:	Vibration magnitude:	Shaft and flange accuracy:	
Coupling output	Grade R	Tolerance N	A
Coupling output	Grade R	Tolerance R	B
Coupling output	Grade S	Tolerance R	C
Coupling output	Grade SR	Tolerance R	D
Belt output	Grade R	Tolerance N	E
Belt output	Grade R	Tolerance R	F
Increased cantilever force (belt output)	Grade R	Tolerance N	G
Increased cantilever force (belt output)	Grade R	Tolerance R	H
Increased speed (coupling output)	Grade S	Tolerance R	J

Shaft extension DE:[7]	Balancing:	Direction of air flow (fan):	Blow-out direction:	
Fitted key	Half-key	DE → NDE	Right	A
Fitted key	Half-key	NDE → DE	Axial	B
Fitted key	Full-key	DE → NDE	Right	C
Fitted key	Full-key	NDE → DE	Axial	D
Plain shaft	–	DE → NDE	Right	J
Plain shaft	–	NDE → DE	Axial	K

Degree of protection:	Seal:	Paint finish:	
IP55, fan IP54	–	Primed	0
IP55, fan IP54	DE flange with shaft sealing ring[6]	Primed	2
IP55, fan IP54	–	Anthracite	3
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	5
IP55, fan IP54	–	Anthracite, two coats	6
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	8

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.[8]	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7224-..C...	750 (553)	1.48 (13.1)	650 (1433)	117	135	149	155	132	**6SL312■-1TE31-3AA3**
1PH7224-..D...	678 (500)			164	190	222	240	200	**6SL312■-1TE32-0AA3**
1PH7224-..F...	636 (469)			188	230	248	256	200	**6SL312■-1TE32-0AA3**
1PH7224-..L...	542 (400)			298	355	419	430	310	**6SL332■-1TE33-1AA3**

Format:	
Booksize	**1**
Chassis	**3**
Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**



1PH7 motor (SH 180 and SH 225)

[1] For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min.
For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

[2] Bearing version for coupling/belt output.

[3] Bearing version for increased cantilever force.

[4] Bearing version for increased maximum speed.

[5] Version for increased maximum speed only possible with vibration magnitude grade S. The following options are not possible:
- Shaft sealing ring

[6] Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible for type of construction IM B3 (IM V5, IM V6), version with increased cantilever force or increased maximum speed.

[7] For preconditions for gearbox mounting, please refer to Gearboxes.

[8] Applies to type of construction IM B35, as type of construction IM B3, the motor is 20 kg (44 lb) lighter.

[9] Motors of shaft height 160 and higher require foot support.

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Asynchronous motors

Main spindle motors for SINAMICS S120

1PH7 motors, standard type
SH 225 – Forced ventilation

Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]		Rated power for duty type				1PH7 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}	n_{max}[5]	P_{rated} S1	S6-60 %	S6-40 %	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.
Forced ventilation – LIne voltage 400 V 3 AC, operation on Active Line Module											
225	1000	3100	2700	–	4500	–	92 (123)	114 (153)	136 (182)	136 (182)	**1PH7226-■ ■D■ ■-0■ ■ ■**
	1500						130 (174)	161 (216)	192 (257)	200 (268)	**1PH7226-■ ■F■ ■-0■ ■ ■**
	2500						168 (225)	208 (279)	248 (333)	265 (355)	**1PH7226-■ ■L■ ■-0■ ■ ■**
	1000	3100	2700	–	4500	–	113 (152)	140 (188)	167 (224)	167 (224)	**1PH7228-■ ■D■ ■-0■ ■ ■**
	1500						160 (215)	198 (266)	237 (318)	237 (318)	**1PH7228-■ ■F■ ■-0■ ■ ■**
	2500						205 (275)	254 (341)	303 (406)	310 (416)	**1PH7228-■ ■L■ ■-0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**
	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit incremental encoder (encoder IN22DQ)	**Q**
Terminal box/ cable entry:	Top/from right	**0**
	Top/from DE	**1**
	Top/from NDE	**2**
	Top/from left	**3**
Type of construction:	IM B3	**0**
	IM B3 (IM V5, IM V6) (hoisting system for vertical types of construction)	**1**
	IM B35[9]	**3**
	IM B35 (IM V15, IM V35) (hoisting system for vertical types construction)[9]	**5**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling output	Grade R	Tolerance N	**A**
Coupling output	Grade R	Tolerance R	**B**
Coupling output	Grade S	Tolerance R	**C**
Coupling output	Grade SR	Tolerance R	**D**
Belt output	Grade R	Tolerance N	**E**
Belt output	Grade R	Tolerance R	**F**
Increased cantilever force (belt output)	Grade R	Tolerance N	**G**
Increased cantilever force (belt output)	Grade R	Tolerance R	**H**
Increased speed (coupling output)	Grade S	Tolerance R	**J**

Shaft extension DE:[7]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Right	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Right	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Right	**J**
Plain shaft	–	NDE → DE	Axial	**K**

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Primed	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Primed	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

To select the type of construction and degree of protection, see Selection guides.

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.[8]	Rated current for duty type				SINAMICS S120 Motor Module	
								Rated output current for S1 duty	For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}				I_{rated}	
				S1	S6-60 %	S6-40 %	S2-30 min		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	Order No.
1PH7226-..D...	880 (649)	1.930 (17.1)	750 (1654)	198	237	280	389	200	**6SL312■-1TE32-0AA3**
1PH7226-..F...	828 (611)			278	330	387	395	310	**6SL332■-1TE33-1AA3**
1PH7226-..L...	642 (474)			362	428	501	511	380	**6SL332■-1TE33-8AA3**
1PH7228-..D...	1080 (797)	2.326 (20.6)	860 (1896)	240	289	342	348	260	**6SL332■-1TE32-6AA3**
1PH7228-..F...	1019 (752)			350	413	483	491	380	**6SL332■-1TE33-8AA3**
1PH7228-..L...	783 (578)			433	534	630	639	490	**6SL332■-1TE35-0AA3**

Format:	
Booksize	**1**
Chassis	**3**
Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**



1PH7 motor (SH 180 and SH 225)

8

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH7 Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased cantilever force.

4) Bearing version for increased maximum speed.

5) Version for increased maximum speed only possible with vibration magnitude grade S. The following options are not possible:
- Shaft sealing ring

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible for type of construction IM B3 (IM V5, IM V6), version with increased cantilever force or increased maximum speed.

7) For preconditions for gearbox mounting, please refer to Gearboxes.

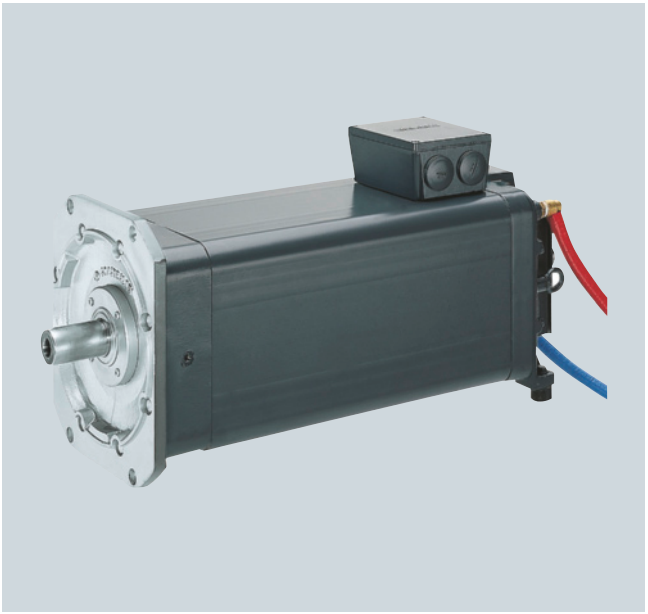
8) Applies to type of construction IM B35, as type of construction IM B3, the motor is 20 kg (44 lb) lighter.

9) Motors of shaft height 160 and higher require foot support.

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1PH4 motors

Overview



Given the compact design of modern machines, the heat loss from electrical drives can have an adverse effect on the accuracy of machining. The resulting demands for cold motors with a high power density led to the development of the water-cooled 1PH4 motors.

Furthermore, a combination of high torque and small construction volume (low mass inertia) results in short acceleration and braking times, and thus in a reduction in non-productive time.

1PH4 motors are rugged, 4-pole asynchronous motors with squirrel-cage rotors. Power loss and noise emission are reduced to a minimum. Thanks to the compact design of the motors, high maximum speeds can be achieved.

The motors are equipped with an encoder system for sensing the motor speed and indirect position. In machine tools, the encoder system is capable of C-axis operation as standard – that is, an additional encoder is not required for C-axis operation.

Benefits

- High power density thanks to the small construction volume
- Maximum speeds of up to 9000 rpm (optional: 12000 rpm)
- Full rated torque is continuously available, even at standstill
- Cooled flange to prevent thermal stressing of the connected mechanical power train
- Low noise level
- High degree of protection IP65 (shaft exit IP55)
- High rotational accuracy
- High cantilever force loading
- Ruggedness

Application

- Wherever 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
- On special machines, when cooling water is available due to the process
- Milling machines with full enclosure
- High-load milling spindles
- Counterspindles or rotating tools for turning machines

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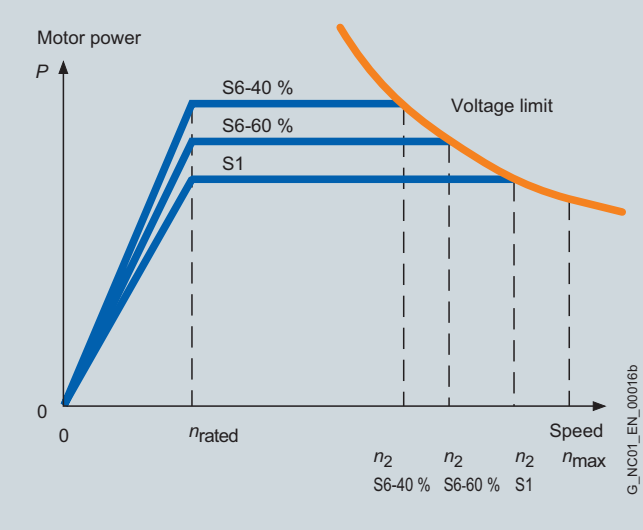
Technical specifications

Product name	1PH4 motor
Cooling	Water cooling
Coolant inlet temperature	Because of the formation of condensation, we recommend a coolant inlet temperature of approx. 30 °C (86 °F), depending on the ambient conditions.
Cooling water pressure at inlet, max.	7 bar
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 of up to 30 °C (86 °F)
Encoder system, built-in	
• Without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R without C and D tracks (encoder IN2048S/R) • Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R) • Absolute encoder 2048 S/R single-turn, 4096 revolutions multi-turn, with EnDat interface (encoder AM2048S/R)
• With DRIVE-CLiQ interface	• 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) + 11 bit commutation position (encoder IC22DQ) • 22 bit incremental encoder (resolution 4194304, 2048 S/R internal) without commutation position (encoder IN22DQ) • 22 bit absolute encoder single-turn (resolution 4194304, 2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions) (encoder AM22DQ)
Type of construction in accordance with EN 60034-7 (IEC 60034-7)	IM B35 (IM V15, IM V35)
Terminal box location (view DE)[1]	Top, rotatable 4 × 90°
Terminal box connection type	
• Motor • Encoder system and PTC thermistor	Terminals in terminal box 12-pin/17-pin circular socket (without mating connector) or DRIVE-CLiQ
Bearing version on DE[2]	Duplex bearing for belt or coupling output (minimum cantilever force required)
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade R (reduced)
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[3]	Tolerance N (normal)
Shaft extension DE in accordance with DIN 748-3 (IEC 60072-1)	Full-key balancing with keyway
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65, IP55 on shaft exit
Sound pressure level L_{pA} (1 m) in accordance with EN ISO 1680 Tolerance + 3 dB	
• 1PH410/1PH413 • 1PH416	69 dB 71 dB
Paint finish	Anthracite
Approvals, according to	cURus

S/R = signals/revolution

Refer to Liquid cooling for a list of heat exchanger manufacturers.

Characteristic curves



Typical speed/power graph for AC motors[4]

The graph shows the typical relationship between motor speed and drive power in 1PH4 motors for duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60 % (S6-60 %) or 40 % (S6-40 %) with a maximum duty cycle time of 10 minutes.

1PH4 motor	Rated speed	Attainable speed for rated power in duty type		
Type	n_{rated}	n_2[5]		
		S1	S6-60 %	S6-40 %
	rpm	rpm	rpm	rpm
1PH4103	1500	8600	7500	6500
1PH4105		8800	7600	6500
1PH4107		8600	7400	6400
1PH4133	1500	8000	7400	6000
1PH4135		7400	6200	5500
1PH4137		6800	5800	5000
1PH4138		7800	6600	5800
1PH4163	1500	6300	5200	4500
1PH4167		5200	4400	3800
1PH4168		6300	5300	4600

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

2) For maximum permissible load, see the 1PH4 Motors Configuration Manual.

3) Shaft extension run-out, concentricity of centering and shaft, and perpendicularity of flange to shaft.

4) For further configuration information, see the 1PH4 Motors Configuration Manual.

5) Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system. It you are using a Smart Line Module, proceed in accordance with the 1PH4 Motors Configuration Manual.

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Selection and ordering data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]			Rated power for duty type			1PH4 asynchronous motor with solid shaft Standard type
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}[2]	n_{max}[3]	n_{max}[4]	P_{rated}			
								S1	S6-60 %	S6-40 %	
	rpm	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	Order No.
Water cooling – Line voltage 400 V 3 AC, operation on Active Line Module											
100	1500	5600	6500	10000	7500	9000	12000	7.5 (10.1)	8.75 (11.7)	10 (13.4)	**1PH4103-4■F26**
								11 (14.8)	12.75 (17.1)	14.75 (19.8)	**1PH4105-4■F26**
								14 (18.8)	16.25 (21.8)	18.75 (25.1)	**1PH4107-4■F26**
132	1500	5200	6000	9250	6700	8000	10000	15 (20.1)	18 (24.1)	21 (28.2)	**1PH4133-4■F26**
								22 (29.5)	26.5 (35.5)	31 (41.6)	**1PH4135-4■F26**
								27 (36.2)	32.5 (43.6)	38 (51.0)	**1PH4137-4■F26**
								30 (40.2)	36 (48.3)	42 (56.3)	**1PH4138-4■F26**
160	1500	4000	4500	7000	5300	6500	8000	37 (49.6)	45 (60.3)	52.5 (70.4)	**1PH4163-4■F26**
								46 (61.7)	55 (73.8)	65 (87.2)	**1PH4167-4■F26**
								52 (69.7)	62.5 (83.8)	73 (97.9)	**1PH4168-4■F26**

Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R (encoder AM2048S/R)	**E**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R)	**M**
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R (encoder IN2048S/R)	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	22 bit absolute encoder single-turn +12 bit multi-turn (encoder AM22DQ)	**F**
	22 bit incremental encoder + commutation position (encoder IC22DQ)	**D**
	22 bit incremental encoder (encoder IN22DQ)	**Q**

Options

Description	Order code
Bearing version (view drive end) (standard = duplex bearing) • Single bearing for coupling, for low to medium cantilever forces or planetary gearboxes (e.g. mounting of a ZF gearbox 2LG43...)[5)6)]	**K00**
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14) (standard = vibration magnitude grade R, duplex bearing) • Grade S with duplex bearing[7)] • Grade S with single bearing[7)] • Grade SR with single bearing[7)]	 **K05** **K02** **K03**
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) (standard = tolerance N) • Tolerance R[8)]	 **K04**
Shaft extension DE (standard = full-key balancing with keyway) • Plain shaft • Half-key balancing	 **K42** **L69**

Description	Order code
Shaft seal DE[9)] • Radial shaft sealing ring, oil-tight, IP65	 **K18**
Brake[6)] • With holding brake mounted on DE	 **G46**
Terminal box location (view DE) (standard = top) • Right side, cable entry from below[6)] • Left side, cable entry from below[6)] Rotation of terminal box on its own axis • By 90°, cable entry from drive end[10)] • By 90°, cable entry from non-drive end[10)] • By 180°, cable entry from above[10)]	 **K09**[12)] **K10**[13)] **K83** **K84** **K85**[12)]
Speed[11)] • With increased maximum speed and half-key balancing	 **L37**
Other • Second rating plate, separately packed	 **K31**

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.

Order No. **1PH4135-4NF26-Z**

Order codes **K05** + **K09** + **K31**

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Motor type (repeated)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type			SINAMICS S120 Motor Module	
							Required rated output current for S1 duty	Booksize format For additional versions and components, see SINAMICS S120 drive system
	M_{rated}	J	m	I_{rated}			I_{rated}	
				S1	S6-60 %	S6-40 %		
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A		Order No.
1PH4103-...	48 (35.4)	0.017 (0.15)	52 (115)	26	29	32	30	**6SL312■-1TE23-0AA3**
1PH4105-...	70 (51.6)	0.024 (0.21)	67 (148)	38	42	47	45	**6SL312■-1TE24-5AA3**
1PH4107-...	90 (66.4)	0.031 (0.27)	80 (176)	46	52	58	60	**6SL312■-1TE26-0AA3**
1PH4133-...	95 (70.1)	0.046 (0.41)	90 (198)	55	65	74	60	**6SL312■-1TE26-0AA3**
1PH4135-...	140 (103)	0.071 (0.63)	112 (247)	73	86	99	85	**6SL312■-1TE28-5AA3**
1PH4137-...	170 (125)	0.085 (0.75)	130 (287)	85	100	114	85	**6SL312■-1TE28-5AA3**
1PH4138-...	190 (140)	0.097 (0.86)	150 (331)	102	119	136	132	**6SL312■-1TE31-3AA3**
1PH4163-...	235 (173)	0.17 (1.50)	175 (386)	107	125	142	132	**6SL312■-1TE31-3AA3**
1PH4167-...	293 (216)	0.206 (1.82)	210 (463)	120	138	158	132	**6SL312■-1TE31-3AA3**
1PH4168-...	331 (244)	0.22 (1.95)	240 (529)	148	173	197	200	**6SL312■-1TE32-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

Notes on water cooling

Motor Type	Coolant flow rate (water)	Connecting thread on non-drive end (NDE)
1PH410	6 l/min (1.59 US gallons)	G 1/4"
1PH413	8 l/min (2.11 US gallons)	G 3/8"
1PH416	10 l/min (2.64 US gallons)	G 1/2"

8

1) For continuous duty with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH4 Motors Configuration Manual.

2) Bearing version for duplex bearing.

3) Bearing version for single bearing.

4) Bearing version for increased speed using option L37.

5) Vibration magnitude grades S, SR and mounting position IM V35 not possible for integrated gearbox. Use order code K00 + G97 for old ZF gearbox 2LG42... (for gear selection, see Gearboxes).

6) Options gear mounting, built-on brake, terminal box location on side are mutually exclusive.

7) Automatically includes version K04. Options K05, K02 and K03 are mutually exclusive.

8) Increased shaft accuracy.

9) Only recommended if oil spray/mist occasionally gets onto the sealing ring.

10) Options K83, K84 and K85 are mutually exclusive.

11) Version for increased maximum speed includes vibration magnitude grade SR and half-key balancing. The following options are not possible:
- Shaft seal.

12) K09 or K10 cannot be combined with K85.

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1PH2 built-in motors for direct drive

Overview



Active parts (rotor and stator) of 1PH2 asynchronous built-in motors

1PH2 built-in motors for turning machines are liquid-cooled squirrel-cage AC asynchronous motors. These built-in motors have been specially developed for variable-speed operation of main spindles on turning machines.

Benefits

- Compact design obtained by dispensing with mechanical components such as coupling, belt drive, gearbox and spindle encoder
- High power density as a result of liquid cooling
- The absence of drive transverse forces permits extremely high accuracy on workpiece due to smooth, accurate spindle motion even at very low speeds
- Extremely short ramp-up and braking times
- Full rated torque is continuously available, even at standstill
- Simple servicing by replacing complete motor spindles
- Increased rigidity of the spindle drive, achieved by mounting the motor components between the main spindle bearings
- C-axis compatibility with hollow-shaft measuring system mounted on the spindle
- Low noise level due to absence of machine elements
- Torque is transmitted to the spindle mechanically without play 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 does not need to be finished after mounting.

Application

1PH2 built-in motors are used for machines requiring excellent machining quality, accuracy and running smoothness.

- Turning machines
- Grinders

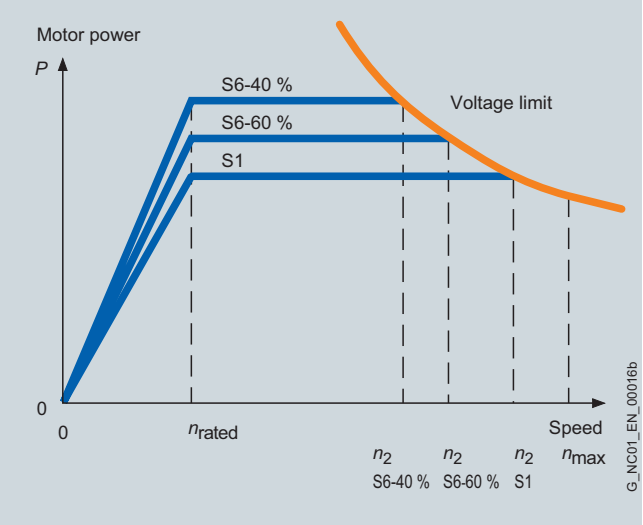
Technical specifications

Product name	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
Cooling flow rate (water)	8l/min (2.11 US gallons)
Connecting thread	Dependent on cooler 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 of up to 25 °C (77 °F)
Motor encoder, recommended	Hollow-shaft measuring system (not included in scope of supply)
Type of construction (cf. ISO)	Individual components: Stator, rotor
Motor connection type	Free cable ends with 0.5 m (19.7 in) or 1.5 m (59.1 in) length
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 supplied separately
Approvals, according to	cURus

Refer to Liquid cooling for a list of heat exchanger 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 1PH2 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60 % (S6-60 %) or 40 % (S6-40 %) with a maximum duty cycle time of 10 minutes.

1PH2 motor	Rated speed	Attainable speed for rated power in duty type		
Type	n_{rated}	n_2[2)]		
	rpm	S1 rpm	S6-60 % rpm	S6-40 % 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 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 1PH2 Motors Configuration Manual.

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1PH2 built-in motors for direct drive
Water cooling

Selection and ordering data

Rated speed	Speed, max.	Rated power for duty type[1]				1PH2 asynchronous built-in motor for direct drive Standard type	Rated torque[1]	
n_{rated}	n_{max}	P_{rated} S1	S1 ΔT=105 K	S6-60 %	S6-40 %		M_{rated}	ΔT=105 K
rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	Order No.	Nm (lb_f-ft)	Nm (lb_f-ft)
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**

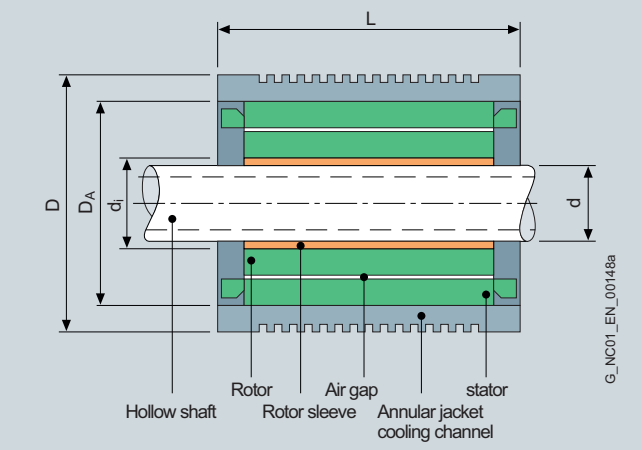
[1] Data for ΔT = 70 K, unless specified otherwise.

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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 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**

Dimensional drawing



1PH2 motor	Standard spindle diameter	Rotor internal diameter	Stator outer diameter	Total outer diameter	Total length
Type	d	d_i	D_A	D	L
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
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)

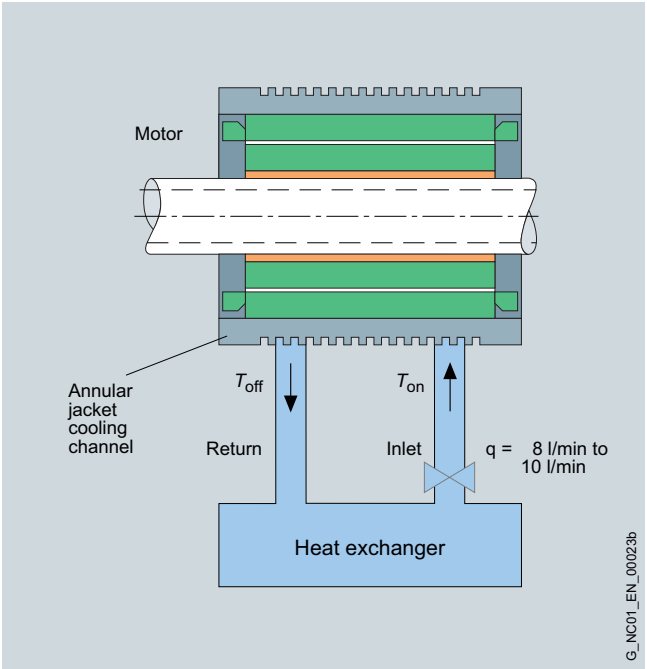
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For 1PH4/1PH2/1FE1 motors

Overview

Cooling principle

For design of the cooling units, see Configuration Manual.



Cooling unit manufacturers

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
Phone: +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
Phone: +49 2245 6107-0
Fax: +49 2245 6107-10
E-mail: info@deltatherm.de
www.deltatherm.com

Glen Dimplex Deutschland GmbH
Geschäftsbereich RIEDEL Kältetechnik

Contact: Mr. Schneider
Am Goldenen Feld 18
95326 KULMBACH, Germany
Phone: +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
Phone: +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
Phone: +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
Phone: +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
Phone: +49 9123 174-909
Fax: +49 9123 174-910
E-mail: goetz.titschack@kkt-kraus.com
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Contact: Mr. Hille
Werner-Witt-Straße 1
21035 HAMBURG, Germany
Phone: +49 40 73412-127
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E-mail: werner.hille@pfannenberg.com
www.pfannenberg.com

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Application

Change-speed gearboxes increase the drive torque at low motor speeds and expand the range of constant power output available from the main spindle motor. The full cutting capacity of modern machine tools can therefore be utilized throughout the entire speed range.

Benefits

The performance characteristics of the two-speed gearboxes for 1PH7/1PH4 motors are as follows:

- Drive power up to 100 kW (134 HP)
- Constant power range at drive shaft up to 1:24
- Suitable for both directions of rotation
- Motor shaft heights SH 100 to SH 225
- Types of construction IM B35 and IM V15 (IM V35 available on request)

Mounting the change-speed gearbox outside the headstock of the machine tool has the following advantages:

- Easy adaptation to the machine tool
- Low noise and no temperature fluctuations due to gearing inside the headstock
- Separate lubrication systems for the main spindle (grease) and the change-speed gearbox (oil)
- Gearbox efficiency > 95 %
- Instead of V belts, the drive power can also be transmitted from the gear output by a gear wheel (available on request) or coaxially by means of a flexible coupling.

Design

The two-speed gearboxes have a planetary design. The central sun wheel distributes the power to several planet wheels which revolve around it. The outstanding advantage of this design is its compactness. The gear-changing device, a splined sleeve that moves axially, is of form-fit design.

Position 1: Gear ratio $i_1 = 4$
Position 2: Gear ratio $i_2 = 1$

The motor is flange-mounted onto the change-speed gearbox using an adapter plate. The AC motor must be suitably prepared for mounting.

For shaft heights of SH 160 and higher, motors of types of construction IM B35 and IM V15 must be supported free from stress on the non-drive end.

Any transverse force imported into the gearbox has to be borne by the gearbox and transmitted to the machine base.

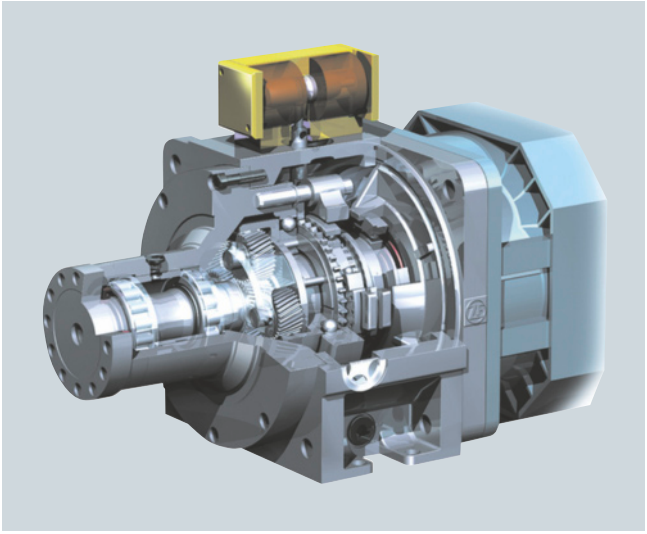
The motors for all 2K gearboxes must be full-key balanced with a fitted key. The 2K 120, 2K 250, 2K 300 gearboxes are enclosed, so that the motor flange is adequately sealed in the standard version.
Vertical mounting positions for the IM V15 and IM V35 require circulating-oil lubrication of the gearboxes.

The standard version of the change-speed gearboxes up to and including the 2K 300 has a maximum circumferential backlash of 30 angular minutes (measured at the gear output). Several special versions suitable for milling or machining with cut interruption can be supplied on request:

- Reduced backlash with special features: max. 20'
- Reduced backlash for high performance: max. 15'

[1] Not included in scope of supply.

Design (continued)



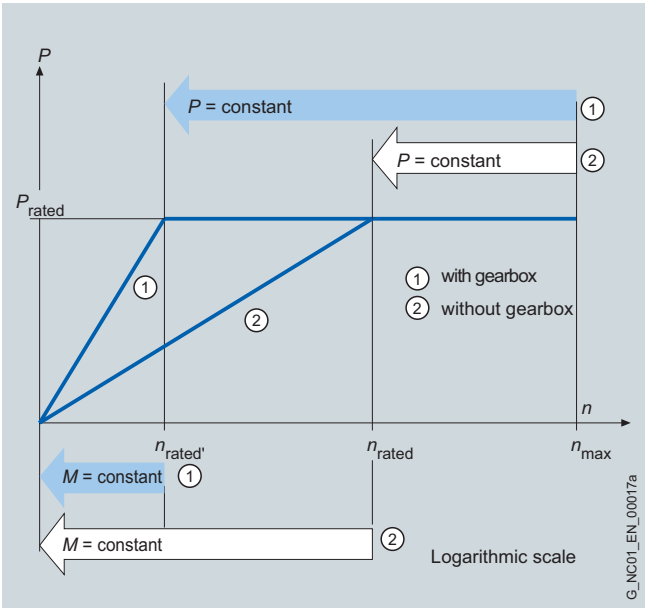
Profile of a planetary gearbox

The power unit (motor and gearbox) is supplied with vibration magnitude grade R in accordance with EN 60034-14 (IEC 60034-14). This is also the case when the motor is ordered with vibration magnitude grade S.

The belt pulley[1] should be a cup wheel type pulley.
For mounting the pulley, the output shaft on the gearbox has a flange with an external centering spigot and tapped holes for easy fitting and removal of the pulley.

Characteristic curves

The use of a change-speed gearbox permits the constant power range to be greatly increased.



Power-speed graph

Legend:

n_{rated}	Rated speed
$n_{rated'}$	Rated speed with two-stage gearbox
n_{max}	Max. permissible speed
P_{rated}	Rated power and constant power of the motor in the speed range between n_{rated} and n_{max} or $n_{rated'}$ and n_{max}
M	Torque

8

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Two-speed gearboxes for 1PH7/1PH4 motors

Technical specifications

1PH motor	Gearbox											
	ZF identifier	Type	Speed, max.[1]	Rated torque, permissible (S1 duty)			Maximum torque, permissible (S6-60 % duty)			Moment of inertia of gearbox		Weight of gearbox, approx.
Shaft height			Drive	Drive	Output $i = 1$	Output $i = 4$	Drive	Output $i = 1$	Output $i = 4$	Output $i = 1$	Output $i = 4$	
SH			n_{max}	M	M	M	M	M	M	J	J	m
			rpm	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kgm^2 (lb_f-in-s^2)	kg (lb)
100	2K 120	2LG4312-...	8000	120 (88.5)	120 (88.5)	480 (354)	140 (103)	140 (103)	560 (413)	0.0110 (0.10)	0.0114 (0.10)	30 (66.2)
132	2K 250	2LG4315-...	6300	250 (184)	250 (184)	1000 (738)	400 (295)	400 (295)	1600 (1180)	0.0270 (0.24)	0.0570 (0.50)	62 (137)
160	2K 300	2LG4320-...	6300	300 (221)	300 (221)	1200 (885)	400 (295)	400 (295)	1600 (1180)	0.0270 (0.24)	0.0570 (0.50)	70 (154)
180	2K 800 2K 801	2LG4250-... 2LG4260-...	5000	800 (590)	800 (590)	3200 (2360)	900 (664)	900 (664)	3600 (2655)	0.1956 (1.73)	0.1766 (1.56)	110 (243)
225	2K 802	2LG4270-...	On request									

For further binding technical specifications and configuring aid (e.g. lubrication, temperature rise and typical applications), please refer to the latest catalog supplied by ZF (Zahnradfabrik Friedrichshafen). The permissible characteristics of the motor and gearbox are a governing factor in the design of the complete drive unit (motor and gearbox).

With 1PH4168 or 1PH7167-2NB motors, for example, the rated torque must be reduced to 300 Nm (221 lb_f-ft). With motors of SH 132, please note that the maximum permissible speed of the 2K 250 gearbox for splash lubrication is 6300 rpm.

Selection and ordering data

Type of construction for complete unit	Output flange dimension D_2	**Two-speed gearbox (standard version)[2]** Gear stage $i_1 = 4$	
	mm (in)	Order No.	ZF identifier
For 1PH710/1PH410 motors[3]			
IM B5, IM B35, IM V1, IM V15	100 (3.94)	**2LG4312-3CC31**	2K 120
For 1PH713/1PH413 motors[3]			
IM B5, IM B35	118 (4.65)	**2LG4315-3FD11**	2K 250
IM V1, IM V15	118 (4.65)	**2LG4315-3FC11**	2K 250
For 1PH716/1PH416 motors[3]			
IM B35	130 (5.12)	**2LG4320-3JD11**	2K 300
IM V15	130 (5.12)	**2LG4320-3JC11**	2K 300
For 1PH7184 motors[4]			
IM B35, IM V15	180 (7.09)	**2LG4250-1JC11**	2K 800
For 1PH7186 motors[4]			
IM B35, IM V15	180 (7.09)	**2LG4260-1JC21**	2K 801

1) Higher drive speeds are allowed with oil-cooled gearboxes and for gear ratios $i = 1$ in some instances (refer to the ZF Catalog).

2) Special versions, such as gearboxes with different torsional backlash, or other gear ratios ($i = 3.17$ or $i = 5.5$), are available on request.

3) Preconditions: DE shaft extension with fitted key and full-key balancing. Option K18 required for 1PH4.

4) Preconditions: DE shaft extension with fitted key and full-key balancing. Bearing version for coupling output. Shaft and flange accuracy tolerance R. DE flange with shaft sealing ring.

Motors with built-on planetary gearbox

The 1PH motors can also be supplied with flange-mounted planetary gearboxes. The motor-gearbox unit is tested for correct functioning. The complete drive unit - that is, 1PH7 or 1PH4 motor with mounted ZF change-speed gearbox – can be ordered directly from Siemens:

Siemens AG

Industrial Solutions and Services
Contact: Mr. Britz

Im Schiffelland 10
66386 ST. INGBERT, Germany

Fax: +49 6894 891-112
E-mail: hans-peter.britz@siemens.com

The following details must be specified with the order:

Ordering example for 1PH4 motor:

Motor complete with gearbox
1PH4133-4NF26-Z
K00
2LG4315-3FD11

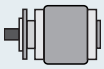
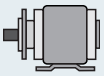
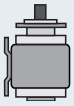
Ordering example for 1PH7 motor:

Motor complete with gearbox
1PH7186-2NE03-0BC2
2LG4260-1JC21
1PH7163-2NF03-0CC0
2LG4320-3JD11

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Type of construction/mounting position

More information

Type of construction/ mounting position	Designation	Type of construction/ mounting position	Designation	Type of construction/ mounting position	Designation
	IM B3		IM B5 IM B14		IM B35
	IM V5		IM V1 IM V18		IM V15
	IM V6		IM V3 IM V19		IM V35

Degree of protection

More information

The degree of protection designation in accordance with EN 60034-5 (IEC 60034-5) is made using the letters "IP" and two digits (e.g., IP64). The second digit in the degree of protection designation represents the protection against water, the first digit the protection against penetration of foreign matter.

Since coolants used for machine tools and transfer machines usually contain oil, are able to creep, and may also be corrosive, protection against water alone is insufficient. The indicated degree of protection should only be considered here as a guideline. The motors must 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.

The table can serve as a decision aid for selecting the proper degree of protection for motors. For a mounting position with vertical shaft end IM V3/IM V19, static fluid on the flange is only permitted with degree of protection IP67/IP68 and recessed DE flange in some cases.

Liquids / Effect	General workshop environment	Water; gen. cooling lubricant (95 % water, 5 % oil); oil	Creep oil; petroleum; aggressive cooling lubricants
Dry	IP64	–	–
Water-enriched environment	–	IP64	IP67[1)]
Mist	–	IP65	IP67
Spray	–	IP65	IP68
Jet	–	IP67	IP68
Surge, brief immersion; constant inundation	–	IP67	IP68

[1)] IP64 with dry run at shaft exit.

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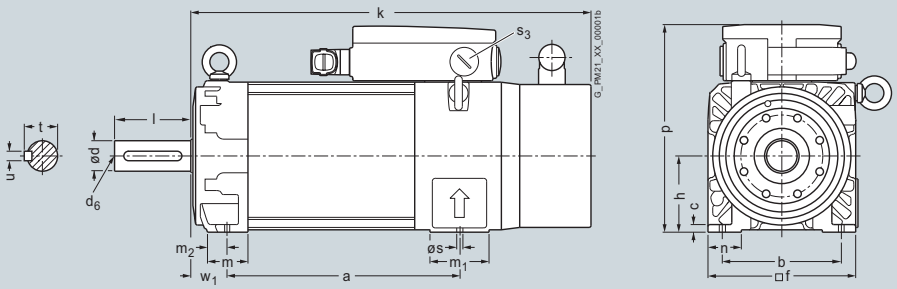
1PH8 motors
SH 80 – Forced ventilation

Dimensional drawings

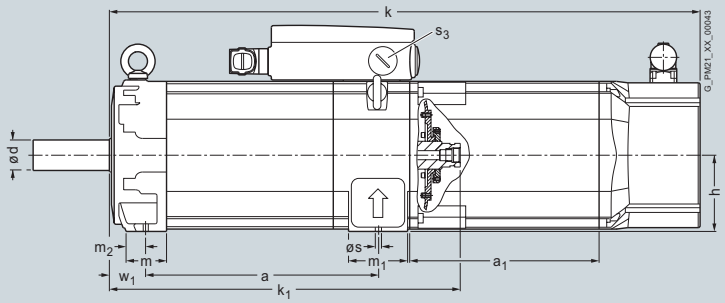
For motor			Dimensions in mm (in)														
Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	h H	k LB	m BA	m_1 –	m_2 –	n AA	p HD	p_1 –	s K	s_3 –	w_1 C
1PH8, type of construction IM B3, forced ventilation																	
80	1PH8083		194 (7.64)	125 (4.92)	8 (0.31)	155 (6.1)	80 (3.15)	375 (14.76)	42 (1.65)	62 (2.44)	20 (0.79)	35 (1.38)	216 (8.5)	253.5 (9.98)	10 (0.39)	M25×1.5	38 (1.5)
	1PH8087		244 (9.61)					425 (16.73)									

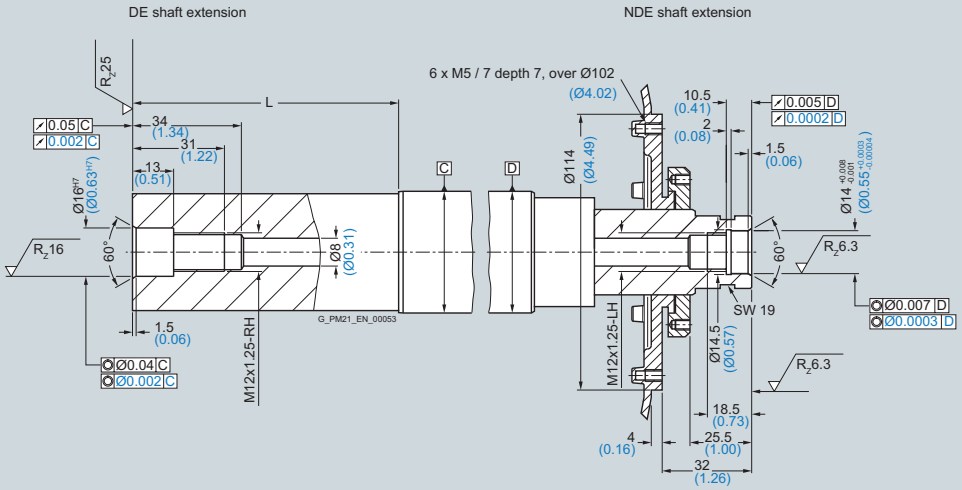
			DE shaft extension				Version with hollow shaft		
Shaft height	Type	DIN IEC	**d** **D**	d_6 –	t GA	u F	k LB	k_1 –	l L
80	1PH8083		**32** **(1.26)**	M12	35 (1.38)	10 (0.39)	575 (22.64)	319.3 (12.57)	80 (3.15)
	1PH8087						625 (24.61)	369.3 (14.54)	

1PH808



Version with hollow shaft



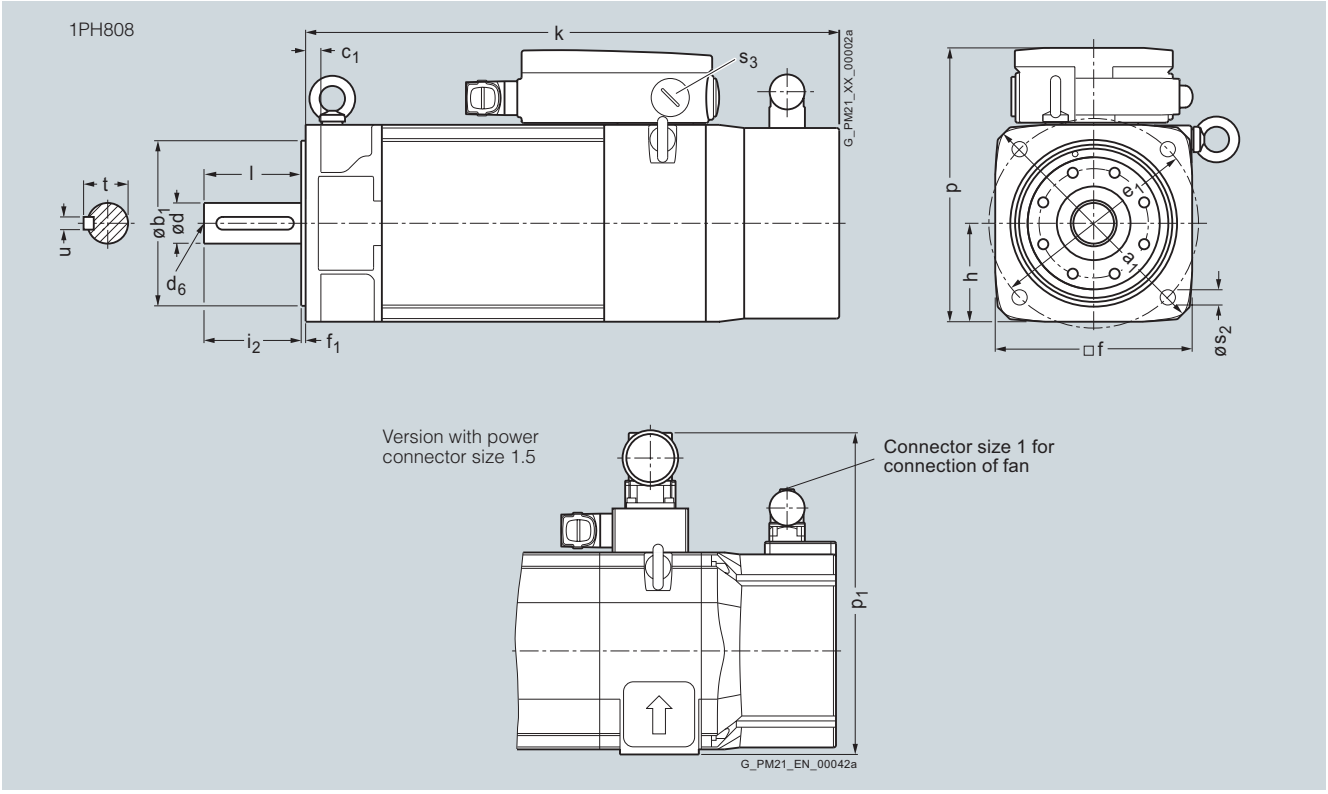


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Dimensional drawings

For motor			Dimensions in mm (in)											
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 (6.5)	155 (6.1)	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)				

			DE shaft extension					Version with hollow shaft		
Shaft height	Type	DIN IEC	**d** **D**	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	l L
80	1PH8083		**32** **(1.26)**	M12	80 (3.15)	35 (1.38)	10 (0.39)	575 (22.64)	319.3 (12.57)	80 (3.15)
	1PH8087							625 (24.61)	369.3 (14.54)	



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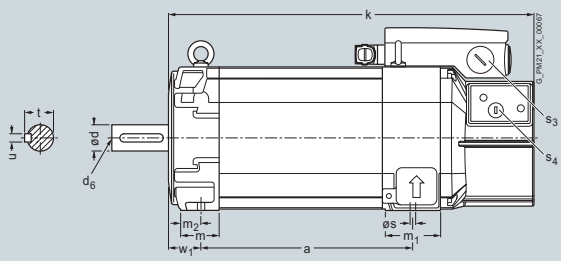
1PH8 motors
SH 100/SH 132 – Forced ventilation

Dimensional drawings

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN IEC	a B	b A	c HA	c_1 LA	f AB	f_1 T	h H	k LB	m BA	m_1 –	m_2 –	n AA	p HD	p_1 –	p_2 –	p_3 –
1PH8, type of construction IM B3, forced ventilation																		
100	1PH8101		167 (6.57)	160 (6.3)	11 (0.43)	–	196 (7.72)	–	100 (3.94)	369.5 (14.55)	44 (1.73)	74 (2.91)	19 (0.75)	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 (8.5)	15 (0.59)	18 (0.71)	260 (10.24)	–	132 (5.2)	439 (17.28)	57 (2.24)	93 (3.66)	27 (1.06)	52 (2.05)	317.5 (12.5)	347 (13.66)	262 (10.31)	357.5 (14.07)
	1PH8133		265.5 (10.5)							484 (19.06)								
	1PH8135		310.5 (12.2)							529 (20.83)								
	1PH8137		350.5 (13.8)							569 (22.40)								

							DE shaft extension				Version with hollow shaft					
Shaft height	Type	DIN IEC	s K	s_3 –	s_4 –	w_1 C	**d D**	d_6 –	t GA	u F	k LB	k_1 –	p HD	p_3 –	s_3 –	l L
100	1PH8101		12 (0.47)	M32×1.5	M20×1.5	43 (1.69)	**38 (1.5)**	M12	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.3)	266.5 (10.49)	276.5 (10.89)	M32×1.5	80 (3.15)
	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)**	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	110 (4.33)
	1PH8133										684 (26.93)	417.8 (16.45)				
	1PH8135										729 (28.7)	462.8 (18.22)				
	1PH8137										769 (30.28)	502.8 (19.8)				

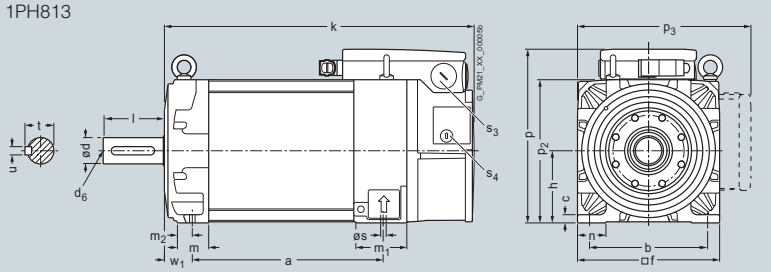
1PH810



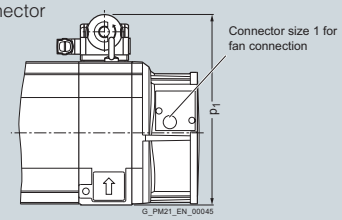
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Dimensional drawings

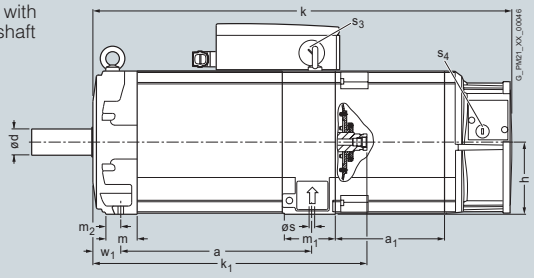
1PH813



Version with power connector size 3

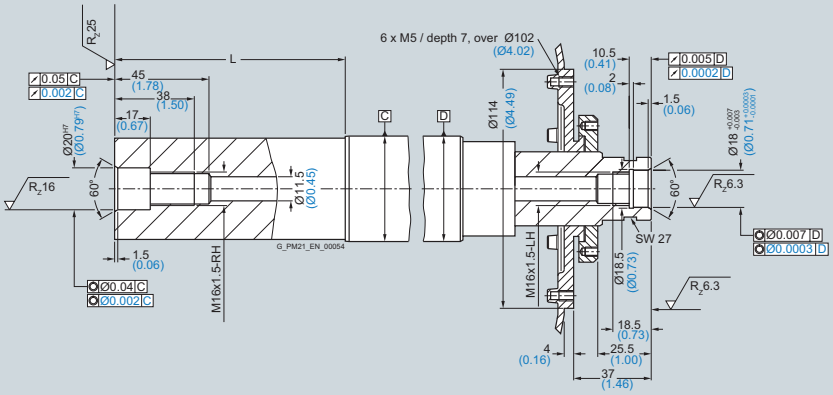


Version with hollow shaft



DE shaft extension

NDE shaft extension



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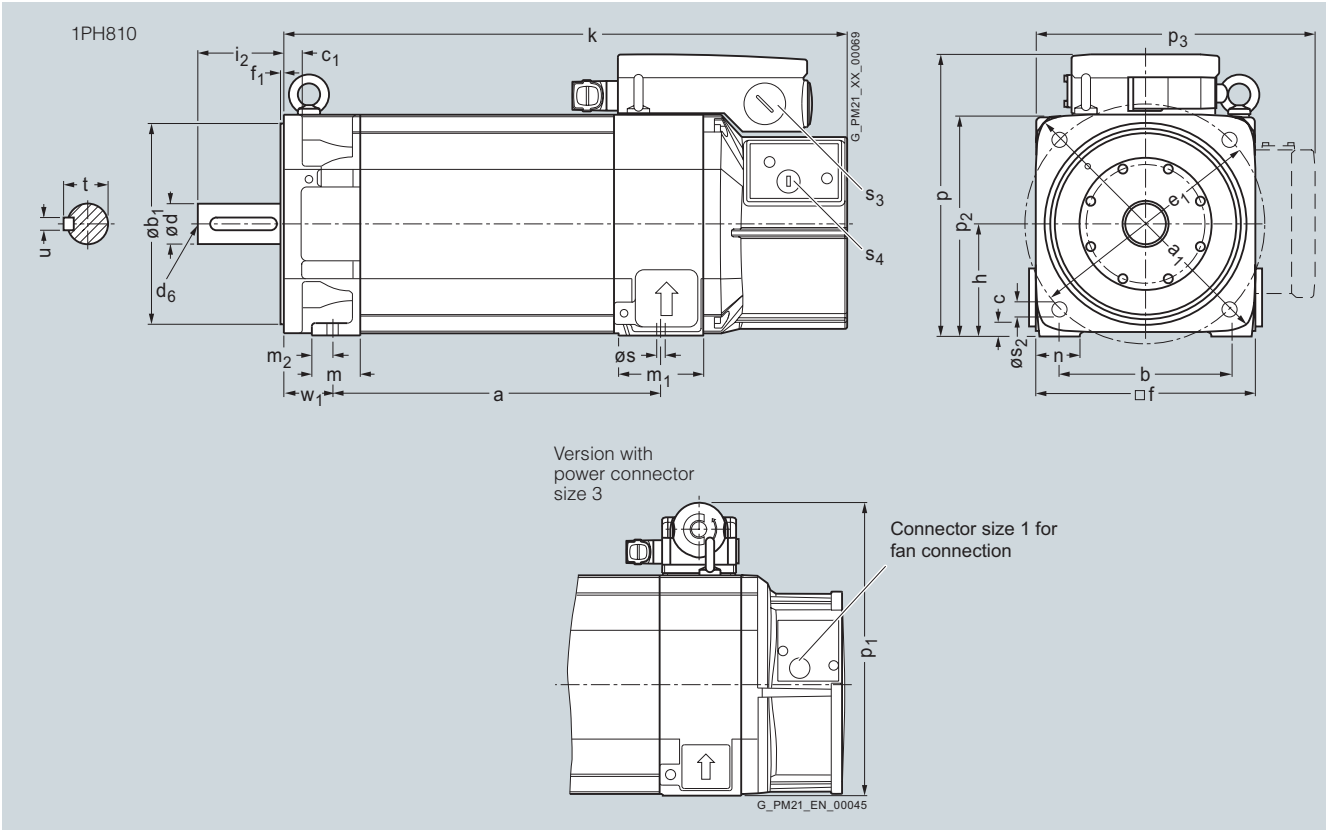
1PH8 motors
SH 100 – Forced ventilation

Dimensional drawings

For motor — Dimensions in mm (in)

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	p HD	p_1 –
1PH8, type of construction IM B35, forced ventilation																			
100	1PH8101		167 (6.57)	250 (9.84)	160 (6.3)	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 height	Type	DIN IEC	p_2 –	p_3 –	s K	s_2 –	s_3 –	s_4 –	w_1 C	DE shaft extension **d** **D**	d_6 –	i_2 E	t GA	u F	Version with hollow shaft k LB	k_1 –	p HD	p_3 –	s_3 –	l L
100	1PH8101		198 (7.8)	276.5 (10.89)	12 (0.47)	14 (0.55)	M32×1.5	M20×1.5	43 (1.69)	**38 (1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.3)	266.5 (10.49)	276.5 (10.89)	M32×1.5	80 (3.15)
	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)				



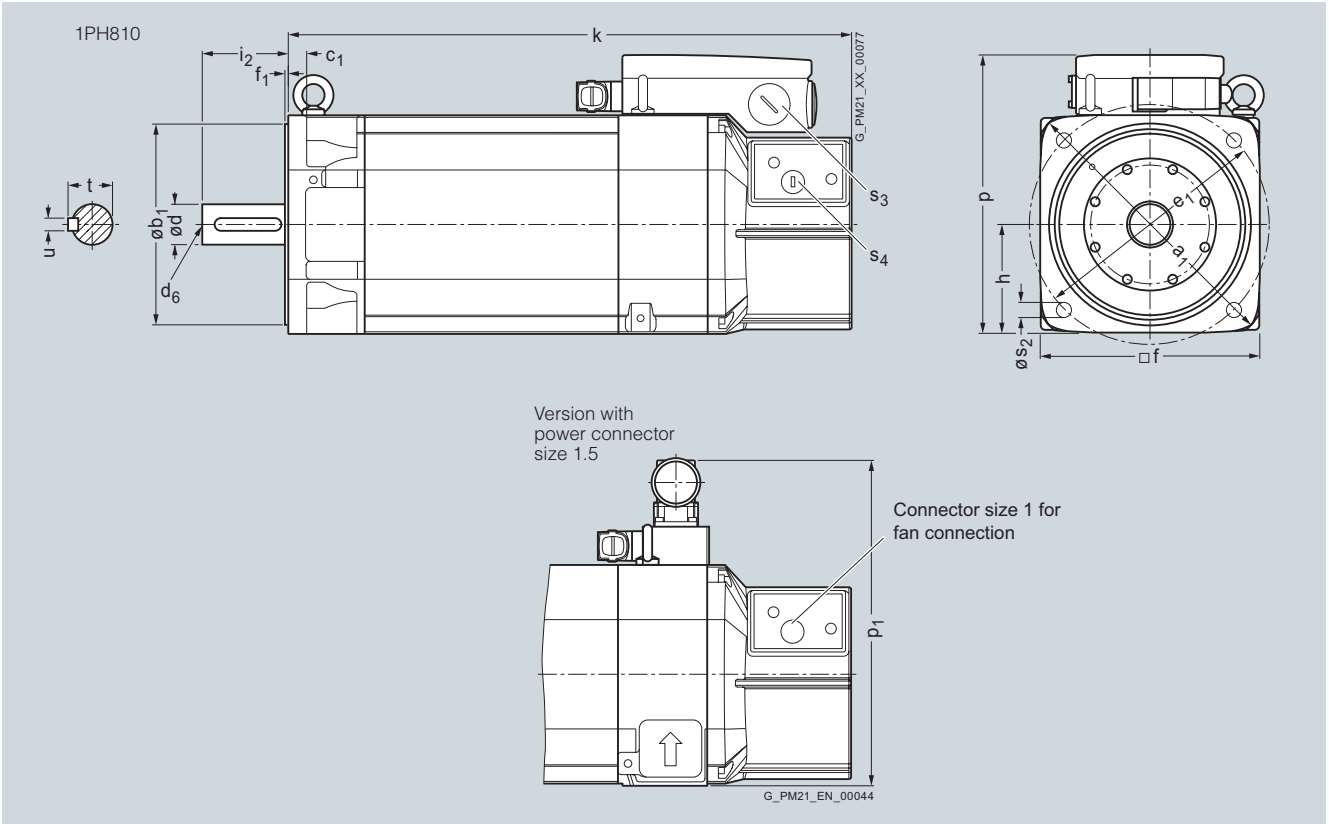
8

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Dimensional drawings

For motor		Dimensions in mm (in)												
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 –	p_2 –	p_3 –
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 (11.5)	–	–
	1PH8103									405 (15.94)				
	1PH8105									464.5 (18.29)				
	1PH8107									500 (19.69)				

						DE shaft extension					Version with hollow shaft				
Shaft height	Type	DIN IEC	s_2 –	s_3 –	s_4 –	**d** **D**	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	s_3 –	l L
100	1PH8101		14 (0.55)	M32×1.5	M20×1.5	**38** **(1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)	569.5 (22.42)	312.3 (12.3)	264.5 (10.41)	M32×1.5	80 (3.15)
	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)			



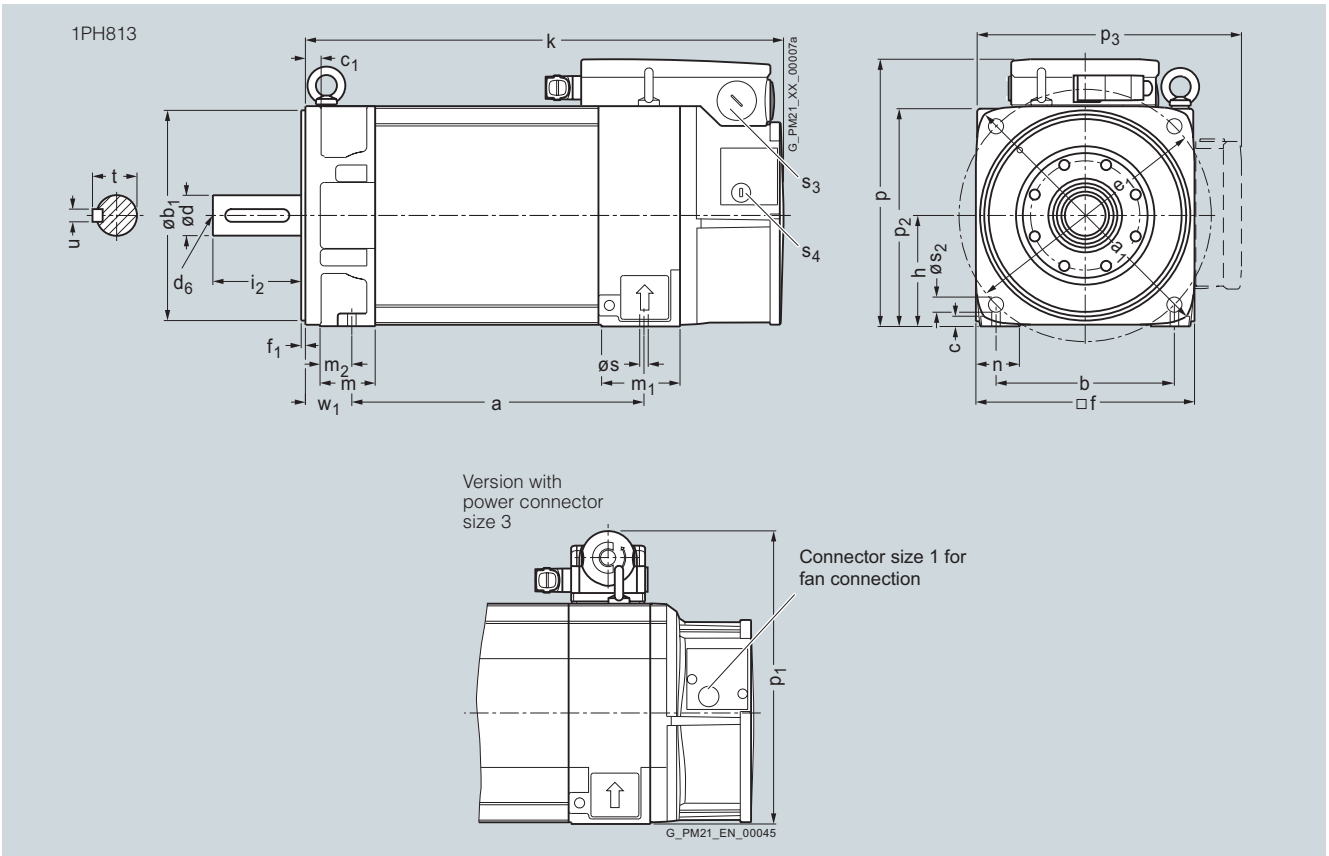
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1PH8 motors
SH 132 – Forced ventilation

Dimensional drawings

For motor		Dimensions in mm (in)																	
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	p HD	p_1 –
1PH8, type of construction IM B35, forced ventilation																			
132	1PH8131		220.5 (8.68)	340 (13.4)	216 (8.5)	250 (9.84)	15 (0.59)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.2)	132 (5.2)	439 (17.28)	65 (2.56)	93 (3.66)	35 (1.38)	52 (2.05)	317.5 (12.5)	347 (13.66)
	1PH8133		265.5 (10.5)										484 (19.06)						
	1PH8135		310.5 (12.2)										529 (20.83)						
	1PH8137		350.4 (13.8)										569 (22.40)						

										DE shaft extension					Version 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**	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	p_3 –	s_3 –	l L
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)**	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	110 (4.33)
	1PH8133														684 (26.93)	417.8 (16.45)				
	1PH8135														729 (28.7)	462.8 (18.22)				
	1PH8137														769 (30.28)	502.8 (19.8)				

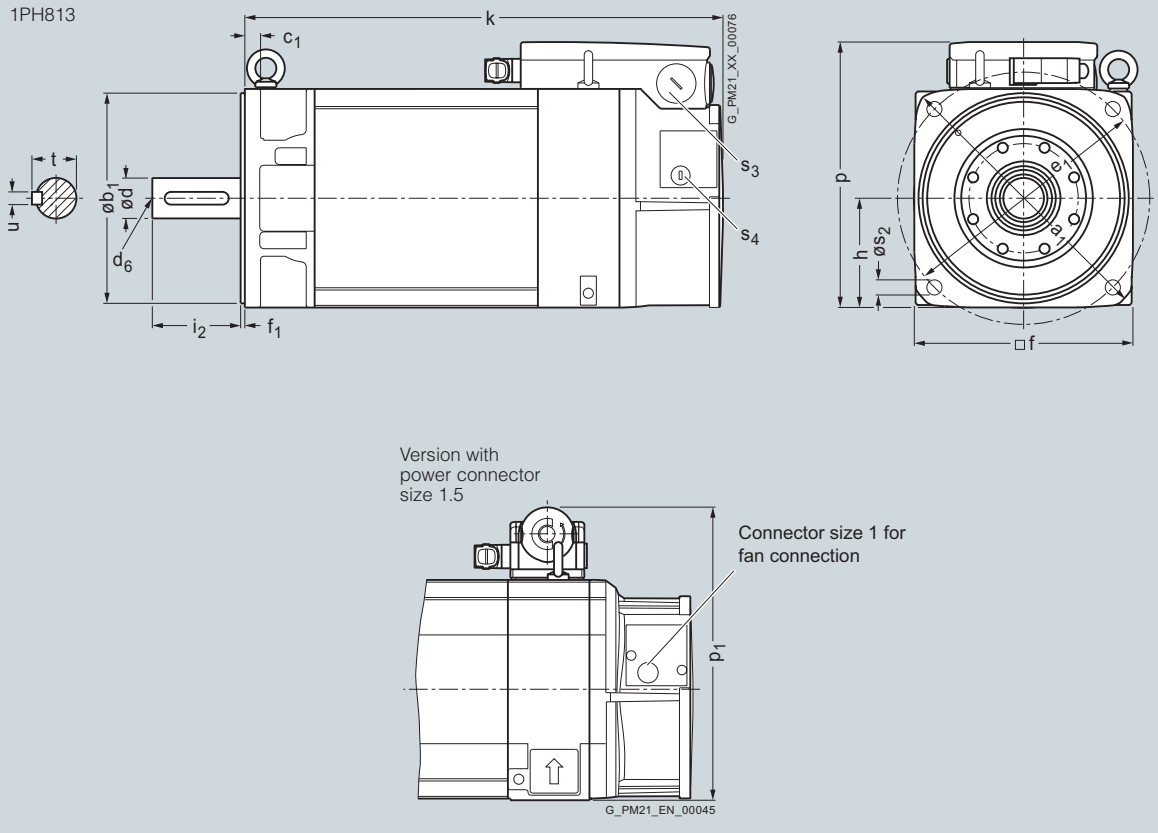


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Dimensional drawings

For motor		Dimensions in mm (in)												
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 –	p_2 –	p_3 –
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 (0.2)	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)				

						DE shaft extension					Version with hollow shaft				
Shaft height	Type	DIN IEC	s_2 –	s_3 –	s_4 –	**d** **D**	d_6 –	i_2 E	t GA	u F	k LB	k_1 –	p HD	s_3 –	l L
132	1PH8131		18 (0.71)	M40×1.5	M20×1.5	**48** **(1.89)**	M16	110 (4.33)	51.5 (2.03)	14 (0.55)	639 (25.16)	372.8 (14.68)	346 (13.62)	M50×1.5	110 (4.33)
	1PH8133										684 (26.93)	417.8 (16.45)			
	1PH8135										729 (28.7)	462.8 (18.22)			
	1PH8137										769 (30.28)	502.8 (19.8)			



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1PH8 motors
SH 80 to SH 132 – Water cooling

Dimensional drawings

For motor — Dimensions in mm (in)

Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	h H	Standard/ Advanced/ Performance k LB	High Performance without hollow shaft k LB	High Performance with hollow shaft k LB	m BA	m_1 –	m_2 –	n AA
1PH8, type of construction IM B3, water cooling														
80	1PH8083		194 (7.64)	125 (4.92)	8 (0.31)	155 (6.1)	80 (3.15)	301.5 (11.87)	306.3 (12.06)	319.3 (12.57)	37 (1.46)	63.5 (2.5)	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 (6.3)	11 (0.43)	196 (7.72)	100 (3.94)	289.5 (11.4)	294.5 (11.59)	312.3 (12.3)	44 (1.73)	68 (2.68)	19 (0.75)	43 (1.69)
	1PH8103		202.5 (7.97)					325 (12.8)	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 (8.5)	15 (0.59)	260 (10.24)	132 (5.2)	347.5 (13.68)	354.8 (13.97)	372.8 (14.68)	42 (1.65)	81 (3.19)	12 (0.47)	43 (1.69)
	1PH8133		265.5 (10.5)					392.5 (15.45)	399.8 (15.74)	417.8 (16.45)				
	1PH8135		310.5 (12.2)					437.5 (17.22)	444.8 (17.54)	462.8 (18.22)				
	1PH8137/8		350.5 (13.8)					477.5 (18.8)	484.8 (19.09)	502.8 (19.8)				

DE shaft extension

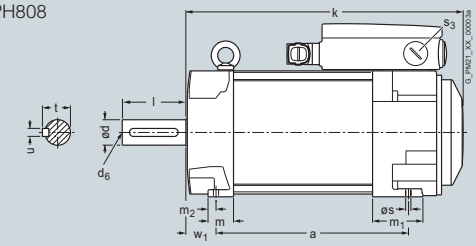
Shaft height	Type	DIN IEC	p HD	p_1 –	p_2 –	p_3 –	s K	s_3 –	w_1 C	**d D**	d_6 –	t GA	u F	l L
80	1PH8083		216 (8.5)	253.5 (9.98)	–	–	10 (0.39)	M25×1.5	38 (1.5)	**32 (1.26)**	M12	35 (1.38)	10 (0.39)	80 (3.15)
	1PH8087													
100	1PH8101		266.5 (10.49)	294 (11.57)	198 (7.8)	276.5 (10.89)	12 (0.47)	M32×1.5	43 (1.69)	**38 (1.5)**	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													
	1PH8137/8													

8

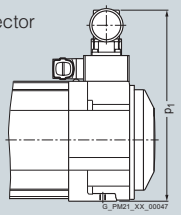
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Dimensional drawings

1PH808



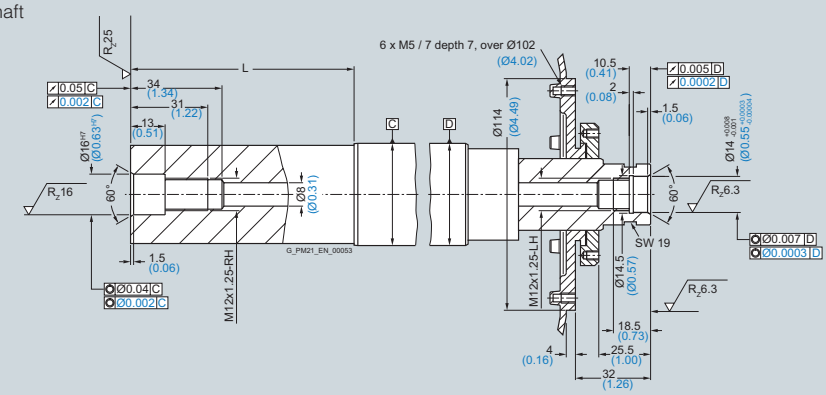
Version with power connector size 1.5



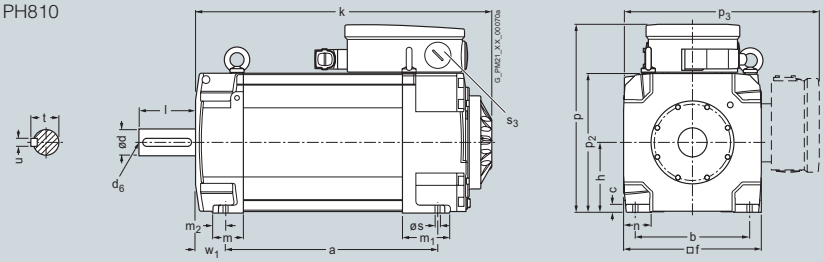
Version with hollow shaft

DE shaft extension

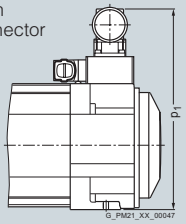
NDE shaft extension



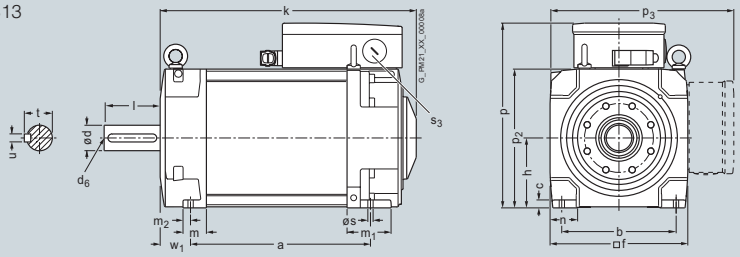
1PH810



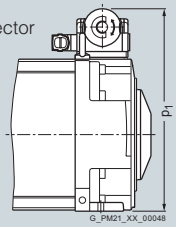
Version with power connector size 1.5



1PH813



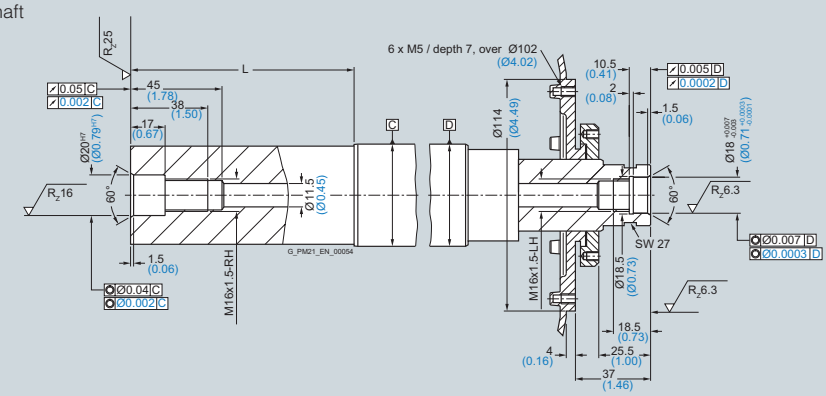
Version with power connector size 3



Version with hollow shaft

DE shaft extension

NDE shaft extension



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1PH8 motors
SH 180 to SH 280 – Water cooling

Dimensional drawings

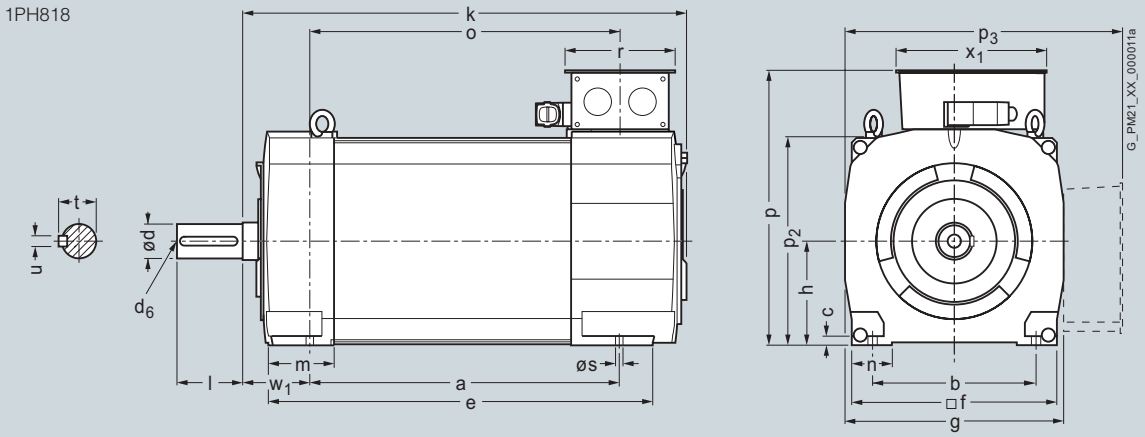
For motor			Dimensions in mm (in)													DE shaft extension				
Shaft height	Type	DIN IEC	a B	b A	c HA	f AB	g AC	h H	k LB	m BA	n AA	p_2 –	s K	w_1 C	**d D**	d_6 –	l E	t GA	u F
1PH8, types of construction IM B3/IM V5, water cooling																				
180	1PH8184		430 (16.93)	279 (10.98)	15 (0.59)	356 (14.02)	384 (15.12)	180 (7.09)	670 (26.38)	138 (5.43)	73 (2.87)	372 (14.65)	14.5 (0.55)	121 (4.76)	**65m6**	M20	140 (5.51)	69 (2.72)	18 (0.71)
	1PH8186		520 (20.47)						760 (29.92)										
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)	**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH8226		545 (21.46)						875 (34.45)										
	1PH8228		635 (25.00)						965 (37.99)										
280	1PH8284		684 (26.93)	457 (17.99)	21 (0.83)	556 (21.89)	588 (23.15)	280 (11.02)	1134 (44.64)	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)										

			Terminal box type															
			1XB7322				1XB7422				1XB7700				1XB7712			
Shaft height	Type	DIN IEC	p HD	p_3 –	r LL	x_1 AG	p HD	p_3 –	r LL	x_1 AG	p HD	p_3 –	r LL	x_1 AG	p HD	p_3 –	r LL	x_1 AG
180	1PH8184		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 (12.2)	295 (11.61)	–	–	–	–
	1PH8186																	
225	1PH8224		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 (25.12)	666 (26.22)	310 (12.2)	295 (11.61)	–	–	–	–
	1PH8226																	
	1PH8228																	
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)	295 (11.61)	820 (32.28)	827 (32.56)	377 (14.84)	370 (14.57)
	1PH8286																	
	1PH8288																	

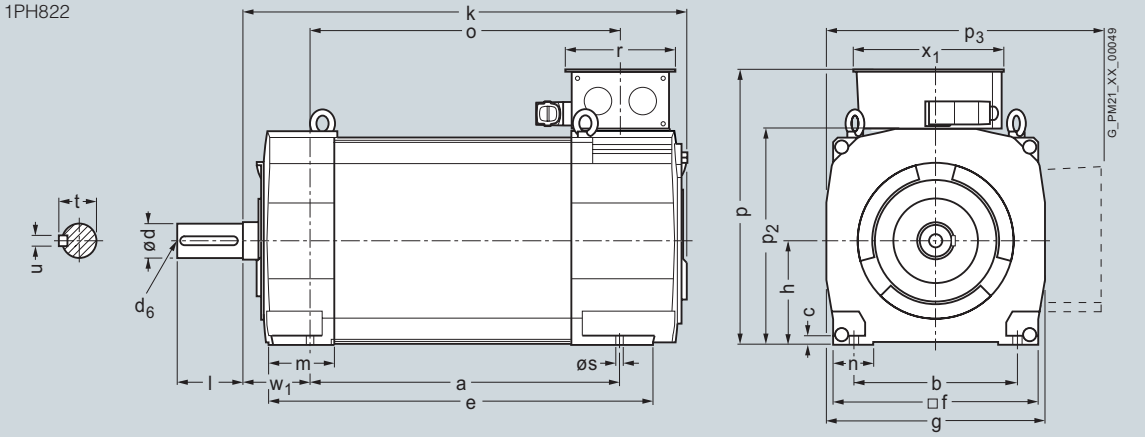
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Dimensional drawings

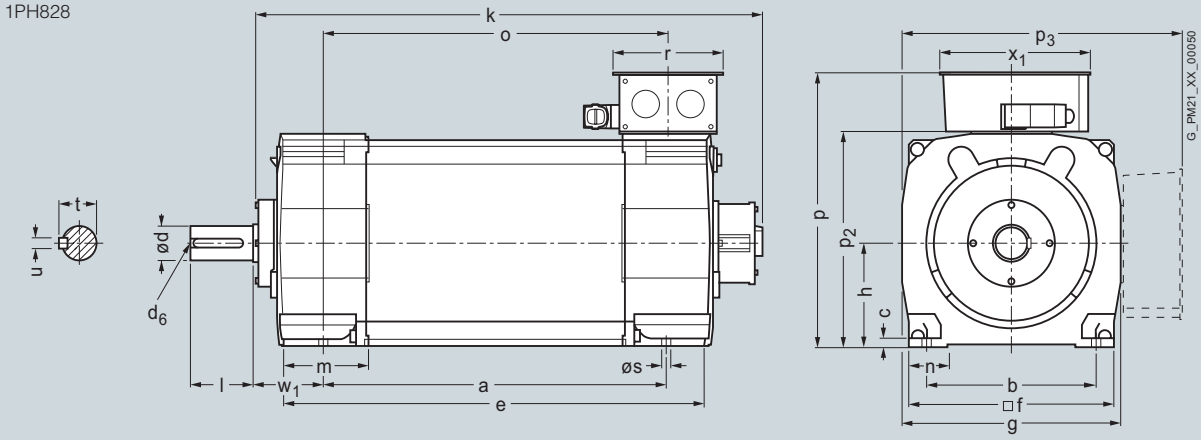
1PH818



1PH822



1PH828



8

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1PH8 motors
SH 80 to SH 132 – Water cooling

Dimensional drawings

For motor | Dimensions in mm (in)

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	Standard/ Advanced/ Performance: k LB	High Performance: without hollow shaft k LB	High Performance: with hollow shaft k LB
1PH8, type of construction IM B5, water cooling													
80	1PH8083		200 (7.87)	130 (5.12)	12 (0.47)	165 (6.5)	155 (6.1)	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 (11.4)	294.5 (11.59)	312.3 (12.3)
	1PH8103										325 (12.8)	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 (0.2)	130 (5.12)	110 (4.33)	347.5 (13.68)	354.8 (13.97)	372.8 (14.68)
	1PH8133										392.5 (15.45)	399.8 (15.74)	417.8 (16.45)
	1PH8135										437.5 (17.22)	444.8 (17.51)	462.8 (18.22)
	1PH8137/8										477.5 (18.8)	484.8 (19.09)	502.8 (19.8)

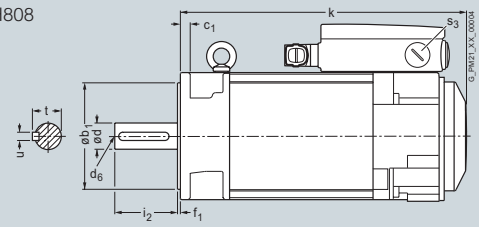
DE shaft extension

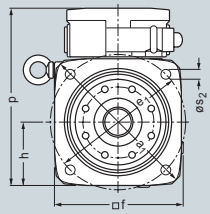
Shaft height	Type	DIN IEC	p HD	p_1 –	p_3 –	s_2 –	s_3 –	**d** **D**	d_6 –	i_2 E	t GA	u F
80	1PH8083		213.5 (8.41)	251 (9.88)	–	12 (0.47)	M25×1.5	**32 (1.25)**	M12	80 (3.15)	35 (1.38)	10 (0.39)
	1PH8087											
100	1PH8101		264.5 (10.4)	292 (11.5)	–	14 (0.55)	M32×1.5	**38 (1.5)**	M12	80 (3.15)	41 (1.61)	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											
	1PH8137/8											

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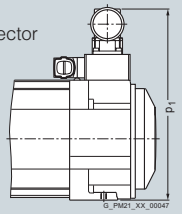
Dimensional drawings

1PH808





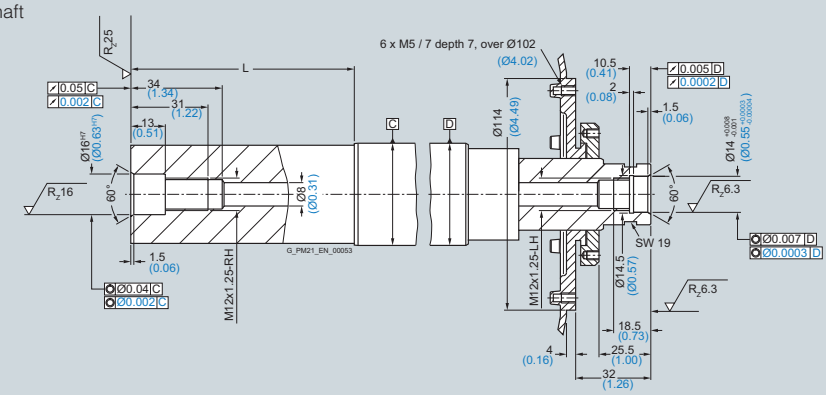
Version with power connector size 1.5



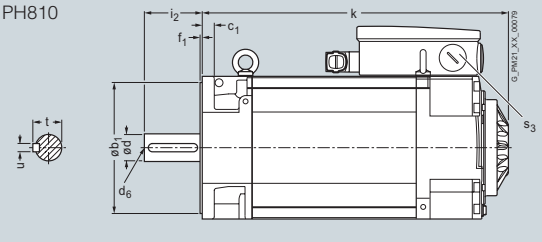
Version with hollow shaft

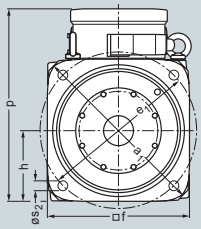
DE shaft extension

NDE shaft extension

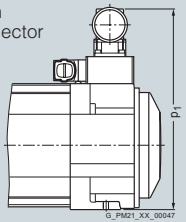


1PH810

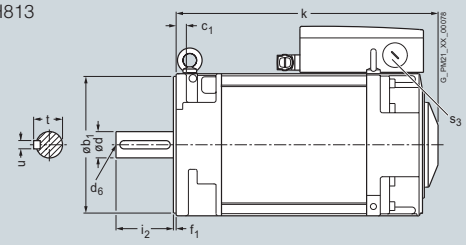


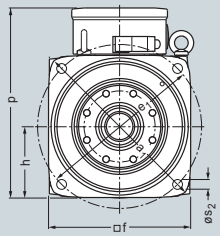


Version with power connector size 1.5

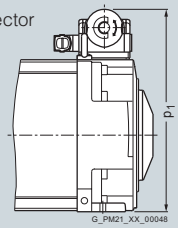


1PH813





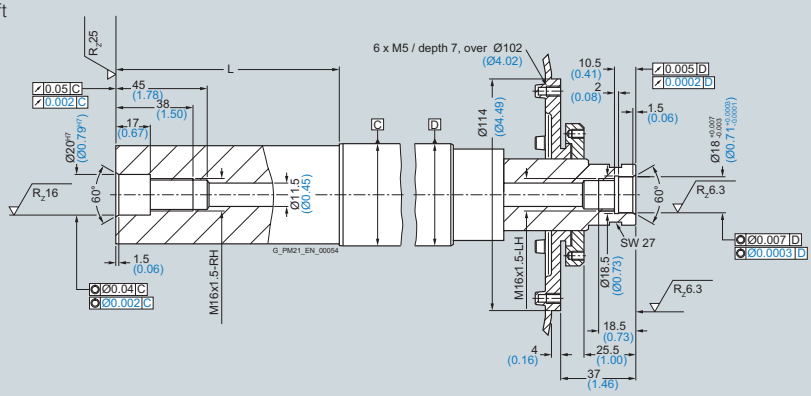
Version with power connector size 3



Version with hollow shaft

DE shaft extension

NDE shaft extension



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1PH8 motors
SH 100/SH 132 – Water cooling

Dimensional drawings

For motor — Dimensions in mm (in)

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	l L	Standard/ Advanced/ Performance k LB	High Performance without hollow shaft k LB	High Performance with hollow shaft k LB	m BA
1PH8, type of construction IM B35, water cooling																	
100	1PH8101		167 (6.57)	250 (9.84)	160 (6.3)	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 (11.4)	294.5 (11.59)	312.3 (12.3)	37 (1.46)
	1PH8103		202.5 (7.97)											325 (12.8)	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 (8.5)	250 (9.84)	15 (0.59)	18 (0.71)	300 (11.81)	260 (0.2)	5 (0.2)	132 (5.2)	110 (4.33)	347.5 (13.68)	354.8 (13.97)	372.8 (14.68)	42 (1.65)
	1PH8133		265.5 (10.45)											392.5 (15.45)	399.8 (15.74)	417.8 (16.45)	
	1PH8135		310.5 (12.22)											437.5 (17.22)	444.8 (17.51)	462.8 (18.22)	
	1PH8137/8		350.5 (13.8)											477.5 (18.8)	484.8 (19.09)	502.8 (19.8)	

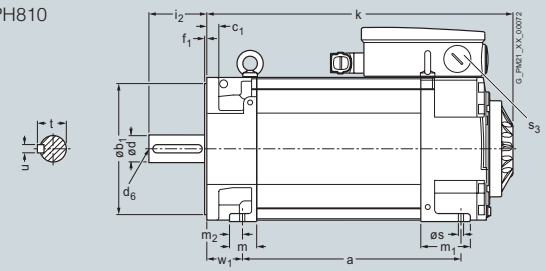
DE shaft extension

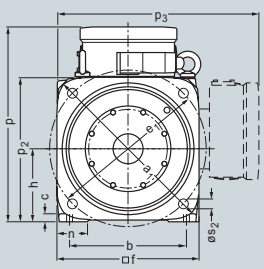
Shaft height	Type	DIN IEC	m_1 –	m_2 –	n AA	p HD	p_1 –	p_2 –	p_3 –	s K	s_2 –	s_3 –	w_1 C	**d D**	d_6 –	i_2 E	t GA	u F
100	1PH8101		68 (2.68)	12 (0.47)	43 (1.69)	266.5 (10.49)	294 (11.57)	198 (7.8)	276.5 (10.89)	12 (0.47)	14 (0.55)	M32×1.5	43 (1.69)	**38 (1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH8103																	
	1PH8105																	
	1PH8107																	
132	1PH8131		81 (3.19)	12 (0.47)	43 (1.69)	347 (13.66)	347 (13.66)	262 (10.3)	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																	
	1PH8137/8																	

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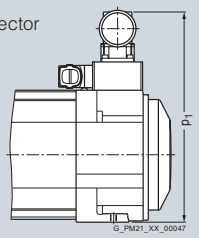
Dimensional drawings

1PH810

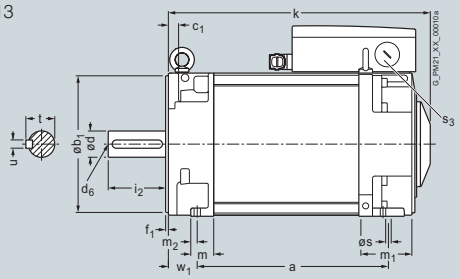


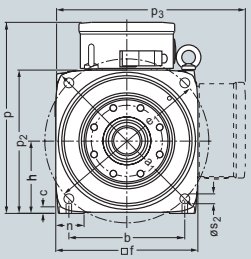


Version with power connector size 1.5

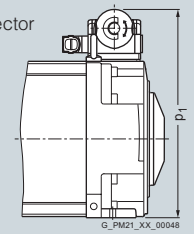


1PH813

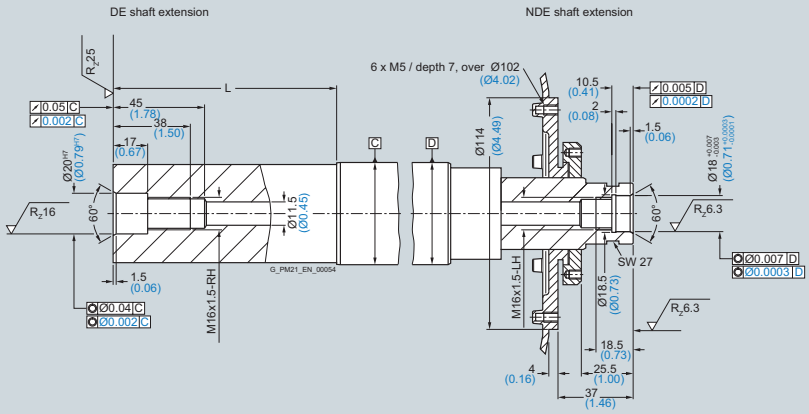




Version with power connector size 1.5



Version with hollow shaft



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1PH8 motors
SH 180 to SH 280 – Water cooling

Dimensional drawings

For motor — Dimensions in mm (in)

Shaft height	Type	DIN IEC	a B	D400 a_1 P	D450 a_1 P	D550 a_1 P	D660 a_1 P	b A	D400 b_1 N	D450 b_1 N	D550 b_1 N	D660 b_1 N	c HA	c_1 LA	D400 e_1 M	D450 e_1 M	D550 e_1 M	D660 e_1 M
1PH8, types of construction IM B35/IM B5/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)	–	–
	1PH8186		520 (20.47)															
225	1PH8224		445 (17.52)	–	–	550 (21.65)	–	356 (14.02)	–	–	450 (17.72)	–	18 (0.71)	20 (0.79)	–	–	500 (19.69)	–
	1PH8226		545 (21.46)															
	1PH8228		635 (25.00)															
280	1PH8284		684 (26.93)	–	–	–	660 (26.98)	457 (17.99)	–	–	–	550 (21.65)	21 (0.83)	24 (0.94)	–	–	–	600 (23.62)
	1PH8286		794 (31.26)															
	1PH8288		924 (36.38)															

DE shaft extension

Shaft height	Type	DIN IEC	f AB	f_1 T	g AC	h H	i_2 EB	k LB	m BA	n AA	p_2 –	s K	w_1 C	**d D**	d_6 –	l E	t GA	u F
180	1PH8184		356 (14.02)	5 (0.20)	384 (15.12)	180 (7.09)	125 (4.92)	670 (26.38)	123 (4.84)	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							760 (29.92)										
255	1PH8224		446 (17.56)	5 (0.20)	474 (18.66)	225 (8.86)	125 (4.92)	770 (30.31)	144 (5.67)	88 (3.46)	462 (18.19)	18.5 (0.73)	149 (5.87)	**75m6**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH8226							872 (34.33)										
	1PH8228							962 (37.87)										
280	1PH8284		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)	190 (7.48)	**95m6**	M24	170 (6.69)	100 (3.94)	25 (0.98)
	1PH8286							1244 (48.98)										
	1PH8288							1374 (54.09)										

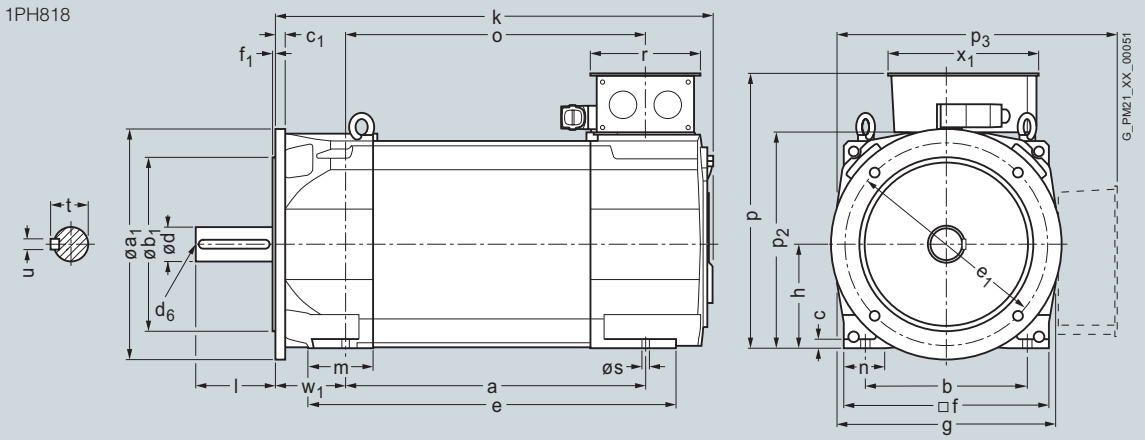
Terminal box type

Shaft height	Type	1XB7322 p HD	1XB7322 p_3 –	1XB7322 r LL	1XB7322 x_1 AG	1XB7422 p HD	1XB7422 p_3 –	1XB7422 r LL	1XB7422 x_1 AG	1XB7700 p HD	1XB7700 p_3 –	1XB7700 r LL	1XB7700 x_1 AG	1XB7712 p HD	1XB7712 p_3 –	1XB7712 r LL	1XB7712 x_1 AG
180	1PH8184	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 (12.2)	295 (11.61)	–	–	–	–
	1PH8186																
225	1PH8224	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 (25.12)	666 (26.22)	310 (12.2)	295 (11.61)	–	–	–	–
	1PH8226																
	1PH8228																
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)	295 (11.61)	820 (32.28)	827 (32.56)	377 (14.84)	370 (14.57)
	1PH8286																
	1PH8288																

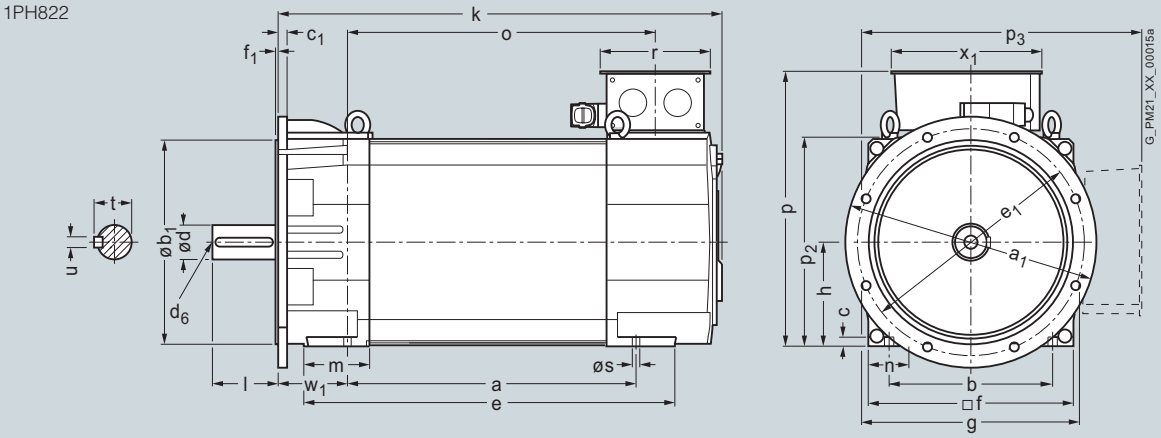
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Dimensional drawings

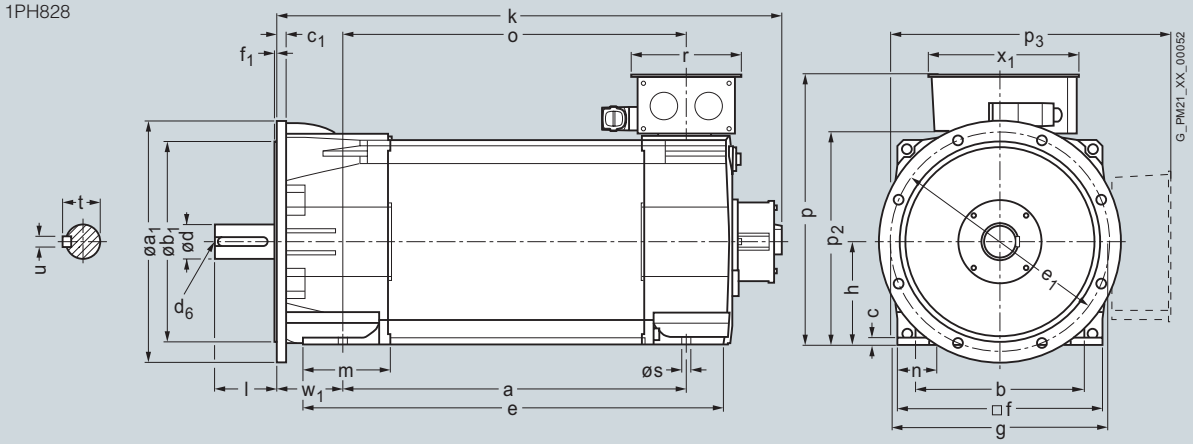
1PH818



1PH822



1PH828



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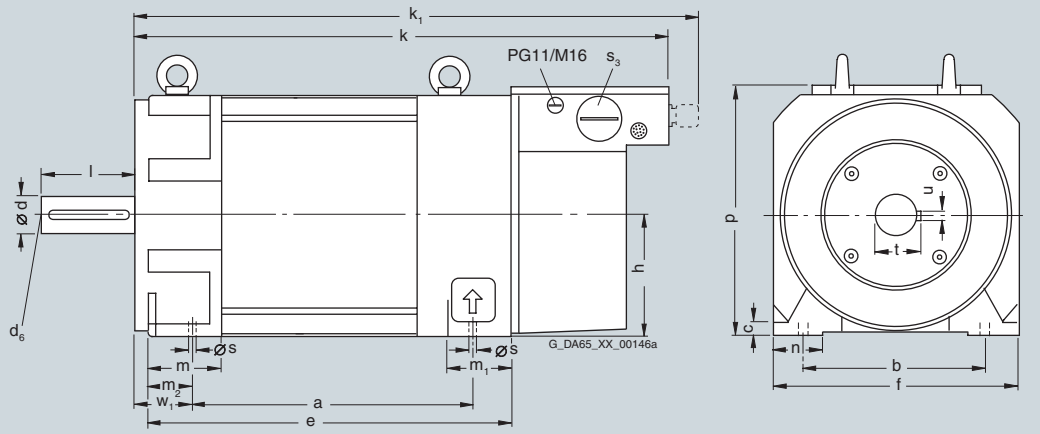
1PH7 motors
Forced ventilation

Dimensional drawings

For motor			Dimensions in mm (in)														
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD	s K	s_3 –
1PH7, type of construction IM B3, forced ventilation																	
100	1PH7101 1PH7103		202.5 (7.97)	160 (6.30)	11 (0.43)	263 (10.35)	196 (7.72)	100 (3.94)	411 (16.18)	434 (17.09)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)	12 (0.47)	PG29/M32
	1PH7105 1PH7107		297.5 (11.71)			358 (14.09)			506 (19.92)	529 (20.83)							
132	1PH7131 1PH7133		265.5 (10.45)	216 (8.50)	14 (0.55)	341 (13.43)	260 (10.24)	132 (5.20)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)	12 (0.47)	PG36/M40
	1PH7135 1PH7137		350.5 (13.80)			426 (16.77)			623 (24.53)	646 (25.43)							
160	1PH7163		346.5 (13.64)	254 (10.00)	17 (0.67)	438 (17.24)	314 (12.36)	160 (6.30)	640 (25.20)	663 (26.10)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)	14 (0.55)	PG42/M50
	1PH7167		406.5 (16.00)			498 (19.61)			700 (27.56)	723 (28.46)							

			DE shaft extension					
Shaft height	Type	DIN IEC	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
100	1PH7101 1PH7103 1PH7105 1PH7107		40 (1.57)	**38** **(1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	1PH7131 1PH7133 1PH7135 1PH7137		50 (1.97)	**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	1PH7163 1PH7167		64 (2.52)	**55** **(2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)

1PH710
1PH713
1PH716



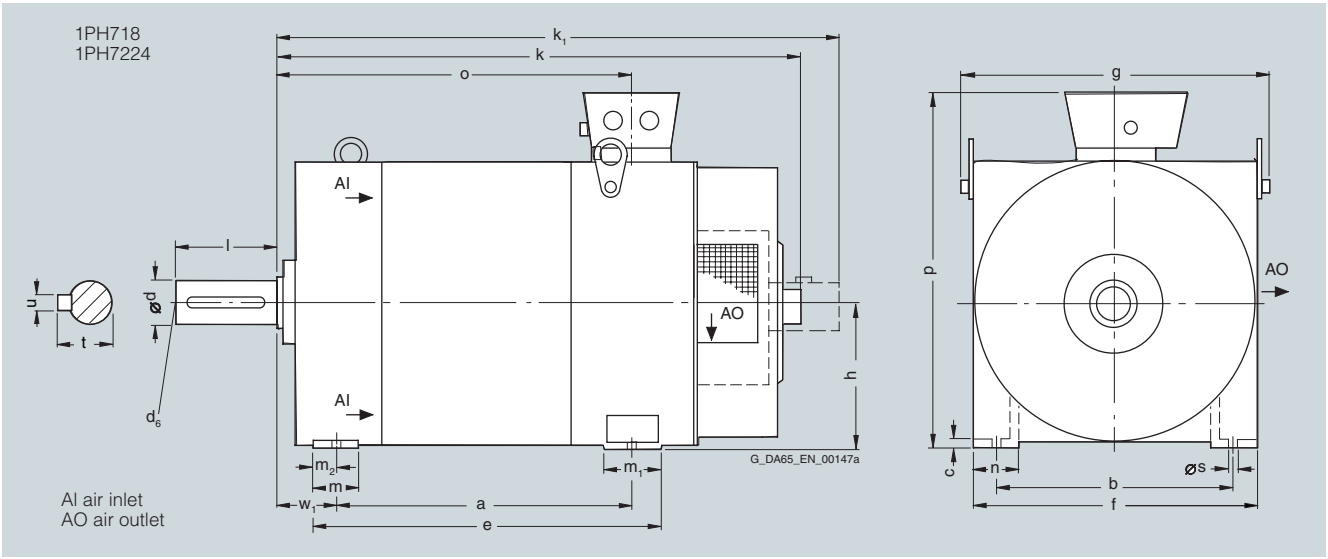
For deviating and additional dimensions of 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

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Dimensional drawings

For motor		Dimensions in mm (in)																Terminal box type 1XB7322
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	o –	p HD	
1PH7, type of construction IM B3, forced ventilation, direction of air flow DE → NDE																		
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	408 (16.09)	180 (7.09)	835 (32.87)	–	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.3)	495 (19.49)	
	1PH7186		520 (20.47)			600 (23.62)				925 (36.42)						631 (24.84)		
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	–	1100 (43.31)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)	595 (23.43)	

			DE shaft extension						
Shaft height	Type	DIN IEC	s K	w_1 C	**d D**	d_6 –	l E	t GA	u F
180	1PH7184		14.5 (0.57)	121 (4.76)	**60 (2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.72)
	1PH7186				**65 (2.56)**			69 (2.72)	
225	1PH7224		18.5 (0.73)	149 (5.87)	**75 (2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)



8

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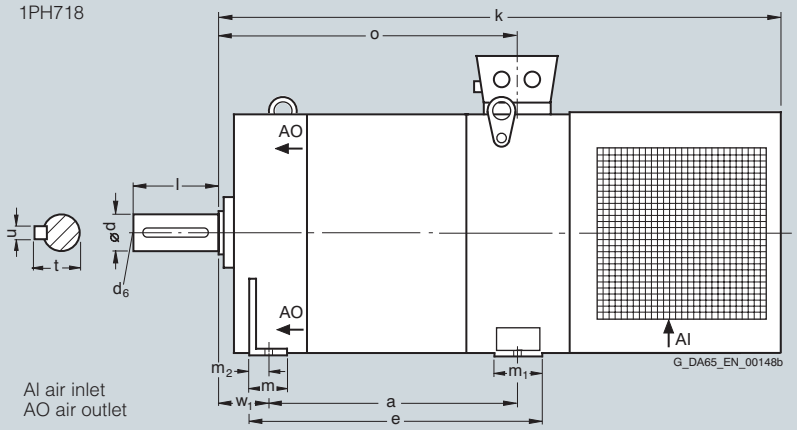
1PH7 motors
Forced ventilation

Dimensional drawings

For motor			Dimensions in mm (in)														Terminal box type 1XB7322
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	m BA	m_1 –	m_2 –	n AA	o –	p HD	
1PH7, type of construction IM B3, forced ventilation, direction of air flow NDE → DE																	
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	405 (15.94)	180 (7.09)	1010 (39.76)	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.3)	495 (19.49)	
	1PH7186		520 (20.47)			600 (23.62)				1100 (43.31)					631 (24.84)		
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	1090 (42.91)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)	595 (23.43)	

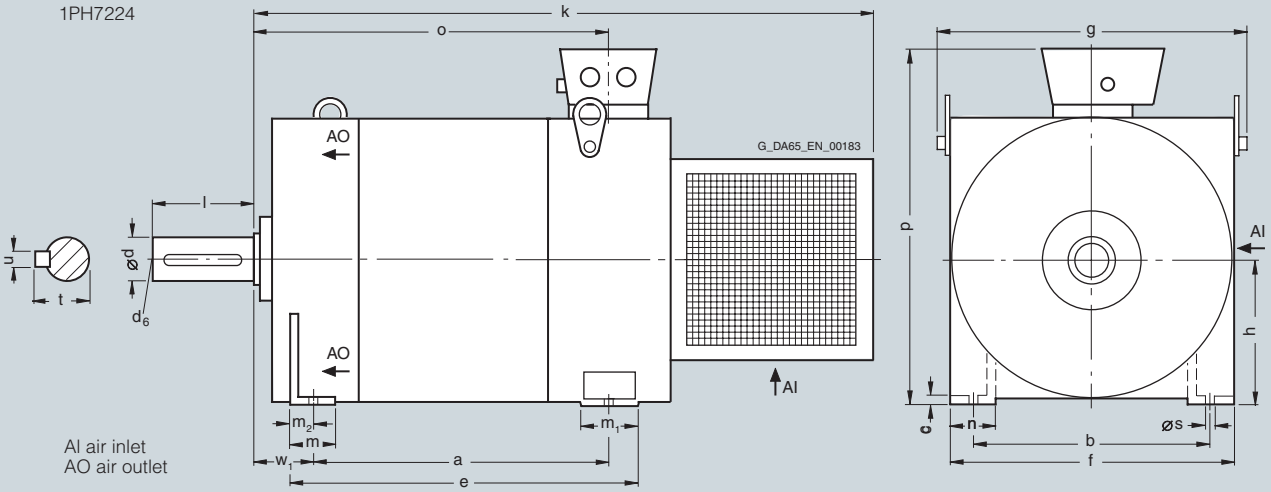
			DE shaft extension						
Shaft height	Type	DIN IEC	s K	w_1 C	**d D**	d_6 –	l E	t GA	u F
180	1PH7184		14.5 (0.57)	121 (4.76)	**60 (2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.71)
	1PH7186				**65 (2.56)**			69 (2.72)	
225	1PH7224		18.5 (0.73)	149 (5.87)	**75 (2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)

1PH718



AI air inlet
AO air outlet

1PH7224



AI air inlet
AO air outlet

8

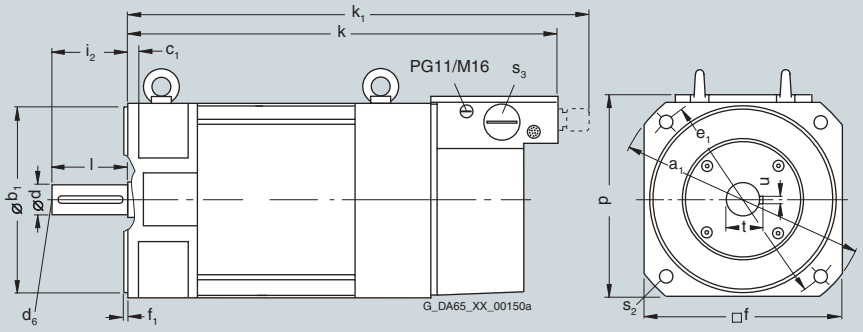
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Dimensional drawings

For motor			Dimensions in mm (in)											
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	i_2 –	k LB	k_1 –	p HD	s_2 S	s_3 –
1PH7, type of construction IM B5, forced ventilation														
100	1PH7101 1PH7103		250 (9.84)	180 (7.09)	10 (0.39)	215 (8.46)	196 (7.72)	4 (0.16)	80 (3.15)	411 (16.18)	434 (17.09)	218 (8.58)	14 (0.55)	PG29/M32
	1PH7105 1PH7107									506 (19.92)	529 (20.83)			
132	1PH7131 1PH7133		350 (13.78)	250 (9.84)	16 (0.63)	300 (11.81)	260 (10.24)	5 (0.2)	110 (4.33)	538 (21.18)	561 (22.09)	273 (10.75)	18 (0.71)	PG36/M40
	1PH7135 1PH7137									623 (24.53)	646 (25.43)			

			DE shaft extension				
Shaft height	Type	DIN IEC	**d** **D**	d_6 –	l E	t GA	u F
100	1PH7101 1PH7103		**38** **(1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH7105 1PH7107						
132	1PH7131 1PH7133		**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7135 1PH7137						

1PH710
1PH713



For deviating and additional dimensions of 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

8

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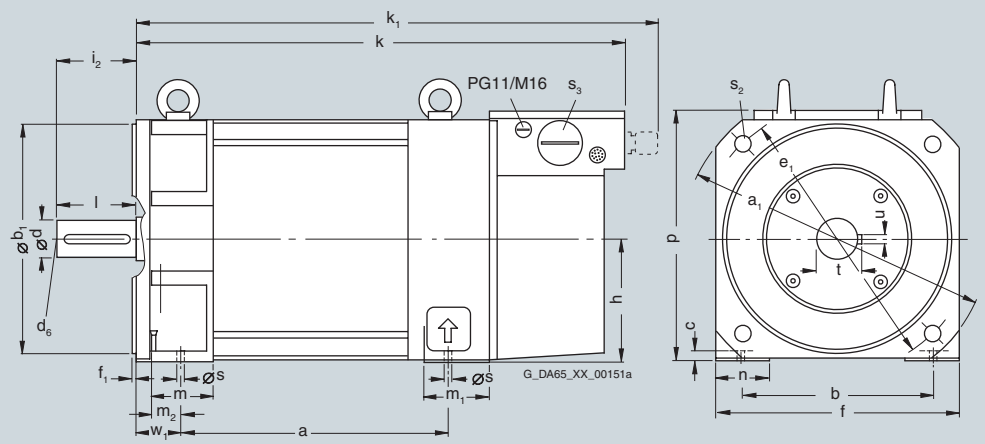
1PH7 motors
Forced ventilation

Dimensional drawings

For motor		Dimensions in mm (in)																	
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	e_1 M	f AB	f_1 T	h H	i_2 –	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD
1PH7, type of construction IM B35, forced ventilation																			
100	1PH7101 1PH7103		202.5 (7.97)	250 (9.84)	160 (6.3)	180 (7.09)	11 (0.43)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	80 (3.15)	411 (16.18)	435 (17.13)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)
	1PH7105 1PH7107		297.5 (11.71)										506 (19.92)	529 (20.83)					
132	1PH7131 1PH7133		265.5 (10.45)	350 (13.78)	216 (8.5)	250 (9.84)	14 (0.55)	300 (11.81)	260 (10.24)	5 (0.2)	132 (5.2)	110 (4.33)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.3)	52 (2.05)	275 (10.83)
	1PH7135 1PH7137		350.5 (13.8)										623 (24.53)	646 (25.43)					
160	1PH7163		346.5 (13.64)	400 (15.75)	254 (10)	300 (11.81)	17 (0.67)	350 (13.78)	314 (12.36)	5 (0.2)	160 (6.3)	110 (4.33)	640 (25.2)	663 (26.1)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)
	1PH7167		406.5 (16)										700 (27.56)	723 (28.46)					

			DE shaft extension								
Shaft height	Type	DIN IEC	s K	s_2 S	s_3 –	w_1 C	**d D**	d_6 –	l E	t GA	u F
100	1PH7101 1PH7103 1PH7105 1PH7107		12 (0.47)	14 (0.55)	PG29/M32	40 (1.57)	**38** **(1.5)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	1PH7131 1PH7133 1PH7135 1PH7137		12 (0.47)	18 (0.71)	PG36/M40	50 (1.97)	**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	1PH7163 1PH7167		14 (0.47)	18 (0.71)	PG42/M50	64 (2.52)	**55** **(2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)

1PH710
1PH713
1PH716

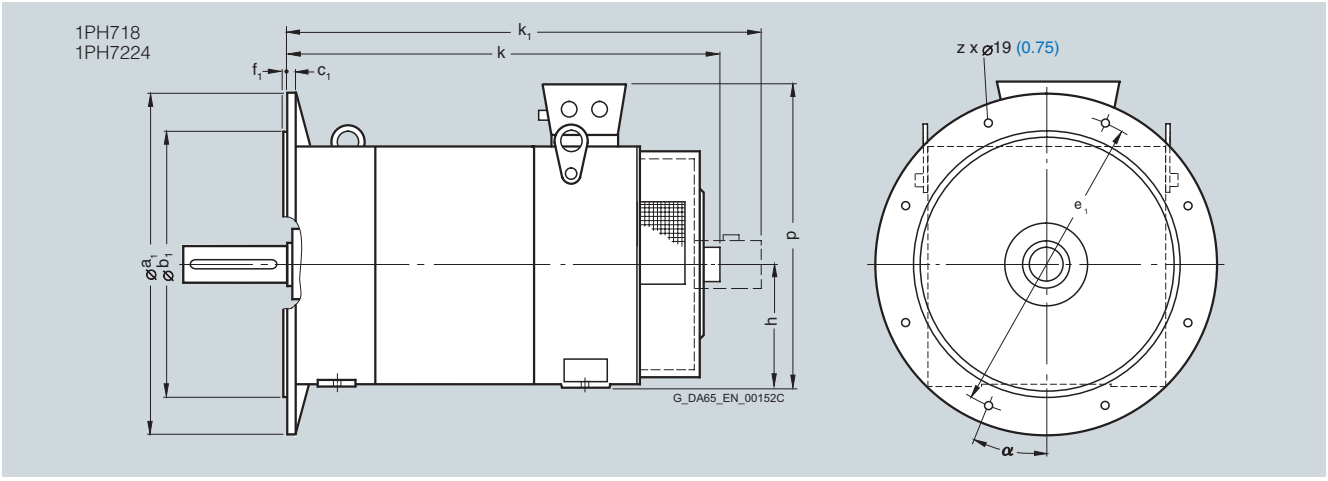


For deviating and additional dimensions of 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

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Dimensional drawings

For motor		Dimensions in mm (in)									For dimensions for foot mounting, shaft and terminal box, see dimensional drawing of 1PH718 and 1PH7224 motors, type of construction IM B3. Terminal box type 1XB7322		
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	k_1 –	p	z –	α –
1PH7, type of construction IM B35, forced ventilation, direction of air flow DE → NDE													
180	1PH7184[1)]		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.2)	180 (7.09)	835 (32.87)	–	495 (19.49)	4	45°
	1PH7184[1)]		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			835 (32.87)			8	22.5°
	1PH7186								925 (36.42)				
225	1PH7224		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.2)	225 (8.86)	–	1100 (43.31)	595 (23.43)	8	22.5°



[1)] For flange selection, see order number supplement for SH 180 and SH 225.

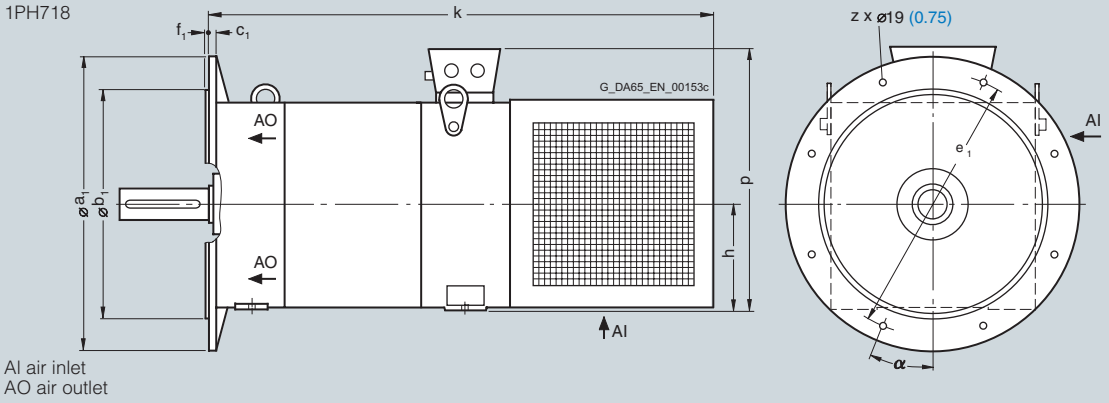
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1PH7 motors
Forced ventilation

Dimensional drawings

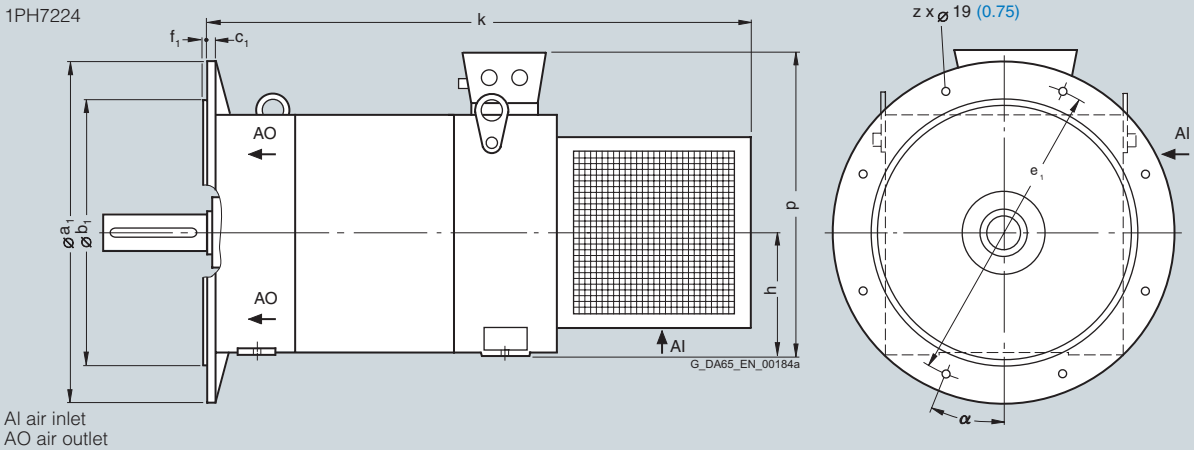
For motor		Dimensions in mm (in)								For dimensions for foot mounting, shaft and terminal box, see dimensional drawing of 1PH718 and 1PH7224 motors, type of construction IM B3. Terminal box type 1XB7322		
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	– p	z –	α –
1PH7, type of construction IM B35, forced ventilation, direction of air flow NDE → DE												
180	1PH7184[1)]		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.2)	180 (7.09)	1010 (39.76)	495 (19.49)	4	45°
	1PH7184[1)]		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			1010 (39.76)		8	22.5°
	1PH7186								1100 (43.31)			
225	1PH7224		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.2)	225 (8.86)	1090 (42.91)	595 (23.43)	8	22.5°

1PH718



AI air inlet
AO air outlet

1PH7224



AI air inlet
AO air outlet

8

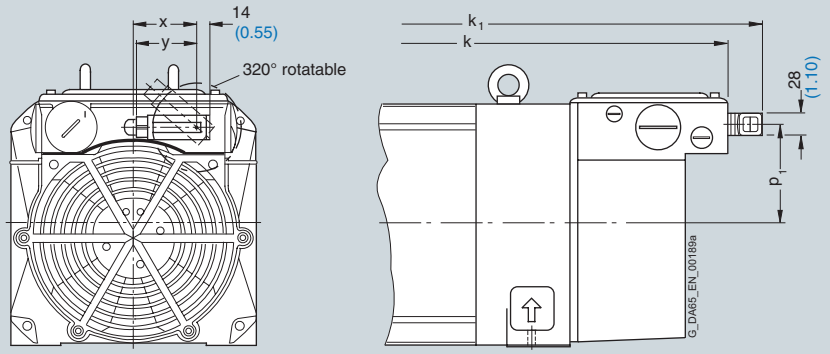
[1)] For flange selection, see order number supplement for SH 180 and SH 225.

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Dimensional drawings

For motor		Dimensions in mm (in)					
Shaft height	Type	DIN IEC	k LB	k_1 –	p_1 –	x –	y –
Deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ to those given in dimension tables 1PH7, forced ventilation							
100	1PH7101 1PH7103		411 (16.18)	453 (17.83)	81 (3.19)	52.5 (2.07)	63.5 (2.50)
	1PH7105 1PH7107		506 (19.92)	548 (21.57)			
132	1PH7131 1PH7133		538 (21.18)	580 (22.83)	103.5 (4.07)	66 (2.60)	63.5 (2.50)
	1PH7135 1PH7137		623 (24.53)	665 (26.18)			
160	1PH7163		640 (25.20)	682 (26.85)	127 (5.00)	75 (2.95)	63.5 (2.50)
	1PH7167		700 (27.56)	742 (29.21)			

1PH710
1PH713
1PH716



8

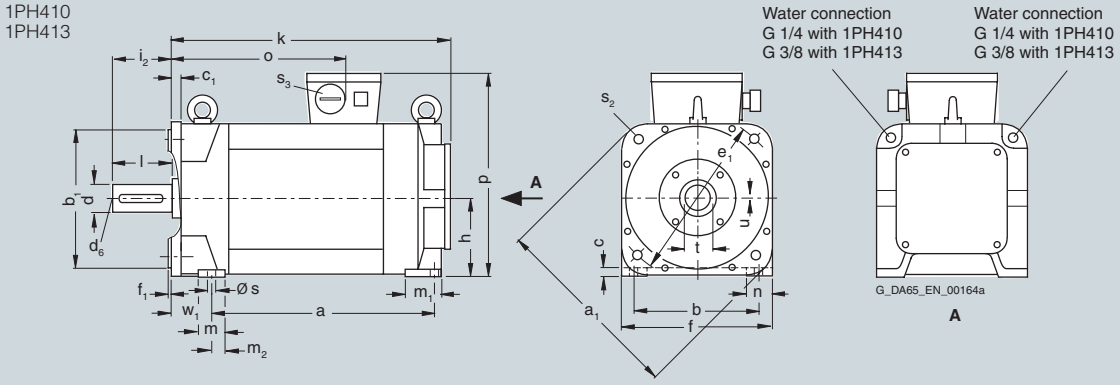
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1PH4 motors
Water cooling

Dimensional drawings

For motor			Dimensions in mm (in)															
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	c_1 –	e_1 –	f AB	f_1 T	h H	i_2 –	k LB	m BA	m_1 –	m_2 –	n AA
1PH4, type of construction IM B35, water cooling																		
100	1PH4103		349 (13.74)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	12 (0.47)	215 (8.46)	190 (7.48)	4 (0.16)	100 (3.94)	80 (3.15)	416 (16.38)	35 (1.38)	60 (2.36)	24 (0.94)	40 (1.57)
	1PH4105		409 (16.10)											476 (18.74)				
	1PH4107		474 (18.66)											541 (21.30)				
132	1PH4133		377 (14.84)	350 (13.78)	216 (8.50)	250 (9.84)	14 (0.55)	16 (0.63)	300 (11.81)	245 (9.65)	5 (0.20)	132 (5.20)	110 (4.33)	458 (18.03)	36 (1.42)	85 (3.35)	24 (0.94)	43 (1.69)
	1PH4135		447 (17.60)											528 (20.79)				
	1PH4137		497 (19.57)											578 (22.76)				
	1PH4138		532 (20.94)											613 (24.13)				

			DE shaft extension										
Shaft height	Type	DIN IEC	o –	p HD	s K	s_2 K	s_3 –	w_1 C	**d D**	d_6 –	l E	t GA	u F
100	1PH4103		244 (9.61)	259 (10.20)	12 (0.47)	14 (0.55)	PG29	44 (1.73)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH4105		304 (11.97)										
	1PH4107		369 (14.53)										
132	1PH4133		264 (10.39)	334.5 (13.17)	12 (0.47)	18 (0.71)	PG36	53 (2.09)	**42 (1.77)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH4135		334 (13.15)										
	1PH4137		384 (15.12)										
	1PH4138		419 (16.50)										

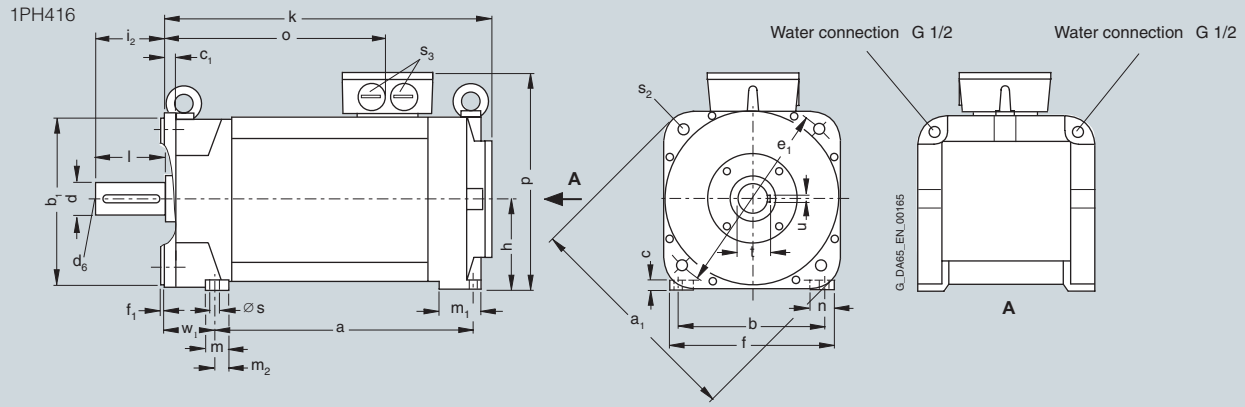


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Dimensional drawings

For motor			Dimensions in mm (in)																
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	c_1 –	e_1 –	f AB	f_1 T	h H	i_2 –	k LB	m BA	m_1 –	m_2 –	n AA	
1PH4, type of construction IM B35, water cooling																			
160	1PH4163		508 (20.00)	400 (15.75)	254 (10.00)	300 (11.81)	15 (0.59)	18 (0.71)	350 (13.78)	294 (11.57)	5 (0.20)	160 (6.30)	110 (4.33)	591 (23.27)	44 (1.73)	77 (3.03)	29 (1.14)	49 (1.93)	
	1PH4167		563 (22.17)											646 (25.43)					
	1PH4163		608 (23.94)											691 (27.20)					

									DE shaft extension				
Shaft height	Type	DIN IEC	o –	p HD	s K	s_2 K	s_3 –	w_1 C	**d D**	d_6 –	l E	t GA	u F
160	1PH4163		407 (16.02)	388 (15.28)	14 (0.55)	18 (0.71)	PG36	56 (2.20)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH4167		462 (18.19)										
	1PH4168		507 (19.96)										



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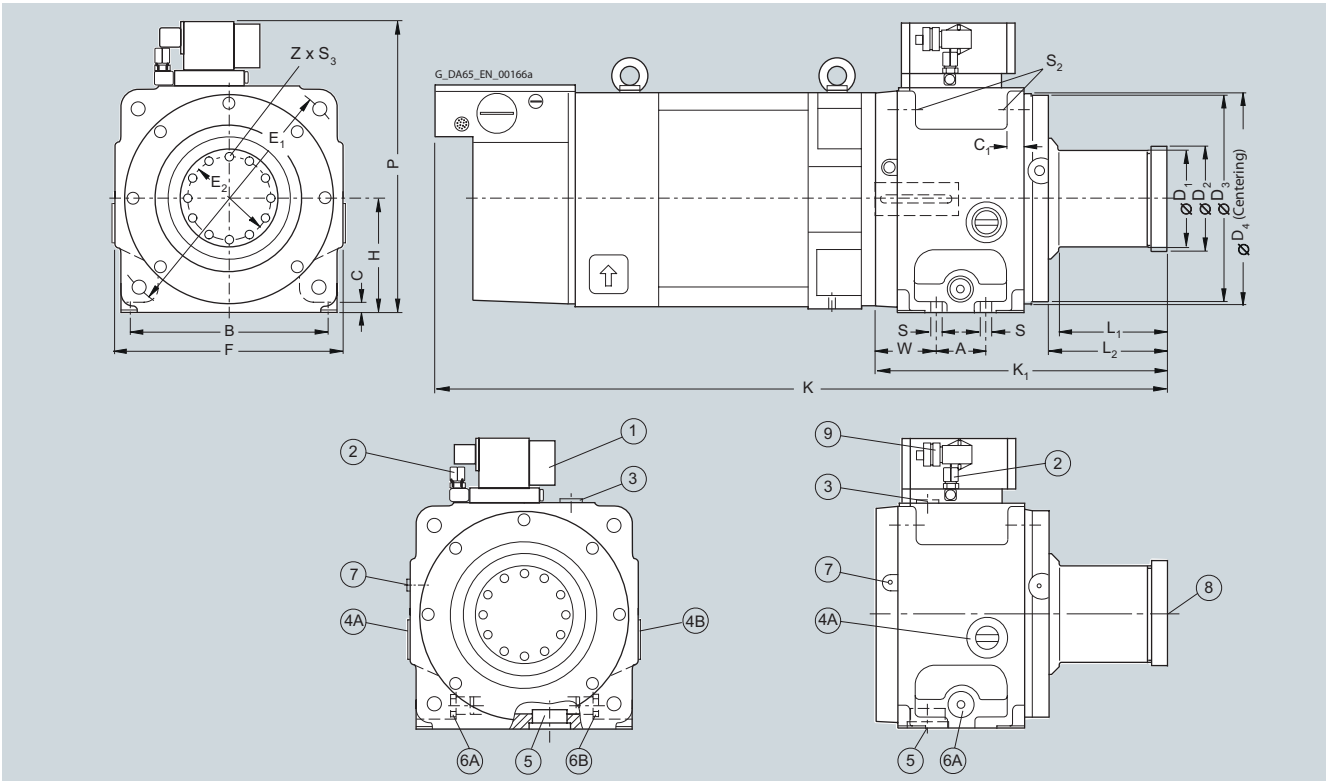
1PH7 motors with two-speed gearbox
Forced ventilation

Dimensional drawings

For motor		Gearbox Dimensions in mm (in)											
Shaft height	Type	A	B	C	C_1	D_1	D_2	D_3	D_4	E_1	E_2	F	**H**
1PH7 with two-speed gearbox, type of construction IM B35, forced ventilation													
100	1PH7101 1PH7103 1PH7105 1PH7107	55 (2.17)	184 (7.24)	12 (0.47)	18 (0.71)	100 (3.94)	100 (3.94)	188 (7.40)	190 (7.48)	215 (8.46)	80 (3.15)	208 (8.19)	**108** **(4.25)**
132	1PH7131 1PH7133 1PH7135 1PH7137	58 (2.28)	234 (9.21)	12 (0.47)	20 (0.79)	116 (4.57)	118 (4.65)	249 (9.80)	250 (9.84)	300 (11.81)	100 (3.94)	270 (10.63)	**136** **(5.35)**
160	1PH7163 1PH7167	58 (2.28)	290 (11.42)	17 (0.67)	20 (0.79)	140 (5.51)	130 (5.12)	249 (9.80)	250 (9.84)	350 (13.78)	100 (3.94)	326 (12.83)	**164** **(6.46)**

		Gearbox Dimensions in mm (in)									Total length motor-gearbox
Shaft height	Type	K_1	L_1	L_2	P	S	S_2	S_3	Z	W	K
100	1PH7101 1PH7103	298 (11.73)	–	116 (4.57)	301 (11.85)	14 (0.55)	14 (0.55)	M8	8	63 (2.48)	709 (27.91)
	1PH7105 1PH7107										804 (31.65)
132	1PH7131 1PH7133	346.5 (13.64)	129.5 (5.10)	142.5 (5.61)	346 (13.62)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	885 (34.84)
	1PH7135 1PH7137										970 (38.19)
160	1PH7163	346.5 (13.64)	–	142.5 (5.61)	402 (15.83)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	987 (38.86)
	1PH7167										1024 (40.31)

Dimensions for 1PH7184, 1PH7186 and 1PH7224 on request.



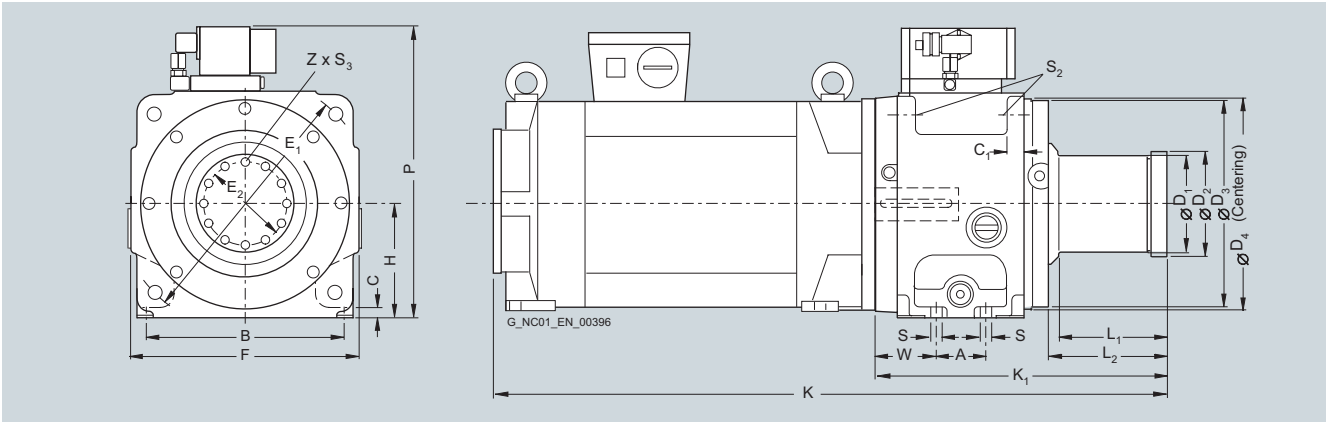
① Switching unit (lifting solenoid 24 V DC, 5 A).
② Ventilation valve.
③ Oil filling bolt.
④A Oil level inspection window or oil return for counterclockwise rotation and circulating-oil lubrication.
④B Oil level inspection window or oil return for clockwise rotation and circulating-oil lubrication.
⑤ Oil drain bolt for type of construction IM B35.
⑥A Oil inlet for clockwise rotation and circulating-oil lubrication.
⑥B Oil inlet for counterclockwise rotation and circulating-oil lubrication.
⑦ Oil inlet for type of construction IM V15 (must be connected).
⑧ Oil inlet for type of construction IM V36.
⑨ Connector, manufacture: Harting, type HAN 8 U.

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Dimensional drawings

For motor		Gearbox Dimensions in mm (in)											
Shaft height	Type	A	B	C	C_1	D_1	D_2	D_3	D_4	E_1	E_2	F	**H**
1PH4 with two-speed gearbox, type of construction IM B35, water cooling													
100	1PH4103 1PH4105 1PH4107	55 (2.17)	184 (7.24)	12 (0.47)	18 (0.71)	100 (3.94)	100 (3.94)	188 (7.40)	190 (7.48)	215 (8.46)	80 (3.15)	208 (8.19)	**108** **(4.25)**
132	1PH4133 1PH4135 1PH4137 1PH4138	58 (2.28)	234 (9.21)	12 (0.47)	20 (0.79)	116 (4.57)	118 (4.65)	249 (9.80)	250 (9.84)	300 (11.81)	100 (3.94)	270 (10.63)	**136** **(5.35)**
160	1PH4163 1PH4167 1PH4168	58 (2.28)	290 (11.42)	17 (0.67)	20 (0.79)	140 (5.51)	130 (5.12)	249 (9.80)	250 (9.84)	350 (13.78)	100 (3.94)	326 (12.83)	**164** **(6.46)**

		Gearbox Dimensions in mm (in)									Total length motor-gearbox
Shaft height	Type	K_1	L_1	L_2	P	S	S_2	S_3	Z	W	K
100	1PH4103	298 (11.73)	–	116 (4.57)	301 (11.85)	14 (0.55)	14 (0.55)	M8	8	63 (2.48)	714 (28.11)
	1PH4105										774 (30.47)
	1PH4107										839 (33.03)
132	1PH4133	346.5 (13.64)	129.5 (5.10)	142.5 (5.61)	346 (13.62)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	805 (31.69)
	1PH4135										875 (34.45)
	1PH4137										925 (36.42)
	1PH4138										960 (37.80)
160	1PH4163	346.5 (13.64)	–	142.5 (5.61)	402 (15.83)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	938 (36.93)
	1PH4167										993 (39.09)
	1PH4168										1038 (40.87)

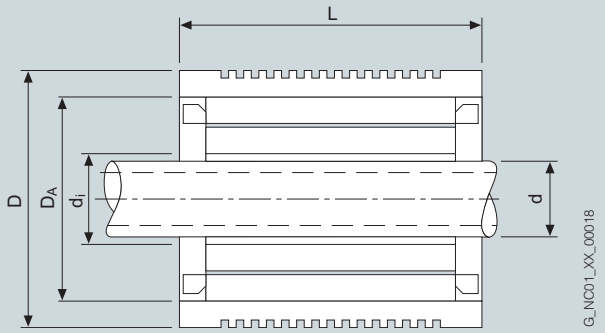


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1PH2 motors
Water cooling

Dimensional drawings

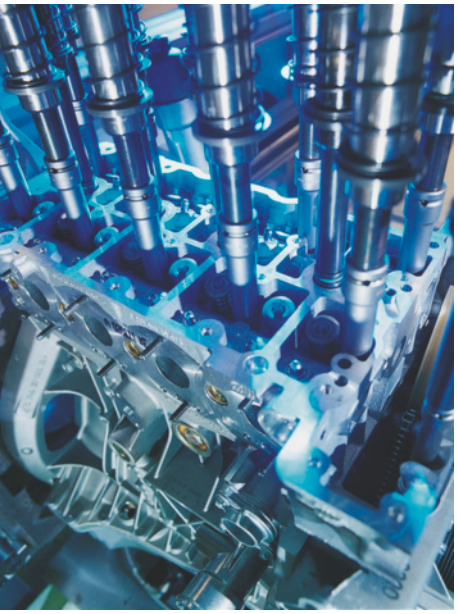
For motor	Gearbox Dimensions in mm (in)				
Type	Standard spindle diameter	Rotor internal diameter	Stator outer diameter	Total outer diameter	Total length
	d	d_i	D_A	D	L
1PH2 built-in motors, water cooling					
1PH2093	67 (2.64)	85 (3.35)	180 (7.09)	205 (8.07)	250 (9.84)
1PH2095					300 (11.81)
1PH2113	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)



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Measuring systems

9



9/2 **Built-on optoelectronic rotary encoders**

9/2 Introduction

9/2 Incremental encoders
9/3 RS 422 incremental encoder (TTL)
9/3 sin/cos 1 V_{pp} incremental encoder
9/3 HTL incremental encoder
9/3 RS 422 double-track incremental encoder (TTL)

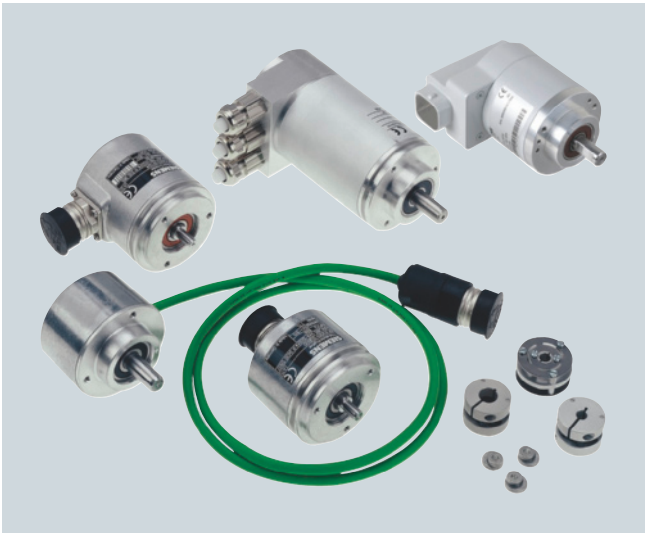
9/6 Absolute encoders
9/7 SSI absolute encoder
9/7 Absolute encoder with DRIVE-CLiQ
9/7 EnDat absolute encoder
9/7 PROFIBUS DP absolute encoder

9/10 Mounting accessories

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Introduction

Overview



The built-on optoelectronic rotary encoders measure paths, angles of rotation, or speeds of machines. They can be used in conjunction with numerical controllers, programmable logic controllers, drives and position displays, e.g. for:

- SINUMERIK CNC controls
- SIMATIC programmable logic controllers
- SIMOTION Motion Control systems
- SINAMICS drive systems
- SIMODRIVE drive systems
- SIMOVERT MASTERDRIVES 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 supported flange joint versions. Encoders with a Synchro flange can be attached to the machine with 3 clamp straps 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 complied with:

- One-time bending: ≥ 20 mm (0.79 in)
- Continuous bending: ≥ 75 mm (2.95 in)

Incremental encoders

Function



Incremental encoders deliver a defined number of electrical pulses per rotation, which represent the measurement of the traveled distance or angle.

Incremental encoders operate on the principle of optoelectronic scanning of dividing disks 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:

- RS 422 difference signals (TTL)
  In the case of RS 422 encoders (TTL), the resolution can be improved by a factor of four by means of edge evaluation.
- sin/cos 1 V_{pp} analog signals
  Even better resolution can be achieved for encoders with sinusoidal signals by interpolating them in the higher-level controller.
- 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	6FX2001-2.... RS 422 incremental encoder (TTL)	6FX2001-3.... sin/cos 1 V_{pp} incremental encoder	6FX2001-4...0 HTL incremental encoder	6FX2001-2UK00 RS 422 double-track incremental encoder (TTL)
Operating voltage V_p on encoder	5 V DC ± 10 % or 10 ... 30 V DC	5 V DC ± 10 %	10 ... 30 V DC	5 V DC ± 5 %
Limit frequency, typical	–	≥ 180 kHz (- 3 dB) ≥ 450 kHz (- 6 dB)	–	–
Scanning frequency, max.	300 kHz	–	300 kHz	Track 1: 160 kHz Track 2: 1 MHz
No-load current consumption, max.	150 mA	150 mA	150 mA	150 mA per track
Signal level	TTL (RS 422)	Sinusoidal 1 V_{pp}	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	TTL (RS 422)
Outputs protected against short-circuit to 0 V	Yes	Yes	Yes	Yes
Switching time (10 ... 90 %) (1 m (3.28 ft) cable and recommended input circuit)	Rise/fall time t_+/t_- ≤ 50 ns	–	Rise/fall time t_+/t_- ≤ 200 ns	Rise/fall time t_+/t_- ≤ 100 ns
Phase angle, signal A to B Edge spacing, min. at	90°	90° ± 10°el.	90°	90°
• 1 MHz	–	–	–	Track 2: ≥ 0.125 µs
• 300 kHz	≥ 0.45 µs	–	≥ 0.45 µs	–
• 160 kHz	–	–	–	Track 1: ≥ 0.8 µs
Cable length to down-stream electronics[1], max.	100 m (328 ft)	150 m (492 ft)	300 m (984 ft)	Up to 500 kHz: 100 m (328 ft) Up to 1 MHz: 50 m (164 ft)
LED failure monitoring	High-resistance driver	–	High-resistance driver	–
Resolution, max.	5000 S/R	2500 S/R	2500 S/R	Track 1: 1024 S/R Track 2: 9000 S/R
Accuracy (in angular seconds)	± 18 mech. × 3600/ number of signals/ revolution z	± 18 mech. × 3600/ number of signals/ revolution z	± 18 mech. × 3600/ number of signals/ revolution z	Track 1: ± 63 Track 2: ± 12
Speed, max.				
• Electrical	(18 × 10^6 rpm)/ number of signals/ revolution	(27 × 10^6 rpm)/ number of signals/ revolution (at - 6 dB)	(18 × 10^6 rpm)/ number of signals/ revolution	Track 1: 9000 rpm Track 2: 6500 rpm
• Mechanical	12000 rpm	12000 rpm	12000 rpm	12000 rpm
Friction torque (at 20 °C) (68 °F)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)
Starting torque (at 20 °C) (68 °F)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)
Shaft loading capacity				
• n > 6000 rpm				
- Axial	10 N (2.25 lb_f)	10 N (2.25 lb_f)	10 N (2.25 lb_f)	–
- Radial at shaft extension	20 N (4.50 lb_f)	20 N (4.50 lb_f)	20 N (4.50 lb_f)	–
• n ≤ 6000 rpm				
- Axial	40 N (8.99 lb_f)	40 N (8.99 lb_f)	40 N (8.99 lb_f)	10 N (2.25 lb_f)
- Radial at shaft extension	60 N (13.5 lb_f)	60 N (13.5 lb_f)	60 N (13.5 lb_f)	20 N (4.50 lb_f)
Angular acceleration, max.	10^5 rad/s^2	10^5 rad/s^2	10^5 rad/s^2	10^5 rad/s^2
Moment of inertia of rotor	1.45 × 10^{-6} kgm^2 (12.8 × 10^{-6} lb_f-in-s^2)	1.45 × 10^{-6} kgm^2 (12.8 × 10^{-6} lb_f-in-s^2)	1.45 × 10^{-6} kgm^2 (12.8 × 10^{-6} lb_f-in-s^2)	20 × 10^{-6} kgm^2 (177 × 10^{-6} lb_f-in-s^2)
Vibration (55 ... 2000 Hz) to EN 60068-2-6	≤ 300 m/s^2 (984 ft/s^2)	≤ 300 m/s^2 (984 ft/s^2)	≤ 300 m/s^2 (984 ft/s^2)	≤ 100 m/s^2 (328 ft/s^2)
Shock to EN 60068-2-27				
• 2 ms	≤ 2000 m/s^2 (6562 ft/s^2)	≤ 2000 m/s^2 (6562 ft/s^2)	≤ 2000 m/s^2 (6562 ft/s^2)	–
• 6 ms	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)

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.

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Technical specifications (continued)

Product name	6FX2001-2.... RS 422 incremental encoder (TTL)	6FX2001-3.... sin/cos 1 V_{pp} incremental encoder	6FX2001-4...0 HTL incremental encoder	6FX2001-2UK00 RS 422 double-track incremental encoder (TTL)
Ambient temperature				
Operation				
• Flange outlet or fixed cable				
- At V_p = 5 V ± 10 %	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-10 ... +70 °C (+14 ... +158 °F)
- At V_p = 10 ... 30 V	-40 ... +70 °C (+14 ... +158 °F)	–	–	–
• Flexible cable				
- At V_p = 5 V ± 10 %	-10 ... +100 °C (+14 ... +212 °F)	-10 ... +100 °C (+14 ... +212 °F)	-10 ... +100 °C (+14 ... +212 °F)	-10 ... +70 °C (+14 ... +158 °F)
- At V_p = 10 ... 30 V	-10 ... +70 °C (+14 ... +158 °F)	–	–	–
Degree of protection to EN 60529 (IEC 60529)				
• Without shaft input	IP67	IP67	IP67	IP67
• With shaft input	IP64	IP64	IP64	IP64
EMC	Tested in accordance with the guidelines for electromagnetic compatibility 89/336/EEC and the regulations of the EMC guidelines (applicable basic standards)			
Weight, approx.	0.25 kg (0.55 lb)	0.25 kg (0.55 lb)	0.25 kg (0.55 lb)	0.7 kg (1.54 lb)
CE mark	Yes	Yes	Yes	Yes
Approvals, according to	cULus	cULus	cULus	cULus

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Selection and ordering data

Description	Order No.
RS 422 incremental encoder (TTL)	
Synchro flange and 5 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-2G■■■**
• Radial flange outlet	**6FX2001-2E■■■**
• Cable 1 m (3.28 ft) with connector[1]	**6FX2001-2C■■■**
Synchro flange and 10 ... 30 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-2H■■■**
• Radial flange outlet	**6FX2001-2F■■■**
• Cable 1 m (3.28 ft) with connector[1]	**6FX2001-2D■■■**
Supported flange joint and 5 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-2R■■■**
• Radial flange outlet	**6FX2001-2P■■■**
• Cable 1 m (3.28 ft) with connector[1]	**6FX2001-2M■■■**
Supported flange joint and 10 ... 30 V DC supply voltage	
Connection:	
• 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**

S/R = signals/revolution

Description	Order No.
sin/cos 1 V_{pp} incremental encoder	
Synchro flange and 5 V DC supply voltage	
Connection:	
• 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**
HTL incremental encoder	
Synchro flange and 10 ... 30 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-4H■■0**
• Radial flange outlet	**6FX2001-4F■■0**
• Cable 1 m (3.28 ft) with connector[1]	**6FX2001-4D■■0**
Supported flange joint and 10 ... 30 V DC supply voltage	
Connection:	
• 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**
RS 422 double-track incremental encoder (TTL)	
Synchro flange and 5 V DC supply voltage	
Connection:	
• Cable 1 m (3.28 ft) with axial connector 2 types of resolution: 9000/1024 S/R	**6FX2001-2UK00**

[1] Universal integrated cable outlet for axial and radial outlet direction.

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Absolute encoders

Function

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 transmitted immediately to the controller. There is no need to travel to a reference point.

SSI, DRIVE-CLiQ and EnDat absolute encoders are of advantage in time-critical applications.

In plants with a large number of encoders, PROFIBUS DP is more of an advantage due to the reduced wiring overhead. PROFIBUS DP encoders are programmable and support isochronous mode with internode communication.

Single-turn encoders divide one rotation (360° mechanical) into a specific number of steps, e.g. 8192. A unique code word is assigned to each position. After 360° the position values are repeated.

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.



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Technical specifications

Product name	6FX2001-5.S.. SSI absolute encoder	6FX2001-5.D..-0AA0 Absolute encoder with DRIVE-CLiQ	6FX2001-5.E.. EnDat absolute encoder	6FX2001-5.P.. PROFIBUS DP absolute encoder
Operating voltage V_p on encoder	10 ... 30 V DC	24 V DC - 15 % + 20 %	5 V DC ± 5 %	10 ... 30 V DC
Power consumption, approx.				
• Single-turn	160 mA	245 mA	160 mA	300 ... 100 mA (2.5 W)
• Multi-turn	200 mA	325 mA	200 mA	300 ... 100 mA (2.5 W)
Interface	SSI	DRIVE-CLiQ	EnDat	PROFIBUS
Clock input	Differential cable receiver according to EIA standard RS 485	–	Differential cable receiver according to EIA standard RS 485	Differential cable receiver according to EIA standard RS 485
Data output	Differential cable driver according to EIA standard RS 485	DRIVE-CLiQ	Differential cable driver according. to EIA standard RS 485	Differential cable driver according to EIA standard RS 485
Short-circuit strength	Yes	Yes	Yes	Yes
Data transfer rate	100 kHz ... 1 MHz	100 Mbit	100 kHz ... 2 MHz	12 Mbit/s
LED for diagnostics	–	–	–	Yes (green/red)
Speed, max.				
• Electrical	–	14000 rpm	–	–
- At ± 1 bit accuracy	5000 rpm	–	5000 rpm	5800 rpm
- At ± 100 bit accuracy	10000 rpm	–	10000 rpm	–
• Mechanical				
- Single-turn	12000 rpm	12000 rpm	12000 rpm	12000 rpm
- Multi-turn	10000 rpm	10000 rpm	10000 rpm	6000 rpm
Cable length to down-stream electronics[1], max.	Up to 1-MHz-cycle: 50 m (164 ft) Up to 300-kHz-cycle: 100 m (328 ft) Up to 100-kHz-cycle: 400 m (1312 ft)	100 m (328 ft)	Up to 1-MHz-cycle: 50 m (164 ft) Up to 300-kHz-cycle: 150 m (492 ft)	Up to 12 Mbit/s: 100 m (328 ft) Up to 1.5 Mbit/s: 200 m (656 ft) Up to 93.75 kbit/s: 1200 m (3937 ft)
Number of nodes	–	–	–	99
Connection	Flange outlet, axial/radial	DRIVE-CLiQ connector, radial	Flange outlet, axial/radial	Terminal block with address selector switch and bus terminating resistor in removable cover with 3 radial cable glands
Cable diameter	–	–	–	6.5 ... 9 mm (0.26 ... 0.35 in) Removal of cover possible without interrupting bus
Resolution				
• Single-turn	13 bit (8192 steps)	22 bit	13 bit (8192 steps)	13 bit (8192 steps)
• Multi-turn	25 bit (8192 × 4096 steps)	34 bit (22 bit Single-turn + 12 bit Multi-turn)	25 bit (8192 × 4096 steps)	27 bit (8192 × 16384 steps)
Message frame length				
• Single-turn	13 bit, without parity	–	According to EnDat specification	–
• Multi-turn	25 bit, without parity	–	According to EnDat specification	–
Incremental track	–	2048 S/R, 1 V_{pp} (encoder-internal only)	512 S/R, 1 V_{pp}	–
Code type				
• Sampling	Gray	Binary (encoder-internal only)	Gray	Gray
• Transfer	Gray, fir tree format	–	Binary	Binary
Network load, approx.	–	–	–	20 µs per encoder at 12 Mbit/s
Cycle time	–	–	–	667 µs

S/R= signals/revolution

[1] Observe the maximum permissible cable length of the connected module.

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Technical specifications (continued)

Product name	6FX2001-5.S.. SSI absolute encoder	6FX2001-5.D..-0AA0 Absolute encoder with DRIVE-CLiQ	6FX2001-5.E.. EnDat absolute encoder	6FX2001-5.P.. PROFIBUS DP absolute encoder
Parameterization capability				
• Resolution per revolution	–	–	–	Arbitrary 1 ... 8192
• Total resolution	–	–	–	Arbitrary 1 ... 16384
• Preset	Set to zero	–	–	Arbitrary
• Counting direction	Yes	Yes	–	Yes
• Speed signal	–	–	–	Yes
• Limit switches	–	–	–	Yes, 2
• Isochronous mode and internode communication acc. to DP V2	–	–	–	Yes
Online parameterization	–	–	–	Yes
Accuracy	± 60 angular seconds	± 36 angular seconds	± 60 angular sec. (incr. track)	± ½ LSB
EMC	Tested in accordance with EN 50081 and EN 50082	Tested in accordance with EN 50081 and EN 50082	Tested in accordance with EN 50081 and EN 50082	Tested in accordance with EN 50081 and EN 50082
Friction torque (at 20 °C) (68 °F)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)
Starting torque (at 20 °C) (68 °F)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)	≤ 0.01 Nm (0.08 lb_f-in)
Shaft loading capacity				
• n > 6000 rpm				
- Axial	10 N (2.25 lb_f)	10 N (2.25 lb_f)	10 N (2.25 lb_f)	10 N (2.25 lb_f)
- Radial at shaft extension	20 N (4.50 lb_f)	20 N (4.50 lb_f)	20 N (4.50 lb_f)	20 N (4.50 lb_f)
• n ≤ 6000 rpm				
- Axial	40 N (8.99 lb_f)	40 N (8.99 lb_f)	40 N (8.99 lb_f)	40 N (8.99 lb_f)
- Radial at shaft extension	60 N (13.5 lb_f)	60 N (13.5 lb_f)	60 N (13.5 lb_f)	110 N (24.7 lb_f)
Angular acceleration, max.	10^5 rad/s^2	10^5 rad/s^2	10^5 rad/s^2	10^5 rad/s^2
Moment of inertia of rotor				
• Solid shaft	1.45×10^{-6} kgm^2 (12.8×10^{-6} lb_f-in-s^2)	1.90×10^{-6} kgm^2 (16.8×10^{-6} lb_f-in-s^2)	1.45×10^{-6} kgm^2 (12.8×10^{-6} lb_f-in-s^2)	1.90×10^{-6} kgm^2 (16.8×10^{-6} lb_f-in-s^2)
• Hollow shaft	–	2.80×10^{-6} kgm^2 (24.8×10^{-6} lb_f-in-s^2)	–	2.80×10^{-6} kgm^2 (24.8×10^{-6} lb_f-in-s^2)
Vibration (55 ... 2000 Hz) to EN 60068-2-6	≤ 300 m/s^2 (984 ft/s^2)	≤ 100 m/s^2 (328 ft/s^2)	≤ 300 m/s^2 (984 ft/s^2)	≤ 100 m/s^2 (328 ft/s^2)
Shock to EN 60068-2-27				
• 2 ms	≤ 2000 m/s^2 (6562 ft/s^2)	≤ 2000 m/s^2 (6562 ft/s^2)	≤ 2000 m/s^2 (6562 ft/s^2)	≤ 2000 m/s^2 (6562 ft/s^2)
• 6 ms	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)	≤ 1000 m/s^2 (3281 ft/s^2)
Ambient temperature				
• Operation	-40 ... +85 °C (-40 ... +185 °F)	-20 ... +100 °C (-4 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +85 °C (-40 ... +185 °F)
Degree of protection to EN 60529 (IEC 60529)				
• Without shaft input	IP67	IP67	IP67	IP67
• With shaft input	IP64	IP64	IP64	IP64
Weight, approx.				
• Single-turn	0.35 kg (0.77 lb)	0.40 kg (0.88 lb)	0.35 kg (0.77 lb)	0.5 kg (1.10 lb)
• Multi-turn	0.35 kg (0.77 lb)	0.44 kg (0.97 lb)	0.35 kg (0.77 lb)	0.7 kg (1.54 lb)
CE mark	Yes	Yes	Yes	Yes
Approvals, according to	cULus	cULus	cULus	cULus
PROFIBUS certificate	–	–	–	Yes
Supported profiles	–	–	–	Class 1, Class 2

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Selection and ordering data

Description	Order No.
SSI absolute encoder	
Synchro flange and 10 ... 30 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-5HS ■■**
• Radial flange outlet	**6FX2001-5FS ■■**
Supported flange joint and 10 ... 30 V DC supply voltage	
Connection:	
• 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 encoder with DRIVE-CLiQ	
24 V DC supply voltage Radial connection	
• Synchro flange Solid shaft 6 mm (0.24 in)	**6FX2001-5FD ■■-0AA0**
• Supported flange joint Solid shaft 10 mm (0.39 in)	**6FX2001-5QD ■■-0AA0**
• Torque bracket Hollow shaft 10 mm (0.39 in)	**6FX2001-5VD ■■-0AA0**
• Torque bracket Hollow shaft 12 mm (0.47 in)	**6FX2001-5WD ■■-0AA0**
Resolution	
• Single-turn 22 bit	**1 3**
• Multi-turn 34 bit	**2 5**
EnDat absolute encoder	
Synchro flange and 5 V DC supply voltage	
Connection:	
• Axial flange outlet	**6FX2001-5HE ■■**
• Radial flange outlet	**6FX2001-5FE ■■**
Supported flange joint and 5 V DC supply voltage	
Connection:	
• 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.
PROFIBUS DP absolute encoder	
10 ... 30 V DC supply voltage Radial connection	
• Synchro flange Solid shaft	**6FX2001-5FP ■■**
• Supported flange joint Solid shaft	**6FX2001-5QP ■■**
• Torque bracket Hollow shaft 8 mm/10 mm/12 mm/15 mm (0.31 in/0.39 in/0.47 in/0.59 in)	**6FX2001-5WP ■■**
Resolution	
• Single-turn 8192 steps/revolution (13 bit)	**1 2**
• Multi-turn 8192 steps/revolution, 16384 revolutions (27 bit)	**2 4**
User Manual For start-up and parameterization of PROFIBUS encoders Language: English/German	**6SN1197-0AB10-0YP4**

More information

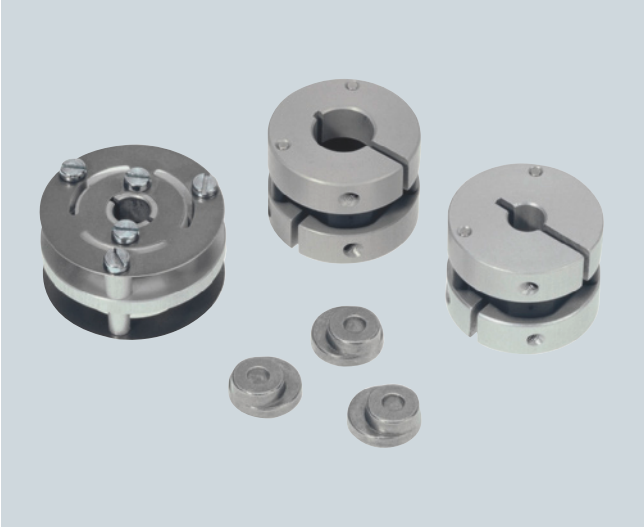
Description	Order No.
Decentralizing with PROFIBUS DP	**ISBN3-89578-074-X**

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Mounting accessories

Overview



Clamp straps/couplings

Clamp straps and couplings are available as mounting accessories for the rotary encoders. The clamp straps are used to fix the encoders with a Synchro flange.

Mating connector

A mating connector is available for the encoder with flange outlet or with cable and encoder connector for cable diameters 5.5 mm (0.22 in) to 12 mm (0.47 in). Connectors with 12 contacts are suitable for all incremental encoders, as well as SSI absolute encoders. Connectors with 17 contacts are suitable for EnDat encoders.

Replacement connector

A replacement connector is available for encoders with cable.

Technical specifications

	6FX2001-7KF10 6FX2001-7KF06	6FX2001-7KS06 6FX2001-7KS10
Product name	Spring disk coupling	Plug-in coupling
Transmission torque, max.	0.8 Nm (2.88 oz_f)	0.7 Nm (2.52 oz_f)
Shaft diameter	6 mm (0.24 in) both ends or d_1 = 6 mm (0.24 in), d_2 = 5 mm (0.20 in)	6 mm (0.24 in) both ends or 10 mm (0.39 in) both ends
Center offset of shafts, max.	0.4 mm (0.02 in)	0.5 mm (0.02 in)
Axial offset	± 0.4 mm (0.02 in)	± 0.5 mm (0.02 in)
Angular displacement of shafts, max.	3°	1°
Torsional rigidity	150 Nm/rad (539.51 oz_f/rad)	31 Nm/rad (111.5 oz_f/rad)
Lateral spring stiffness	6 N/mm (1.35 lb_f)	10 N/mm (2.25 lb_f)
Moment of inertia	19 gcm^2 (168 × 10^{-7} lb_f-in-s^2)	20 gcm^2 (177 × 10^{-7} lb_f-in-s^2)
Speed, max.	12000 rpm	12000 rpm
Ambient temperature		
• Operation	-40 ... +150 °C (-40 ... +302 °F)	-40 ... +80 °C (-40 ... +176 °F)
Weight, approx.	16 g (0.56 oz)	20 g (0.71 oz)

Selection and ordering data

Description	Order No.
Clamp strap (1 unit) For double-track encoders and encoders with Synchro flange (3 units are required)	**6FX2001-7KP01**
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**
Mating connector for flange outlet or encoder connector with cap nut (1 unit) Crimp version, socket contacts for cable diameters 5.5 … 12 mm (0.22 … 0.47 in)	
• 12-pin, insulator with 12 socket contacts for TTL, sin/cos 1 V_{pp}, HTL incremental encoders and SSI absolute encoders	**6FX2003-0SU12**
• 17-pin, insulator with 17 socket contacts for EnDat absolute encoders	**6FX2003-0SU17**
Replacement connectors with external thread for encoders (1 unit)	**6FX2003-0SA12**
• 12-pin, insulator with 12 contact pins for RS 422, sin/cos 1 V_{pp}, HTL incremental encoders and SSI absolute encoders	

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Connection system MOTION-CONNECT

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10/38 **Length code**

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Overview

MOTION-CONNECT cables are suitable for use with many different types of machine tool and production machine.

The power cables and signal cables can be ordered by the meter or pre-assembled.

The following MOTION-CONNECT cable designs are available:

- **MOTION-CONNECT 500** is the option for mainly fixed installation.
- **MOTION-CONNECT 700** is the ideal complement to linear motors and machines with high dynamic requirements. The cables are resistant to cutting oils.
- **MOTION-CONNECT 800** meets all high mechanical requirements for use in cable carriers for machine tools and production machines. The cables are resistant to cutting oils.

Benefits

The use of pre-assembled MOTION-CONNECT cables will ensure high quality and system-tested, problem-free operation.

The pre-assembled cables can be ordered in length units of 10 cm (3.94 in) and can be extended, if necessary.

SPEED-CONNECT:

The new pre-assembled cables with SPEED-CONNECT connectors support reliable, stable and fast connection. With a short rotation as far as the stop, the lock nut of the connector secures the connection.

Application

Degree of protection of pre-assembled power and signal cables and their extensions is IP67 when closed and connected.

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.

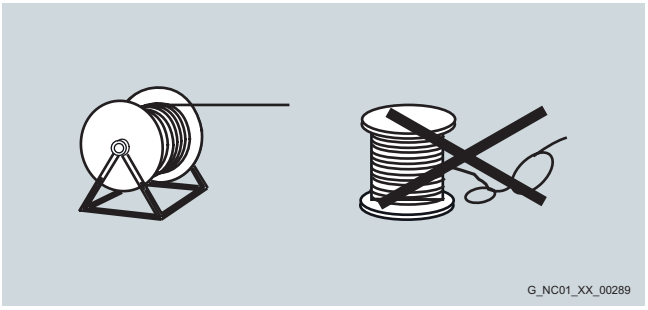
Siemens AG assumes no liability for correct transmission of signals or power in this case.

When the power and/or signal cables include more than one additional intermediate connection, the maximum permissible cable length is reduced by 2 m (6.56 ft) for each interruption point.

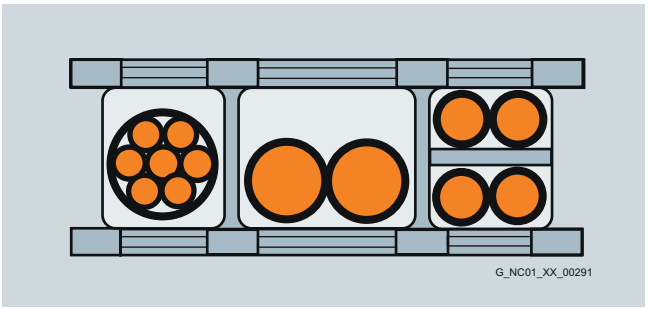
MOTION-CONNECT cables are not suitable for outdoor use.

MOTION-CONNECT cables are approved for a maximum horizontal travel distance of 5 m (16.41 ft).

Function



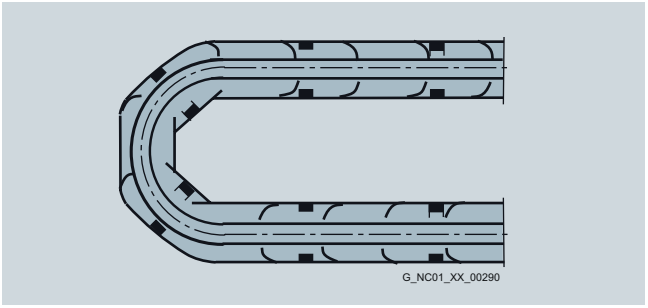
The cables must be removed from the drum without twisting, i.e. the cables must be unwound and must never be lifted over the drum flange in loops.



To maximize the service life of the cable carrier and cables, cables in the carrier made from different materials must be installed in the cable carrier with spacers. 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 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.

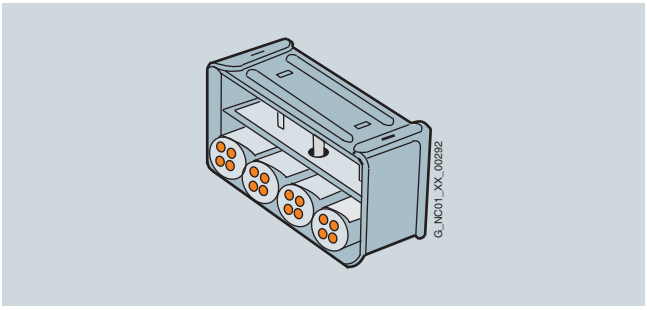


The cables must be able to be moved without applying force in particular in the bending radii of the carrier. The specified minimum bending radii must be adhered to.

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. A cable strain relief is attached 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 connectors 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
	Exposed core ends
	The cable is not included in the scope of supply, it must be provided by the customer

1) Not with DRIVE-CLiQ signal cables.
2) One control circuit pair.
3) One symmetrically loaded AC cable.
4) Current-carrying capacity extrapolated according to EN 60204-1, IEC 60364-5-52 and VDE 0298 Part 4.

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 factors from the table of derating factors.

Cross-section	Current carrying capacity rms AC 50/60 Hz or DC in amps for installation type			
	B1 Single-core cables in protection tubes or installation ducts	**B2** Multi-core cables in protection tubes or installation ducts	**C** Multi-core cables, vertically or horizontally on walls / open, without protection tubes and installation ducts / with contact	**E** Multi-core cables, horizontally or vertically on perforated cable racks / open, without protection tubes and installation ducts / with contact
mm^2				
Electronics[2]				
0.20	–	4.3	4.4	4.4
0.30	–	7.5	7.5	7.8
0.75	–	9	9.5	10
Power[3]				
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
150[4]	239	206	259	276
185[4]	274	235	296	315
> 185	The values must be taken from the IEC 60364-5-52 standard			

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

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Power cables

Technical specifications

Power cables	6FX500.-....-.... MOTION-CONNECT 500	6FX700.-....-.... MOTION-CONNECT 700	6FX800.-.....-.... MOTION-CONNECT 800
Approvals			
• VDE[1]	Yes	Yes	Yes
• cUL or UL/CSA	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90
• UL-CSA File No.[2]	Yes	Yes	Yes
• RoHS conformity	Yes	Yes	Yes
Rated voltage V_0/V in accordance with EN 50395			
• Power conductors	600 V/1000 V	600 V/1000 V	600 V/1000 V
• Signal conductors	24 V (EN) 1000 V (UL/CSA)	24 V (EN) 1000 V (UL/CSA)	24 V (EN) 1000 V (UL/CSA)
Test voltage, rms			
• Power conductors	4 kV	4 kV	4 kV
• Signal conductors	2 kV	2 kV	2 kV
Operating temperature on the surface			
• Fixed installation	-20 … +80 °C (-4 ... +176 °F)	-50 … +80 °C (-58 ... +176 °F)	-50 … +80 °C (-58 ... +176 °F)
• Flexible installation	0 … 60 °C (32 ... 140 °F)	-20 … +60 °C (-4 ... +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)	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)	20 N/mm^2 (2901 lb$_f$/in^2)
Smallest bending radius			
• Fixed installation	5 × D_{max}	4 × D_{max}	6 × D_{max}
• Flexible installation	See power cables	See power cables	See power cables
Torsional stress	Absolute 30°/m	Absolute 30°/m	Absolute 30°/m
Bending	100000	10 million from 16 mm^2: 3 million	10 million from 10 mm^2: 3 million
Traversing velocity	30 m/min (98.4 ft/min)	200 m/min (656 ft/min) from 16 mm^2: 150 m/min (492 ft/min)	180 m/min (591 ft/min) from 10 mm^2: 100 m/min (328 ft/min)
Acceleration	2 m/s^2 (6.56 ft/s^2)	30 m/s^2 (98.4 ft/s^2)	5 m/s^2 (16.41 ft/s^2) (5 m (16.41 ft)); 10 m/s^2 (32.81 ft/s^2) (2.5 m (8.20 ft))
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen/silicone-free IEC 60754-1/ DIN VDE 0472-815	CFC/halogen/silicone-free IEC 60754-1/ DIN VDE 0472-815
Oil resistance	EN 60811-2-1 (mineral oil only)	EN 60811-2-1	EN 60811-2-1
Outer jacket	PVC DESINA color orange RAL 2003	PUR, HD22.10 S2 (VDE 0282, Part 10) DESINA color orange RAL 2003	PUR, HD22.10 S2 (VDE 0282, Part 10) DESINA color orange RAL 2003
Flame-retardant	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3

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[1] The respective registration number is printed on the cable jacket (only applies to power cables).
[2] The file number is printed on the cable jacket.

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Technical specifications (continued)

Signal cables	6FX500.-....-.... MOTION-CONNECT 500	6FX700.-....-.... MOTION-CONNECT 700	6FX800.-.....-.... MOTION-CONNECT 800
Approvals			
• VDE	Yes	Yes	Yes
• cUL or UL/CSA	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90
• UL-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)	-50 … +80 °C (-58 ... +176 °F)	-50 … +80 °C (-58 ... +176 °F)
• Flexible installation	0 … 60 °C (32 ... 140 °F)	-20 … +60 °C (-4 ... +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)	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)	20 N/mm^2 (2901 lb$_f$/in^2)
Smallest bending radius			
• Fixed installation	60 mm (2.36 in)	60 mm (2.36 in)	60 mm (2.36 in)
• Flexible installation	100 mm (3.94 in)	95 mm (3.74 in)	100 mm (3.94 in)
Torsional stress	Absolute 30°/m	Absolute 30°/m	Absolute 30°/m
Bending	2 million	10 million	10 million
Traversing velocity	180 m/min (591 ft/min)	200 m/min (656 ft/min)	180 m/min (591 ft/min)
Acceleration	5 m/s^2 (16.41 ft/s^2)	30 m/s^2 (98.43 ft/s^2)	5 m/s^2 (16.41 ft/s^2) (5 m (16.41 ft)); 10 m/s^2 (32.81 ft/s^2) (2.5 m (8.20 ft))
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen/silicone-free IEC 60754-1	CFC/halogen/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-2-1 (mineral oil only)	EN 60811-2-1	EN 60811-2-1
Outer jacket	PVC DESINA color green RAL 6018	PUR, HD22.10 S2 (VDE 0282, Part 10) DESINA color green RAL 6018	PUR, HD22.10 S2 (VDE 0282, Part 10) 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

[1)] The file number is printed on the cable jacket.

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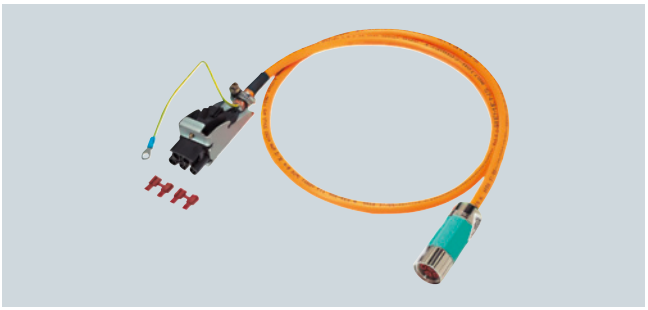
Technical specifications (continued)

DRIVE-CLiQ signal cables	6FX2...-1DC..-.... DRIVE-CLiQ	6FX5...-.DC..-.... DRIVE-CLiQ MOTION-CONNECT 500	6FX8...-.DC..-.... DRIVE-CLiQ MOTION-CONNECT 800
Approvals			
• VDE	Yes	Yes	Yes
• cUL or UL/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
• UL-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)	-20 … +80 °C (-4 ... +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)	60 mm (2.36 in)
• Flexible installation	–	125 mm (4.92 in)	100 mm (3.94 in)
Torsional stress	–	Absolute 30°/m	Absolute 30°/m
Bending	–	100000	10 million
Traversing velocity	–	30 m/min (98.4 ft/min)	180 m/min (591 ft/min)
Acceleration	–	2 m/s^2 (6.56 ft/s^2)	5 m/s^2 (16.41 ft/s^2) (5 m (16.41 ft)); 10 m/s^2 (32.81 ft/s^2) (2.5 m (8.20 ft))
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 Gray RAL 7032	PVC DESINA color green RAL 6018	PUR, HD22.10 S2 (VDE 0282, Part 10) 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

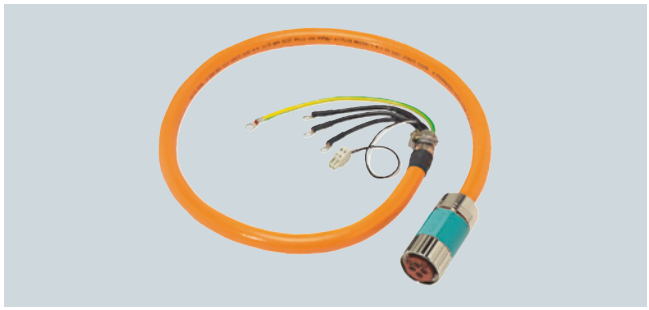
[1] The file number is printed on the cable jacket.

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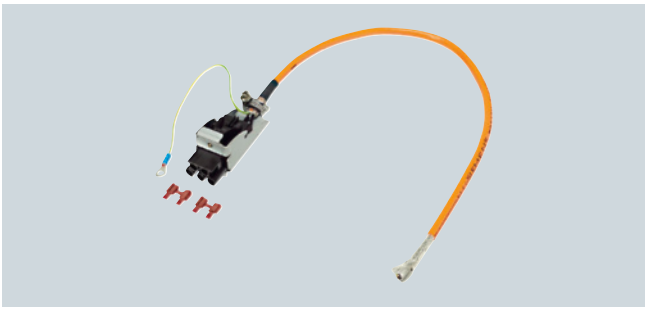
Overview



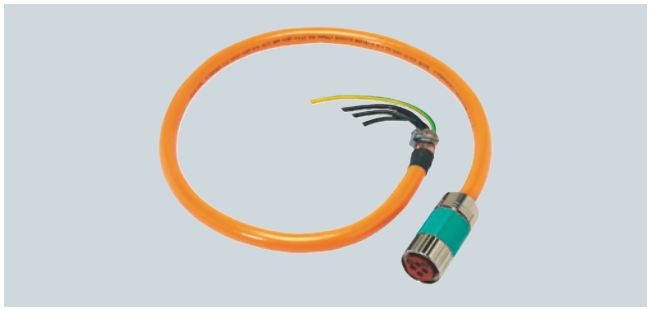
Motor Module plug with circular connector



Ring cable lugs with circular connector



Motor Module plug with exposed core ends



Power Module connecting cable with circular connector

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.

Note:
On request, all **6FX.002-5....-....** power cables are also available with crimped contacts and with the connector enclosure for the **module end** enclosed separately.

In this case, the 6th position of the Order No. must be changed from 0 to 1:
6FX.0**1**2-5....-....

Once the contacts have latched into the insulator, they can no longer be removed.

Type of delivery

Pre-assembled cables can be ordered in units of 10 cm (3.94 in) up to a maximum length of 299.8 m (984 ft).

1.5 mm^2 and 2.5 mm^2 cables can be supplied in lengths of 50 m, 100 m, 200 m and 500 m (164 ft, 328 ft, 656 ft and 1641 ft) and 4 mm^2 cables can be supplied in units of 1 m (3.28 ft) up to a maximum length of 100 m (328 ft).

Above 30 kg or 100 m (66.2 lb or 328 ft), cable drums are used instead of reels.

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Power cables for 1FT/1FK/1PH8 motors with connectors

Selection and ordering data

MOTION-CONNECT power cables without brake cores for 1FT/1FK/1PH8 motors with SPEED-CONNECT connectors or full thread and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Motor Modules

Connection method, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm^2		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5	1	**6FX■002-5C■01-....**	8.4 (0.33)	10.4 (0.41)	**6FX■008-1BB11-....**	0.12 (0.08)	0.16 (0.11)	155 (6.10)	100 (3.94)
		1.5	**6FX■002-5C■21-....**							
		e. c.[4]	**6FX 5 002-5CS02-....**							
	4 × 2.5	1	**6FX■002-5C■11-....**	10.0 (0.39)	12.1 (0.48)	**6FX■008-1BB21-....**	0.21 (0.14)	0.23 (0.16)	180 (7.09)	120 (4.72)
		1.5	**6FX■002-5C■31-....**							
		e. c.[4]	**6FX 5 002-5CS12-....**							
	4 × 4	1.5	**6FX■002-5C■41-....**	11.4 (0.45)	13.2 (0.52)	**6FX■008-1BB31-....**	0.27 (0.18)	0.31 (0.21)	210 (8.27)	130 (5.12)
		e. c.[4]	**6FX 5 002-5CS42-....**							
	4 × 6	1.5	**6FX■002-5C■51-....**	13.6 (0.54)	16.0 (0.63)	**6FX■008-1BB41-....**	0.37 (0.25)	0.42 (0.28)	245 (9.65)	170 (6.69)
		e. c.[4]	**6FX 5 002-5CS52-....**							
	4 × 10	1.5	**6FX■002-5C■61-....**	20.0 (0.79)	19.4 (0.76)	**6FX■008-1BB51-....**	0.73 (0.49)	0.63 (0.42)	360 (14.17)	210 (8.27)
		35[5]	**6FX■002-5CS13-....**							
		e. c.[4]	**6FX 5 002-5CS62-....**							
Ring cable lugs[6]	4 × 6	1.5	**6FX■002-5C■54-....**	13.6 (0.54)	16.0 (0.63)	**6FX■008-1BB41-....**	0.37 (0.25)	0.42 (0.28)	245 (9.65)	170 (6.69)
	4 × 10	1.5	**6FX■002-5C■64-....**	20.0 (0.79)	19.4 (0.76)	**6FX■008-1BB51-....**	0.73 (0.49)	0.63 (0.42)	360 (14.17)	210 (8.27)
		35[5]	**6FX■002-5CS14-....**							
	4 × 16	1.5	**6FX 8 002-5CS24-....**	24.2 (0.95)	23.6 (0.93)	**6FX■008-1BB61-....**	1.10 (0.74)	0.95 (0.64)	440 (17.32)	260 (10.24)
		35[5]	**6FX■002-5CS23-....**							
Sold by the meter	4 × 25	–	–	28.0 (1.10)	–	**6FX 5 008-1BB25-....**	1.62 (1.09)	–	505 (19.88)	–
	4 × 35	–	–	31.5 (1.24)	–	**6FX 5 008-1BB35-....**	1.93 (1.30)	–	570 (22.44)	–
	4 × 50	–	–	38.0 (1.50)	–	**6FX 5 008-1BB50-....**	3.04 (2.04)	–	685 (26.97)	–
	4 × 70	–	–	42.6 (1.68)	–	**6FX 5 008-1BB70-....**	3.96 (2.66)	–	770 (30.31)	–
	4 × 95	–	–	51.7 (2.04)	–	**6FX 5 008-1BB05-....**	5.55 (3.73)	–	935 (36.81)	–
	4 × 120	–	–	56.0 (2.20)	–	**6FX 5 008-1BB12-....**	6.69 (4.50)	–	1010 (39.76)	–
	4 × 150	–	–	63.0 (2.48)	–	**6FX 5 008-1BB15-....**	8.21 (5.52)	–	1135 (44.68)	–
	4 × 185	–	–	66.2 (2.61)	–	**6FX 5 008-1BB18-....**	9.82 (6.60)	–	1195 (47.05)	–

MOTION-CONNECT 500	**5**																						**5**	
MOTION-CONNECT 800	**8**																						**8**	
SPEED-CONNECT connector at motor end																					**N**			
Connector at motor end, fully threaded																					**S**			
Length code																						**....**		**....**

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
[3] For Motor Modules 3 A to 30 A in booksize format.
[4] e. c. = exposed core ends; suitable for motors with terminal box.
[5] Connector at motor end, fully threaded only.
[6] For Motor Modules 45 A and 60 A in booksize format.

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Selection and ordering data (continued)

MOTION-CONNECT power cables with brake cores for 1FT/1FK motors with SPEED-CONNECT connectors or full thread and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Motor Modules

Connection method, Motor Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Connector[3]	4 × 1.5+2 × 1.5	0.5[5]	6FX 5 002-5DA20-....	10.8 (0.43)	12.9 (0.51)	6FX5008-1BA11-....	0.22 (0.15)	0.25 (0.17)	195 (7.68)	125 (4.92)
		1	6FX■002-5D■01-....			6FX■008-1BA11-....				
		1.5	6FX■002-5D■21-....							
	4 × 2.5+2 × 1.5	1	6FX■002-5D■11-....	12.4 (0.49)	14.2 (0.56)	6FX■008-1BA21-....	0.25 (0.17)	0.31 (0.21)	225 (8.86)	140 (4.92)
		1.5	6FX■002-5D■31-....							
	4 × 4+2 × 1.5	1.5	6FX■002-5D■41-....	14.0 (0.55)	15.3 (0.60)	6FX■008-1BA31-....	0.35 (0.24)	0.40 (0.27)	255 (10.04)	150 (5.91)
	4 × 6+2 × 1.5	1.5	6FX■002-5D■51-....	16.1 (0.63)	17.8 (0.70)	6FX■008-1BA41-....	0.49 (0.33)	0.53 (0.36)	290 (11.42)	195 (7.68)
	4 × 10+2 × 1.5	1.5	6FX■002-5D■61-....	21.7 (0.85)	20.8 (0.82)	6FX■008-1BA51-....	0.81 (0.54)	0.78 (0.52)	395 (15.55)	230 (9.06)
		3[5]	6FX■002-5DS13-....							
Ring cable lugs[6]	4 × 6+2 × 1.5	1.5	6FX■002-5D■54-....	16.1 (0.63)	17.8 (0.70)	6FX■008-1BA41-....	0.49 (0.33)	0.53 (0.36)	290 (11.42)	195 (7.68)
	4 × 10+2 × 1.5	1.5	6FX■002-5D■64-....	21.7 (0.85)	20.8 (0.82)	6FX■008-1BA51-....	0.81 (0.54)	0.78 (0.52)	395 (15.55)	230 (9.06)
		3[5]	6FX■002-5DS14-....							
	4 × 16+2 × 1.5	3[5]	6FX■002-5DS23-....	25.0 (0.98)	24.7 (0.97)	6FX■008-1BA61-....	1.12 (0.75)	1.05 (0.71)	450 (17.72)	275 (10.83)
Exposed core ends[4]	4 × 16+2 × 1.5	3[5]	6FX■002-5DG23-....	25.0 (0.98)	24.7 (0.97)	6FX■008-1BA61-....	1.12 (0.75)	1.05 (0.71)	450 (17.72)	275 (10.83)
	4 × 25+2 × 1.5	3[5]	6FX■002-5DG33-....	29.4 (1.16)	27.9 (1.10)	6FX■008-1BA25-....	1.62 (1.09)	1.51 (1.01)	530 (20.87)	325 (12.80)
	4 × 35+2 × 1.5	3[5]	6FX■002-5DG43-....	32.6 (1.28)	32.0 (1.26)	6FX■008-1BA35-....	2.06 (1.38)	2.00 (1.34)	590 (23.23)	380 (14.96)
	4 × 50+2 × 1.5	3[5]	6FX■002-5DG53-....	38.0 (1.50)	35.8 (1.41)	6FX■008-1BA50-....	3.04 (2.04)	2.66 (1.79)	685 (27.97)	420 (16.54)

MOTION-CONNECT 500	**5**																	**5**		
MOTION-CONNECT 800	**8**																	**8**		
SPEED-CONNECT connector at motor end									**N**											
Connector at motor end, fully threaded									**S**											
Length code										**....**									**....**	

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.
[3] For Motor Modules 3 A to 30 A in booksize format.
[4] 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.
[5] Connector at motor end, fully threaded only.
[6] For Motor Modules 45 A and 60 A in booksize format.

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Power cables for 1FT/1FK/1PH8 motors with connectors

Selection and ordering data (continued)

MOTION-CONNECT power cables without brake cores for 1FT/1FK/1PH8 motors with SPEED-CONNECT connectors and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Power Modules AC/AC units

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Exposed core ends	4 × 1.5	1	6FX■002-5CG10-....	8.4 (0.33)	10.4 (0.41)	6FX■008-1BB11-....	0.12 (0.08)	0.16 (0.11)	155 (6.10)	100 (3.94)
		1.5	6FX■002-5CG22-....							
	4 × 2.5	1	6FX■002-5CG12-....	10.0 (0.39)	12.1 (0.48)	6FX■008-1BB21-....	0.21 (0.14)	0.23 (0.15)	180 (7.09)	120 (4.72)
		1.5	6FX■002-5CG32-....							
	4 × 4	1.5	6FX■002-5CG42-....	11.4 (0.45)	13.2 (0.52)	6FX■008-1BB31-....	0.27 (0.18)	0.31 (0.21)	210 (8.27)	130 (5.12)
	4 × 6	1.5	6FX■002-5CG52-....	13.6 (0.54)	16.0 (0.63)	6FX■008-1BB41-....	0.37 (0.25)	0.42 (0.28)	245 (9.65)	170 (6.69)
	4 × 10	1.5	6FX■002-5CG62-....	20.0 (0.79)	19.4 (0.76)	6FX■008-1BB51-....	0.73 (0.49)	0.63 (0.42)	360 (14.17)	210 (8.27)
MOTION-CONNECT 500			**5**			**5**				
MOTION-CONNECT 800			**8**			**8**				
Length code			....			....				

MOTION-CONNECT power cables without brake cores for 1FT/1FK motors with fully threaded connectors and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Power Modules AC/AC units

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Exposed core ends	4 × 1.5	1	6FX■002-5CG01-....	8.4 (0.33)	10.4 (0.41)	6FX■008-1BB11-....	0.12 (0.08)	0.16 (0.11)	155 (6.10)	100 (3.94)
		1.5	6FX■002-5CG21-....							
	4 × 2.5	1	6FX■002-5CG11-....	10.0 (0.39)	12.1 (0.48)	6FX■008-1BB21-....	0.21 (0.14)	0.23 (0.15)	180 (7.09)	120 (4.72)
		1.5	6FX■002-5CG31-....							
	4 × 4	1.5	6FX■002-5CG41-....	11.4 (0.45)	13.2 (0.52)	6FX■008-1BB31-....	0.27 (0.18)	0.31 (0.21)	210 (8.27)	130 (5.12)
	4 × 6	1.5	6FX■002-5CG51-....	13.6 (0.54)	16.0 (0.63)	6FX■008-1BB41-....	0.37 (0.25)	0.42 (0.28)	245 (9.65)	170 (6.69)
	4 × 10	1.5	6FX■002-5CG61-....	20.0 (0.79)	19.4 (0.76)	6FX■008-1BB51-....	0.73 (0.49)	0.63 (0.42)	360 (14.17)	210 (8.27)
		3	6FX■002-5CG13-....							
	4 × 16	3	6FX■002-5CG23-....	24.2 (0.95)	23.6 (0.93)	6FX5008-1BB61-....	1.10 (0.74)	0.95 (0.64)	440 (17.32)	260 (10.24)
MOTION-CONNECT 500			**5**			**5**				
MOTION-CONNECT 800			**8**			**8**				
Length code			....			....				

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.

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Selection and ordering data (continued)

MOTION-CONNECT power cables with brake cores for 1FT/1FK motors with SPEED-CONNECT connectors and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Power Modules AC/AC units

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Exposed core ends	4 × 1.5+2 × 1.5	1	6FX■002-5DG10-....	10.8 (0.43)	12.9 (0.51)	6FX■008-1BA11-....	0.22 (0.15)	0.25 (0.17)	195 (7.68)	125 (4.92)
		1.5	6FX■002-5DG22-....							
	4 × 2.5+2 × 1.5	1	6FX■002-5DG12-....	12.4 (0.49)	14.2 (0.56)	6FX■008-1BA21-....	0.25 (0.17)	0.31 (0.21)	225 (8.86)	140 (5.51)
		1.5	6FX■002-5DG32-....							
	4 × 4+2 × 1.5	1.5	6FX■002-5DG42-....	14.0 (0.55)	15.3 (0.60)	6FX■008-1BA31-....	0.35 (0.34)	0.40 (0.27)	255 (10.04)	150 (5.91)
	4 × 6+2 × 1.5	1.5	6FX■002-5DG52-....	16.1 (0.63)	17.8 (0.70)	6FX■008-1BA41-....	0.49 (0.33)	0.53 (0.36)	290 (11.42)	195 (7.68)
	4 × 10+2 × 1.5	1.5	6FX■002-5DG62-....	21.7 (0.85)	20.8 (0.82)	6FX■008-1BA51-....	0.81 (0.54)	0.78 (0.52)	395 (15.55)	230 (9.06)

MOTION-CONNECT 500		**5**				**5**				
MOTION-CONNECT 800		**8**				**8**				
Length code		**....**				**....**				

MOTION-CONNECT power cables with brake cores for 1FT/1FK motors with fully threaded connectors and cables sold by the meter for motors with terminal boxes on SINAMICS S120 Power Modules AC/AC units

Connection method, Power Module end	No. of cores × cross-section	Connector size, motor end	Pre-assembled cable	D_{max}		Cable sold by the meter[1]	Weight (without connector)		Smallest perm. bending radius[2]	
				6FX5	6FX8		6FX5	6FX8	6FX5	6FX8
	mm²		Order No.	mm (in)	mm (in)	Order No.	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
Exposed core ends	4 × 1.5+2 × 1.5	0.5	6FX 5 002-5DA30-....	10.8 (0.43)	–	6FX 5 008-1BA11-....	0.22 (0.15)	–	195 (7.68)	–
		1	6FX■002-5DG01-....	10.8 (0.43)	12.9 (0.51)	6FX■008-1BA11-....	0.22 (0.15)	0.25 (0.17)	195 (7.68)	125 (4.92)
		1.5	6FX■002-5DG21-....							
	4 × 2.5+2 × 1.5	1	6FX■002-5DG11-....	12.4 (0.49)	14.2 (0.56)	6FX■008-1BA21-....	0.25 (0.17)	0.31 (0.21)	225 (8.86)	140 (5.51)
		1.5	6FX■002-5DG31-....							
	4 × 4+2 × 1.5	1.5	6FX■002-5DG41-....	14.0 (0.55)	15.3 (0.60)	6FX■008-1BA31-....	0.35 (0.24)	0.40 (0.27)	255 (10.04)	150 (5.91)
	4 × 6+2 × 1.5	1.5	6FX■002-5DG51-....	16.1 (0.63)	17.8 (0.70)	6FX■008-1BA41-....	0.49 (0.33)	0.53 (0.36)	290 (11.42)	195 (7.68)
	4 × 10+2 × 1.5	1.5	6FX■002-5DG61-....	21.7 (0.85)	20.8 (0.82)	6FX■008-1BA51-....	0.81 (0.54)	0.78 (0.52)	395 (15.55)	230 (9.06)
		3	6FX■002-5DG13-....							
	4 × 16+2 × 1.5	3	6FX■002-5DG23-....	25.0 (0.98)	24.7 (0.97)	6FX■008-1BA61-....	1.12 (0.75)	1.05 (0.71)	450 (17.72)	275 (10.83)
	4 × 25+2 × 1.5	3	6FX■002-5DG33-....	29.4 (1.16)	27.9 (1.10)	6FX■008-1BA25-....	1.62 (1.09)	1.51 (1.01)	530 (20.87)	325 (12.80)
	4 × 35+2 × 1.5	3	6FX■002-5DG43-....	32.6 (1.28)	32.0 (1.26)	6FX■008-1BA35-....	2.06 (1.38)	2.00 (1.34)	590 (23.23)	380 (14.96)
	4 × 50+2 × 1.5	3	6FX■002-5DG53-....	38.0 (1.50)	35.8 (1.41)	6FX■008-1BA50-....	3.04 (2.04)	2.66 (1.79)	685 (27.97)	420 (16.54)

MOTION-CONNECT 500		**5**				**5**				
MOTION-CONNECT 800		**8**				**8**				
Length code		**....**				**....**				

[1] Note type of delivery.
[2] Valid for installation in a cable carrier.

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Power cable extensions

Accessories

Power cable extensions for motors on SINAMICS S120 Motor Modules

No. of cores × cross-section mm²	Connector size	Basic cable for motors Type	Extension Order No.
4 × 1.5	0.5[1]	6FX5002-5DA20-....	**6FX 5 002-5ME05-....**
	1	6FX . 002-5 . S01-....	**6FX■002-5■A05-....**
		6FX . 002-5 . N01-....	**6FX■002-5■N05-....**
	1.5	6FX . 002-5 . S21-....	**6FX■002-5■A28-....**
		6FX . 002-5 . N21-....	**6FX■002-5■Q28-....**
4 × 2.5	1	6FX . 002-5 . S11-....	**6FX■002-5■A15-....**
		6FX . 002-5 . N11-....	**6FX■002-5■Q15-....**
	1.5	6FX . 002-5 . S31-....	**6FX■002-5■A38-....**
		6FX . 002-5 . N31-....	**6FX■002-5■Q38-....**
4 × 4	1.5	6FX . 002-5 . S41-....	**6FX■002-5■A48-....**
		6FX . 002-5 . N41-....	**6FX■002-5■Q48-....**
4 × 6	1.5	6FX . 002-5 . S51-....	**6FX■002-5■A58-....**
		6FX . 002-5 . N51-....	**6FX■002-5■Q58-....**
4 × 10	1.5	6FX . 002-5 . S61-....	**6FX■002-5■A68-....**
		6FX . 002-5 . N61-....	**6FX■002-5■Q68-....**
	3[1]	6FX . 002-5 . S13-....	**6FX■002-5■X18-....**
4 × 16	3[1]	6FX . 002-5 . S23-....	**6FX■002-5■X28-....**
		6FX . 002-5 . G23-....	**6FX■002-5■X28-....**
4 × 25	3[1]	6FX . 002-5DG33-....	**6FX■002-5DX38-....**
4 × 35	3[1]	6FX . 002-5DG43-....	**6FX■002-5DX48-....**
4 × 50	3[1]	6FX . 002-5DG53-....	**6FX■002-5DX58-....**

MOTION-CONNECT 500				**5**
MOTION-CONNECT 800				**8**
Without brake cores			**C**	
With brake cores			**D**	
Length code				**....**

The combinations of power cable extensions shown are only provided by way of example.

Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Connector at motor end, fully threaded only.

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Accessories (continued)

Power cable extensions for motors on SINAMICS S120 Power Modules AC/AC units

No. of cores × cross-section mm²	Connector size	Basic cable for motors Type	Extension Order No.
4 × 1.5	0.5[1]	6FX5002-5DA30-....	**6FX5002-5ME05-....**
	1	6FX.002-5 . G01-....	**6FX■002-5■A05-....**
		6FX.002-5 . G10-....	**6FX■002-5■N05-....**
	1.5	6FX.002-5 . G21-....	**6FX■002-5■A28-....**
		6FX.002-5 . G22-....	**6FX■002-5■Q28-....**
4 × 2.5	1	6FX.002-5 . G11-....	**6FX■002-5■A15-....**
		6FX.002-5 . G12-....	**6FX■002-5■Q15-....**
	1.5	6FX.002-5 . G31-....	**6FX■002-5■A38-....**
		6FX.002-5 . G32-....	**6FX■002-5■Q38-....**
4 × 4	1.5	6FX.002-5 . G41-....	**6FX■002-5■A48-....**
		6FX.002-5 . G42-....	**6FX■002-5■Q48-....**
4 × 6	1.5	6FX.002-5 . G51-....	**6FX■002-5■A58-....**
		6FX.002-5 . G52-....	**6FX■002-5■Q58-....**
4 × 10	1.5	6FX.002-5 . G61-....	**6FX■002-5■A68-....**
		6FX.002-5 . G62-....	**6FX■002-5■Q68-....**
	3[1]	6FX.002-5 . G13-....	**6FX■002-5■X18-....**
4 × 16	3[1]	6FX.002-5 . G23-....	**6FX■002-5■X28-....**
4 × 25	3[1]	6FX.002-5DG33-....	**6FX■002-5DX38-....**
4 × 35	3[1]	6FX.002-5DG43-....	**6FX■002-5DX48-....**
4 × 50	3[1]	6FX.002-5DG53-....	**6FX■002-5DX58-....**

MOTION-CONNECT 500			**5**	
MOTION-CONNECT 800			**8**	
Without brake cores		**C**		
With brake cores		**D**		
Length code				**....**

The combinations of power cable extensions shown are only provided by way of example.

Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Connector at motor end, fully threaded only.

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Power cables for 1PH7 motors

Selection and ordering data

MOTION-CONNECT power cables for 1PH7 motors on SINAMICS S120 Motor Modules

Motor	Armour thread	No. of cores × cross-section	**Pre-assembled cable**	Weight by the meter	Smallest perm. bending radius[1)]
Type	Size	mm^2	Order No.	kg/m (lb/ft)	mm (in)
1PH710	PG29	4 × 16	**6FX5002-5CH16-....**	1.10 (0.74)	440 (17.3)
1PH713	PG36	4 × 16	**6FX5002-5CJ16-....**	1.10 (0.74)	440 (17.3)
1PH716	PG42	4 × 25	**6FX5002-5CK25-....**	1.56 (1.05)	530 (20.87)
Length code			**....**		

Note:
For 1PH7 motors with a holding brake, there are no pre-assembled power cables. If a holding brake is used, it must be supplied through a separate cable via the terminal box. For 1PH7 motors with a metric cable entry in the terminal box, the adapter must be removed.

[1)] Valid for installation in cable carrier.

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Selection and ordering data

MOTION-CONNECT power cables for 1FN3 linear motors, peak/continuous load versions
Connection to SINAMICS S120 through adapter cable

No. of cores × cross-section	Thread size	**Pre-assembled adapter cable**	Connector size Interface	**Pre-assembled basic cable to the drive system**	D_{max}	**Cable sold by meter**[1] **for pre-assembled adapter cable**	Weight (without connector)	Smallest perm. bending radius[2]
mm^2		Order No.		Order No.	mm (in)	Order No.	kg/m (lb/ft)	mm (in)
4 × 2.5	M20	**6FX7002-5LM42-....**	1	**6FX8002-5CS11-....**	12.1 (0.48)	**6FX7008-1BB21-....**	0.23 (0.16)	90 (3.54)
4 × 2.5	M20	**6FX7002-5LM62-....**[3]	1	**6FX8002-5CS11-....**	12.1 (0.48)	**6FX7008-1BB21-....**	0.23 (0.16)	90 (3.54)
4 × 4	M32	**6FX7002-5LM72-....**	1.5	**6FX8002-5CS41-....**[4]	13.2 (0.52)	**6FX7008-1BB31-....**	0.29 (0.20)	100 (3.94)
4 × 6	M32	**6FX7002-5LM82-....**	1.5	**6FX8002-5CS54-....**	15.9 (0.63)	**6FX7008-1BB41-....**	0.37 (0.25)	120 (4.72)
4 × 10	M32	**6FX7002-5LM32-....**	1.5	**6FX8002-5CS64-....**	19.2 (0.76)	**6FX7008-1BB51-....**	0.57 (0.38)	140 (5.51)
4 × 16	M32	**6FX7002-5LM02-....**	1.5	**6FX8002-5CS24-....**	22.5 (0.89)	**6FX7008-1BB61-....**	0.93 (0.63)	165 (6.50)
Length code		**....**		**....**		**....**		

Accessories

Power cable extensions for 1FN3 linear motors, peak/continuous load versions

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-....[4]	**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-....**
Length code			**....**

The combinations of power cable extensions shown are only provided by way of example.

Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Note type of delivery.
[2] Valid for installation in cable carrier.
[3] Only for motors with Order No. 1FN3300 motors or higher.
[4] For 1FN3 linear motors in the peak load version, the pre-assembled basic cable 6FX8002-5CS54-.... (4 × 6 mm^2) to the converter must be used.

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Power cables for 1FN6 motors

Selection and ordering data

MOTION-CONNECT power cables for 1FN6 linear motors on SINAMICS S120

No. of cores × cross-section	Connector size, motor end	**Pre-assembled cable to the drive system**	D_{max}	**Cable sold by the meter**[1]	Weight (without connector)	Smallest perm. bending radius[2]
mm^2		Order No.	mm (in)	Order No.	kg/m (lb/ft)	mm (in)
4 × 1.5	1	**6FX8002-5CN01-....**	10.4 (0.41)	**6FX8008-1BB11-....**	0.16 (0.116)	100 (3.94)
4 × 2.5	1	**6FX8002-5CN11-....**	12.1 (0.48)	**6FX8008-1BB21-....**	0.23 (0.155)	120 (4.72)
4 × 4	1.5	**6FX8002-5CN41-....**	13.2 (0.52)	**6FX8008-1BB31-....**	0.31 (0.208)	130 (5.12)
4 × 10	1.5	**6FX8002-5CN64-....**[3]	19.4 (0.76)	**6FX8008-1BB51-....**	0.63 (0.423)	210 (8.27)
Length code		**....**		**....**		

Accessories

Power cable extensions for 1FN6 linear motors

No. of cores × cross-section	Connector size, motor end	Pre-assembled cable to the drive system	**Extension**
mm^2		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-....[3]	**6FX8002-5DQ68-....**
Length code			**....**

The combinations of power cable extensions shown are only provided by way of example.

Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Note type of delivery.
[2] Valid for installation in cable carrier.
[3] Module end with ring cable lugs.

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Selection and ordering data

MOTION-CONNECT power cables for 1FW6 torque motors, connection via adapter cable

No. of cores × cross-section	Connector size, motor end	**Pre-assembled cable to the drive system**	D_{max}	**Cable sold by the meter**[1]	Weight (without connector)	Smallest perm. bending radius[2]
mm^2		Order No.	mm (in)	Order No.	kg/m (lb/ft)	mm (in)
4 × 2.5	1	**6FX8002-5CS11-....**	12.1 (0.48)	**6FX8008-1BB21-....**	0.23 (0.155)	120 (4.72)
4 × 4	1.5	**6FX8002-5CS41-....**	13.2 (0.52)	**6FX8008-1BB31-....**	0.31 (0.208)	130 (5.12)
4 × 6	1.5	**6FX8002-5CS54-....**	16.0 (0.63)	**6FX8008-1BB41-....**	0.46 (0.309)	170 (6.69)
4 × 10	1.5	**6FX8002-5CS64-....**	19.4 (0.76)	**6FX8008-1BB51-....**	0.63 (0.423)	210 (8.27)
4 × 16	1.5	**6FX8002-5CS24-....**	23.6 (0.93)	**6FX8008-1BB61-....**	0.95 (0.638)	260 (10.24)
Length code		**....**		**....**		

Accessories

Power cable extensions for 1FW6 torque motors

No. of cores × cross-section	Connector size	Pre-assembled 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-....**
Length code			**....**

The combinations of power cable extensions shown are only provided by way of example.

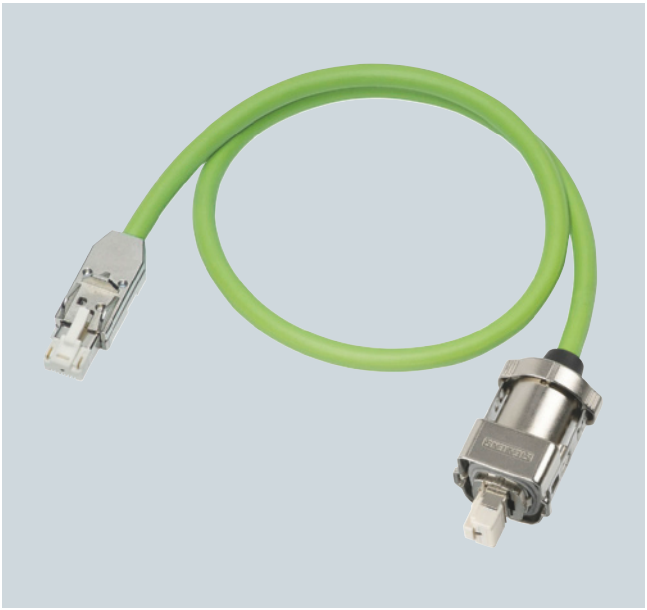
Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Note type of delivery.
[2] Valid for installation in cable carrier.

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Connection overviews

Overview



MOTION-CONNECT DRIVE-CLiQ cable

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 cables
- MOTION-CONNECT DRIVE-CLiQ cables
- MOTION-CONNECT pre-assembled cables

Application

DRIVE-CLiQ 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 cables

are used whenever components with DRIVE-CLiQ connections must meet high requirements such as mechanical stress and oil resistance, e.g. in the event of a connection outside the cabinet between

- Motor Modules and Sensor Modules
- Motor Modules and motors with DRIVE-CLiQ interface

MOTION-CONNECT DRIVE-CLiQ cables have 24 V DC cores.

MOTION-CONNECT pre-assembled cables

are used whenever motor encoders on motors without DRIVE-CLiQ interface are connected to Sensor Modules.

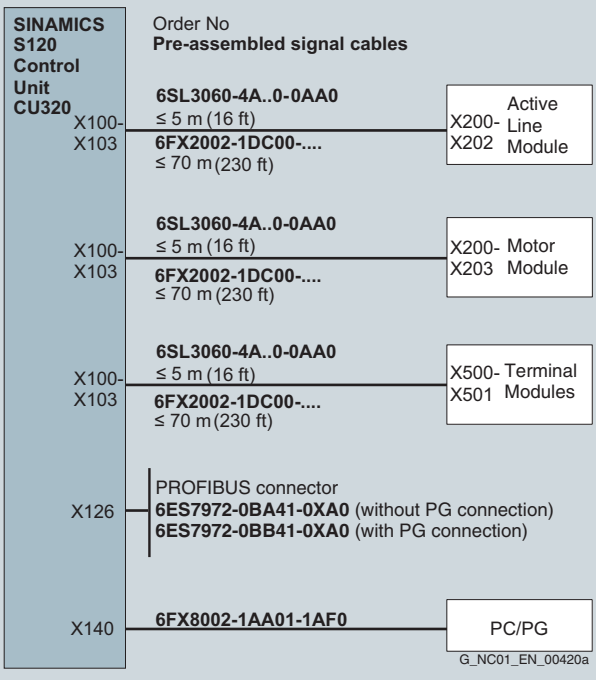
Note:
All **6FX.002-2C...** signal cables are also available with crimped contacts and with the connector enclosure supplied separately (not in the case of DRIVE-CLiQ signal cables).

- Signal cables with enclosed connector enclosure **for the motor end**. 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 enclosed connector enclosure **for the module end**. In this case, the 6th position of the Order No. must be changed from 0 to 1: 6FX.0**1**2-2C...-....

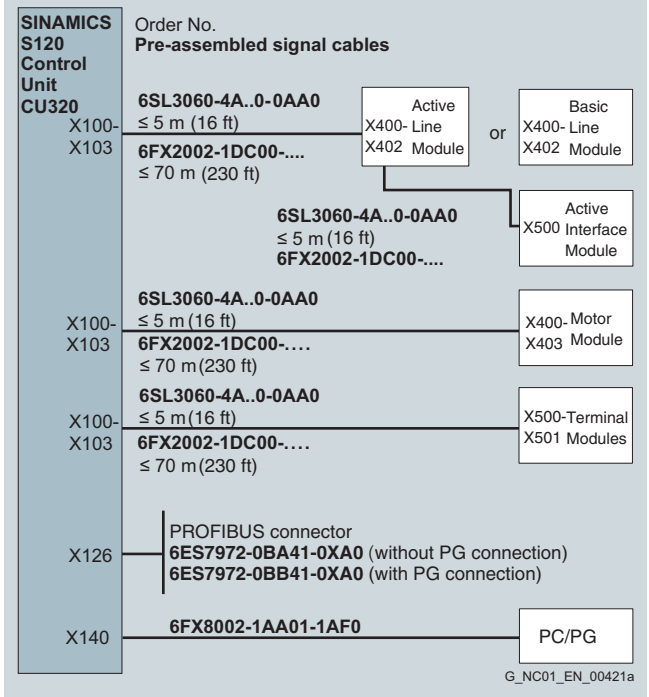
Integration

The DRIVE-CLiQ 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 CU320 Control Unit in booksize format



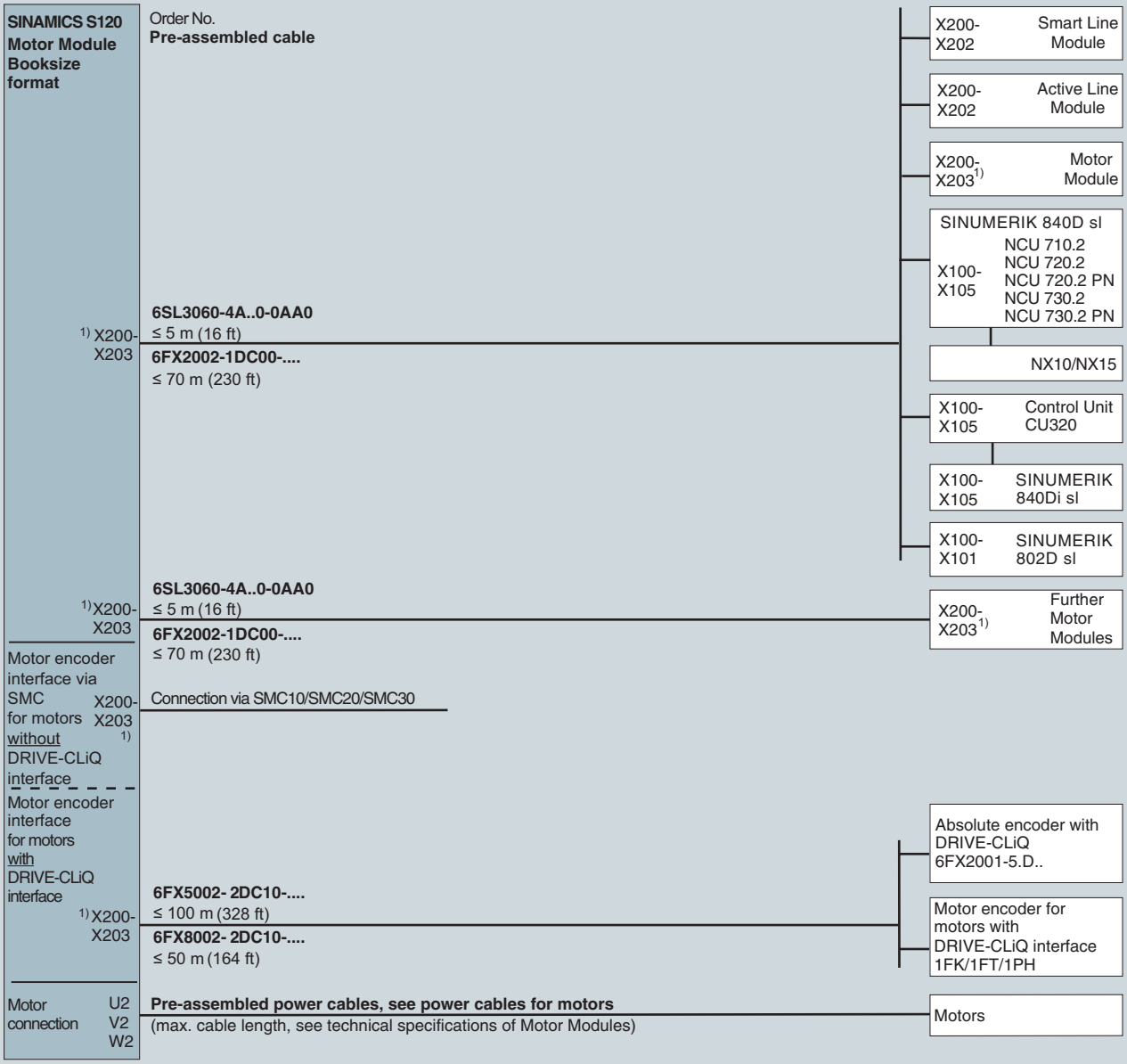
Connection overview of CU320 Control Unit in chassis format



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Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in booksize format and SINUMERIK 802D sl/840Di sl/840D sl for motors with DRIVE-CLiQ interface



1) For Single Motor Module: X200-X202
For Double Motor Module: X200-X203

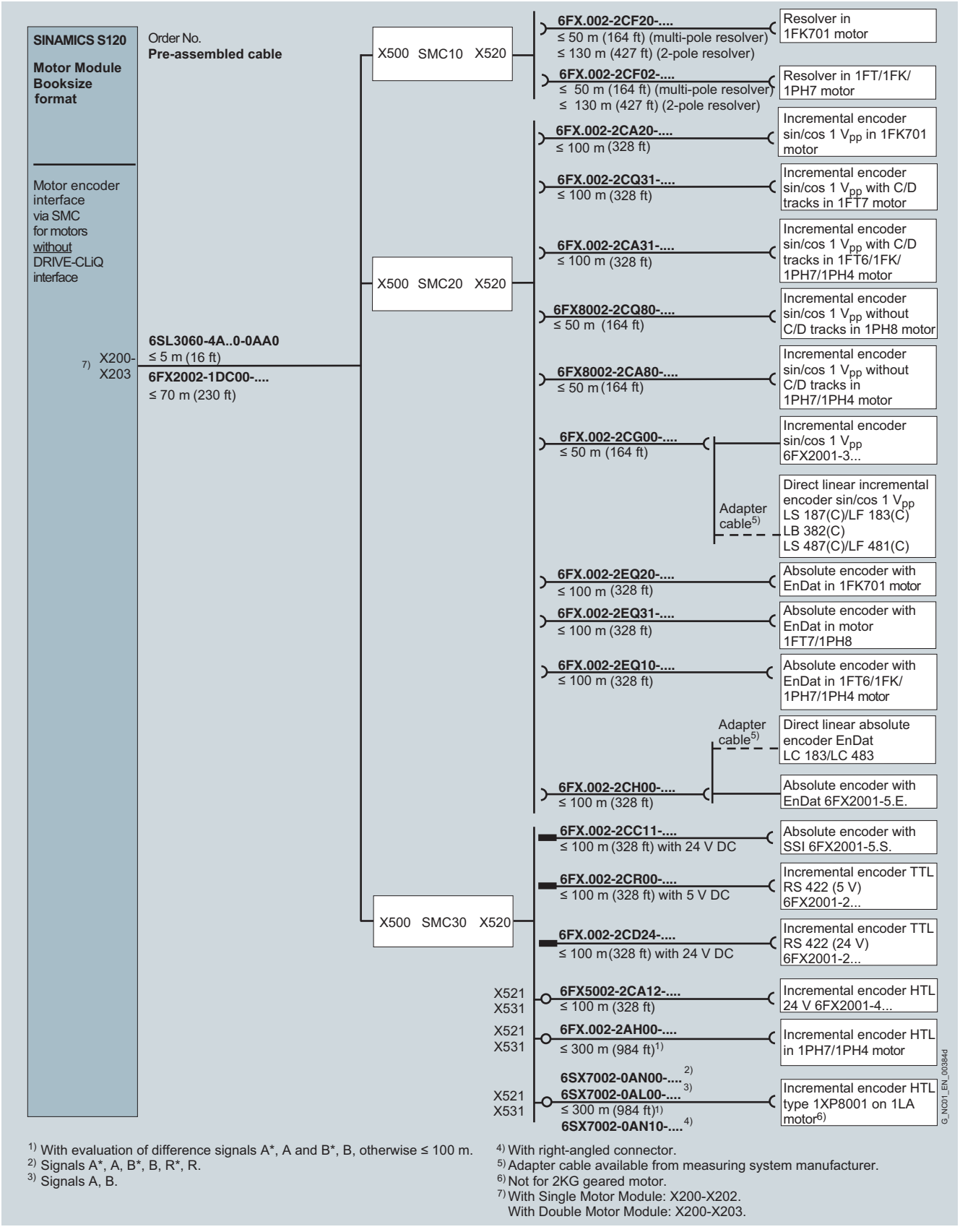
10

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Connection overviews

Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in booksize format and SINUMERIK 802D sl/840Di sl/840D sl for motors without DRIVE-CLiQ interface

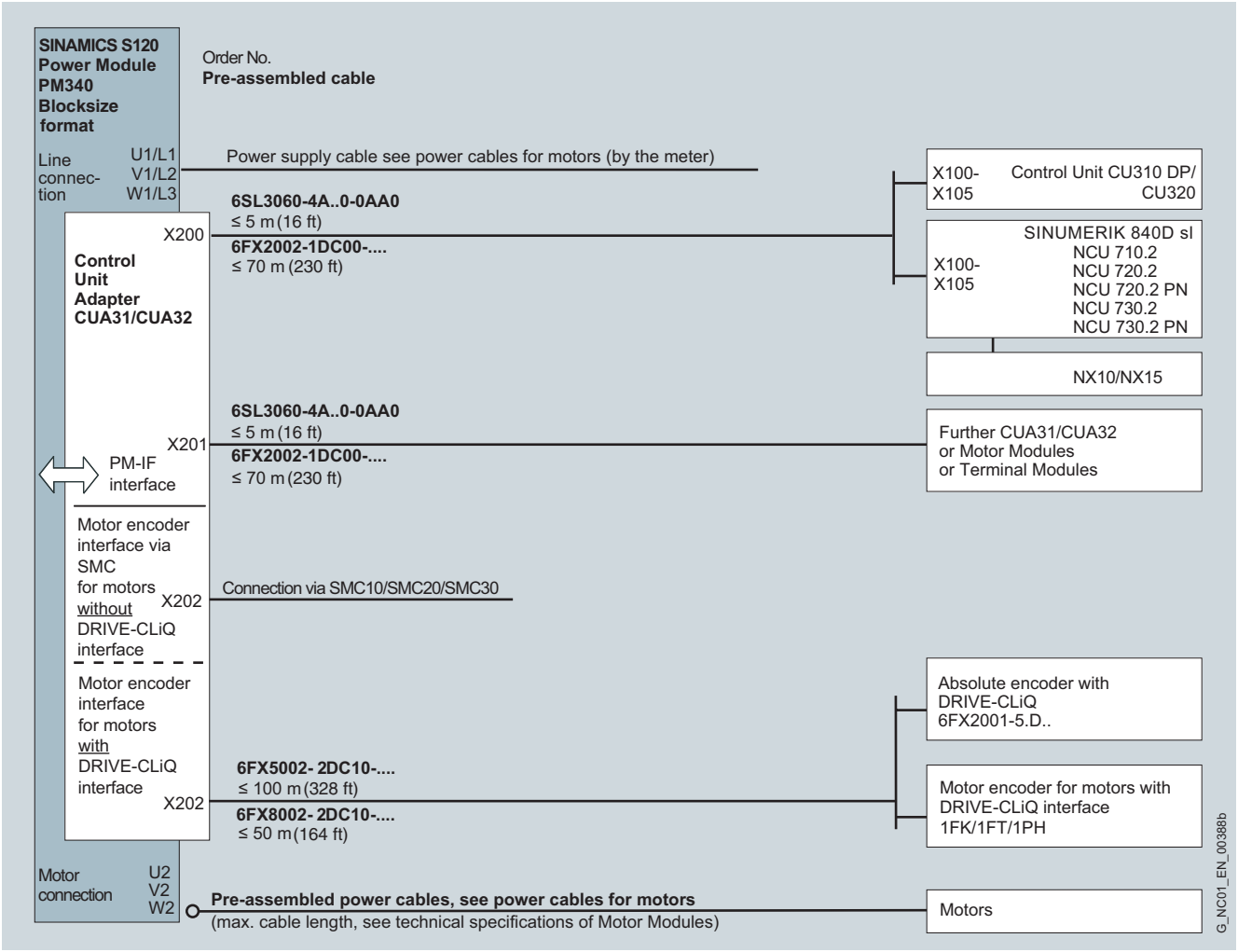


1) With evaluation of difference signals A*, A and B*, B, otherwise ≤ 100 m.
2) Signals A*, A, B*, B, R*, R.
3) Signals A, B.
4) With right-angled connector.
5) Adapter cable available from measuring system manufacturer.
6) Not for 2KG geared motor.
7) With Single Motor Module: X200-X202.
With Double Motor Module: X200-X203.

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Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with Control Unit Adapter CUA31 and SINUMERIK 840D sl for motors with DRIVE-CLiQ interface

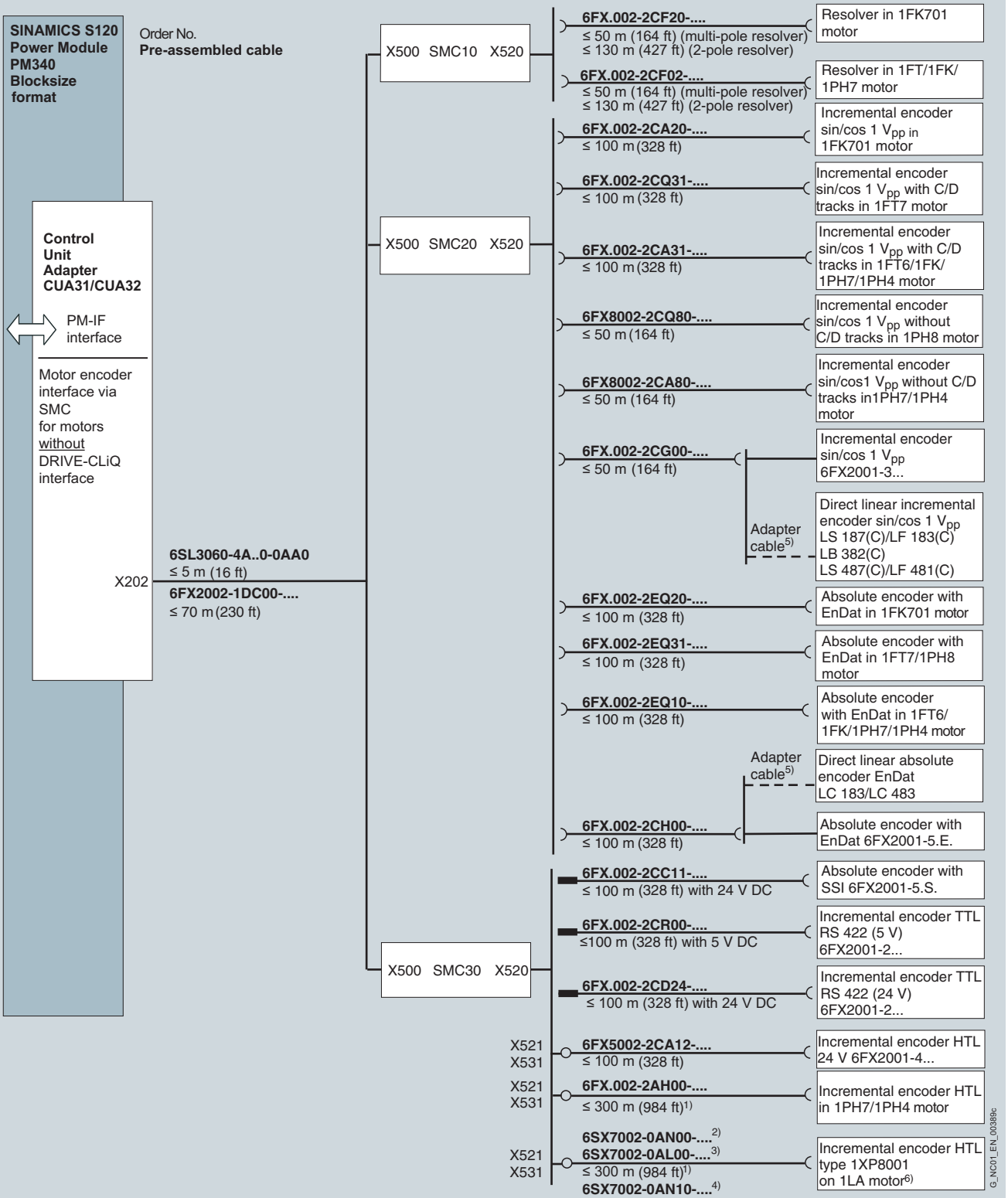


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Connection overviews

Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with Control Unit Adapter CUA31/CUA32 and SINUMERIK 840D sl for motors without DRIVE-CLiQ interface

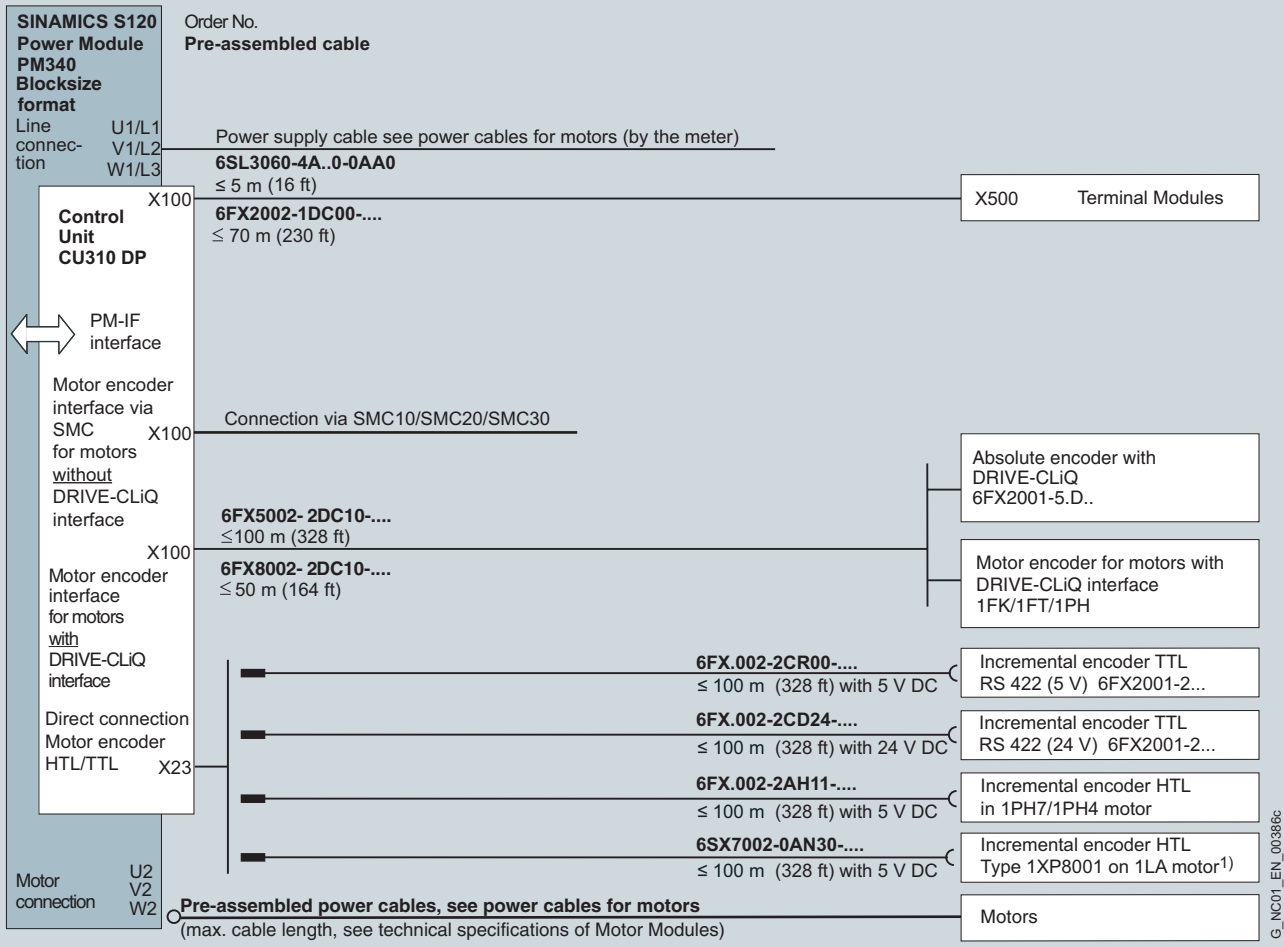


1) With evaluation of difference signals A*, A and B*, B, otherwise ≤ 100 m.
2) Signals A*, A, B*, B, R*, R.
3) Signals A, B.
4) With right-angled connector.
5) Adapter cable available from measuring system manufacturer.
6) Not for 2KG geared motor.

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Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with Control Unit CU310 DP and SINUMERIK 840D sl for motors with DRIVE-CLiQ interface



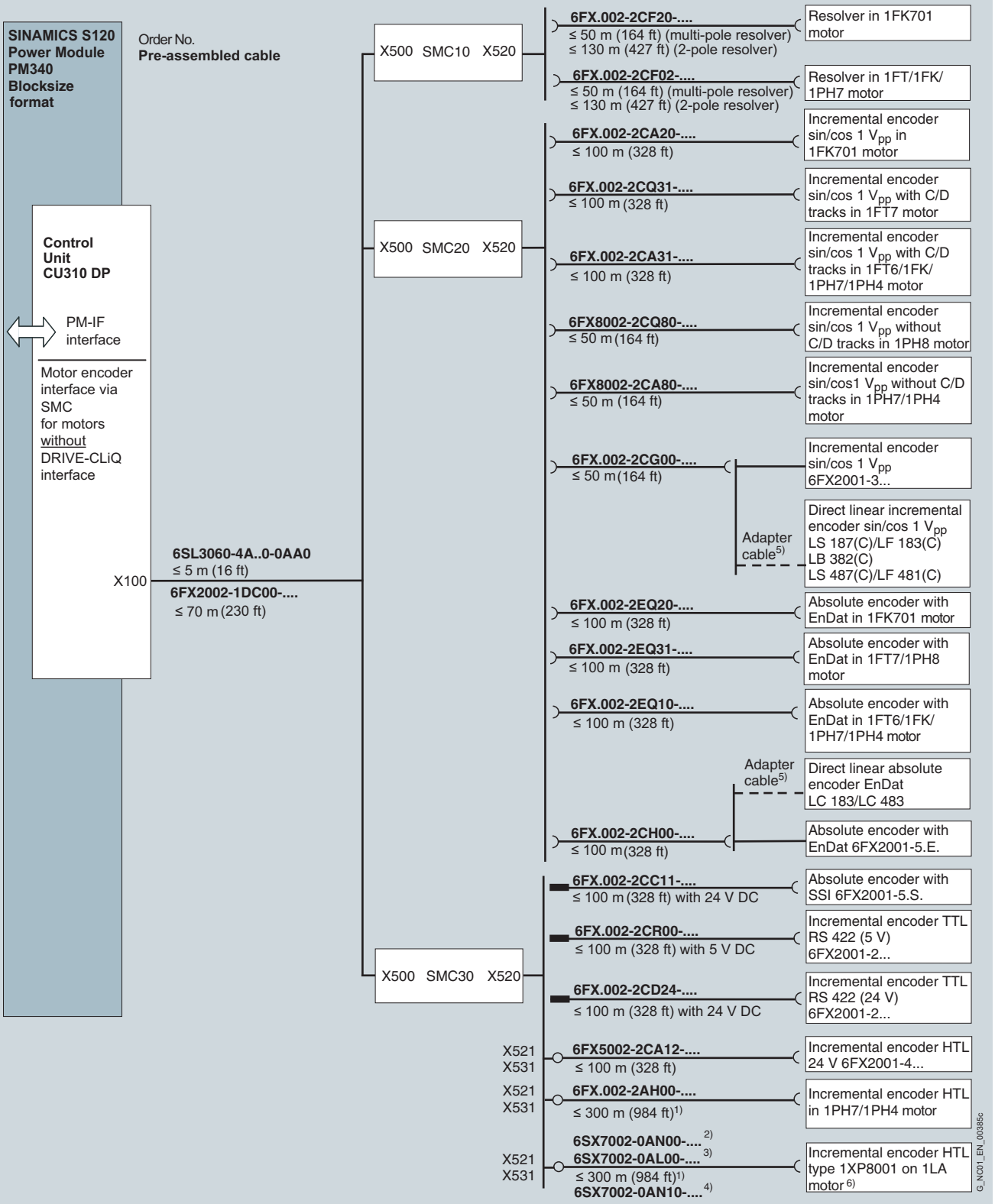
1) Not for 2KG geared motors.

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Connection overviews

Integration (continued)

Connection overview of SINAMICS S120 Power Modules in blocksize format with Control Unit CU310 DP and SINUMERIK 840D sl for motors without DRIVE-CLiQ interface

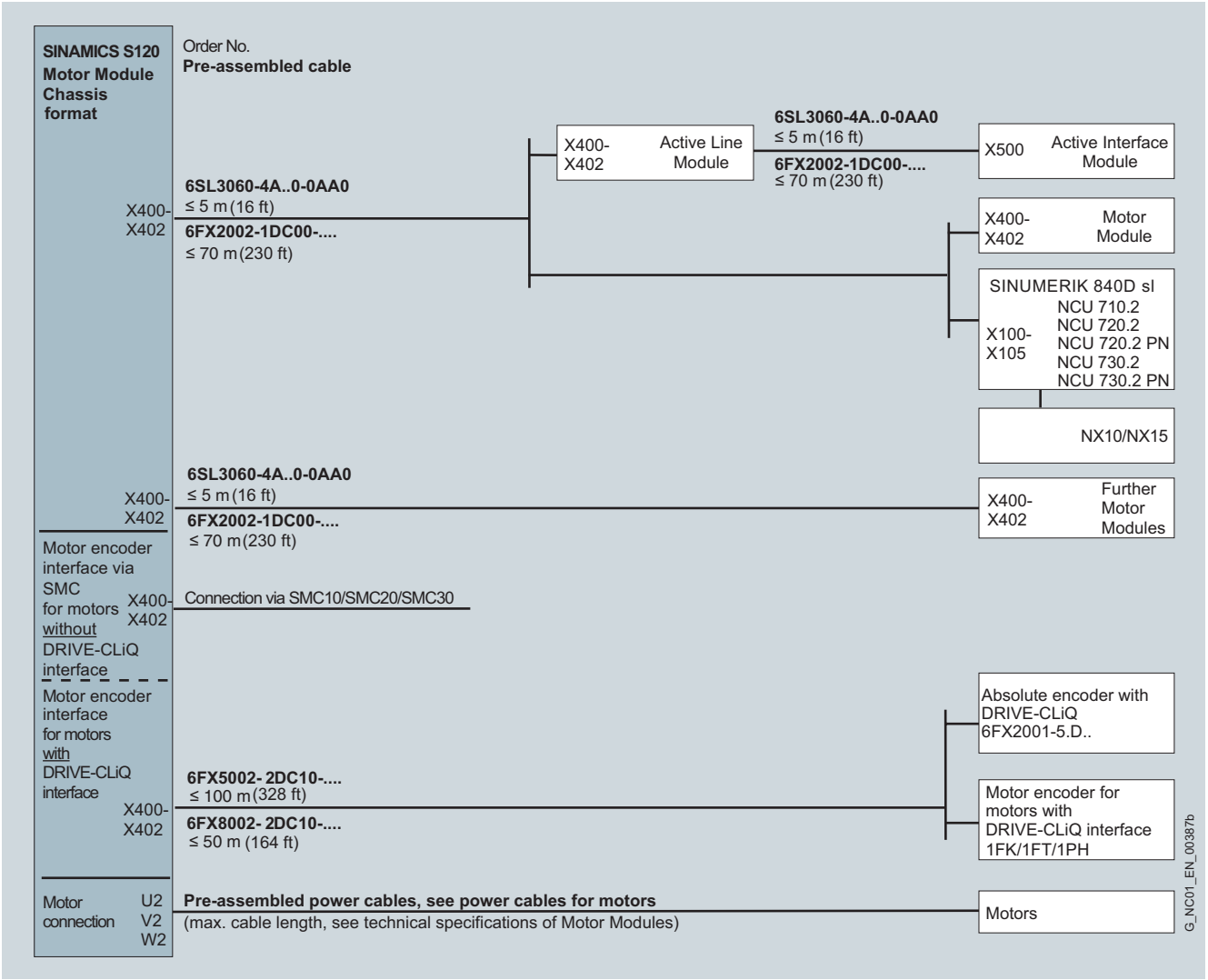


1) With evaluation of difference signals A*, A and B*, B, otherwise ≤ 100 m.
2) Signals A*, A, B*, B, R*, R.
3) Signals A, B.
4) With right-angled connector.
5) Adapter cable available from measuring system manufacturer.
6) Not for 2KG geared motor.

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Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in chassis format and SINUMERIK 840D sl for motors with DRIVE-CLiQ interface

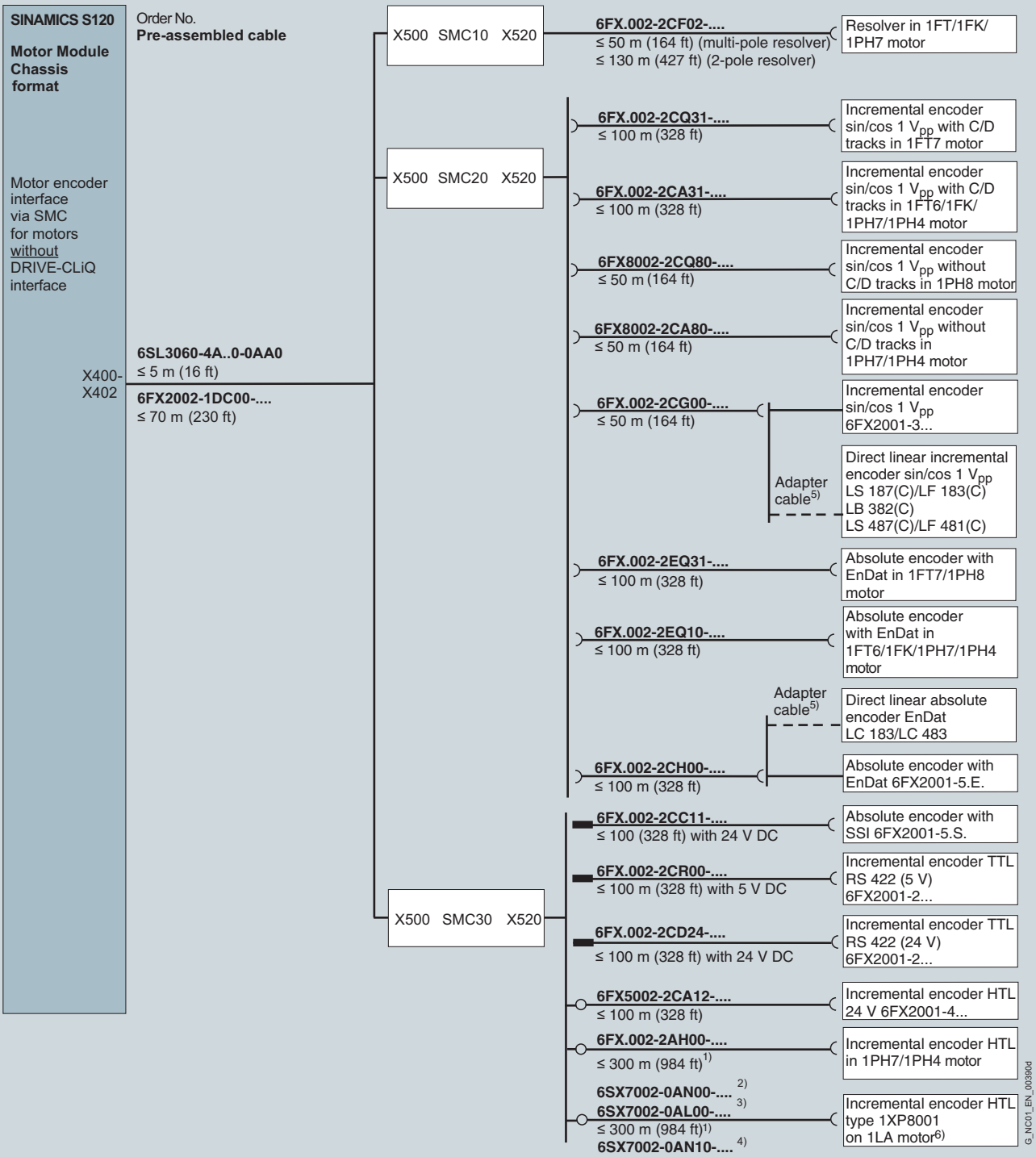


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Connection overviews

Integration (continued)

Connection overview of SINAMICS S120 Line Modules and Motor Modules in chassis format and SINUMERIK 840D sl for motors without DRIVE-CLiQ interface

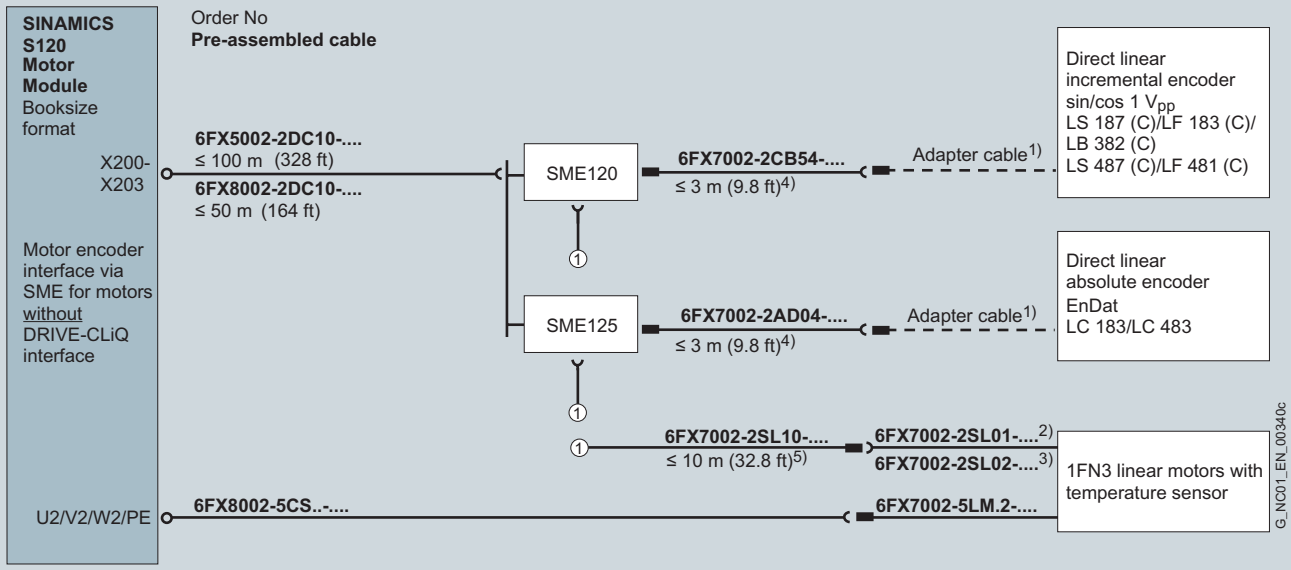


1) With evaluation of difference signals A*, A and B*, B, otherwise ≤100 m.
2) Signals A*, A, B*, B, R*, R.
3) Signals A, B.
4) With right-angled connector.
5) Adapter cable available from measuring system manufacturer.
6) Not for 2KG geared motor.

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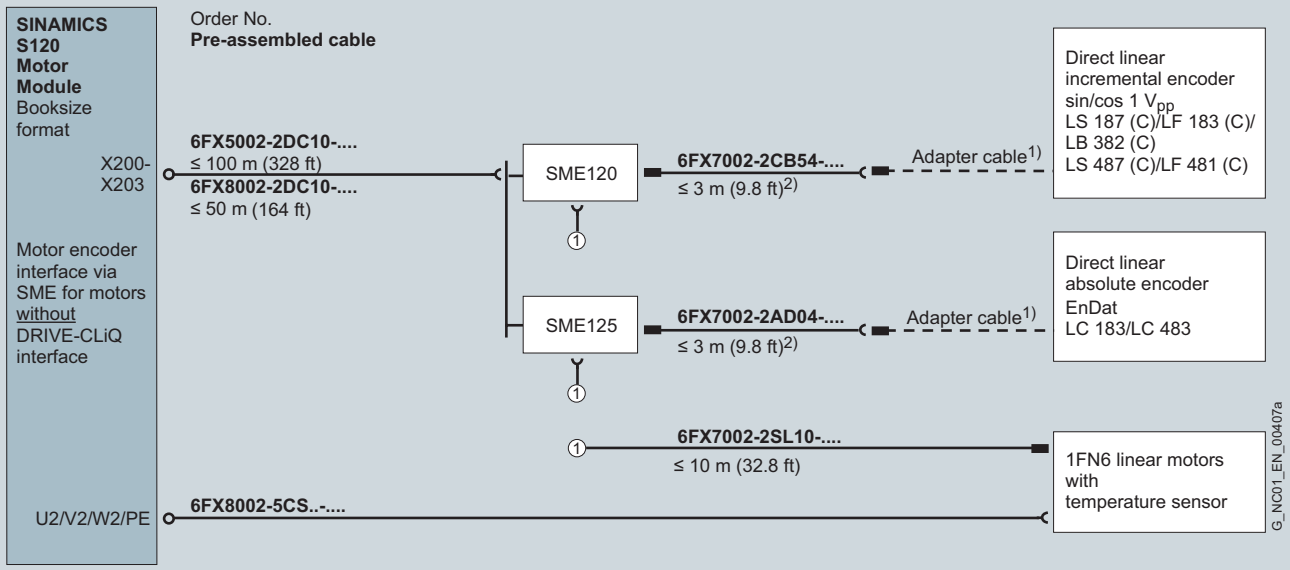
Integration (continued)

Connection overview of SINAMICS S120 Motor Modules in booksize format and 1FN3 linear motors



1) Adapter cable available from measuring system manufacturer.
2) For motors 1FN3100/1FN3150.
3) For motors 1FN3300 to 1FN3900.
4) Up to 10 m (32.8 ft) possible, depending on encoder current consumption.
5) The total cable length between SME125 and 1FN3 must not exceed 10 m (32.8 ft).

Connection overview of SINAMICS S120 Motor Modules in booksize format and 1FN6 linear motors



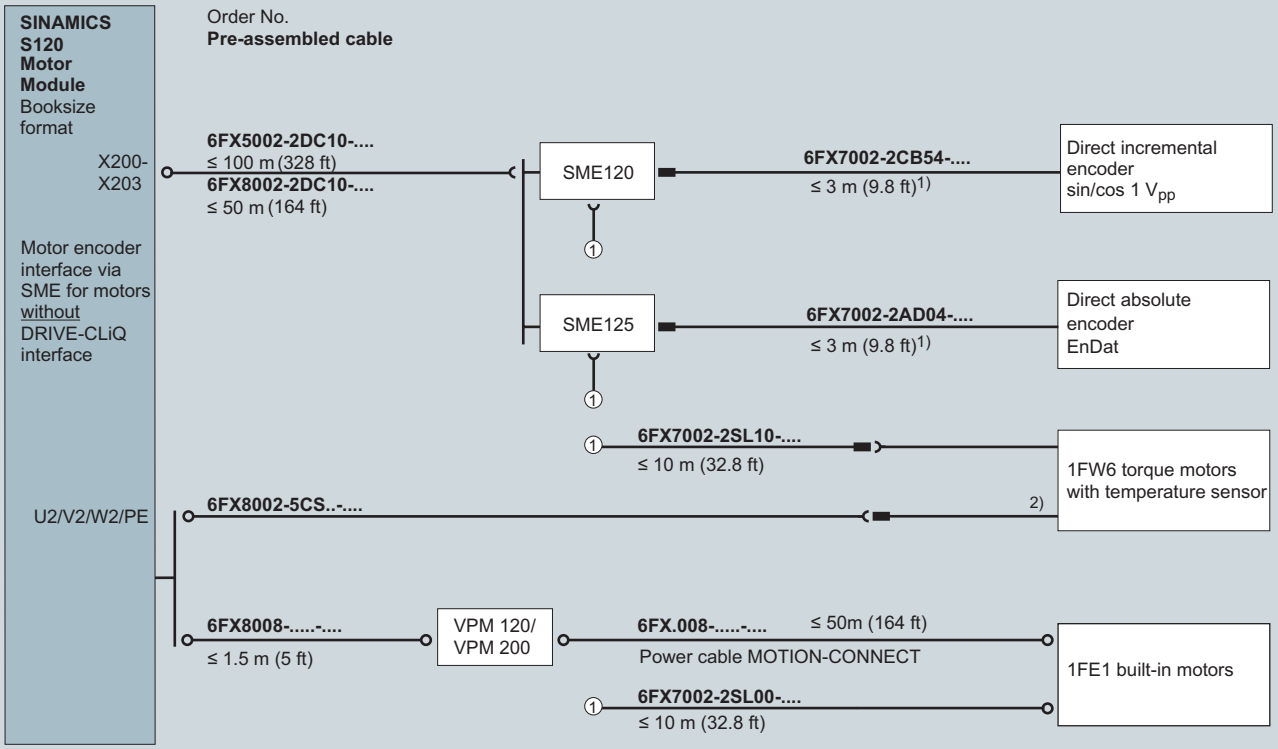
1) Adapter cable available from measuring system manufacturer.
2) Up to 10 m (32.8 ft) possible, depending on encoder current consumption.

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Connection overviews

Integration (continued)

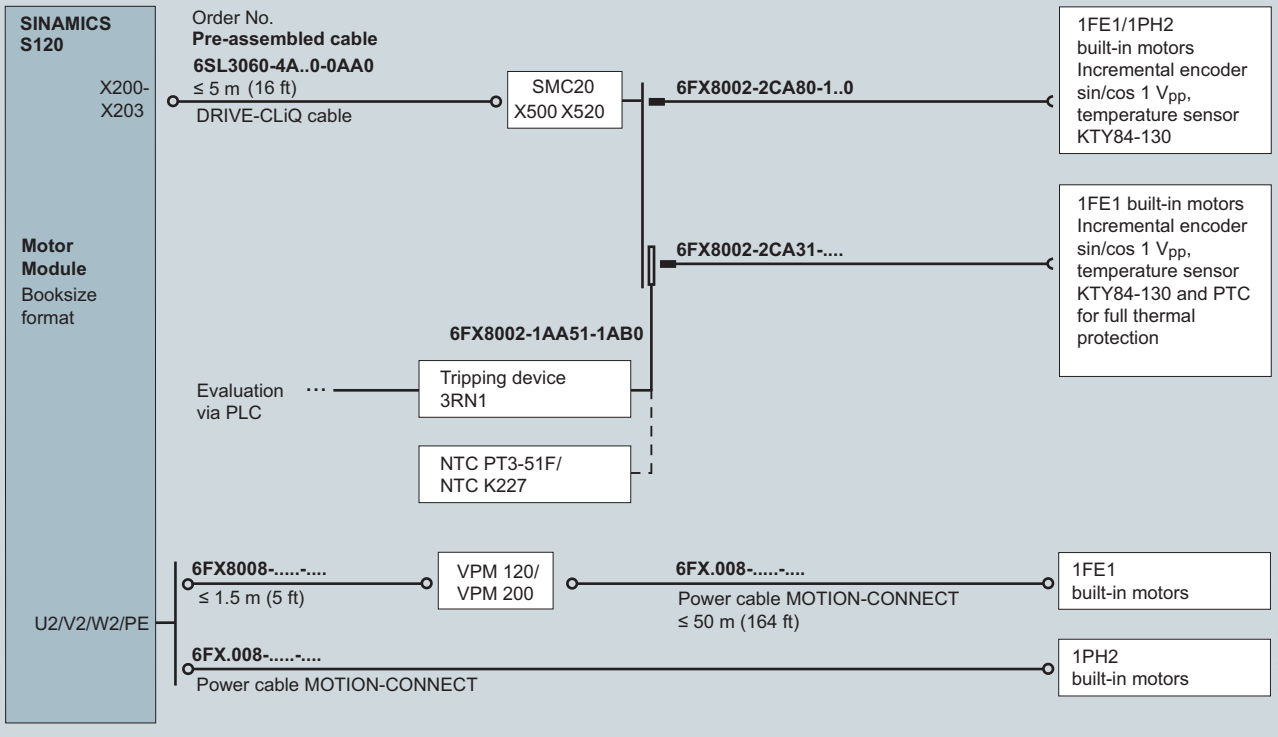
Connection overview of SINAMICS S120 Motor Modules in booksize format with SME12. and 1FW6/1FE1 motors



1) Up to 10 m (32.8 ft) possible, dependent on encoder current consumption.

2) Pre-assembled cables, see selection and ordering data for synchronous motors.

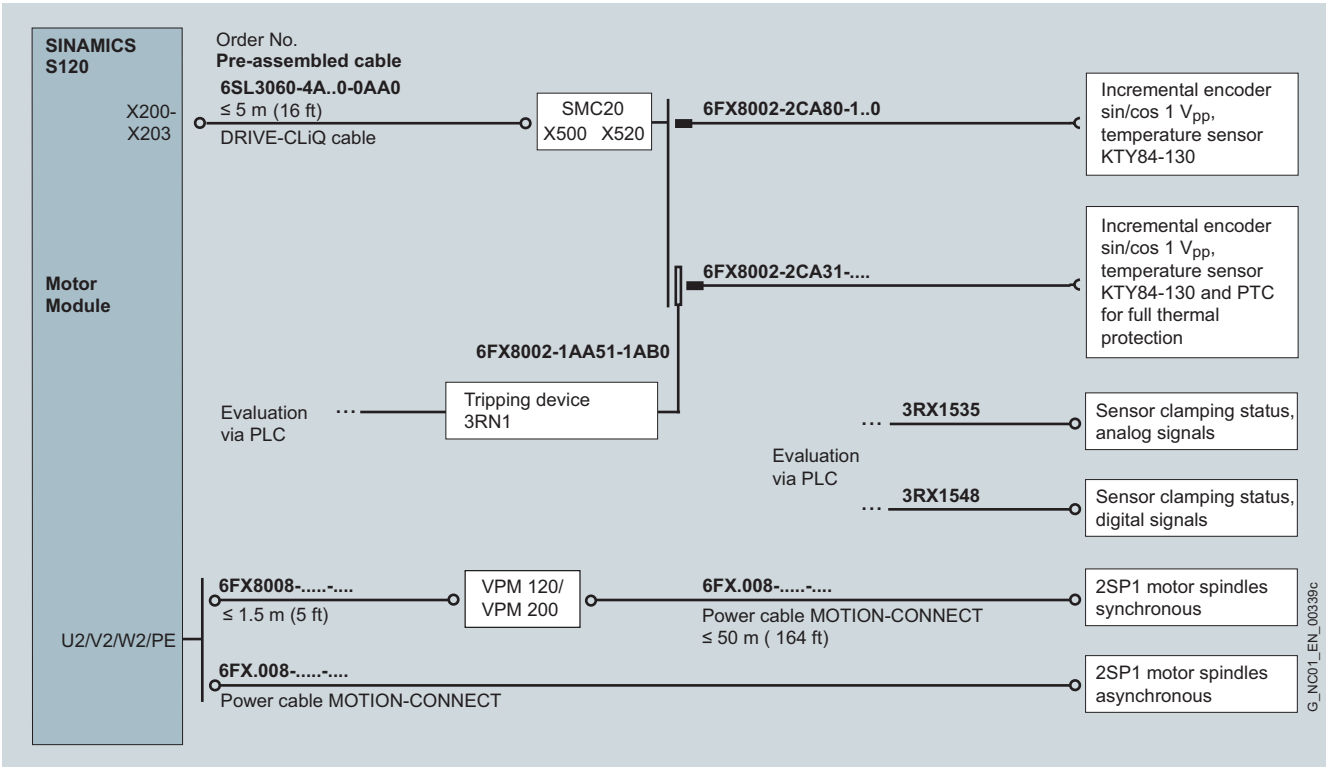
Connection overview of SINAMICS S120 Motor Modules in booksize format with SMC20 and 1FE1/1PH2 motors



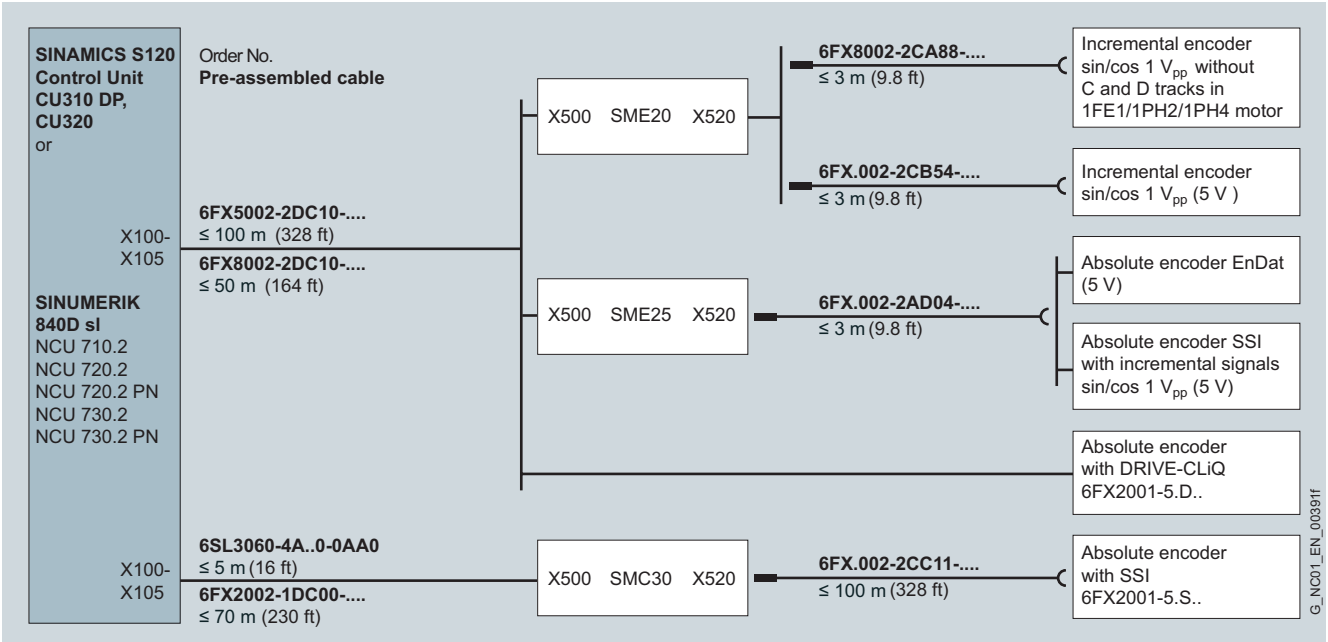
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Integration (continued)

Connection overview of SINAMICS S120 Motor Modules and 2SP1 motors



Connection of a machine encoder (direct measuring system)



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Connection overviews

Selection and ordering data

Pre-assembled DRIVE-CLiQ signal cables

Type	Length	D_{max}	Degree of protection Connector	**DRIVE-CLiQ signal cables** without 24 V DC cores Order No.
In fixed lengths	0.11 m (0.36 ft)		IP20/IP20	**6SL3060-4AB00-0AA0**
	0.16 m (0.52 ft)			**6SL3060-4AD00-0AA0**
	0.21 m (0.69 ft)			**6SL3060-4AF00-0AA0**
	0.26 m (0.85 ft)			**6SL3060-4AH00-0AA0**
	0.31 m (1.02 ft)			**6SL3060-4AK00-0AA0**
	0.36 m (1.18 ft)			**6SL3060-4AM00-0AA0**
	0.41 m (1.35 ft)			**6SL3060-4AP00-0AA0**
	0.60 m (1.97 ft)			**6SL3060-4AU00-0AA0**
	0.95 m (3.12 ft)			**6SL3060-4AA10-0AA0**
	1.20 m (3.94 ft)			**6SL3060-4AW00-0AA0**
	1.45 m (4.76 ft)			**6SL3060-4AF10-0AA0**
	2.80 m (9.19 ft)			**6SL3060-4AJ20-0AA0**
	5.00 m (16.4 ft)			**6SL3060-4AA50-0AA0**
To the meter	max. 70 m (230 ft)	7.0 mm (0.28 in)	IP20/IP20	**6FX2002-1DC00-....**
	max. 70 m (230 ft)	7.0 mm (0.28 in)	IP67/IP67	**6FX2002-1DC20-....**
Length code				**....**

Encoder system	Motor type	Length, max.	D_{max}	Degree of protection Connector	**DRIVE-CLiQ signal cables** with 24 V DC cores Order No.
Encoder systems in the motors with DRIVE-CLiQ interface: Incremental encoder, absolute encoder Resolver Absolute encoder with DRIVE-CLiQ 6FX2001-5.D..	1FK7/1FT/1FW6/ 1FN/1PH	50 m (164 ft)	7.1 mm (0.28 in)	IP20/IP20	**6FX8002-2DC00-....**
		100 m (328 ft)	7.1 mm (0.28 in)		**6FX5002-2DC00-....**
		50 m (164 ft)	7.1 mm (0.28 in)	IP20/IP67	**6FX8002-2DC10-....**
		100 m (328 ft)	7.1 mm (0.28 in)		**6FX5002-2DC10-....**
		50 m (164 ft)	7.1 mm (0.28 in)	IP67/IP67[1)]	**6FX8002-2DC20-....**
		100 m (328 ft)	7.1 mm (0.28 in)		**6FX5002-2DC20-....**
MOTION-CONNECT 500					**5**
MOTION-CONNECT 800					**8**
Length code					**....**

[1)] No direct connection to the Motor Modules.

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Selection and ordering data (continued)

Pre-assembled signal cables for motors with full-thread connector or terminal box

Encoder system	Motor type	Connection via	Length, max.	D_{max}	Degree of protection Connector	Basic cables Order No.	Extensions Order No.
Incremental encoder sin/cos 1 V_{pp} 2048 S/R							
• With C and D tracks	1FK7[1]/1FT6/ 1PH4/1PH7	SMC20	100 m (328 ft)	9.8 mm (0.39 in)	IP20/IP67	**6FX■002-2CA31-....**	**6FX■002-2CA34-....**
• Without C and D tracks	1PH4/1PH7	SMC20	50 m (164 ft)	9.2 mm (0.36 in)	IP20/IP67	**6FX8002-2CA80-....**	**6FX■002-2CA34-....**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R	1FK701	SMC20	50 m (164 ft)	9.8 mm (0.39 in)	IP20/IP67	**6FX■002-2CA20-....**	**6FX5002-2CA24-....**
Incremental encoder sin/cos 1 V_{pp} 2048 S/R	1FS6	SMC20	50 m (164 ft)	9.9 mm (0.39 in)	IP20/IP67	**6FX5002-2XA00-....**[2]	–
HTL incremental encoder	1PH7/1PH4	SMC30	100 m (328 ft) 300 m (984 ft)[3]	9.3 mm (0.37 in)	IP20/IP67	**6FX■002-2AH00-....**	**6FX■002-2AH04-....**
HTL incremental encoder 24 V DC 6FX2001-4		SMC30	100 m (328 ft)	9.3 mm (0.37 in)		**6FX5002-2CA12-....**	–
TTL incremental encoder RS 422 6FX2001-2							
• 5 V DC		SMC30	100 m (328 ft)	9.3 mm (0.37 in)	IP20/IP67	**6FX■002-2CR00-....**	**6FX■002-2CB54-....**
• 24 V DC		SMC30	100 m (328 ft)	9.3 mm (0.37 in)	IP20/IP67	**6FX■002-2CD24-....**	**6FX■002-2CB54-....**
HTL incremental encoder 5 V DC	1PH7/1PH4	CU310 DP	100 m (328 ft)	9.3 mm (0.37 in)	IP20/IP67	**6FX■002-2AH11-....**	–
HTL incremental encoder 5 V DC	1LA[4]	CU310 DP	300 m (984 ft)	8.0 mm (0.31 in)	IP20/IP67	**6SX7002-0AN30-....**	–
HTL incremental encoder type 1XP8001	1LA[4]	SMC30			IP20/IP67		
• Signals A, B			100 m (328 ft)	6.3 mm (0.25 in)		**6SX7002-0AL00-....**	–
• Signals A*, A, B*, B, R*, R			300 m (984 ft)[3]	8.0 mm (0.31 in)		**6SX7002-0AN00-....**	–
• Signals A*, A, B*, B, R*, R with right-angled connector			300 m (984 ft)[3]	8.0 mm (0.31 in)		**6SX7002-0AN10-....**	–
Incremental encoder sin/cos 1 V_{pp} 6FX2001-3		SMC20	50 m (164 ft)	9.3 mm (0.37 in)	IP20/IP67	**6FX■002-2CG00-....**	**6FX■002-2CB54-....**
Incremental encoder sin/cos 1 V_{pp} 5 V DC with C and D tracks		SME20	3 m (9.84 ft)[5]	9.3 mm (0.37 in)	IP67/IP67	**6FX■002-2CB54-....**	–
Incremental encoder sin/cos 1 V_{pp} 5 V DC without C and D tracks	1FE1/1PH2/ 1PH4	SME20	3 m (9.84 ft)[5]	9.2 mm (0.36 in)	IP67/IP67	**6FX8002-2CA88-....**	**6FX8002-2CA34-....**
Direct linear incremental encoder sin/cos 1 V_{pp}	1FN3[6]/1FN6/ 1FW6	SME120	3 m (9.84 ft)[5]	9.3 mm (0.37 in)	IP67/IP67	**6FX■002-2CB54-....**	–
MOTION-CONNECT 500						**5**	**5**
MOTION-CONNECT 800						**8**	**8**
Length code						**....**	**....**

The combinations of signal cable extensions shown are only provided by way of example.

Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Not for 1FK701.
[2] Temperature-resistant up to 100 °C (212 °F).
[3] With evaluation of difference signals A*, A, B*, B.
[4] Not for 2KG geared motor.
[5] Up to 10 m (32.8 ft) possible, depending on the encoder current consumption.
[6] Continuous load version.

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Connection overviews

Selection and ordering data (continued)

Pre-assembled signal cables for motors with full-thread connector

Encoder system	Motor type	Connection via	Length, max.	D_{max}	Degree of protection Connector	Basic cables Order No.	Extensions Order No.
Absolute encoder with SSI 6FX2001-5.S..		SMC30			IP20/IP67	**6FX■002-2CC11-....**	**6FX■002-2CB54-....**
• Clock-pulse rate 100 ... 250 kHz			100 m (328 ft)	9.3 mm (0.37 in)			
Absolute encoder with SSI 5 V DC		SME25	3 m (9.84 ft)	9.2 mm (0.36 in)	IP67/IP67	**6FX■002-2AD04-....**	–
Absolute encoder with EnDat	1FK[1]/1FT6/ 1FW3/1PH4	SMC20	100 m (328 ft)	9.8 mm (0.39 in)	IP20/IP67	**6FX■002-2EQ10-....**	**6FX■002-2EQ14-....**
Absolute encoder with EnDat	1FK701	SMC20	50 m (164 ft)	9.8 mm (0.39 in)	IP20/IP67	**6FX■002-2EQ20-....**	**6FX5002-2EQ24-....**
Absolute encoder with EnDat 2048 S/R	1FS6	SMC20	50 m (164 ft)	9.9 mm (0.39 in)	IP20/IP67	**6FX5002-2XQ10-....**[3]	–
Absolute encoder with EnDat 6FX2001-5.E..		SMC20	100 m (328 ft)	9.2 mm (0.36 in)	IP20/IP67	**6FX■002-2CH00-....**	**6FX■002-2AD04-....**
Absolute encoder with EnDat 5 V DC		SME25	3 m (9.84 ft)	9.2 mm (0.36 in)	IP67/IP67	**6FX■002-2AD04-....**	–
Direct linear EnDat absolute encoder	1FN3[2]/1FN6/ 1FW6	SME125	3 m (9.84 ft)	9.2 mm (0.36 in)	IP67/IP67	**6FX7002-2AD04-....**	–
Resolver							
• Multi-pole	1FK[1]/1FT/ 1FW3	SMC10	50 m (164 ft)	9.2 mm (0.36 in)	IP20/IP67	**6FX■002-2CF02-....**	**6FX■002-2CF04-....**
• 2-pole	1FK[1]/1FT/ 1PH7/1PL6	SMC10	130 m (426 ft)	9.2 mm (0.36 in)	IP20/IP67		
Resolver	1FK701	SMC10	50 m (164 ft)	9.2 mm (0.36 in)	IP20/IP67	**6FX■002-2CF20-....**	**6FX5002-2CF24-....**
PTC thermistor for connection to 3RN10 triggering device	1FS6	–	Without constraints	5.3 mm (0.21 in)	–	**6FX5002-1XA04-....**[3]	–
Temperature sensor	1FN3100 ... 1FN3150[2]	SME120/ SME125	10 m (32.8 ft)	11.9 mm (0.47 in)	IP67/IP67	**6FX7002-2SL01-....**	**6FX7002-2SL10-....**
Temperature sensor	1FN3300 ... 1FN3900[2]	SME120/ SME125	10 m (32.8 ft)	11.9 mm (0.47 in)	IP67/IP67	**6FX7002-2SL02-....**	**6FX7002-2SL10-....**
Temperature sensor	1FN6/1FW6	SME120/ SME125	10 m (32.8 ft)	11.9 mm (0.47 in)	IP67/IP67	**6FX7002-2SL10-....**	–
MOTION-CONNECT 500						**5**	**5**
MOTION-CONNECT 800						**8**	**8**
Length code						**....**	**....**

Pre-assembled signal cables for motors with SPEED-CONNECT connector

Encoder system	Motor type	Connection via	Length, max.	D_{max}	Degree of protection Connector	Basic cables Order No.	Extensions Order No.
Incremental encoder sin/cos 1 V_{pp} 2048 S/R							
• With C and D tracks	1FT7/1PH8	SMC20	100 m (328 ft)	9.8 mm (0.39)	IP20/IP67	**6FX■002-2CQ31-....**	**6FX■002-2CQ34-....**
• Without C and D tracks	1PH8		50 m (164 ft)	9.2 mm (0.36 in)		**6FX8002-2CQ80-....**	**6FX■002-2CQ34-....**
Absolute encoder with EnDat	1FT7/1PH8	SMC20	100 m (328 ft)	9.8 mm (0.39 in)	IP20/IP67	**6FX8002-2EQ31-....**	**6FX■002-2EQ34-....**
MOTION-CONNECT 500						**5**	**5**
MOTION-CONNECT 800						**8**	**8**
Length code						**....**	**....**

The combinations of signal cable extensions shown are only provided by way of example.

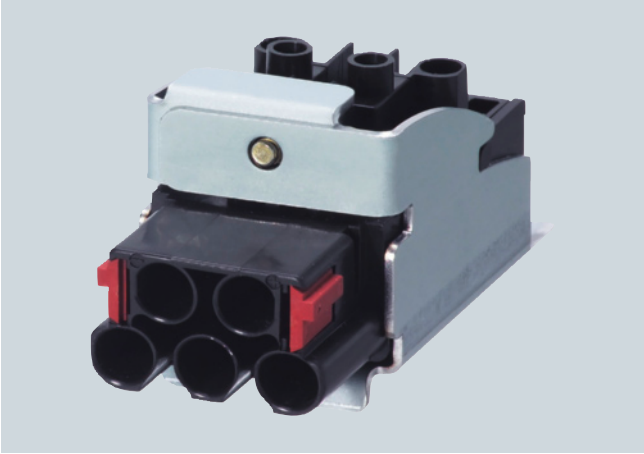
Note:
The maximum specified cable length (basic cable and extensions) must not be exceeded. The total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

[1] Not for 1FK701.
[2] Continuous load version.
[3] Temperature-resistant up to 100 °C (212 °F).

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Power connector for SINAMICS Motor Modules

Overview



Power connector with screw-type connection

3 A to 30 A Motor Modules in booksize format are shipped without power connector, as this is already connected to the MOTION-CONNECT power cables.

Power connectors can also be ordered separately, e.g. for applications where installation of the motor cable would be difficult if a power connector were attached.

Selection and ordering data

Description	Order No.
Power connector for Motor Modules 3 … 30 A booksize format with screw-type connection (enclosure, insulator, 2 coding pins, screw-type connections, motor: 1.5 ... 10 mm^2, brake: 1.5 mm^2)	**6SL3162-2MA00-0AA0**

Mounting flange

Overview

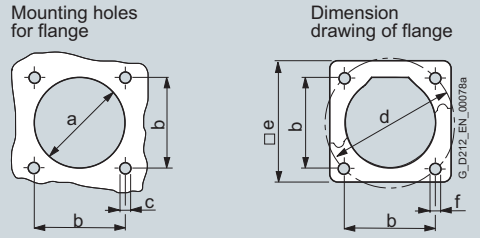


Mounting flanges are used to route or fix connectors in IP67 degree of protection, for example, in control cabinets. With the exception of angled connectors, a mounting flange can be retro-mounted on connectors with a union nut or with external thread.

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**

Dimensional drawings

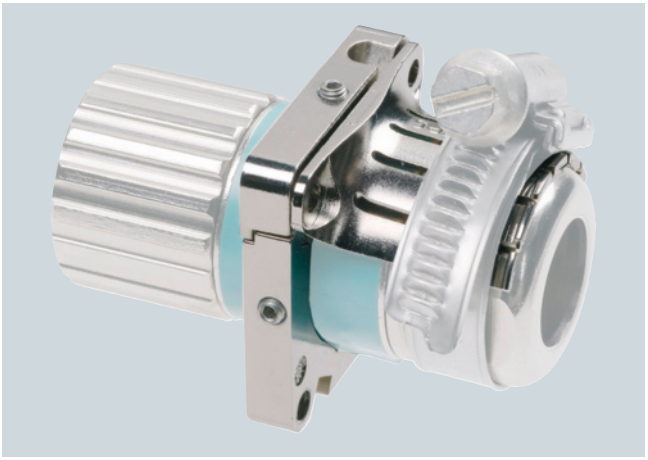


Dimensions	Power connector				Signal connector	
	Connector size 0.5	Connector size 1	Connector size 1.5	Connector size 3	M17	M23
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
a	Ø 23 (0.91)	Ø 28.6 (1.13)	Ø 47 (1.85)	Ø 66 (2.6)	Ø 23 (0.91)	Ø 27.6 (1.09)
b	22.6 (0.89)	28.3 (1.11)	42.4 (1.67)	75 (2.95)	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)	36.8 (1.45)	55 (2.17)	84.9 (3.34)	32 (1.26)	36.8 (1.45)
f	M3	M4	M5	M6	M3	M4

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HF (high-frequency) clamp

Overview



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.

Selection and ordering data

Description	Order No.
HF (high-frequency) clamp for	
• Power connector size 1 and signal connector M23	**6FX2003-7FX00**
• Power connector, size 1.5	**6FX2003-7GX00**
• Power connector, size 3	Not necessary

DRIVE-CLiQ cabinet bushing

Overview



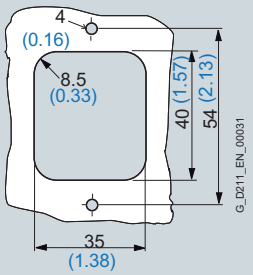
The DRIVE-CLiQ cabinet bushing provides the high IP67 degree of protection for MOTION-CONNECT DRIVE-CLiQ cables routed through openings in control cabinets. The DRIVE-CLiQ cabinet bushing features IP54 degree of protection on the outside and IP20 on the inside of the control cabinet.

Selection and ordering data

Description	Order No.
DRIVE-CLiQ cabinet bushing for signal cables	**6SL3066-2DA00-0AA0**

Dimensional drawings

Cabinet cut-out for DRIVE-CLiQ cabinet bushing



Dimensions in mm (inches)

10

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Overview



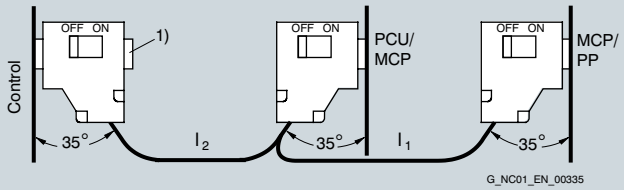
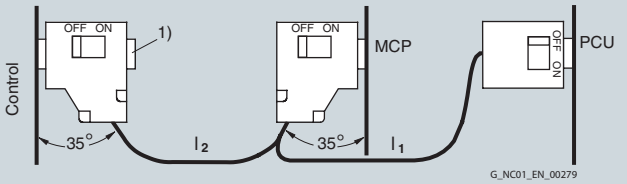
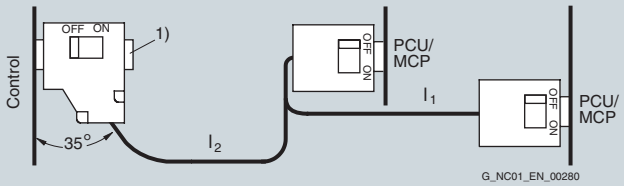
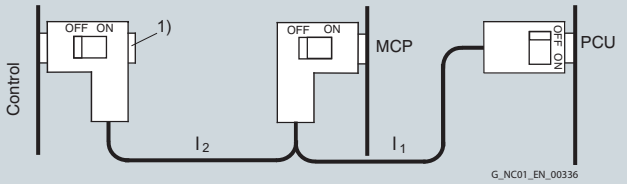
The DRIVE-CLiQ coupler makes it possible to join two MOTION-CONNECT DRIVE-CLiQ cables with degree of protection IP67.

Selection and ordering data

Description	Order No.
DRIVE-CLiQ coupler for signal cables	**6SL3066-2DA00-0AB0**

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Selection and ordering data

Description	Order No.	
Pre-assembled MPI bus cable with variable length l_2 with 3 connectors • Trailable • Fixed installation **Length l_1:** 1 m (3.28 ft) **Length l_2:** variable	**6FX8002-4EB00-....** **6FX2002-4EB00-....**	
Pre-assembled MPI bus cable with variable length l_2 with 3 connectors • Trailable • Fixed installation **Length l_1:** 1 m (3.28 ft) **Length l_2:** variable	**6FX8002-4EB10-....** **6FX2002-4EB10-....**	
Pre-assembled MPI bus cable with variable length l_2 with 3 connectors • Trailable **Length l_1:** 1 m (3.28 ft) **Length l_2:** variable	**6FX8002-4EB20-....**	
Pre-assembled MPI bus cable with variable length l_2 with 3 connectors • Trailable **Length l_1:** 1 m (3.28 ft) **Length l_2:** variable	**6FX8002-4EB30-....**	
Length code	....	

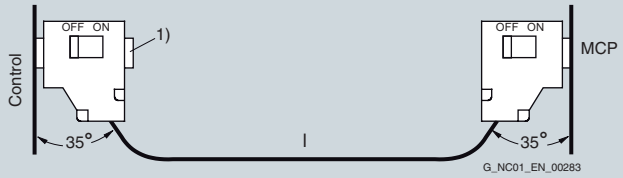
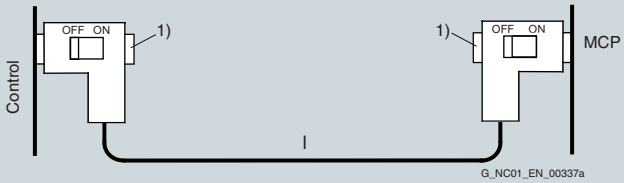
MCP Machine control panel
PP Push Button Panel

OFF ON Terminating resistors can be switched off

[1] Connection socket for programming device or other devices.

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Selection and ordering data (continued)

Description	Order No.	
Pre-assembled MPI bus cable with variable length l with 2 connectors • Trailable • Fixed installation	**6FX8002-4EB40-....** **6FX2002-4EB40-....**	
Pre-assembled MPI bus cable with variable length l with 2 connectors • Trailable • Fixed installation	**6FX8002-4EB50-....** **6FX2002-4EB50-....**	
Pre-assembled MPI bus cable with variable length l with 2 connectors • Fixed installation	**6FX2002-4EB60-....**	
Pre-assembled MPI bus cable with variable length l with 2 connectors • Fixed installation	**6FX2002-4EB70-....**	
Length code	....	

MCP Machine control panel
PP Push Button Panel

OFF ON Terminating resistors can be switched off

1) Connection socket for programming device or other devices.

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Length code

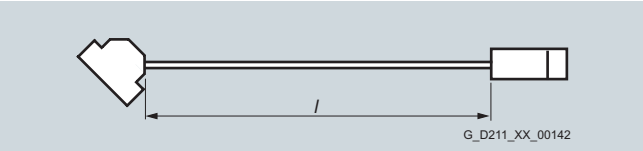
Overview

Description	Order No. supplement			
Length code for pre-assembled cables				
	6FX....-.....- ■ ■ ■ ■			
	6SX....-.....- ■ ■ ■ **0**			
0 m (0 ft)	**1**			
100 m (328 ft)	**2**			
200 m (656 ft)	**3**			
0 m (0 ft)		**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 (0 ft)			**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 in)				**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 (23.6 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

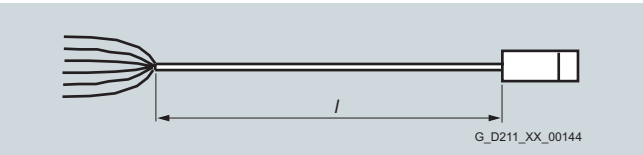
Description	Order No. supplement			
Length code for power and signal cables, sold by the meter[1)]				
	6FX.008-.....- ■ ■ ■ ■			
50 m (164 ft)	**1**	**F**	**A**	**0**
100 m (328 ft)	**2**	**A**	**A**	**0**
200 m (656 ft)	**3**	**A**	**A**	**0**
500 m (1640 ft)	**6**	**A**	**A**	**0**

More information

Definition of lengths for pre-assembled cables



Signal cables



Power cables 6FX.002-5LM..-.... for linear/torque motors

Tolerances:

- Cable lengths up to 10 m (32.8 ft): ± 2 %
- Cable lengths of 10 m (32.8 ft) and longer: ± 1 %

[1)] Note type of delivery.

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Services and supplementary products

11



11/2	**SINUMERIK Manufacturing Excellence**
11/3	Machine Development
11/4	Mechatronic Support
11/5	Machine Simulator
11/6	Manufacturing IT
11/7	ePS Network Services
11/9	Extended Machine Contracts
11/10	Repair service contract RSV
11/12	Productivity Improvement
11/13	Machine Retrofit
11/14	**SINUMERIK Solution Partners**
11/29	**Service & Support**
11/30	**SINORIX – Fire-extinguishing systems for machine tools**
11/31	**Control cabinets**
11/33	**Logistics solutions for our customers**
11/34	**Components for CNC basic and further training**
11/34	SinuTrain control-identical programming and simulation software
11/37	eLearning/training booklets
11/39	**Training equipment**
11/39	SINUMERIK 840D sl training case
11/39	SINUMERIK 840D sl OP training case
11/40	SINUMERIK 840D sl training rack
11/41	**Training**
11/42	**Documentation**
11/42	General documentation
11/43	SINUMERIK 802D sl
11/43	SINUMERIK 840Di sl/840D sl
11/45	SINAMICS S120
11/46	Motors for SINAMICS
11/46	Measuring systems
11/47	**CAD CREATOR**

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Overview

SINUMERIK Manufacturing Excellence – the portfolio of services for your machines and processes

Innovative services for machines offer enormous potential for optimizing the lifecycle costs. Siemens accompanies machines over the complete lifecycle – from the initial idea and design to operation and retrofit. The service package SINUMERIK Manufacturing Excellence plays an important role in optimizing the manufacturing process – regardless of the technologies used, the degree of automation, and the planning and manufacturing strategies.

Benefits

For the machine manufacturer:

- Shorter machine development time
- Cost-optimized machine development
- Better machine servicing
- Machines with optimized dynamic response
- Creation of new service potentials
- Reduced warranty costs

For the machine operator:

- Reduced costs per item
- Process optimization
- Increased availability and productivity
- Quality optimization

More information

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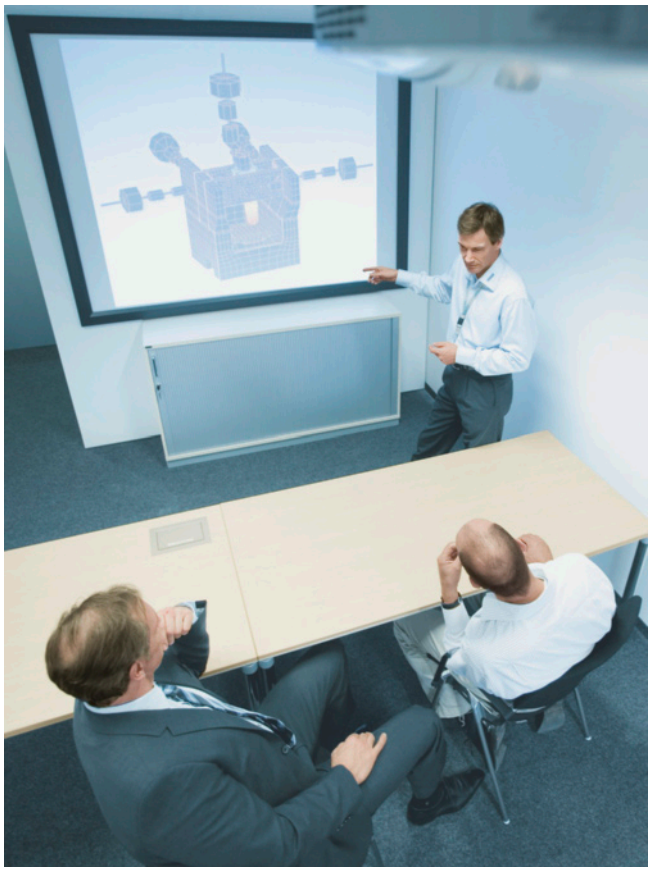
Overview

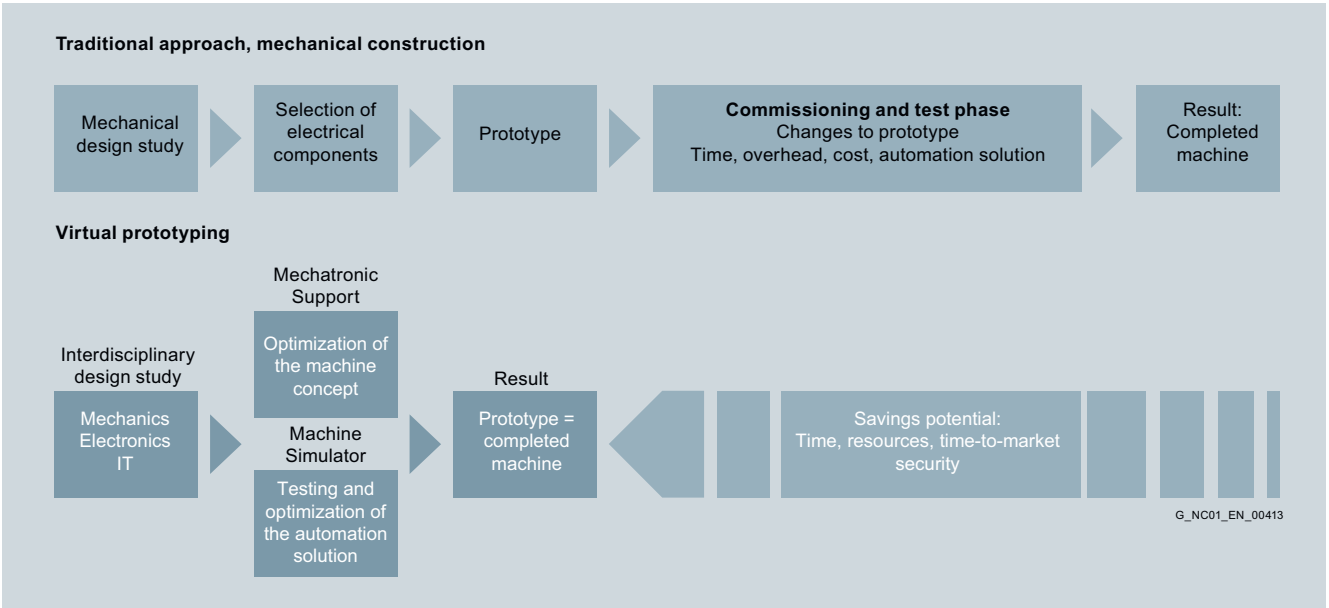
Achieve the next generation of machines faster with Machine Development

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.

The Machine Development services comprise the engineering services from the Mechatronic Support module as well as the Machine Simulator simulation software.

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.





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Machine Development
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.

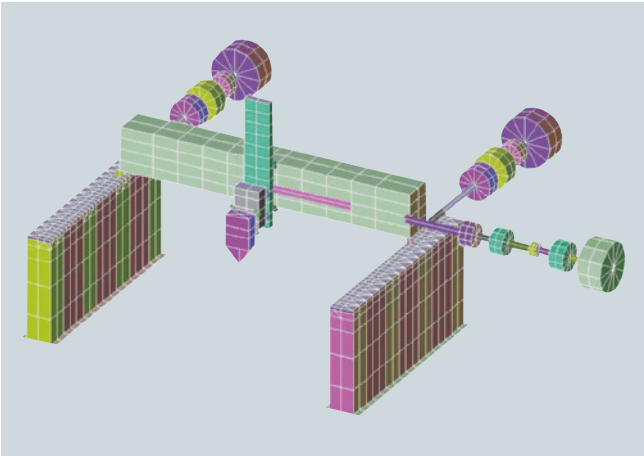
Virtual simulation, real construction

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.
Consultation 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

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Overview

Reliable engineering of the automation solution

The Machine Simulator opens up completely new routes for generating CNC-based automation solutions:
The simulation software accelerates commissioning and testing of the CNC-controlled and PLC-controlled basic functionality of a new machine. Commissioning is prepared on the basis of a simulation model of the machine and performed virtually.

This results in considerable savings of time and money during machine commissioning.

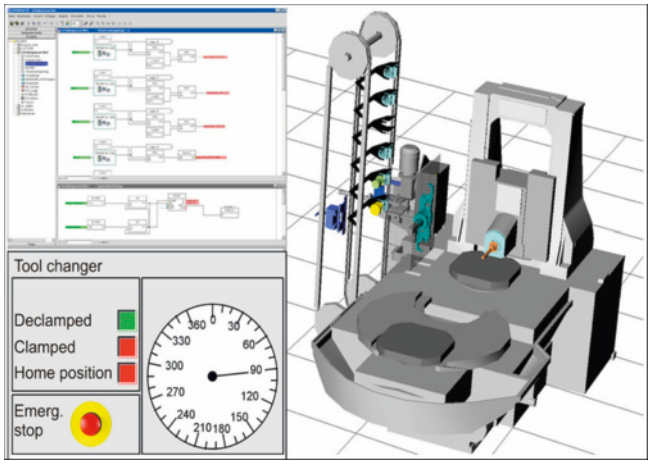
The interaction between the machine tool and automation solution can be realistically simulated and optimized long before the machine is fully developed and available as a prototype. The logical procedures and performance data of the machine can then be verified by means of simulation.

For the machine manufacturer, the user software verified by simulation results in an overall improvement in software quality. As the end customer, you benefit from a machine with a mature, reliable software solution.

The Machine Simulator can also be used as a training system.

Benefits

- Shorter time-to-market thanks to shorter development, adjustment and commissioning times
- Assured machine productivity
- Training on the simulated machine
- Identical operation of simulated machine and the real machine



Selection and ordering data

Description	Order No.
Machine Simulator Basic Bundle Comprises the basic software on CD-ROM and a DP-PCI card for connection to PROFIBUS	**6FC5880-0YC05-0AA0**
Machine Simulator Open Bundle Comprises the open software on CD-ROM and a DP-PCI card for connection to PROFIBUS	**6FC5880-1YC05-0AA0**
Machine Simulator Basic Software Comprises the basic software on CD-ROM	**6FC5880-2YC05-0AA0**
Machine Simulator Open Software Comprises the open software on CD-ROM	**6FC5880-3YC05-0AA0**
Machine Simulator Upgrade Comprises the license for upgrading from Machine Simulator Basic to Machine Simulator Open	**6FC5880-4YC05-0AA0**

More information

Please contact your local Siemens sales office or representative for more information.

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Manufacturing IT

Overview

Optimize production with integrated IT processes

In the framework of SINUMERIK Manufacturing Excellence, Manufacturing IT offers a holistic approach for optimizing production in the environment of machine tools with integrated IT processes.

The building blocks are the familiar Motion Control Information System MCIS 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 processes with a wide range of modules that perfectly interact.

Job management and preparation PDA

Production Data Acquisition (PDA) is used for flexible control of the work in hand. 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 MDA

Transparency is improved significantly by use of Machine Data Acquisition (MDA). This allows you to determine optimization potentials. Targeted analyses such as machine availability (OEE), cycle times, degrees of utilization or alarm statistics prevent disturbances and result in longer machine runtimes.

Part monitoring and archiving PMT

The functions for part monitoring and archiving (PMT) support intelligent parts management as well as convenient part 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 TDI

Whether for individual machines, flexible transfer lines, or for the complete machine park – with our tool management (TDI), you have access to all tool data. 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 DNC

CNC program management (DNC) offers you system-wide networking of your CNC machines and supports CNC program handling on transfer to and from the machine. DNC reduces costs in the CNC organization through secure and convenient CNC data archiving with versioning and administration functions.

Overview (continued)



Preventive maintenance TPM

The software module for maintenance management (TPM) supports preventive maintenance and optimizes servicing with 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

Data management supports backup, comparison and administration of controls. 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.

Benefits

- Optimized use of resources
- Shorter setup times and enhanced efficiency
- Reduced machine downtimes
- Automatic fault analyses
- Transparency in manufacturing down to the machine level

More information

For further information about Manufacturing IT and the Motion Control Information System MCIS, see the section HMI Software.

Or contact your local Siemens sales office or representative.

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Overview

ePS Network Services: Innovation potential for servicing and maintenance

The objective of ePS Network Services is to increase the productivity and availability of machines and to optimize global service and maintenance processes. The services operate on an Internet-based platform. This supports inter-company servicing and support processes and provides secured communication.

The following services are provided within ePS Network Services:

ePS Diagnostic Services

With ePS Diagnostic Services, you can organize your service help desk and monitor the status 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 you can trace the machine history in ePS Diagnostic Services and thus find and analyze the causes of a fault quicker.

You can synchronize your machines regularly with the ePS servers in the field. 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.

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.

The benefits of ePS Diagnostic Services

- Designing and optimizing your service processes
- Remote operation and monitoring of the controls using standard browsers
- Fault diagnostics with the help of data and notification services



ePS 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, ePS Condition Monitoring supports machine operators, maintenance technicians and service engineers with determining the machine status 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 status-oriented maintenance. The optimum time for maintenance can then be selected and productivity can be further improved.

The benefits of ePS Condition Monitoring Basic

- 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 preventive or status-oriented maintenance measures

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Overview (continued)

The ePS Service platform

If required, Siemens will provide the complete IT infrastructure for ePS Network Services:

An Internet-based infrastructure with high-performance servers, storage media and links to e-mail/text message systems. Also, software for acquiring, preparing and archiving machine-specific data.

The ePS 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.

The complete range for the ePS Service platform offers the following 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

Selection and ordering data

Description	Order No.
ePS Company Account	**6FC6001-0EE00-0CA1**
ePS Connect Machine	
Languages:	
English/German	
• On reporting the final destination information in EUNA	**6FC6001-0EE00-0CE1**
• Without EUNA registration	**6FC6001-0EE00-0CE0**
ePS Diagnostic Services	
• For the first year, 15-month term, max. 6 h teleservice per machine and per year	**6FC6001-0EE00-0DS0**
• For each additional year, 12-month term, max. 6 h teleservice per machine and per year	**6FC6001-0EE00-0DS1**
Subsequent invoicing of ePS Diagnostic Services	
Per minute of online time, for more than 6 h per machine, per year:	
• ePS Value Account 1 Credit	**6FC6001-0EE00-8AF8**
• ePS Value Account 50 Credits	**6FC6001-0EE00-3AF8**
• ePS Value Account 1000 Credits	**6FC6001-0EE00-0AF8**
ePS Condition Monitoring Basic	
• For the first year, 15-month term	**6FC6001-0EE00-0MB0**
• For each additional year, 12-month term	**6FC6001-0EE00-0MB1**
ePS combi package Diagnostic Services + Condition Monitoring Basic	
• For the first year, 15-month term, max. 6 h teleservice per machine and per year	**6FC6001-0EE00-0KP0**
• For each additional year, 12-month term, max. 6 h teleservice per machine and per year	**6FC6001-0EE00-0KP1**

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Overview

Extended Machine Contracts: Calculable costs for maintenance and service

With the Extended Machine Contracts option, we offer calculable costs for maintenance and service for machine manufacturers and machine distributors as well as the operators of machine tools.

In these individually agreed contracts, maintenance concepts are assembled from the following modules: preventive 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.



The benefits of Extended Machine Contracts

- 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 RSV: Subsequent repairs at fixed prices

We have developed the repair service contract RSV 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 RSV scope, you can use regional service or add-on services. This includes extended service periods, agreed response times and preventive measures.

The benefits of the RSV repair service contract

- 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

LSV local service contract: the modular service package

With the LSV local service contract, we offer machine users an individual, modular service package that ensures the availability of machine tools and manufacturing systems to a considerable extent and therefore makes an important contribution to efficient production.

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 in the 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 LSV local service contract

- Assured availability through reduction of the machine downtimes
- Plannable costs thanks to agreed service contract prices
- Services tailored to requirements

More information

Please contact your local Siemens sales office or representative for more information.

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Repair service contract RSV

Overview

RSV description of performance

In the context of the repair service contract (RSV), Siemens eliminates faults on the Siemens Industry Sector, IA & DT components specified in the contract (with the exception of complete motor spindles) at the machine location on behalf of the machine tool manufacturer and dealer.

RSV services

- Provision of servicing personnel
- Fault diagnostics on site
- Fault correction on site
- Proof of fault correction

Fault diagnostics refers to the components specified in the parts list of the final destination memo. 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 for fault diagnostics and fault correction on our products. If mechanical work is also necessary, this must be provided or arranged by the manufacturer/dealer. Example: dismounting/mounting of motors or other mechanical components.

The services are provided during the usual working hours in the country of installation.

Spare parts are provided either from our central spare parts warehouse or from regional spare parts warehouses using our worldwide spare parts logistic infrastructure. Our central spare parts warehouses contain all important spare parts. Regional spare parts warehouses are adapted to include the components specified in the final destination memo[1)].

The following components are not defined as spare parts:

- Motors[2)]
- Cables[3)]
- Special or customer-specific modules and components not available from Siemens as spare parts.

Faulty components[4)] are replaced free-of-charge within the agreed contract period. See under "Service exclusions".

Contract prerequisites

- Final destination memo
- Data backup at the user
- Parts lists for the individual components

The manufacturer/dealer provides the final destination memo 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 memo are: machine number, machine type, processing technology, control system, drive system, number of measuring circuits, data for OEM application, date of supply of Siemens components, date of commissioning at end user, country of end user, parts list of components used.

RSV certificate

As the RSV contract partner, the manufacturer or dealer is provided with a certificate once the final destination memo 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 RSV commences on the date registered with us for completion of the second commissioning procedure at the end customer site, and ends on expiry of the RSV period.

Contract periods

The RSV is offered for the limitation period (warranty period) that our customers (manufacturers/dealers) provide to their end customers. Various RSV periods permit you to satisfy different market requirements. In the case of RSV periods exceeding the limitation period originally granted for Siemens I DT components, the limitation period is extended with respect to claims for subsequent performance, with the exception of further rights and claims, in line with the extended RSV period. An existing RSV can be extended once by six months or one year. The extension must be ordered during the period of the basic RSV.

Contract versions

Two versions of the RSV are available.

- The master contract is for machine manufacturers who agree to order one RSV for all machines with Siemens equipment.
- The individual contract is for machine manufacturers who order an RSV 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 quality defects of the "General conditions of supply and delivery for the electrical industry"[4)]. 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 RSV in the case of proper use, irrespective of the actual duration of the RSV.

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.

1) Since the export of standard versions (components/system) is subject to a time-consuming official approval procedure, which applies in equal measure to the supply of such components for the purpose of servicing and spare parts supply, we recommend **supply of the export version** wherever 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 also observe the paragraph **Export control information** in Section Overview of functions.

2) For selected motors, we centrally stock components for fast delivery within Germany and the U.S.A. These motors can be manufactured and delivered within a few working days. You can obtain the current list from your Siemens partner.

3) The delivery times known to you usually apply.

4) Examples of service exclusions:
- Non-compliance with the Siemens project engineering and user guidelines
- Function-critical fouling, e.g. oil, conductive substances, rust
- Mechanical damage
- External electrical influence
- Intentional destruction.

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Overview (continued)

Response time

As a rule, the following response times apply when the RSV is implemented in the case of a machine standstill:

Country groups	
CG 1	Next working day
CG 2	Within two working days
CG 3	Depending on country-specific conditions
CG 4	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 listed response times apply to "technically clarified fault messages" within the usual working hours of the region (e.g., Monday to Friday 8 a.m. to 5 p.m.) excluding public holidays.

Country list

The repair service is offered for the following countries:

Continent	Country/region
Country group 1	
America	Brazil, Canada, Mexico, USA
Asia	China, India, Indonesia, Japan, Malaysia, Singapore, 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
America	Argentina
Australia	New Zealand
Europe	Bulgaria, Estonia, Ireland, Latvia, Lithuania, Norway, Slovenia
Country group 3	
Africa	Egypt, Morocco
America	Bolivia, Chile, Columbia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
Asia	Iran, Israel, Pakistan, Philippines, United Arab Emirates (Bahrain, Dubai, Kuwait, Oman, Qatar, Saudi Arabia), Vietnam
Europe	Belarus, Bosnia-Herzegovina, Croatia, Greece, Malta, Macedonia, Russia, Serbia and Montenegro, Ukraine
Country group 4	
	Remaining countries

OEM service levels

To ensure 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.

Selection and ordering data

Description	Order No.
Repair service contract RSV	
For Siemens I DT components on machine tools for countries in country groups 1 to 3	
• 1 year contract period[1]	**6FC8506-1 ■ X0 ■ -0AA0**
• 2 year contract period[2]	**6FC8506-2 ■ X0 ■ -0AA0**
• Master contract	**R**
• Individual contract	**E**
• 0 to 4 measurement circuits[4]	**1**
• 5 to 6 measurement circuits[4]	**2**
• 7 to 8 measurement circuits[4]	**3**
• = 9 measurement circuits[4] (basic RSV for = 9 measurement circuits[4])	**8**
• > 9 measurement circuits[4] (measurement circuit supplement for RSV) > 9 measurement circuits[3])	**0**
Repair service contract RSV Extension of contract by 6 or 12 months	
For Siemens I DT components on machine tools for countries in country groups 1 to 3	
• Basic RSV for 1 year	**6FC8506-0 ■ X0 ■ - ■ AA1**
• Basic RSV for 2 years	**6FC8506-0 ■ X0 ■ - ■ AA2**
• Master contract	**F**
• Individual contract	**E**
• 0 to 4 measurement circuits[4]	**1**
• 5 to 6 measurement circuits[4]	**2**
• 7 to 8 measurement circuits[4]	**3**
• = 9 measurement circuits[4] (basic RSV for = 9 measurement circuits)	**8**
• > 9 measurement circuits[4] (measurement circuit supplement for RSV) > 9 measurement circuits[3])	**0**
Contract extension (possible once per RSV)	
• By 6 months	**6**
• By 1 year	**1**
OEM service levels	
Surcharge for repair service contract for Siemens components on machine tools with OEM applications. Measurement 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**

[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] Example for 17 measurement circuits: (basic RSV for = 9 measurement circuits) plus 8 x (measurement circuit supplement for RSV > 9 measurement circuits).

[4] Physical axes and spindles count as measurement circuits.

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Productivity Improvement

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 price (dependent on results) and with a contractually assured machine standstill period.

When is Productivity Improvement viable?

In general, Productivity Improvement is profitable 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.

Where is Productivity Improvement applied?

In CNC, the service is used as follows: The higher computing performance achieved by modernization of the control 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

- Targeted control update (software and hardware)
- Reduced machining time while maintaining the same quality level
- Only a short machine standstill, thanks to systematic and time-optimized project development
- Suitable for improving the productivity of older machine tools

More information

Please contact your local Siemens sales office or representative for more information.



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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.:

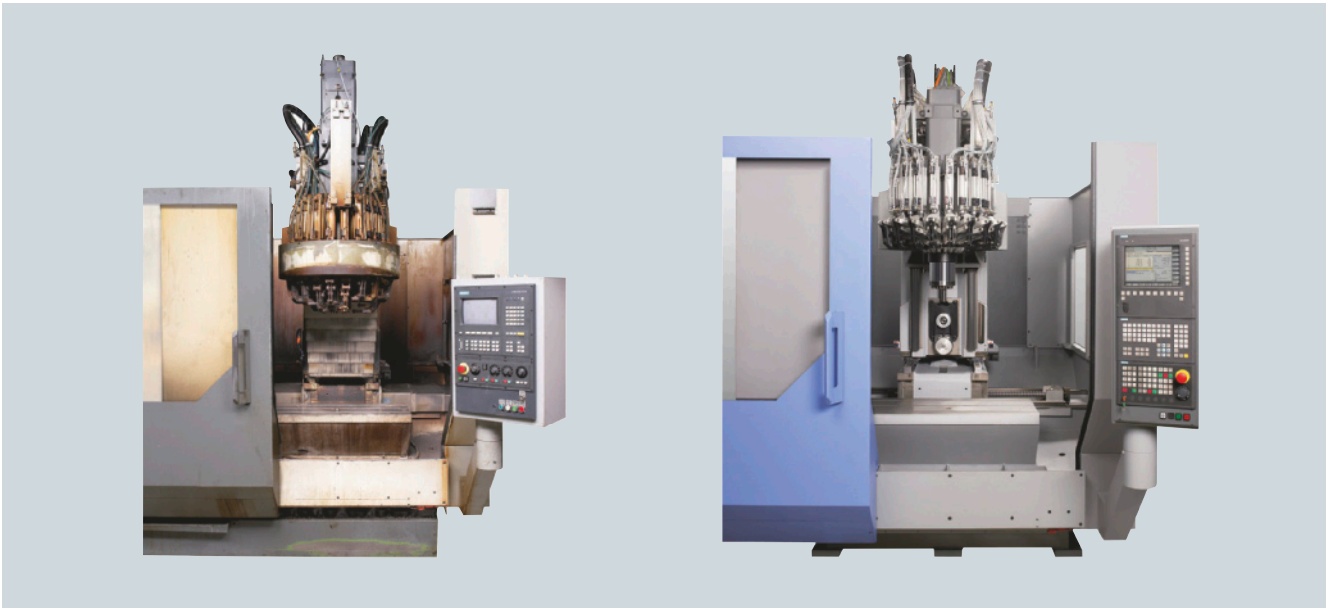
- New control technology and drive systems with SINUMERIK and SINAMICS
- Shopfloor-based programming with ShopMill and ShopTurn
- Mechanical overhauls, where necessary.

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

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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

You can find additional information in the Internet at:

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ARTIS GmbH
Tool and process monitoring

Overview



Tool and process monitoring system

The autonomous CTM system (Computer integrated Tool and Machine monitoring) from ARTIS can be integrated into the CNC and is used to monitor tools, machines and processes.

Benefits

- Fast integration resulting from minimized hardware and fieldbus technology
- Simple, fast installation of software
- No additional wiring in the solution without a sensor
- 4 independent monitoring channels on one CTM card
- Autonomous mode of operation, thus minimum load on the control
- System and sensors from a single source

Operator control of CTM as well as visualization can be integrated into the user interface of the CNC. Operation is clear, informative and easy to master following a short period of training.

Tool monitoring prevents the production of faulty parts or the occurrence of other damage resulting from worn, broken or missing tools. Bearing damage on motor spindles, tool unbalance and collisions are detected by the machine monitoring functions. The functions for process monitoring are responsible for observation of quality criteria, for example, the tolerances of tap-drill sizes and thread depths.

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Comara KG
Intelligent feedrate control

Overview



Intelligent feedrate control

The intelligent software solution iCut tracks the stock removal process and intervenes automatically when required.

iCut measures the spindle output up to 500 times per second and adjusts the feedrate automatically to the current cutting conditions. Variations in allowance or cutter contact angle, different depths of cut, increased hardness or tool wear - the feedrate is as fast as possible, but as slow as necessary. The ideal feedrate in any situation. With a unique response time.

iCut always calculates on the basis of the programmed feedrate, which corresponds to 100 %. From the load values measured on the tool, iCut computes the ideal feedrate for the prevailing cutting conditions and increases or reduces the feedrate fully automatically (e.g. 70 % or 120 %).

Benefits

- Production time savings combined with high process stability

More information

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Comara KG

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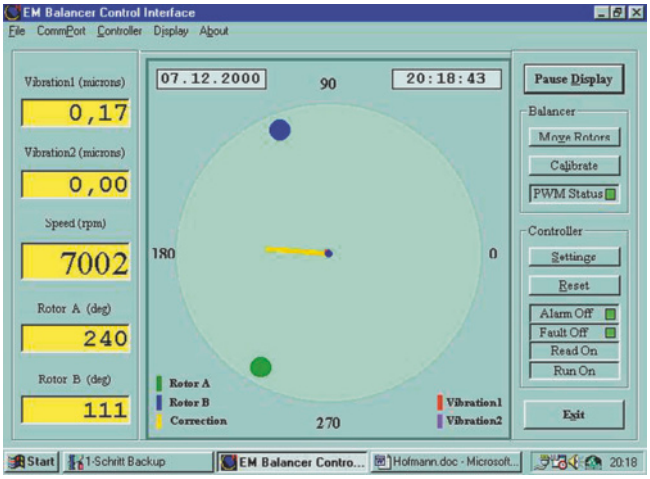
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HOFMANN GmbH & Co. KG
Measuring and balancing technology

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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HOFMANN Mess- und Auswuchttechnik GmbH & Co. KG

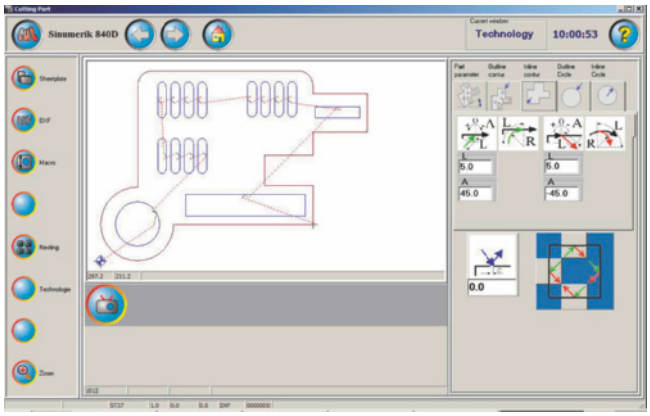
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IBE Software GmbH
Shopfloor-oriented cutting applications

Overview



Shopfloor-oriented cutting applications

With cncCUT, CNC programs can be created directly on the CNC control quickly and easily without the need for specialist knowledge.

The geometry is based on various graphical formats, including DXF. Different geometrical shapes can also be created directly at the machine using ready-made macros based on dimension parameters. The system automatically creates the cutting paths, complete with first cuts, but they can be modified manually.

By entering the number of parts, nesting is performed based on the shortest traversing paths with subsequent creation of the CNC program. The saved nesting diagrams can be called again at any time and executed. Technologies such as different velocities can be stored in a reference and can be assigned automatically according to material and thickness.

More information

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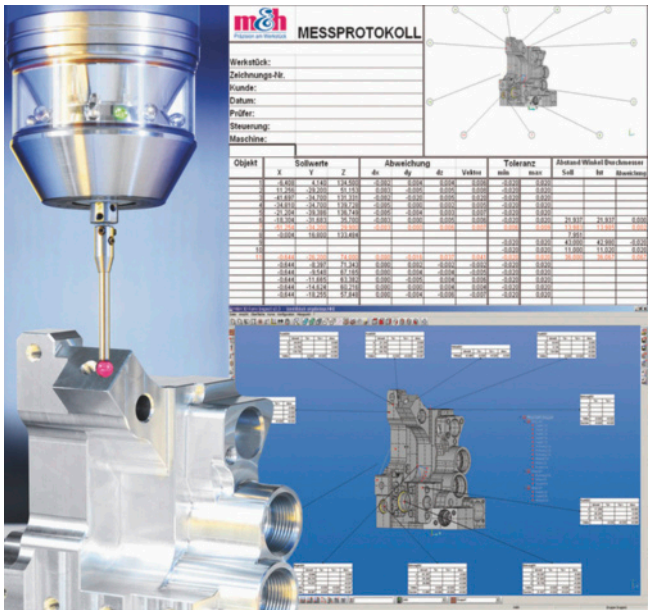
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m&h Inprocess Messtechnik GmbH
Workpiece measurement

Overview



3D Form Inspect Software – workpiece measurement

The high-speed 3D control solution for tool and mold makers supporting workpiece measuring directly on the machine tool.

3D Form Inspect software overview:

- Free-form surfaces can be measured at any angle on the machine tool
- Touch trigger points can be selected easily just by clicking with the mouse on the PC
- Software is easy to use, no need for special measuring knowledge
- Graphic evaluation on the screen or via report generator on printer
- Available for SINUMERIK controls

High precision in combination with high precision m&h probes and a laser-calibrated machine tool with linear scales. Many companies have been using our proven, trend-setting probes for more than a decade. High-precision probes from m&h ensure secure radio/infrared transmission with optimum receiving technology, reliable activation, operation tailored for a workshop, durability, and the highest degree of precision.

Benefits

- 3D form control on the machine tool
- Cost savings – no need for a measuring machine
- Reworking possible, because measuring takes place on the machine tool while the part is still clamped in position
- Time savings – no need to move to a measuring station

More information

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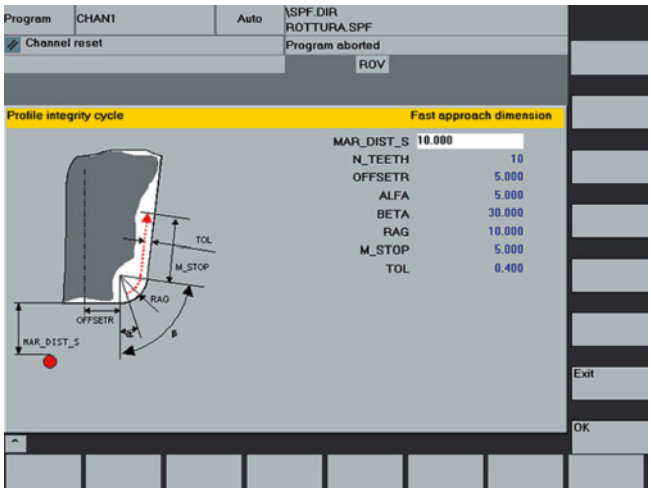
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MARPOSS S.p.A.
Laser tool monitoring

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

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MCU GmbH & Co. KG
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 RS 232 C 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 integral 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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MCU GmbH & Co. KG

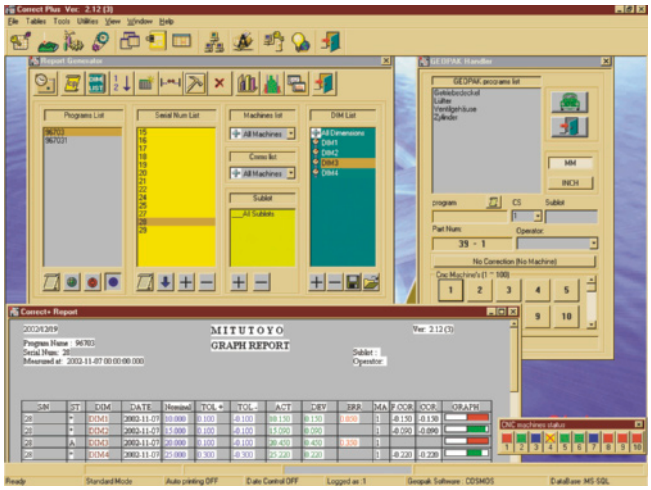
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Mitutoyo Messgeräte GmbH
Evaluation software

Overview



Evaluation software for the feedback of measuring data

The "Correct Plus" evaluation software ensures the fast feedback of measuring data to machining centers when integrated in the user interface of the CNC control. It makes the immediate online correction of machining data, which are received continuously or as samples by a coordinate measuring device, possible. Online correction can include each individual feature, e.g., the position and diameter of drilled holes.

Benefits

- Integration of the calculated correction values into the correction database of the machine tool
- Production of the subsequent workpiece with corrected data due to the immediate transfer of the modified work program to the machine control unit
- Cost-saving shortening of the run-in times of new process sequences
- A.S.A.P. change-over of 100 % measurements to inspections on the basis of samples due to an extremely quick stabilization of run-in times
- Automatic analysis of measurement results, calculation of new set values and direct creation of correction databases without time losses
- Clear improvement of process security thanks to error reduction, since the corrections are always performed in the direction of the nominal value
- Considerable reduction in scrap, since possible fabrication defects do not cumulate all the time, but can be corrected directly on the next workpiece to be processed
- Full automation of process sequences via optional software
- Executes under Windows 98/NT 4.0/2000/XP

More information

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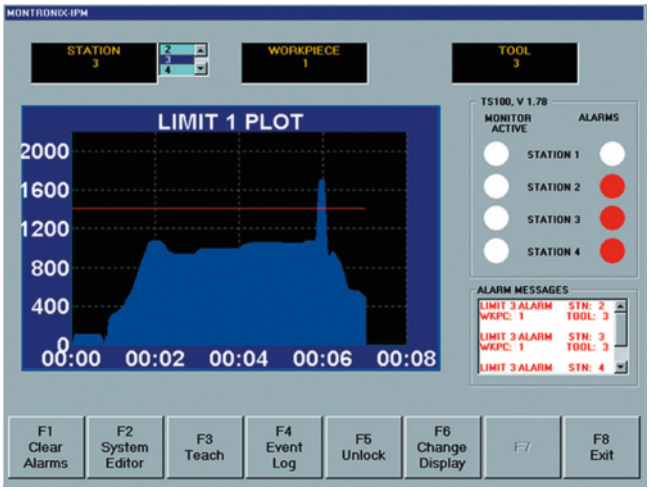
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Montronix GmbH
Tool and process monitoring

Overview



Tool and process monitoring system

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 via an RS 232 C or RS 485 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.

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Müller IT & VIDEO GmbH
Teleservice with video

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 a notebook, for example, 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.

Preconditions for VIDEO VISION:

- Telecommunications link (ISDN connection recommended)

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OMATIVE Systems
Real-time feedrate optimization

Overview



ADAPTIVE CONTROL & MONITORING (ACM) for real-time feedrate optimization

The OMATIVE ACM system is fully integrated into SINUMERIK NCK version 6.5 or higher and into the SINUMERIK HMI environment's user interface purely as a software solution.

ACM can be used for every cutting operation in feedrate-control, monitoring and event-recording modes.

In **feedrate-control** mode, ACM measures the current spindle load and continuously calculates the optimum feedrate for each individual tool and material. The feedrate is set to the highest possible value automatically and in real time. This reduces cycle times and also prevents tool breakage and damage to the tool and spindle, particularly during critical roughing operations and in rough-finishing applications. If the tool becomes overloaded, ACM stabilizes to an acceptable value automatically. This value is defined via an algorithm 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.

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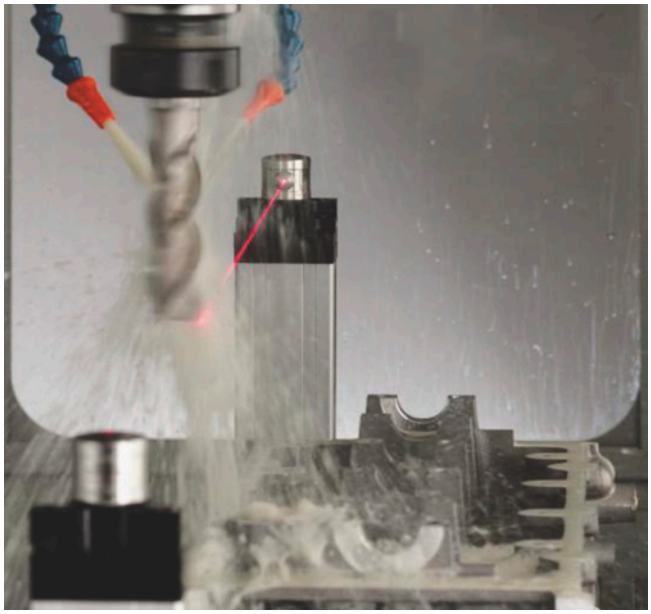
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Renishaw Plc.
Non-contact tool inspection

Overview



Non-contact tool inspection

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

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).

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PROMETEC GmbH PROSIN PLUS

Overview



PROSIN PLUS tool monitoring as integrated software solution for the SINUMERIK 840D/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.

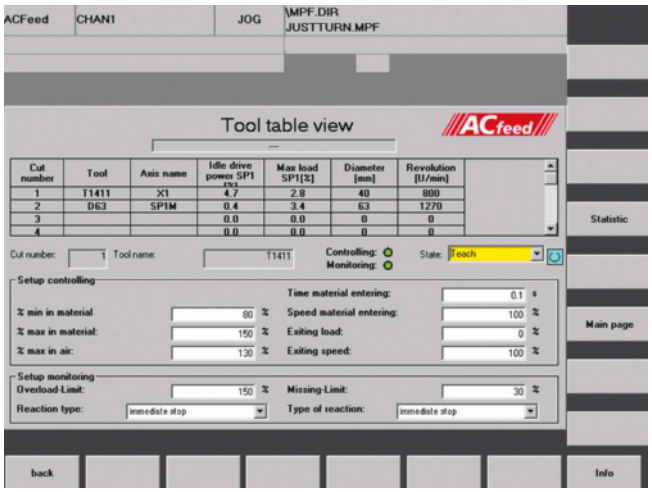
A particular highlight of PROSIN PLUS is the reliable detection of wear on rough-machining tools. This assumes mass production in which the batch size is significantly larger than the number of working tools.

PROSIN PLUS is patented according to EP 1 276 027 and its derivations.

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PROMETEC GmbH
ACfeed

Overview



Adaptive control for intelligent automatic feed optimization as integrated software solution for the SINUMERIK 840D/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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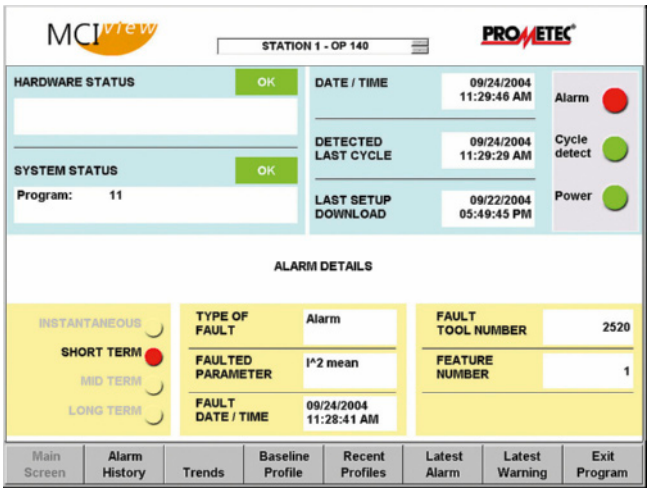
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PROMETEC GmbH
MCI (Machine Condition Indicator)

Overview



MCI – Machine Condition Indicator with MCIview software: Machine status monitoring through evaluation of a single vibration sensor

Using a sensor mounted on the spindle housing, MCI acquires the vibration signals from a machine tool fully automatically and continuously in all the different machine states of the production process, e.g., cutting, tool changes, spindle run-up, acceleration and braking of axes.

MCI also tests the spindle and slide during no-load operation at predefined intervals.

The MCI hardware acquires and stores the sensor data and processes them using an integrated digital signal processor. The signals are conditioned by a variety of analytical processes, e.g. Fast Fourier Transformation, RMS, 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.

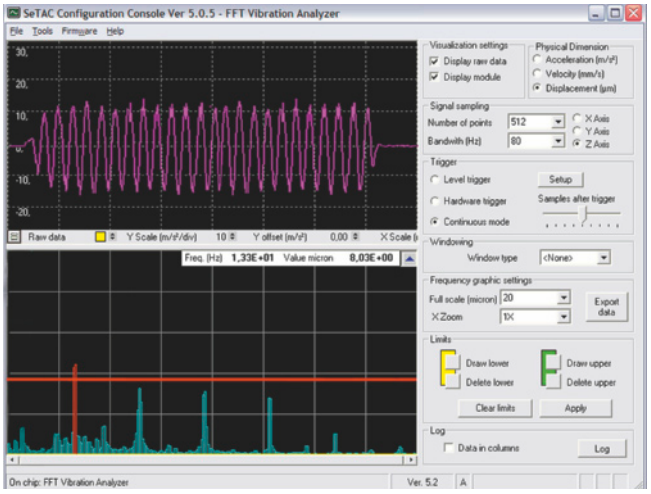
The MCI data which can be viewed online on the control can be displayed and stored at any time via an interface installed on the housing of the machine or control cabinet. The trends can then be analyzed for non-conformances in offline mode and compared with the data of other machines of the same type. 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.
Collision and vibration monitoring

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

- 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

Main applications

- 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.

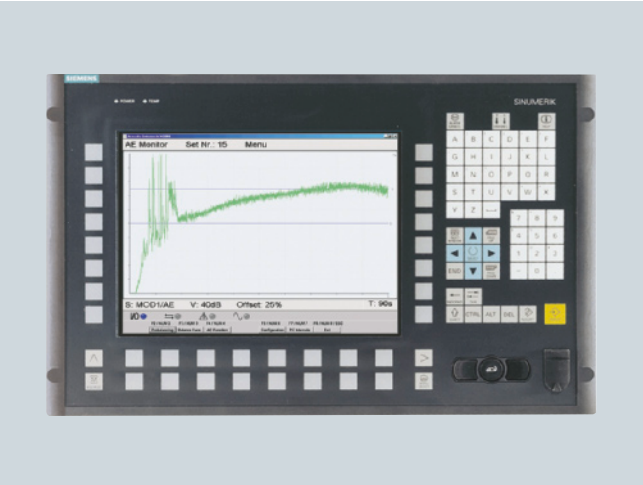
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Fax: +39 011 6402985
E-mail: info@sequoia.it
www.sequoia.it

Walter DITTEL GmbH
Balancing and process monitoring system

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, 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
- Storage of measured AE signals on control PC or external PC; connection via RS 232 C interface

More information

Please contact:

Walter DITTEL GmbH

Contact: Mr. Adalbert Sporer

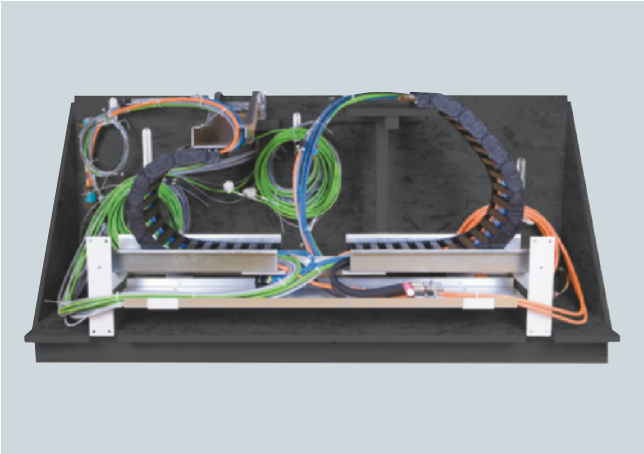
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E-mail: sporer@dittel.com
www.dittel.com

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LQ Mechatronik-Systeme GmbH
Complete mechatronic installation systems

Overview



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.

Pre-assembled cables, hydraulic components, pneumatic hoses and media hoses, sheet metal parts and add-on parts, strain-relief systems – it will all 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 urgent customer requests quickly at any time. Thanks to our own fleet, we can meet delivery deadlines to an accuracy of one hour.

Available worldwide.

We deliver energy chain 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 chains anywhere, round the globe, completely ready for final assembly.

Products and services:

- Energy management systems, prefabricated and ready to install
- Pre-assembled cables and wires
- Installation modules and cable sets
- Fluid and pneumatic modules
- Completely pre-assembled machine installations, e.g. equipment plates
- Development, design and project engineering
- Construction of prototypes
- Documentation (2 and 3-dimensional)
- Logistics: State-of-the-art materials logistics is supplemented by special installation trolleys – cost-effective and environmentally friendly
- 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

- Reduce the number of suppliers and orders
- Reduce stockholding costs for cables, chains, tubing, etc. as far as 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 energy management chain
- Delivery on special installation and transport frames – economical and environmentally friendly

More information

Are you interested in complete systems from LQ, which make electrical installation easy, 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. Mathias Leuze

Carl-Benz-Straße 6
74354 BESIGHEIM
Germany

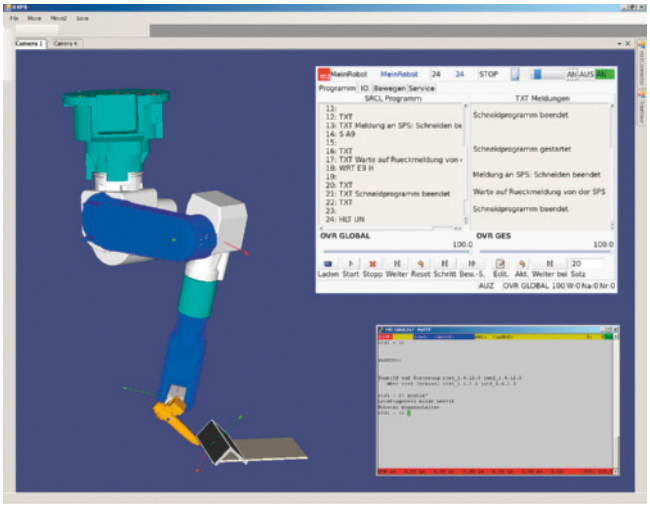
Phone: +49 7143 9683-0
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E-mail: Mathias.Leuze@de.lq-group.com
www.lq-group.com



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mz robolab GmbH
rcs1 robot control

Overview



mz robolab GmbH – 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.

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 device (PHG) 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

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www.robolab.de

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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 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)

In our company, it is the Application Technology Department that is the service department for the worldwide customer base. 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

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Germany

Phone: +49 9123 186-0
Fax: +49 9123 14313
E-mail: info@emuge-franken.de
www.emuge-franken.com

FRANKEN GmbH & Co. KG
Factory for precision tools

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ETALON AG – Testing/calibrating/ compensating of machine tools

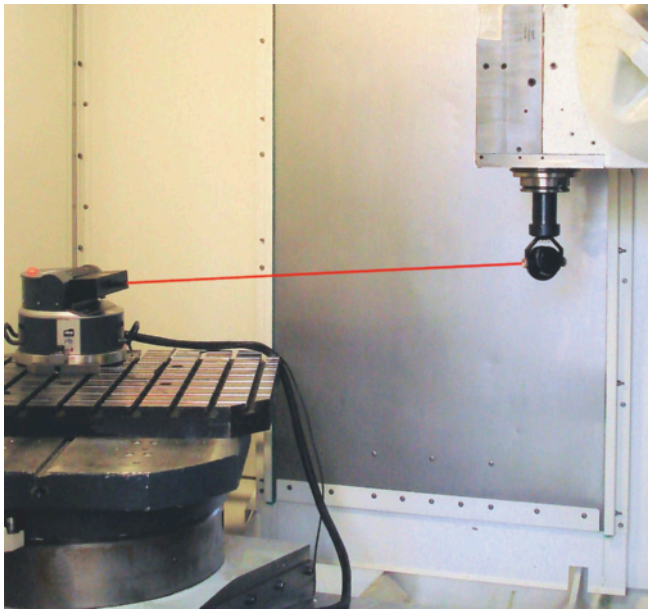
Overview

Testing, calibrating and compensating of machine tools



The LaserTRACER in a large gantry milling machine

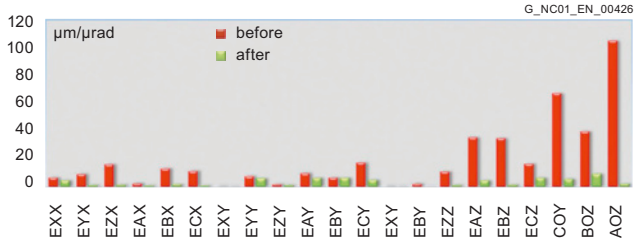
Using the ETALON system, the geometric variations of a machine can be measured quickly and very accurately. The traversing paths of the machine are automatically traced in space by the LaserTRACER and evaluated using a patented process. Extremely high accuracy is achieved as a result of distance measurements in space using a high-resolution interferometer. The procedure is also used to calibrate highly accurate coordinate measuring devices.



The LaserTRACER in a high-precision horizontal milling machine

Overview (continued)

The automatically generated compensation data can then be directly transferred to a SINUMERIK CNC. Using the Volumetric Compensation System (VCS) option, systematic deviations are compensated throughout the working range. 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
- High-speed machine test 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) Utz Hluchnik

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Fax: +49 531 592 1979
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MOTOMAN robotec GmbH
Robot systems

Overview

Robot systems



MOTOMAN – Expert in automation technology

- MOTOMAN, with more than 200000 robot systems installed worldwide, is one of the largest manufacturers of industrial robots, certified according to ISO 9001
- More than 60 sites, 21 of which are in Europe, underline its position as a global player in automation technology
- The MOTOMAN sites are subsidiaries of the renowned YASKAWA Electric Corporation
- MOTOMAN offers the broadest robot product range complete with I/O and systems engineering, including application-specific turnkey complete systems for welding, palletizing, handling, paint spraying, and various clean-room applications
- Continuous research and development in control and servo systems engineering and robots produced by robots are the basis for our success and guarantee maximum reliability and quality

Production program

Services:

- Configuration
- Programming
- Commissioning
- Training, maintenance and service for robots

Machinery and plants:

- MOTOMAN robots with load bearing capacities from 3 to 800 kg (6.62 lb to 1764 lb)
- Industrial robots with 4, 5, 6, 7, and 13 axes
- Automation technology
- Multi-robot plants
- DX100 control
- Positioners
- Gantries and track systems
- Handling systems
- Safety equipment
- Tool-changing equipment
- Equipment

Application

Application areas

- Order picking, palletizing, packing
- Clinching
- Riveting
- Deburring
- Sanding, polishing
- Painting
- Gluing
- Sawing
- Assembly, handling
- Measuring
- Cutting
- Milling
- Gas-shielded welding, spot-welding
- Laser applications

Sectors and target groups

- Automotive and subsupplier industry
- Mechanical engineering
- Food processing industry, beverages industry
- Woodworking and furniture making
- Agricultural machinery
- Building services, construction industry
- Electrical engineering
- Plastics industry
- Clean-room sector
- Photovoltaic sector



More information

Please contact:

MOTOMAN robotec GmbH

Frankfurt site

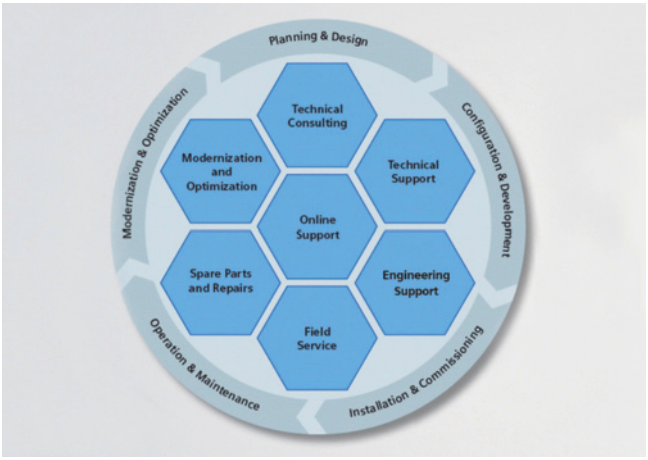
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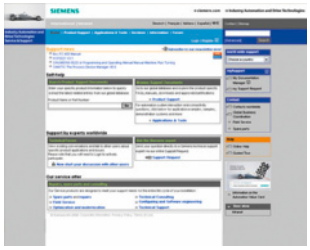
Services covering the entire lifecycle



Our Service & Support accompanies you worlwide in all concerns related to the automation and drive technology of Siemens. In more than 100 countries directly on site and covering all phases of the life cycle of your machines and plants. Round the clock.

An experienced team of specialists with their combined knowhow is ready to assist you. Regular training courses and a close contact of our employees among each other – also across continents – assure a reliable service for multifaceted scopes.

Online Support



The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

www.siemens.com/automation/service&support

Technical Support



Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

www.siemens.com/automation/support-request

In Germany, call:
Phone: +49 (0) 180 50 50 222[1)]

In the Unites States, call toll-free:
Phone: +1 800 333 7421
Fax: +1 423 262 2200
E-mail: solutions.support@sea.siemens.com

In Canada, call:
Phone: +1 888 303 3353
E-Mail: cic@siemens.ca

In Asia, call:
Phone:+86 10 6475 7575
Fax: +86 10 6474 7474
E-mail:
adsupport.asia@siemens.com

Technical Consulting



Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution.

Engineering Support



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project.

Field Service



With Field Service, we offer services for startup and maintenance essential for ensuring system availability.

In Germany, call:
Phone: +49 (0) 180 50 50 444[1)]

In the Unites States, call toll-free:
Phone: +1 800 333 7421
In Canada, call:
Phone: +1 888 303 3353

Spare Parts and Repairs



In the operating phase of a machine or automation system, we provide a comprehensive repair and spare parts service ensuring the highest degree of plant availability.

In Germany, call:
Phone: +49 (0) 180 50 50 446[1)]

In the Unites States, call toll-free:
Phone: +1 800 241 4453
In Canada, call:
Phone: +1 888 303 3353

Optimization and Upgrading



After startup or during the operating phase, additional potential for inceasing the productiviy or for reducing costs often arises. For this purpose, we offer you high-quality services in optimization and upgrading.

[1)] 0.14 €/minute from a German landline network, mobile telephone prices may vary.

You find contact details in the Internet under:
www.siemens.com/automation/service&support

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Overview



Sinorix al-deco are automatic fire-extinguishing systems for machine tools. Sinorix al-deco fights the fire where it breaks out – in the machine tool – without posing a risk to people, the environment, or technical components.

Sinorix al-deco fire extinguishers do not require an energy supply to detect and extinguish fires, as the actual extinguishing process functions pneumatically.

Sinorix al-deco fire extinguishers are CE-compliant, meet all the relevant EU standards and are approved by the German Technical Inspectorate (TÜV).

Benefits

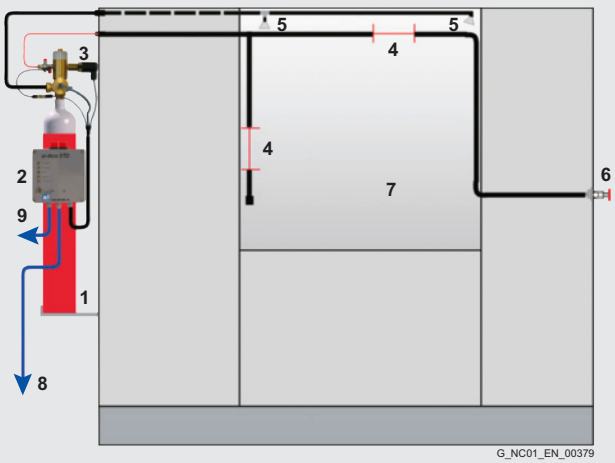
- Optimum protection against outbreak of fire in a machine tool
- Capable of detection and extinction of fires without power supply
- Online remote monitoring of fire extinguisher and extinguishing agent fill level
- Easy maintenance supported by optical/acoustic indicators
- Event log recordings

Design

The communication interface monitors the pneumatic fire extinguishing system, signals an alarm in the event of a fire or operating state fault and supports recording of operating data.

The LIFDES sensor is pressurized and breaks open at temperatures above 110 °C (230 °F).

The DIMES measuring probe measures the extinguishing agent fill level online and outputs an alarm when it drops below the minimum required quantity. When the LIFDES sensor de-pressurizes, the valve releases the fire extinguishing agent.



1 Extinguishing agent container
2 Communication interface
3 DIMES measuring probe and valve
4 Flexible detection hose (LIFDES sensor)
5 Fire-extinguishing nozzles
6 Push button with manometer
7 Hazardous working area
8 al-deco interface
alarm signaling with 230 V AC/3 A potential-free changeover contact for controling EMERGENCY OFF
9 230 V AC

Function

The Sinorix al-deco system uses fire detection and fire extinction methods which operate pneumatically. As a result, the system does not require a power supply to be able to detect and extinguish fires.

This fire extinguisher does not have any special requirements of the machine tools such as sealing air, control signals or signaling criteria.

More information

You can find additional information on the Internet at:

www.siemens.com/buildingtechnologies

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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

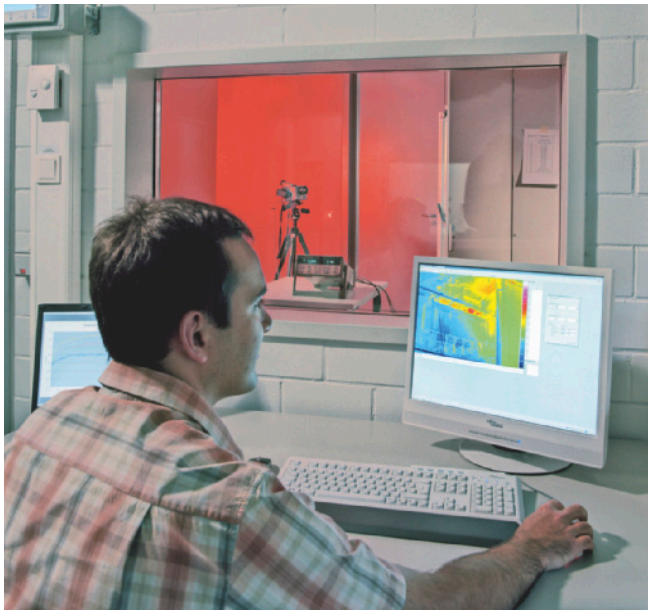
Production at a high level of quality

Complete equipment is manufactured at a high industrial level. This means that

- 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

© Siemens AG 2010

Overview (continued)

Superior logistics

Everything from a single source offers you the following advantages:

- Cost savings for procurement, stockkeeping, financing
- Reduction in throughput times
- Delivery just in time

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

In the framework of complete equipment, Siemens also offers the development and construction of customized supplementary products, e.g. special operator panels and power supply systems.

Liability of product nonconformance

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.

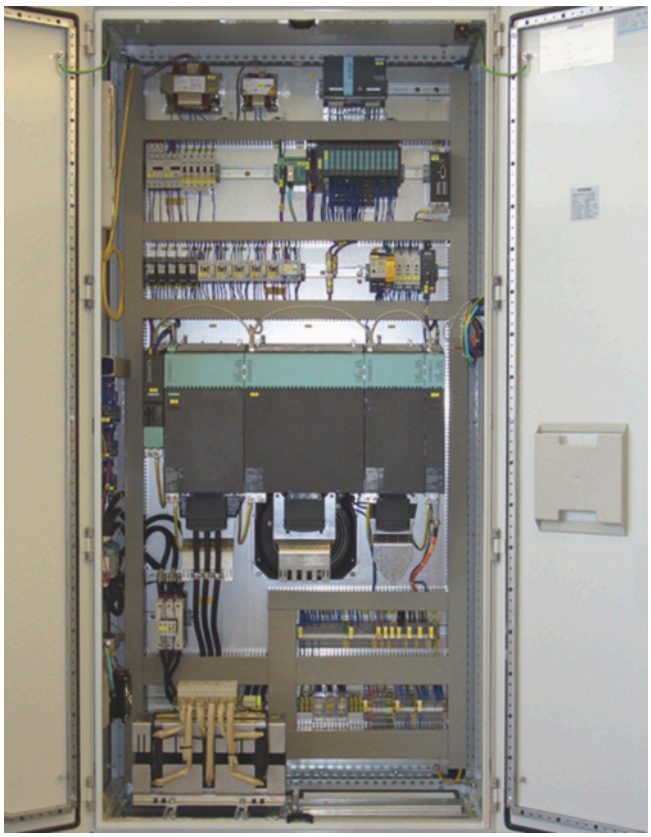
Your benefits

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

© Siemens AG 2010

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.

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 uniform 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 • Installation • Tests	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 box 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 considering their environmental compatibility.
Export handling	• Export declaration • Customs formalities • Worldwide • Multi-partner/regions 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.

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SinuTrain control-identical programming and simulation software

Overview



SinuTrain control-identical programming and simulation software

SinuTrain is a control-identical CNC training/programming software on a PC. It can be used for:

- Training
- Self-study
- Program development and simulation

The following versions are available: (for execution with Windows XP Service Pack 2)

SinuTrain complete package 810D/840D/840Di sl/840D sl (without HMI Advanced)

- ShopMill – User and programming interface for milling machines
- ShopTurn – User and programming interface for turning machines
- DIN 66025 programming in ShopMill or ShopTurn
- User-friendly contour calculator
- Detailed turning and milling cycles
- Tool management
- Network linking via DNC Direct Numeric Control
- CAD reader for reading the machining contour of your workpiece
- Printing/hard copy
- Programming examples
- 6 languages can be selected online (English, French, German, Italian, Spanish, Chinese Simplified)
- Further languages can be downloaded from the Internet

SinuTrain ShopMill

- User and programming interface for milling machines
- CAD Reader
- Printing/hard copy
- Programming examples
- Configuration tool for adapting to different machines (not available for all versions)
- 6 languages can be selected online (English, French, German, Italian, Spanish, Chinese Simplified)

SinuTrain ShopTurn

- User and programming interface for turning machines
- For other functions, see ShopMill

Overview (continued)

SinuTrain licenses and updates

All versions of SinuTrain are available with a single-user station license or a classroom license. The classroom license enables you to install the software on up to 16 individual PCs.

Updates for the SinuTrain complete package, for example, can be obtained on request. You will receive these updates on production of an existing SinuTrain license. Updates of the latest version or a different higher version can be obtained.

Benefits

- Control-identical training on the PC – practical training
- SinuTrain is available in 6 languages – further languages are available on request
- Linking to the CAD system – fast program generation
- Commissioning/installation/instruction through Siemens – everything from a single source
- Training courses and Teachware – easy introduction for trainers
- Integration of customer applications – OEM version implementable (machine tool manufacturers)

Application

The SinuTrain training software is used to create and simulate CNC programs on a PC, using the DIN 66025 programming language plus SINUMERIK language commands and the ShopMill and ShopTurn products.

Design

Programs created with the SinuTrain software can be used on real machines. The configurations and settings of the real machine need to be mapped in the software for this purpose. A total of 99 machines can be configured additionally and stored in the configuration memory. The machine to be used can be selected in the Start menu each time.

Note:

Programs can be adapted by authorized personnel within the specified limits, although additional costs may be incurred as a result.

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Function

With DNC, programs and tool data can be transferred from PC to PC or from PC to machine. The CAD Reader program converts DXF files into contours or hole drilling templates for SINUMERIK, ShopMill or ShopTurn. The contours can be modified later in DIN-ISO format or contour calculator format. You can print out part programs, subprograms and ShopMill/ShopTurn programs using the "Print" function.

The single-user station

The scope of functions of the SinuTrain software takes into account production and training requirements.
The operator interface identical to production together with the identical scope of programming functions make it easy for the trainer to pass on skills and knowledge for production use.
A difference in the media or methods does not exist because identical control software is used.

The environment encountered by the programmer on the PC is identical to the programming environment on the machine. Convenience is, of course, much greater on the PC.

The classroom

The classroom license has been specially devised to meet the requirements of a training environment and offers 16 individual licenses.

The trainee and trainer workstations are linked over a network. The CNC programs created during training can be transferred to a training machine directly via the network using DNC, if SinuTrain has been configured for this machine.

Note:

We recommend the use of a network specifically designed for training environments, which will allow the tutor to intervene in the training process from the tutor workstation at any time. The network is not supplied with the SinuTrain software.

The training center

The last step in the integrated training concept is complete when the training programs developed by the students are transferred to the CNC machines. DNC Machine also transfers programs from PC to machine via the existing network, thus allowing execution of the programs, manual modification and program development right on the machine itself.

We offer an appropriate infrastructure:

- Media, as well as their installation
- Commissioning and service
- Advice on hardware and software

We support machine tool manufacturers in their efforts to implement their own or external CNC training centers.

Selection and ordering data

Description	Order No.
SinuTrain complete package 810D/840D/840Di sl/840D sl	
(with ShopMill/ShopTurn, without HMI Advanced)	
On CD-ROM for Windows XP (Service Pack 2)	
• Single-user license Floating license (1 unit) Current software version	**6FC5270-7AX70-3AG0**
• Classroom license Floating license (16 units) Current software version	**6FC5270-7AX72-3AG0**
SinuTrain ShopMill	
On CD-ROM for Windows XP (Service Pack 2)	
• Single-user license Floating license (1 unit) Software version 7.2	**6FC5463-7FA41-2AG0**
• Classroom license Floating license (16 units) Software version 7.2	**6FC5463-7FA43-2AG0**
SinuTrain ShopTurn	
On CD-ROM for Windows XP (Service Pack 2)	
• Single-user license Floating license (1 unit) Software version 7.2	**6FC5463-7GA51-2AG0**
• Classroom license Floating license (16 units) Software version 7.2	**6FC5463-7GA53-2AG0**
SinuTrain 802D sl	
On CD-ROM for Windows XP (Service Pack 2)	
• Single-user license Floating license (1 unit) Software version 1.4 SP1	**6FC5270-0AX80-0AG0**
• Classroom license Floating license (16 units) Software version 1.4 SP1	**6FC5270-0AX82-0AG0**
Accessories	
SinuTrain training keyboard[1)]	**6FC5203-0AC55-0AA0**

[1)] Not approved for use on machines.

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SinuTrain control-identical programming and simulation software

Accessories

SinuTrain training keyboard [1)]

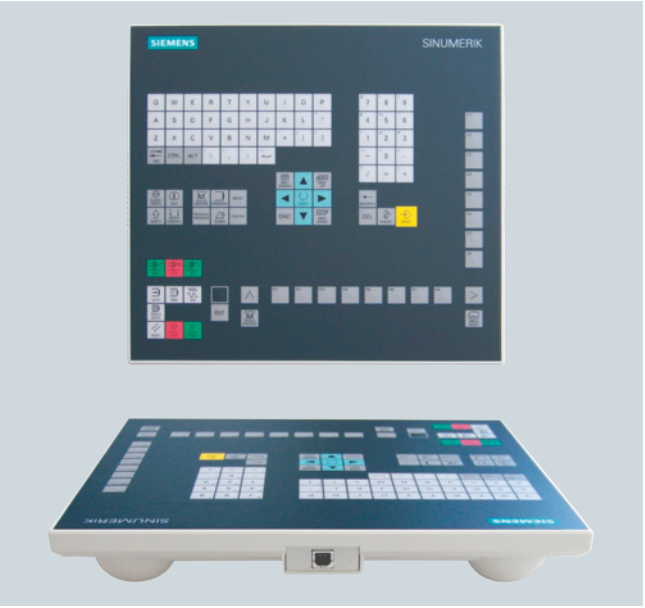
The training keyboard for machine simulation makes PC-based training in machine operation and programming even more realistic.

On the SinuTrain training keyboard, you will find all the keys familiar to you from the control itself, or from exercises in the training manual, in their original layout. This greatly simplifies the use of SinuTrain and ShopMill/ShopTurn on the one hand, and saves you from having to rethink the entire layout when you progress from training to the machine itself or use the PC as an external programming console and have to switch back and forth between machine and PC.

The SinuTrain training keyboard is easily connected via the PC's USB interface, that is to say, neither additional hardware (plug-in card) nor an external power supply is required for the keyboard.

Preconditions:

- An operating system-supported USB interface on the PC
- SinuTrain software



More information

For additional information, please contact your local Siemens office.

You can find additional information on the Internet at:

www.sitrain.com

www.siemens.com/sinutrain

www.siemens.com/jobshop

[1)] Not approved for use on machines.

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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. This software has been awarded the Digita prize.

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.		
Booklet "We are part of the workshop team"			
• Print version:			
- Black/white	**6FC5095-0AA60-0**	■	**P2**
- Color	**6FC5095-0AA60-1**	■	**P2**
• Languages:			
- German			**A**
- English			**B**
CD "We are part of the workshop team" Languages: English/German	**E80001-V211-E73-X-7400**		
ShopMill training booklet			
• Print version:			
- Black/white	**6FC5095-0AA50-0**	■	**P2**
- Color	**6FC5095-0AA50-1**	■	**P2**
ShopTurn training booklet			
• Print version:			
- Black/white	**6FC5095-0AA80-0**	■	**P1**
- Color	**6FC5095-0AA80-1**	■	**P1**
SINUMERIK 810D/840Di/840D training booklet			
• Print version:			
- Black/white	**6FC5095-0AB00-0**	■	**P1**
- Color	**6FC5095-0AB00-1**	■	**P1**
• Languages:[1)]			
- Chinese Simplified			**R**
- German			**A**
- English			**B**
- French			**D**
- Italian			**C**
- Korean			**L**
- Dutch			**J**
- Polish			**N**
- Portuguese			**K**
- Russian			**P**
- Spanish			**E**
ShopMill training booklet CD Languages: English, French, German, Italian, Spanish	**6FC5095-0AA50-0YG0**		
ShopTurn training booklet CD Languages: English, French, German, Italian, Spanish	**6FC5095-0AA80-0YG0**		
SINUMERIK 810D/840Di/840D training booklet CD Languages: English, French, German, Italian, Spanish	**6FC5095-0AB00-0YG0**		

[1)] Additional languages on request.

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eLearning/training booklets

Selection and ordering data (continued)

Description	Order No.		
ShopMill self-study course	**6FC5095-0AA71-0**	■	**G0**
CBT on CD-ROM			
ShopTurn self-study course	**6FC5095-0AB00-0**	■	**G0**
CBT on CD-ROM			
Languages:[1]			
• English/German		**B**	
• English/French		**C**	
• English/Italian		**D**	
• English/Spanish		**E**	
The new SITRAIN tutorials on CD-ROM			
SINUMERIK 802C/802S Operation and Programming	**6ZB3300-0BD01-6AA0**		
Languages:[2] English, German, Chinese Simplified			
SINUMERIK 802D Operation and Programming	**6ZB3300-0BL01-6AA0**		
Languages:[2] English, German, Chinese Simplified			
SINUMERIK 840D Operation and Programming	**6ZB3300-0BK00-6AA0**		
Languages:[2] English, German, Dutch			
Fundamental Principles of NC Programming – Milling	**6ZB3300-0BF00-6AA0**		
Languages: English, French, German, Italian, Spanish, Chinese Simplified			
Fundamental Principles of NC Programming – Turning	**6ZB3300-0BG00-6AA0**		
Languages: English, French, German, Italian, Spanish, Chinese Simplified			

More information

You can find additional information on the Internet at:

www.siemens.com/sinumerik/training

www.siemens.com/jobshop

[1] English/Chinese Simplified available soon.

[2] Additional languages available soon.

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SINUMERIK 840 D sl training case

Overview



The training case is used for practicing the commissioning and servicing of the SINUMERIK 840D sl in a realistic situation. It can also be used in presentations.

The SINUMERIK 840D sl OP training case is required for operation.

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.

Technical specifications

Product name	6ZB2410-0BA00 SINUMERIK 840D sl training case
Degree of protection in accordance with DIN VDE 0470 Part 1/EN 60529/IEC 60529	IP00
Ambient temperature	
• Storage	-5 ... +60 °C (23 ... 140 °F)
• Transport	-5 ... +60 °C (23 ... 140 °F)
• Operation	5 ... 40 °C (41 ... 104 °F)
Dimensions	
• Width	320 mm (12.60 in)
• Height	650 mm (25.59 in)
• Depth	330 mm (12.99 in)
Weight, approx.	30 kg (66.2 lb)

Selection and ordering data

Description	Order No.
SINUMERIK 840D sl training case	**6ZB2410-0BA00**

SINUMERIK 840D sl OP training case

Overview



The training case and 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 in realistic situations. 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	6ZB2410-0BB00 SINUMERIK 840D sl OP training case
Degree of protection in accordance with 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 OP training case	**6ZB2410-0BB00**

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SINUMERIK 840D sl training rack

Overview



The SINUMERIK 840D sl training rack is used for the realistic practice of operating, programming, installation and service tasks.

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 × 5 A
- 1 × 1FK7044-7AF71 synchronous motor with incremental encoder
- 1 × 1FK7060-5AF71 synchronous motor with absolute encoder
- 1 × 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

	6ZB2410-0BC00
Product name	SINUMERIK 840D sl training rack
Degree of protection in accordance with 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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Faster and more applicable know-how: Hands-on training from the manufacturer

SITRAIN – the Siemens Training for Automation and Industrial Solutions – provides you with comprehensive support in solving your tasks.

Training by the market leader in automation and plant engineering 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

More information

Visit our Internet site at:

www.siemens.com/sitrain

or let us advise you personally. You can request our latest training catalog from:

SITRAIN Customer Support Germany

Phone: +49 1805 235611

Fax: +49 1805 235612

(€0.14/min. from the German landline network, mobile telephone prices may vary)

E-mail: info@sitrain.com

SITRAIN highlights

Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

Wide variety

With a total of about 300 local attendance courses, we train the complete range of Siemens Industry products as well as interaction of the products in systems.

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" means 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.



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General documentation

Overview

A high-quality programmable control 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 controls and the SINAMICS S120 drive system. This documentation includes Operator's Guides, Programming Guides or Configuration Guides, as well as Installation Guides.

Information is available in the following formats:

- Paper version, printed copy
- PDF file available on the Internet as DOConWEB application with 'search all documents' function

www.siemens.com/automation/doconweb

You can find additional information on the Internet at:

www.siemens.com/motioncontrol/docu

My Documentation Manager – Customizing information

Whether for turning, milling, grinding or nibbling – with My Documentation Manager, machine manufacturers and machine operators can assemble their individual operating instructions on the Internet, for specific topics, such as programming and commissioning.

My Documentation Manager offers all Motion Control customers an innovation with extended usability: 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 and PDF formats or even in XML format.

You can find further information on the Internet at:

www.siemens.com/mdm

More information

Please send your questions and suggestions to:

docu.motioncontrol@siemens.com

Selection and ordering data

Description	Order No.
Catalog NC 61 · 2010	
• German	**E86060-K4461-A101-A3**
• English	**E86060-K4461-A101-A3-7600**
• French[1)]	**E86060-K4461-A101-A3-7700**
• Italian[1)]	**E86060-K4461-A101-A3-7200**
• Spanish[1)]	**E86060-K4461-A101-A3-7800**
Catalog ST 70 · 2009	
• German	**E86060-K4670-A101-B2**
• English	**E86060-K4670-A101-B2-7600**
• French	**E86060-K4670-A101-B2-7700**
• Italian	**E86060-K4670-A101-B2-7200**
• Spanish	**E86060-K4670-A101-B2-7800**
Decentralizing with PROFIBUS DP	**ISBN 3-89578-074-X**

Description	Order No.
User/manufacturer documentation	
DOConCD SINUMERIK 802S/802C/802D SINUMERIK 810D/840Di/840D SINUMERIK 802D sl/840D sl SIMODRIVE 611 SINAMICS S120 User and Manufacturer Documentation on CD-ROM with Help Tool Edition: 10/2009 Languages: English, German	**6FC5398-0AC10-0YA4**
DOConCD The up-to-date version will be supplied in English/German	**6FC5398-0CD00-0YG0**
Update service for DOConCD Languages: English, German	**6FC5298-0CD00-0YG2**
User Manual Collection SINUMERIK 802S/802C/802D SINUMERIK 810D/840Di/840D SINUMERIK 802D sl/840Di sl/840D sl User documentation on CD-ROM Edition: 06/2008 Languages: English, French, German, Italian, Spanish	**6FC5298-7CA00-0YG4**

[1)] Available soon.

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SINUMERIK 802D sl

Selection and ordering data

Description	Order No.
User/manufacturer documentation	
Turning SINUMERIK 802D sl Operation/Programming	
• German	**6FC5398-1CP10-5AA0**
• English	**6FC5398-1CP10-5BA0**
• French	**6FC5398-1CP10-5DA0**
• Italian	**6FC5398-1CP10-5CA0**
• Spanish	**6FC5398-1CP10-5EA0**
SINUMERIK 802D sl Manual Machine Plus Turning Programming and Operating Manual	
• German	**6FC5398-6CP10-1AA0**
• English	**6FC5398-6CP10-1BA0**
• French	**6FC5398-6CP10-1DA0**
• Italian	**6FC5398-6CP10-1CA0**
• Spanish	**6FC5398-6CP10-1EA0**
Milling SINUMERIK 802D sl Operation/Programming	
• German	**6FC5398-0CP10-5AA0**
• English	**6FC5398-0CP10-5BA0**
• French	**6FC5398-0CP10-5DA0**
• Italian	**6FC5398-0CP10-5CA0**
• Spanish	**6FC5398-0CP10-5EA0**
Grinding SINUMERIK 802D sl Operation/Programming	
• German	**6FC5398-4CP10-2AA0**
• English	**6FC5398-4CP10-2BA0**
• French	**6FC5398-4CP10-2DA0**
• Italian	**6FC5398-4CP10-2CA0**
• Spanish	**6FC5398-4CP10-2EA0**
Nibbling SINUMERIK 802D sl Operation/Programming	
• German	**6FC5398-3CP10-0AA0**
• English	**6FC5398-3CP10-0BA0**
• French	**6FC5398-3CP10-0DA0**
• Italian	**6FC5398-3CP10-0CA0**
• Spanish	**6FC5398-3CP10-0EA0**
SINUMERIK 802D sl Diagnostics Guide	
• German	**6FC5398-2CP10-2AA0**
• English	**6FC5398-2CP10-2BA0**
Manufacturer documentation	
SINUMERIK 802D sl Operating Instructions	
• German	**6FC5397-0CP10-6AA0**
• English	**6FC5397-0CP10-6BA0**
• French	**6FC5397-0CP10-5DA0**
• Italian	**6FC5397-0CP10-5CA0**
• Spanish	**6FC5397-0CP10-5EA0**
SINUMERIK 802D sl Function Manual	
• German	**6FC5397-1CP10-3AA0**
• English	**6FC5397-1CP10-3BA0**
• French	**6FC5397-1CP10-3DA0**
• Italian	**6FC5397-1CP10-3CA0**
• Spanish	**6FC5397-1CP10-3EA0**
SINUMERIK 802D sl Parameter Manual	
• German	**6FC5397-5CP10-2AA0**
• English	**6FC5397-5CP10-2BA0**
• French	**6FC5397-5CP10-2DA0**
• Italian	**6FC5397-5CP10-2CA0**
• Spanish	**6FC5397-5CP10-2EA0**

SINUMERIK 840Di sl/840D sl

Selection and ordering data

Description	Order No.
User documentation	
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 HMI-Embedded SINUMERIK 840D sl	
• German	**6FC5398-1AP10-2AA0**
• English	**6FC5398-1AP10-2BA0**
• French	**6FC5398-1AP10-2DA0**
• Italian	**6FC5398-1AP10-2CA0**
• Spanish	**6FC5398-1AP10-2EA0**
Operating Manual HMI sl universal	
• German	**6FC5398-6AP10-3AA0**
• English	**6FC5398-6AP10-3BA0**
• French	**6FC5398-6AP10-3DA0**
• Italian	**6FC5398-6AP10-3CA0**
• Spanish	**6FC5398-6AP10-3EA0**
Operating Manual HMI sl Turning	
• German	**6FC5398-8CP20-0AA0**
• English	**6FC5398-8CP20-0BA0**
• French	**6FC5398-8CP20-0DA0**
• Italian	**6FC5398-8CP20-0CA0**
• Spanish	**6FC5398-8CP20-0EA0**
Operating Manual HMI sl Milling	
• German	**6FC5398-7CP20-0AA0**
• English	**6FC5398-7CP20-0BA0**
• French	**6FC5398-7CP20-0DA0**
• Italian	**6FC5398-7CP20-0CA0**
• Spanish	**6FC5398-7CP20-0EA0**
Operating/Programming ShopMill SINUMERIK 840D sl	
• German	**6FC5398-4AP10-2AA0**
• English	**6FC5398-4AP10-2BA0**
• French	**6FC5398-4AP10-2DA0**
• Italian	**6FC5398-4AP10-2CA0**
• Spanish	**6FC5398-4AP10-2EA0**
Operating/Programming ShopTurn SINUMERIK 840D sl	
• German	**6FC5398-5AP10-2AA0**
• English	**6FC5398-5AP10-2BA0**
• French	**6FC5398-5AP10-2DA0**
• Italian	**6FC5398-5AP10-2CA0**
• Spanish	**6FC5398-5AP10-2EA0**
Programming Manual Fundamentals SINUMERIK 840D sl	
• German	**6FC5398-1BP20-0AA0**
• English	**6FC5398-1BP20-0BA0**
• French	**6FC5398-1BP20-0DA0**
• Italian	**6FC5398-1BP20-0CA0**
• Spanish	**6FC5398-1BP20-0EA0**
Programming Manual Job Planning SINUMERIK 840D sl	
• German	**6FC5398-2BP20-0AA0**
• English	**6FC5398-2BP20-0BA0**
• French	**6FC5398-2BP20-0DA0**
• Italian	**6FC5398-2BP20-0CA0**
• Spanish	**6FC5398-2BP20-0EA0**

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Selection and ordering data (continued)

Description	Order No.
User documentation	
User Manual SINUMERIK 840D sl Measuring Cycles	
• German	**6FC5398-4BP20-2AA0**
• English	**6FC5398-4BP20-2BA0**
• French	**6FC5398-4BP20-2DA0**
• Italian	**6FC5398-4BP20-2CA0**
• Spanish	**6FC5398-4BP20-2EA0**
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/840Di sl SINAMICS S120	
• German	**6FC5398-6BP10-4AA0**
• English	**6FC5398-6BP10-4BA0**
Manufacturer and service documentation	
Manual NCU SINUMERIK 840D sl	
• German	**6FC5397-0AP10-2AA0**
• English	**6FC5397-0AP10-2BA0**
Manual Operator Components and Networking SINUMERIK 840D sl/840Di sl	
• German	**6FC5397-1AP10-4AA0**
• English	**6FC5397-1AP10-4BA0**
SINUMERIK 840Di sl Manual	
• German	**6FC5397-4CP10-4AA0**
• English	**6FC5397-4CP10-4BA0**
Manual ADI 4 - Analog Drive Interface for 4 Axes	
• German	**6FC5297-0BA01-0AP4**
• English	**6FC5297-0BA01-0BP4**
• Italian	**6FC5297-0BA01-0CP3**
Commissioning Manual CNC: NCK, PLC, Drive SINUMERIK 840D sl SINAMICS S120	
• German	**6FC5397-2AP10-5AA0**
• English	**6FC5397-2AP10-5BA0**
• French	**6FC5397-2AP10-5DA0**
• Italian	**6FC5397-2AP10-5CA0**
• Spanish	**6FC5397-2AP10-5EA0**
Commissioning Manual CNC: Base Software and HMI-Embedded SINUMERIK 840D sl	
• German	**6FC5397-8CP10-1AA0**
• English	**6FC5397-8CP10-1BA0**
• French	**6FC5397-8CP10-1DA0**
• Italian	**6FC5397-8CP10-1CA0**
• Spanish	**6FC5397-8CP10-1EA0**

Description	Order No.
Manufacturer and service documentation	
Commissioning Manual CNC: Base Software and HMI-Advanced SINUMERIK 840D sl/840D/ 840Di sl/810D	
• German	**6FC5397-0DP10-3AA0**
• English	**6FC5397-0DP10-3BA0**
• French	**6FC5397-0DP10-3DA0**
• Italian	**6FC5397-0DP10-3CA0**
• Spanish	**6FC5397-0DP10-3EA0**
Commissioning Manual CNC: Base Software and HMI sl SINUMERIK 840D sl	
• German	**6FC5397-1DP10-4AA0**
• English	**6FC5397-1DP10-4BA0**
• French	**6FC5397-1DP10-4DA0**
• Italian	**6FC5397-1DP10-4CA0**
• Spanish	**6FC5397-1DP10-4EA0**
Commissioning Manual CNC: ShopMill SINUMERIK 840D sl	
• German	**6FC5397-4AP10-2AA0**
• English	**6FC5397-4AP10-2BA0**
• French	**6FC5397-4AP10-2DA0**
• Italian	**6FC5397-4AP10-2CA0**
• Spanish	**6FC5397-4AP10-2EA0**
Commissioning Manual CNC: ShopTurn SINUMERIK 840D sl	
• German	**6FC5397-5AP10-2AA0**
• English	**6FC5397-5AP10-2BA0**
• French	**6FC5397-5AP10-2DA0**
• Italian	**6FC5397-5AP10-2CA0**
• Spanish	**6FC5397-5AP10-2EA0**
Lists (Book 1) SINUMERIK 840D sl/840Di sl	
• German	**6FC5397-7AP10-4AA0**
• English	**6FC5397-7AP10-4BA0**
Lists (Book 2) SINUMERIK 840D sl/840Di sl	
• German	**6FC5397-3CP10-4AA0**
• English	**6FC5397-3CP10-4BA0**
Parameter Manual System Variables SINUMERIK 840D sl	
• German	**6FC5397-6AP10-3AA0**
• English	**6FC5397-6AP10-3BA0**
Function Manual SINUMERIK 840D sl Basic Functions	
• German	**6FC5397-0BP10-4AA0**
• English	**6FC5397-0BP10-4BA0**
Function Manual SINUMERIK 840D slD Extended Functions	
• German	**6FC5397-1BP10-4AA0**
• English	**6FC5397-1BP10-4BA0**
Function Manual SINUMERIK 840D sl Special Functions	
• German	**6FC5397-2BP10-4AA0**
• English	**6FC5397-2BP10-4BA0**
Description of Functions SINUMERIK 840D sl Tool Management	
• German	**6FC5397-6BP10-0AA0**
• English	**6FC5397-6BP10-0BA0**

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SINUMERIK 840Di sl/840D sl

Selection and ordering data

Description	Order No.
Manufacturer and service documentation	
Description of Functions SINUMERIK 840D sl Safety Integrated	
• German	**6FC5397-4BP10-3AA0**
Description of Functions SINUMERIK 840D sl Synchronized Actions	
• German	**6FC5397-5BP10-4AA0**
• English	**6FC5397-5BP10-4BA0**
Description of Functions SINUMERIK 840D sl/840Di sl/ 828D/802D sl ISO Dialects for SINUMERIK	
• German	**6FC5397-7BP10-0AA0**
• English	**6FC5397-7BP10-0BA0**
EMC Guidelines	
• German	**6FC5297-0AD30-0AP2**
• English	**6FC5297-0AD30-0BP2**
Description of Functions Motion Control Information System RPC Computer Link	
• German	**6FC5297-6AD61-0AP1**
• English	**6FC5297-6AD61-0BP1**
Description of Functions Motion Control Information System SinTDI Tool Management	
• German	**6FC5297-6AE00-0AP0**
• English	**6FC5297-6AE00-0BP0**
Description of Functions Motion Control Information System TDI Ident Connection	
• German	**6FC5297-1AE60-0AP0**
• English	**6FC5297-1AE60-0BP0**
Description of Functions Motion Control Information System NC Program Management DNC Machine	
• German	**6FC5297-1AE81-0AP0**
• English	**6FC5297-1AE81-0BP0**
Description of Functions Motion Control Information System NC Program Management DNC	
• German	**6FC5297-2AE80-0AP1**
• English	**6FC5297-2AE80-0BP1**
Description of Functions Motion Control Information System Preventive Maintenance TPM	
• German	**6FC5260-2FX28-0AG2**
• English	**6FC5260-2FX28-0BG2**
Operating Manual Motion Control Information System TDI Tool Data Information	
• German	**6FC5297-6AE01-0AP4**
• English	**6FC5297-6AE01-0BP4**
• French	**6FC5297-6AE01-0DP4**
• Italian	**6FC5297-6AE01-0CP4**
Description of Functions Motion Control Information System SinTDC Tool Data Communication	
• German	**6FC5297-5AF30-0AP0**
• English	**6FC5297-5AF30-0BP0**

SINAMICS S120

Selection and ordering data

Designation	Order No.
Manufacturer and service documentation	
Manual SINAMICS S120 Control Units and Additional System Components	
• German	**6SL3097-2AH00-0AP5**
• English	**6SL3097-2AH00-0BP5**
• French	**6SL3097-2AH00-0DP5**
• Italian	**6SL3097-2AH00-0CP5**
Manual SINAMICS S120 Power Units in Booksize Format	
• German	**6SL3097-4AC00-0AP1**
• English	**6SL3097-4AC00-0BP1**
Manual SINAMICS S120 Power Units in Chassis Format	
• German	**6SL3097-2AE00-0AP3**
• English	**6SL3097-2AE00-0BP3**
• French	**6SL3097-2AE00-0DP3**
• Italian	**6SL3097-2AE00-0CP3**
Function Manual SINAMICS S120 Drive Functions	
• German	**6SL3097-2AB00-0AP5**
• English	**6SL3097-2AB00-0BP5**
• French	**6SL3097-2AB00-0DP5**
• Italian	**6SL3097-2AB00-0CP5**
Commissioning Manual SINAMICS S120	
• German	**6SL3097-2AF00-0AP8**
• English	**6SL3097-2AF00-0BP8**
• French	**6SL3097-2AF00-0DP8**
• Italian	**6SL3097-2AF00-0CP8**
Function Manual SINAMICS S120 Safety Integrated	
• German	**6SL3097-2AR00-0AP2**
• English	**6SL3097-2AR00-0BP2**
• French	**6SL3097-2AR00-0DP2**
• Italian	**6SL3097-2AR00-0CP2**
Manual SINAMICS S120 AC Drive	
• German	**6SL3097-2AL00-0AP8**
• English	**6SL3097-2AL00-0BP8**
• French	**6SL3097-2AL00-0DP8**
• Italian	**6SL3097-2AL00-0CP8**
List Manual SINAMICS S120/150	
• German	**6SL3097-2AP00-0AP7**
• English	**6SL3097-2AP00-0BP7**
• French	**6SL3097-2AP00-0DP7**
• Italian	**6SL3097-2AP00-0CP7**
Getting Started SINAMICS S120	
• German	**6SL3097-2AG00-0AP3**
• English	**6SL3097-2AG00-0BP3**
• French	**6SL3097-2AG00-0DP3**
• Italian	**6SL3097-2AG00-0CP3**

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Motors for SINAMICS

Selection and ordering data

Description	Order No.
Manufacturer and service documentation	
Configuration Manual 1FT6 Synchronous Motors	
• German	**6SN1197-0AD12-0AP0**
• English	**6SN1197-0AD12-0BP0**
• Italian	**6SN1197-0AD12-0CP0**
Configuration Manual 1FT7 Synchronous Motors	
• German	**6SN1197-0AD13-0AP2**
• English	**6SN1197-0AD13-0BP2**
Configuration Manual 1FK7 Synchronous Motors	
• German	**6SN1197-0AD16-0AP1**
• English	**6SN1197-0AD16-0BP1**
• French	**6SN1197-0AD16-0DP1**
• Italian	**6SN1197-0AD16-0CP1**
• Spanish	**6SN1197-0AD16-0EP1**
Configuration Manual 1PH2 Asynchronous Motors	
• German	**6SN1197-0AC63-0AP0**
• English	**6SN1197-0AC63-0BP0**
• French	**6SN1197-0AC63-0DP0**
• Italian	**6SN1197-0AC63-0CP0**
• Spanish	**6SN1197-0AC63-0EP0**
Configuration Manual 1PH4 Asynchronous Motors	
• German	**6SN1197-0AD64-0AP1**
• English	**6SN1197-0AD64-0BP1**
• French	**6SN1197-0AD64-0DP1**
• Italian	**6SN1197-0AD64-0CP1**
• Spanish	**6SN1197-0AD64-0EP1**
Configuration Manual 1PH7 Asynchronous Motors	
• German	**6SN1197-0AC71-0AP0**
• English	**6SN1197-0AC71-0BP0**
• French	**6SN1197-0AC71-0DP0**
• Italian	**6SN1197-0AC71-0CP0**
• Spanish	**6SN1197-0AC71-0EP0**

Description	Order No.
Manufacturer and service documentation	
Configuration Manual 1PH8 synchronous/ asynchronous motors	
• German	**6SN1197-0AD74-0AP0**
• English	**6SN1197-0AD74-0BP0**
Configuration Manual 1FN3 Linear Motors Peak Load and Continuous Load	
• German	**6SN1197-0AB86-0AP0**
• English	**6SN1197-0AB86-0BP0**
Configuration Manual 1FN6 Linear Motors	
• German	**6SN1197-0AB78-0AP2**
• English	**6SN1197-0AB78-0BP1**
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	**6SN1197-0AE00-0AP3**
• English	**6SN1197-0AE00-0BP3**
• French	**6SN1197-0AE00-0DP3**
• Italian	**6SN1197-0AE00-0CP3**
• Spanish	**6SN1197-0AE00-0EP3**
Configuration Manual 2SP1 Motor Spindles	
• German	**6SN1197-0AD04-0AP5**
• English	**6SN1197-0AD04-0BP5**
• French	**6SN1197-0AD04-0DP3**
• Italian	**6SN1197-0AD04-0CP3**
• Spanish	**6SN1197-0AD04-0EP3**

Measuring systems

Selection and ordering data

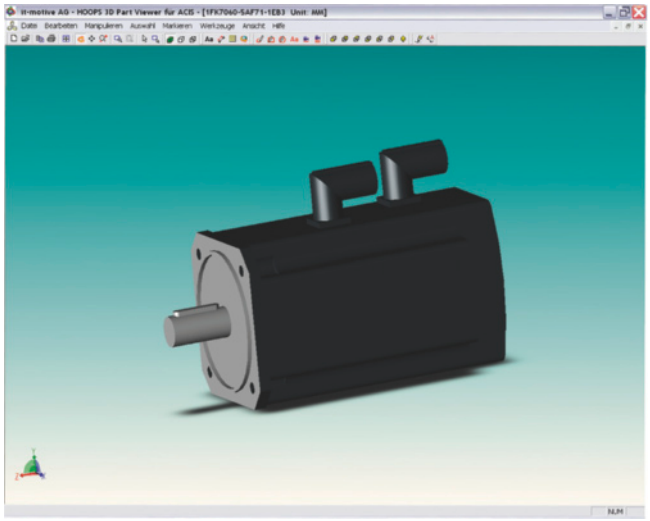
Description	Order No.
Manufacturer and service documentation	
User Manual SIMODRIVE sensor Absolute Encoder with PROFIBUS Encoder	
• English/German	**6SN1197-0AB10-0YP4**

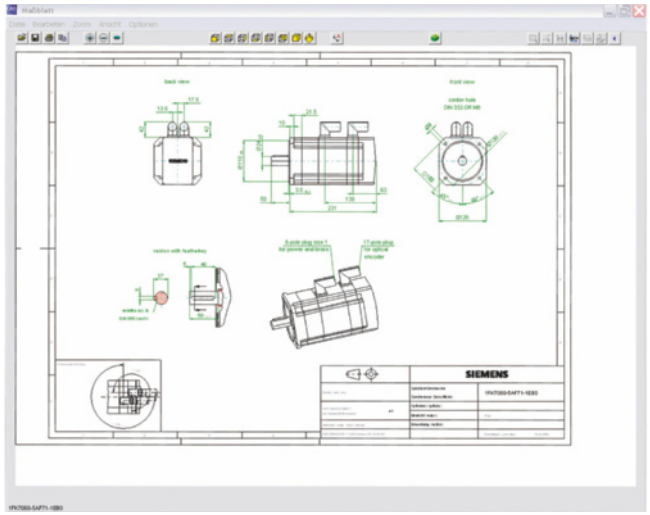
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CAD CREATOR - Dimension drawing and 2D/3D CAD generator

Overview

The CAD CREATOR provides a user-friendly interface which helps you to create product-specific data quickly and supports you in generating plant documentation considering project-specific information.





Benefits

- Multilingual operator interface in English, French, German, Italian and Spanish
- Dimension sheets with measurements in mm or inches
- Dimension sheets and 2D/3D CAD data for
- Motors
  - 1FK7/1FT7/1FT6/1FE1 synchronous motors
  - 1FW3 torque motors
  - 1FK7/1FK7 DYA/1FT7/1FT6 geared motors
  - 1PH8 synchronous/asynchronous motors
  - 1PH7/1PH4/1PL6 asynchronous motors
  - 1PM4/1PM6 asynchronous motors
  - 2SP1 motor spindles
- SINAMICS S120
  - Control Units
  - Power Modules (booksize/chassis)
  - Line Modules (booksize/chassis)
  - Line-side components
  - Motor Modules (booksize/chassis)
  - DC link components
  - Supplementary system components
  - Encoder system connection
  - Connection system MOTION-CONNECT
- SINUMERIK
  - CNC controls
  - Operator components for CNC controls

The CAD CREATOR provides you with various options to begin the product configuration:

- Order number
- Order number search
- Geometric data

Once a product is successfully configured, the product-specific information, such as dimension drawing and 2D/3D CAD data are displayed and offered for storing in various formats, e.g.: *.pdf, *.dxf, *.stp or *.igs.

Selection and ordering data

Description	Order No.
CAD CREATOR Dimension sheet and 2D/3D CAD generator On DVD-ROM Languages: English, German, French, Italian, Spanish	**6SL3075-0AA00-0AG0**

More information

The CAD CREATOR is available on DVD-ROM and as an Internet application.

Additional information is available in the Internet under:

www.siemens.com/cadcreator

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Notes

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Appendix



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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

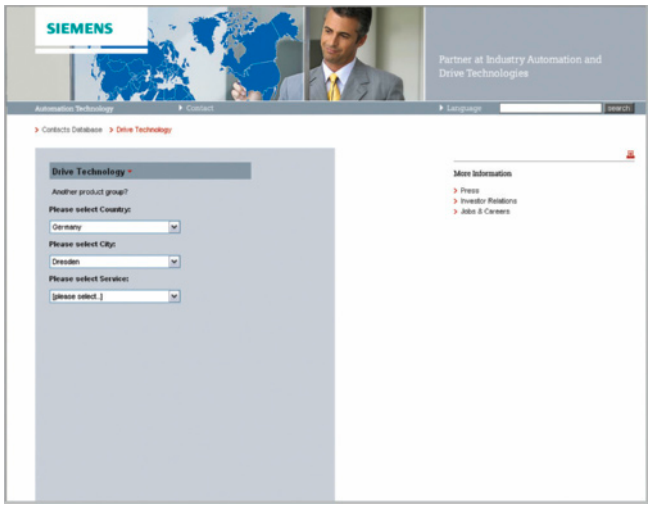
Test standard:

- Standard CAN/CSA-C22.2 No. 0-M91/No. 14-05/ No. 142-M1987

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Overview







At Siemens Industry Automation and Drive Technologies, more than 85000 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 can find

- Contacts by country
- Contacts by sector
- Contacts by product

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Information and Ordering in the Internet and on DVD-ROM

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/automation

you will find everything you need to know about products, systems and services.

Product Selection Using the Offline Mall of Industry



Detailed information together with convenient interactive functions:
The Offline Mall CA 01 covers more than 80000 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 Offline Mall CA 01 can be found in the Internet under

www.siemens.com/automation/ca01

or on DVD-ROM.

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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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.

The DVD also includes a full-text search and our Knowledge Manager for targeted searches for solutions. The DVD 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



Small card – great support

The Automation Value Card is an integral component of the comprehensive service concept with which Siemens Automation and Drives will accompany you in each phase of your automation project.

It doesn't matter whether you want just specific services from our Technical Support or want to purchase something on our Online portal, you can always pay with your Automation Value Card. No invoicing, transparent and safe. With your personal card number and associated PIN you can view the state of your account and all transactions at any time.

Services on card. This is how it's done.

Card number and PIN are on the back of the Automation Value Card. When delivered, the PIN is covered by a scratch field, guaranteeing that the full credit is on the card.

By entering the card number and PIN you have full access to the Service & Support services being offered. The charge for the services procured is debited from the credits on your Automation Value Card.

All the services offered are marked in currency-neutral credits, so you can use the Automation Value Card worldwide.

Order your Automation and Value Card easily and comfortably like a product with your sales contact.

Description	Order No.
Automation Value Card	
200 Credits	**6ES7997-0BA00-0XA0**
500 Credits	**6ES7997-0BB00-0XA0**
1000 Credits	**6ES7997-0BC00-0XA0**
10000 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

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
Support Tools in the Support Shop	
	Tools that can be used directly for configuration, analysis and testing

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Software licenses

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
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- Upgrade

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Rotary inertia (to convert from A to B, multiply by entry in table)

A \ B	lb-in^2	lb-ft^2	lb-in-s^2	lb-ft-s^2 slug-ft^2	kg-cm^2	kg-cm-s^2	gm-cm^2	gm-cm-s^2	oz-in^2	oz-in-s^2
lb-in^2	1	6.94×10^{-3}	2.59×10^{-3}	2.15×10^{-4}	2.926	2.98×10^{-3}	2.92×10^{3}	2.984	16	4.14×10^{-2}
lb-ft^2	144	1	0.3729	3.10×10^{-2}	421.40	0.4297	4.21×10^{5}	429.71	2304	5.967
lb-in-s^2	386.08	2.681	1	8.33×10^{-2}	1.129×10^{3}	1.152	1.129×10^{6}	1.152×10^{3}	6.177×10^{3}	16
lb-ft-s^2 slug-ft^2	4.63×10^{3}	32.17	12	1	1.35×10^{4}	13.825	1.355×10^{7}	1.38×10^{4}	7.41×10^{4}	192
kg-cm^2	0.3417	2.37×10^{-3}	8.85×10^{-4}	7.37×10^{-5}	1	1.019×10^{-3}	1000	1.019	5.46	1.41×10^{-2}
kg-cm-s^2	335.1	2.327	0.8679	7.23×10^{-2}	980.66	1	9.8×10^{5}	1000	5.36×10^{3}	13.887
gm-cm^2	3.417×10^{-4}	2.37×10^{-6}	8.85×10^{-7}	7.37×10^{-8}	1×10^{-3}	1.01×10^{-6}	1	1.01×10^{-3}	5.46×10^{-3}	1.41×10^{-5}
gm-cm-s^2	0.335	2.32×10^{-3}	8.67×10^{-4}	7.23×10^{-5}	0.9806	1×10^{-3}	980.6	1	5.36	1.38×10^{-2}
oz-in^2	0.0625	4.34×10^{-4}	1.61×10^{-4}	1.34×10^{-5}	0.182	1.86×10^{-4}	182.9	0.186	1	2.59×10^{-3}
oz-in-s^2	24.13	0.1675	6.25×10^{-2}	5.20×10^{-3}	70.615	7.20×10^{-2}	7.09×10^{4}	72.0	386.08	1

Torque (to convert from A to B, multiply by entry in table)

A \ B	lb-in	lb-ft	oz-in	N-m	kg-cm	kg-m	gm-cm	dyne-cm
lb-in	1	8.333×10^{-2}	16	0.113	1.152	1.152×10^{-2}	1.152×10^{3}	1.129×10^{6}
lb-ft	12	1	192	1.355	13.825	0.138	1.382×10^{4}	1.355×10^{7}
oz-in	6.25×10^{-2}	5.208×10^{-3}	1	7.061×10^{-3}	7.200×10^{-2}	7.200×10^{-4}	72.007	7.061×10^{4}
N-m	8.850	0.737	141.612	1	10.197	0.102	1.019×10^{4}	1×10^{7}
kg-cm	0.8679	7.233×10^{-2}	13.877	9.806×10^{-2}	1	10^{-2}	1000	9.806×10^{5}
kg-m	86.796	7.233	1.388×10^{3}	9.806	100	1	1×10^{5}	9.806×10^{7}
gm-cm	8.679×10^{-4}	7.233×10^{-5}	1.388×10^{-2}	9.806×10^{-5}	1×10^{-3}	1×10^{-5}	1	980.665
dyne-cm	8.850×10^{-7}	7.375×10^{-8}	1.416×10^{-5}	10^{-7}	1.0197×10^{-6}	1.019×10^{-8}	1.019×10^{-3}	1

Length (to convert from A to B, multiply by entry in table)

A \ B	inches	feet	cm	yd	mm	m
inches	1	0.0833	2.54	0.028	25.4	0.0254
feet	12	1	30.48	0.333	304.8	0.3048
cm	0.3937	0.03281	1	1.09×10^{-2}	10	0.01
yd	36	3	91.44	1	914.4	0.914
mm	0.03937	0.00328	0.1	1.09×10^{-3}	1	0.001
m	39.37	3.281	100	1.09	1000	1

Power (to convert from A to B, multiply by entry in table)

A \ B	HP	Watts
HP (English)	1	745.7
(lb-in) (deg./sec)	2.645×10^{-6}	1.972×10^{-3}
(lb-in) (rpm)	1.587×10^{-5}	1.183×10^{-2}
(lb-ft) (deg./sec)	3.173×10^{-5}	2.366×10^{-2}
(lb-ft) (rpm)	1.904×10^{-4}	0.1420
Watts	1.341×10^{-3}	1

Force (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	dyne	N
lb	1	16	453.6	4.448×10^{5}	4.4482
oz	0.0625	1	28.35	2.780×10^{4}	0.27801
gm	2.205×10^{-3}	0.03527	1	1.02×10^{-3}	N.A.
dyne	2.248×10^{-6}	3.59×10^{-5}	980.7	1	0.00001
N	0.22481	3.5967	N.A.	100000	1

Mass (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	kg	slug
lb	1	16	453.6	0.4536	0.0311
oz	6.25×10^{-2}	1	28.35	0.02835	1.93×10^{-3}
gm	2.205×10^{-3}	3.527×10^{-2}	1	10^{-3}	6.852×10^{-5}
kg	2.205	35.27	10^{3}	1	6.852×10^{-2}
slug	32.17	514.8	1.459×10^{4}	14.59	1

Rotation (to convert from A to B, multiply by entry in table)

A \ B	rpm	rad/sec.	degrees/sec.
rpm	1	0.105	6.0
rad/sec.	9.55	1	57.30
degrees/sec.	0.167	1.745×10^{-2}	1

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Temperature Conversion

°F	°C	°C	°F
0	–17.8	–10	14
32	0	0	32
50	10	10	50
70	21.1	20	68
90	32.2	30	86
98.4	37	37	98.4
212	100	100	212
subtract 32 and multiply by $^5/_9$		multiply by $^9/_5$ and add 32	

Mechanism Efficiencies

Acme-screw with brass nut	~0.35–0.65
Acme-screw with plastic nut	~0.50–0.85
Ball-screw	~0.85–0.95
Chain and sprocket	~0.95–0.98
Preloaded ball-screw	~0.75–0.85
Spur or bevel-gears	~0.90
Timing belts	~0.96–0.98
Worm gears	~0.45–0.85
Helical gear (1 reduction)	~0.92

Friction Coefficients

Materials	μ
Steel on steel (greased)	~0.15
Plastic on steel	~0.15–0.25
Copper on steel	~0.30
Brass on steel	~0.35
Aluminum on steel	~0.45
Steel on steel	~0.58

Mechanism	μ
Ball bushings	<0.001
Linear bearings	<0.001
Dove-tail slides	~0.2++
Gibb ways	~0.5++

Material Densities

Material	lb-in^3	gm-cm^3
Aluminum	0.096	2.66
Brass	0.299	8.30
Bronze	0.295	8.17
Copper	0.322	8.91
Hard wood	0.029	0.80
Soft wood	0.018	0.48
Plastic	0.040	1.11
Glass	0.079–0.090	2.2–2.5
Titanium	0.163	4.51
Paper	0.025–0.043	0.7–1.2
Polyvinyl chloride	0.047–0.050	1.3–1.4
Rubber	0.033–0.036	0.92–0.99
Silicone rubber, without filler	0.043	1.2
Cast iron, gray	0.274	7.6
Steel	0.280	7.75

Wire Gauges[1)]

Cross-section mm^2	Standard Wire Gauge (SWG)	American Wire Gauge (AWG)
0.2	25	24
0.3	23	22
0.5	21	20
0.75	20	19
1.0	19	18
1.5	17	16
2.5	15	13
4	13	11
6	12	9
10	9	7
16	7	6
25	5	3
35	3	2
50	0	1/0
70	000	2/0
95	00000	3/0
120	0000000	4/0
150	–	6/0
185	–	7/0

[1)] The table shows approximate SWG/AWG sizes nearest to standard metric sizes; the cross-sections do not match exactly.

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Explanation of the metal factor

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded.

The surcharges will be determined based on the following criteria:

- Official price of the metal
- Official price on the day prior to receipt of the order or prior to the release order (=daily price) for
  - silver (sale price of the processed material),
  - gold (sale price of the processed material)

  Source: Umicore, Hanau
  www.metalsmanagement.umicore.com

  and for
  - copper (low DEL notation + 1 %),
  - aluminum (aluminum in cables) and
  - lead (lead in cables)

  Source: German Trade Association for Cables and Conductors
  www.kabelverband.org
- Metal factor of the products
- Certain products are assigned a metal factor. The metal factor determines the official price as of which the metal surcharges are charged 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 method of calculation refers to the list price or a discounted price (customer net price)
(L = list price / N = customer net price).

The remaining digits indicate the method of calculation used for the respective metal. If no surcharge is added, 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)

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 result is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (2 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

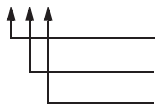
Percentage method

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.

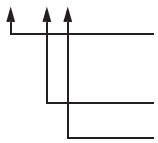
Metal factor examples

L E A – – –



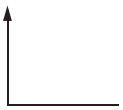
Basis for % surcharge: List price
Silver: basis 150 €, step range 50 €, 0.5 %
Copper: basis 150 €, step range 50 €, 0.1 %
No surcharge for aluminum
No surcharge for lead
No surcharge for gold

N – A 6 – –



Basis for % surcharge: Customer net price
No surcharge for silver
Copper: basis 150 €, step range 50 €, 0.1 %
Aluminum acc. to weight, basic offic. price 225 €
No surcharge for lead
No surcharge for gold

– – 3 – – –



No basis necessary
No surcharge for silver
Copper acc. to weight, basic official price150 €
No surcharge for aluminum
No surcharge for lead
No surcharge for gold

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Values of the metal factor

Percentage method	Basic official price	Step range	% surcharge 1st step	% surcharge 2nd step	% surcharge 3rd step	% surcharge 4th step	% surcharge per additional step
			Official price	Official price	Official price	Official price	
			151 € – 200 €	201 € – 250 €	251 € – 300 €	301 € – 350 €	
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
H	150	50	1.2	2.4	3.6	4.8	1.2
J	150	50	1.8	3.6	5.4	7.2	1.8
			176 € – 225 €	226 € – 275 €	276 € – 325 €	326 € – 375 €	
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
			226 € – 275 €	276 € – 325 €	326 € – 375 €	376 € – 425 €	
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
			151 € – 175 €	176 € – 200 €	201 € – 225 €	226 € – 250 €	
Y	150	25	0.3	0.6	0.9	1.2	0.3
			401 € – 425 €	426 € – 450 €	451 € – 475 €	476 € – 500 €	
Z	400	25	0.1	0.2	0.3	0.4	0.1
	Price basis (1st digit)						
L	Charged on the list price						
N	Charged on the customer net price or discounted list price						

Weight method	Basic official price	
2	100	Calculation based on raw material weight
3	150	
4	175	
5	200	
6	225	
7	300	
8	400	
9	555	
Misc.		
-	No metal surcharge	

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The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.
The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products. An exact explanation of the metal factor can be found on the page entitled "Metal surcharges".

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