

SIEMENS

MOTION CONTROL **SINUMERIK 828** Equipment for Machine Tools

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Catalog
NC 82

Edition
2025



Промэлектроника, sales@prom-elec.com

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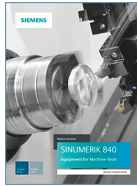
Motion Control

SINUMERIK 840

Equipment for Machine Tools

NC 62

PDF (E86060-K4462-A101-A4-7600)



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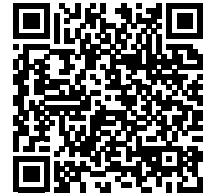
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SINUMERIK 828

Equipment for Machine Tools

Motion Control



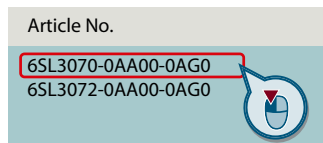
Catalog NC 82 · 2025

Supersedes:
Catalog NC 82 · January 2022

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The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with DIN EN ISO 9001. The certificate is recognized by all IQNet countries.

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Motion beyond expectations

Drives move the industries. But how can they make them more efficient, more reliable and more sustainable – and exceed all expectations while they are doing it? Our answer: Siemens Xcelerator for Digital Drivetrain.

Digital solutions for Drivetrain Design and Drivetrain Health

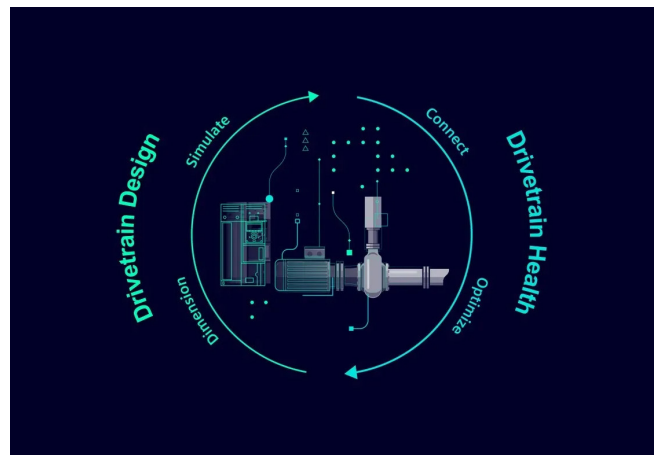
Combine the real and the digital world to reach the next level of efficiency and sustainability in your drivetrain value chain: with suitable digital solutions for drivetrain design and drivetrain health.

Drivetrain Design:

Simplify and shorten the engineering steps to get faster and more efficiently from concept to the commissioned drivetrain.

Drivetrain Health:

Reduce total cost of ownership for your equipment and machine park – energy, maintenance, downtime.



[siemens.com/digital-drivetrain](https://www.siemens.com/digital-drivetrain)

Digitalization along the drivetrain value chain



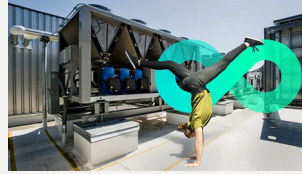
Dimension

Accurate in motion: Dimension your motors, gearboxes, and complete drivetrains digitally with greater precision – for greater reliability and energy efficiency.



Simulate

Faster in motion: Add the digital twin of the drivetrain to your machine simulation to speed up your design and engineering phases and to accelerate your time-to-market!



Connect

Data in motion: Acquire high-quality raw data and connect your entire drivetrains or machines to cloud or on-premise platforms – for a consistent and secure data flow.



Optimize

Better in motion: Analyze and visualize drivetrain and machine data in digital solutions and apps to identify optimization potentials and concrete actionable measures how to tap it.

Use cases for digital drivetrain technology



Condition monitoring for drivetrains

Healthy in motion: Gain valuable insights into your drivetrain to optimize maintenance, system availability, cost efficiency, and sustainability: Discover intelligent digital condition monitoring for your drivetrains!

Are your drivetrains fit enough for tough times?

The industries are expected to produce ever more efficiently, ever more sustainably and ever more cost-effectively. And if you can't do that, it's easier to be left behind by the competition. Use digitalization and the data from your motors and converters to optimize your competitiveness – and to keep your production in motion.



What if you consume too much electricity?

With digital solutions and digital drive technology, you can significantly reduce your share of this!



What if you waste too much energy?

Digitalization enables you to detect energy waste and impending system down-times at an early stage so that you can take counter-measures in due time!



What if your motors are incorrectly designed?

Digital tools make it quicker and easier to correctly design your drive components!



What if your drives fail unexpectedly?

With digital solutions, you can identify risks in your drivetrain at an early stage and react before a failure occurs.

"Our digital solutions transform your drivetrain value chain to the next level of efficiency and sustainability."

[siemens.com/digital-drivetrain](https://www.siemens.com/digital-drivetrain)



TIA Selection Tool – quick, easy, smart configuration

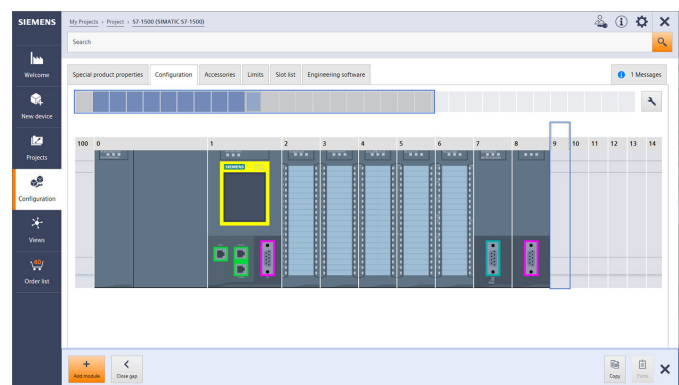
For you to get the most out of our portfolio quickly and easily.

Do you always need the optimum configuration for planning your project?

For your application we offer the TIA Selection Tool to support all project planners, beginners and experts alike.

No detailed portfolio knowledge is necessary.

TIA Selection Tool is available for download as a free desktop version or a cloud variant.



Your Advantages

Quick

- Configure a complete project with just a few entries – without a manual, without special knowledge
- Import and export of hardware configuration to TIA Portal or other systems
- Ideal visualization of the projects to be configured

Easy

- Tool download either as desktop version or web-based cloud version
- Technically always up-to-date about product portfolio and innovative approaches
- Highly flexible, secure, cross-team work in the cloud
- Direct ordering in SiePortal

Smart

- Smart selection wizard for error-free configuration and ordering
- Configuration options can be tested and simulated in advance
- Library for archiving sample configurations

The TIA Selection Tool is a completely paperless solution.

Download it now:

www.siemens.com/tst

For more
information,
scan the
QR code



Introduction



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Introduction

SINUMERIK CNCs

1

SINUMERIK – the CNC portfolio for the global machine tool market

Overview

From basic, standard CNC machines and standardized machine tools to modular high-end machine concepts – the SINUMERIK CNCs offer the right solution for all machine concepts and accompany the path to digitalization.

Whether for individual parts or mass production, simple or complex workpieces – SINUMERIK is the highly dynamic automation solution, integrated for all areas of production. From prototype building and tool design to mold making, all the way to large-scale series production.

www.siemens.com/sinumerik

SINUMERIK 808	SINUMERIK 828	SINUMERIK ONE
The entry-level CNC for simple standard machines The SINUMERIK 808D ADVANCED control is a panel-based CNC for the lower performance range. This compact and user-friendly entry-level solution is used for basic turning and milling applications. Features such as easy operation, commissioning and maintenance, combined with an optimum cost position, represent the perfect basis for equipping entry-level CNC machines.	The compact CNC for standardized machines The SINUMERIK 828 control is ideally suited for standardized machines with low levels of modularity and high unit quantities. The powerhouse SINUMERIK 828D in the compact class is the solution for cost-sensitive markets that demand high CNC performance and easy commissioning. The digital twin can be used to optimize the machines even before the real start.	The "digital native" CNC – the next level of the digital transformation SINUMERIK ONE is the world's first CNC developed from scratch and specifically designed to meet the challenges of digital transformation in the machine tool industry. This has led to a paradigm shift, with the digital twin constituting an integral part of the control and forming the essential basis for real-world action. Machining processes and machine behavior can be simulated in realistic conditions with meticulous attention to detail.
		
• Panel-based compact CNC • Up to 6 axes/spindles • 1 machining channel • 8.4" color display • PLC based on SIMATIC S7-200	• Panel-based compact CNC • Up to 10 axes/spindles and 2 auxiliary axes • Up to 2 machining channels and 2 handling channels T, M, G • 12.1" color display and 15.6" touch display • PLC based on SIMATIC S7-200	• Digital twin as integral part of the CNC • Drive and panel-based modular CNC • Multi-technology CNC • Up to 31 axes/spindles and any number of PLC axes • Up to 10 machining channels • Modular panel concept with up to 24" multi-touch color display • SIMATIC S7-1500F PLC
SINAMICS V70 SIMOTICS S-1FL6 SIMOTICS M-1PH1	SINAMICS S120 Combi SINAMICS S120/S220 Booksize SIMOTICS	SINAMICS S120/S220 Booksize SINAMICS S120 Chassis SINAMICS S120 Combi SIMOTICS
SINUMERIK 808D ADVANCED	SINUMERIK 828D	SINUMERIK ONE

Overview***SINUMERIK 828D – the powerhouse among the compact CNCs***

With their unique CNC performance, SINUMERIK 828D CNCs set productivity benchmarks when it comes to milling and turning on standard machines as well as functions for easy automation of grinding machines. New SINAMICS drives and SIMOTICS Motion Control motors make the SINUMERIK 828D even more productive.

Rugged and maintenance-free

An operator panel front of die-cast magnesium, the panel-based CNC design with minimal interfaces and the high degree of protection on the front of the PPU make the SINUMERIK 828D CNCs reliable partners even in harsh environments. Designed without a fan or hard disk, with NVRAM memory technology and no back-up battery, SINUMERIK 828D CNCs are completely maintenance-free.

User-friendly

The SINUMERIK 828D CNCs are easy to operate thanks to a full QWERTY CNC keyboard with short-stroke keys and a high-resolution 12.1" TFT color display or 15.6" touch display.

CNC data are quickly and simply transferred via the USB 3.1 interface on the operator panel front.

Optimum scalability

Based on the three CNC performance versions SW24x, SW26x and SW28x of the SINUMERIK 828D CNCs, favorably-priced compact and also complex machines with additional axes/spindles as well as up to 2 machining channels and 2 handling channels can be implemented.

Digital twin

Create MyVirtualMachine and/or Run MyVirtualMachine minimize setup and run-in times, reduce collision hazards and speed up program optimization. Increased productivity and safety - even before the actual machine starts.

***Technology tailor-made for use in standard turning and milling machines***

SINUMERIK 828D is perfectly adapted to use in standard machines and provides optimum support for turning and milling technology. With two preconfigured system software variants for machining technology, the SINUMERIK 828D CNC systems are ready for use in turning and milling machines on dispatch from the factory.

An ideal basis for implementing a compact grinding machine

The G-Tech technology variant provides grinding machine manufacturers with a perfect platform on which to design grinding machines – it also supports cylindrical and surface grinding machines.

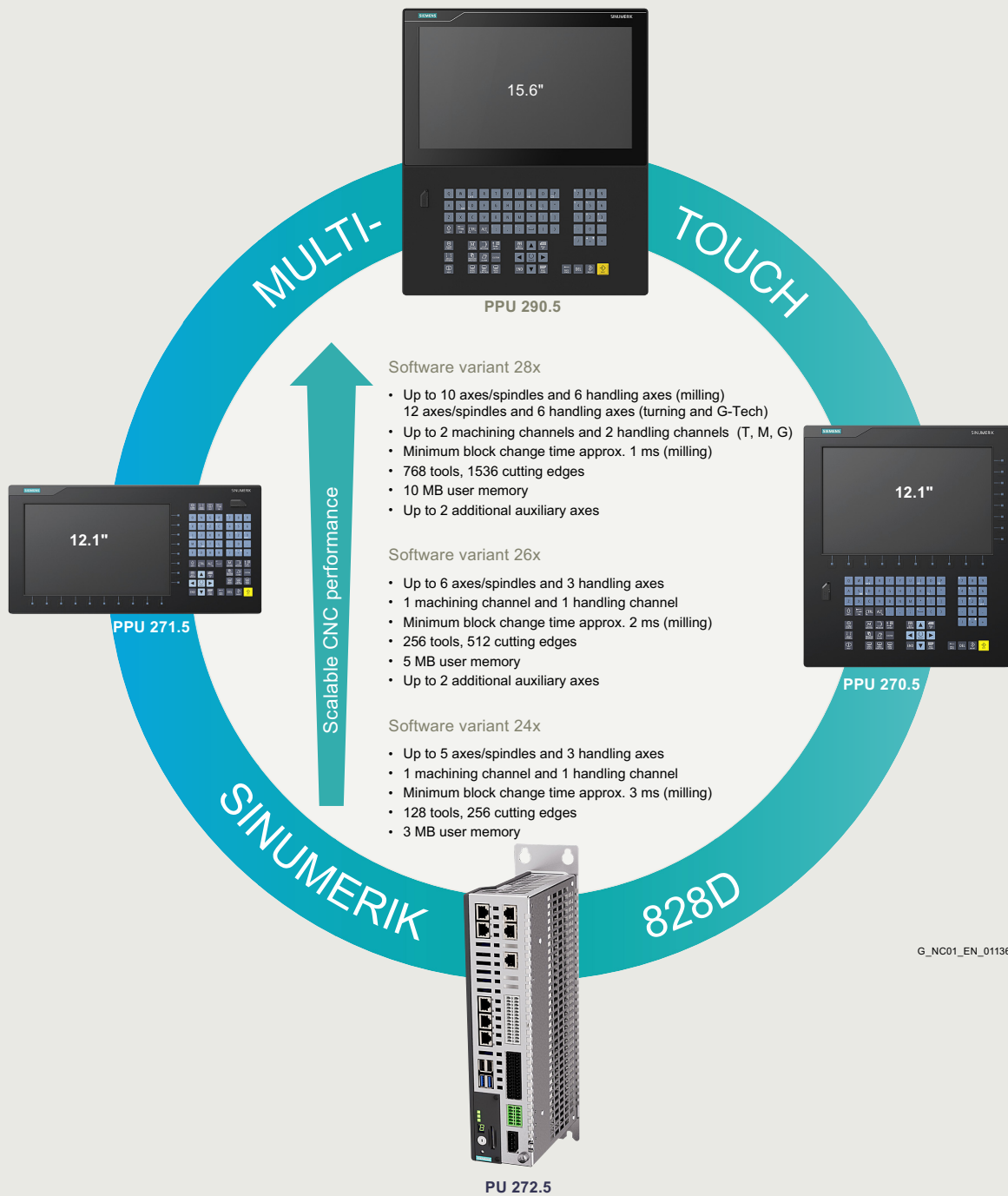
Since grinding machine manufacturers want to fully incorporate their specific process know-how so that it is even reflected in the operating philosophy of the CNC, the G-Tech variant of the SINUMERIK 828D offers a number of sophisticated grinding and dressing cycles for this purpose. Additionally, SINUMERIK Run MyScreens and Run MyHMI /3GL provides grinding machine manufacturers with the option of designing their own HMI.

Introduction

SINUMERIK CNCs

SINUMERIK 828

Overview



Overview***The right performance for the relevant technology – scalable by selection of appropriate software***

The SINUMERIK 828D support three technology variants:

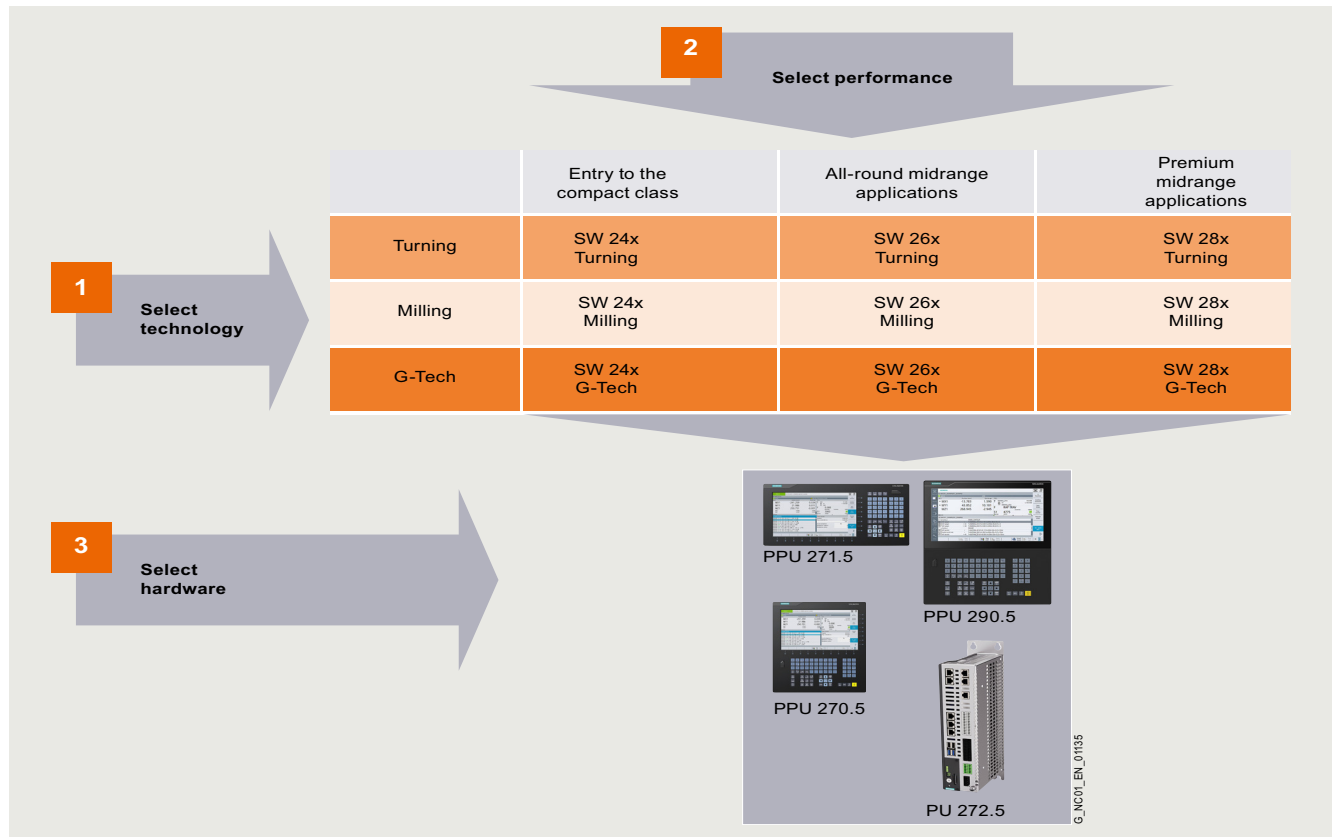
- Turning
- Milling
- G-Tech

SINUMERIK 828D offers the right performance level for any compact machine. One of three different performance variants can be used depending on the requirements of the application in terms of channels, axis quantity structures, and the cycle times of the interpolator and position controller.

The following variants are available:

- SW 24x
- SW 26x
- SW 28x

The name of the technology variant is added to the end of the software designation. The full software designation is formed in conjunction with the performance variant: SW 2xx Turning for a turning machine.

Bundling of software and hardware

The bundling process for software and hardware is completed by selection of a suitable CNC (PPU). Two vertical PPUs 2x0.5 and one horizontal PPU 271.5 are available here.

Additionally, the PU 272.5 as an independent evaluation unit can be used for installation in the control cabinet. SIMATIC Industrial Flat Panels (IFP 1500/1900/2200) tailored to SINUMERIK 828 can be used to connect the displays.

Example 1:

Software package SW 24x Turning is required for a turning machine with 4 axes/spindles. It must then be decided whether the vertical or horizontal variant of the CNC will be used. The horizontal variant is the better option for turning machines, so the PPU 271.5 is selected for this example application.

Example 2:

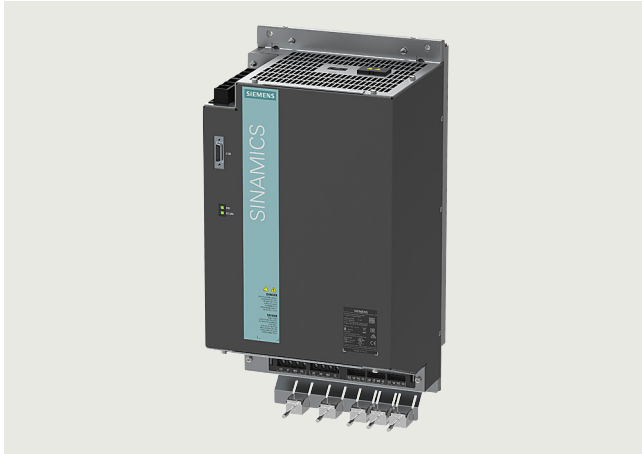
Software package SW 26x Milling is required for a milling machine with 6 axes/spindles. It must then be decided whether the vertical or horizontal variant of the CNC will be used. The vertical variant is the better option for milling machines, so the PPU 270.5 is selected for this example application.

Introduction

SINAMICS S120/S220 drive system

1

Overview



SINAMICS S120 Combi Power Module, frame type Bxx



SINAMICS S220 Double Motor Module in booksize format C/D type



SINAMICS S220 Smart Line Module, in booksize format

The rugged drive class for compact machine concepts

The SINAMICS S120 Combi drive system offers the usual SINAMICS functionality in a multi-axis drive module tailored for compact turning and milling machines. Featuring a host of technical highlights, the SINAMICS S120 Combi sets new standards in this drive class.

SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability as well as 3 or 4 Motor Modules for spindle and feed motors in one Power Module. The power spectrum extends up to 16 kW spindle power (S1) and up to 12 A current (S1) for feed motors.

SINAMICS S120 Combi thus covers the typical range of power ratings of compact standard turning and milling machines and is the perfect drive partner for the SINUMERIK 828D CNCs.

The solution for machines with more axes and higher power ratings

The SINAMICS Combi Power Module frame type Bxx can be extended by the SINAMICS S120 Motor Modules in booksize format if the machine has more axes. This application is supported by the CNC software from V4.95 onwards.

For machine concepts beyond the performance limit of the SINAMICS S120 Combi, the SINAMICS S120/S220 modular drive system is available as an alternative to the SINUMERIK 828D CNCs.

With SINAMICS S220 Booksize, Siemens is enhancing the proven SINAMICS S120 series with considerably more powerful functions and is providing answers to future requirements. SINAMICS S220 is the reliable, robust, and innovative high-performance solution that meets all the requirements with regard to IoT and industrial cybersecurity.

SINAMICS S220 Smart Line Modules are the first steps in innovating the proven SINAMICS S120 range. Smart Line Modules are an integral part of the SINAMICS S220 Booksize series and are characterized by the highest level of performance, maximum flexibility, high degree of user-friendliness and their fit for digitalization. Available in two versions (C and D type). Their higher power density, greater overload capability, and precise dimensioning mean that economical machine solutions can be implemented, while also requiring less space in the control cabinet. Thanks to their innovative mechanical design, Smart Line Modules are also simple and reliable to install and extremely robust.

Operation of SINAMICS S220 Smart Line Modules is possible with a CU320-2 Control Unit (as of SINAMICS firmware V5.2 SP3 HF10).

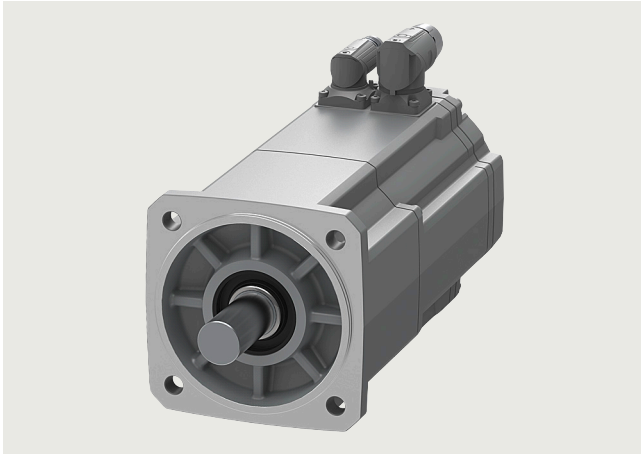
Smart Line Modules can supply energy and return regenerative energy to the supply system. Braking Modules and braking resistors are required only if the drives need to be decelerated in a controlled manner after a power failure – i.e. when energy cannot be regenerated into the line supply. When a Smart Line Module is used as the infeed, the matching line reactor must be installed. A line filter can be optionally installed in order to ensure compliance with the limits stipulated for Category C2 in EN 61800-3.

TIA Selection Tool

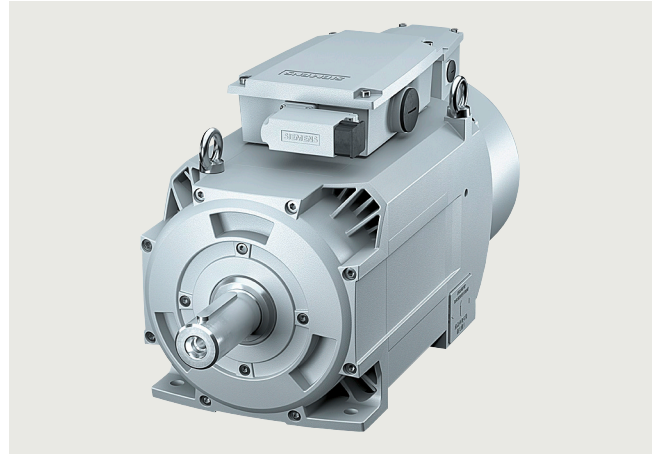
The TIA Selection Tool is available for optimum configuration and planning of projects. It supports users in selecting and assembling automation components – regardless of their experience level. No detailed portfolio knowledge is necessary. The tool is available both as a free desktop version and as a cloud variant.

www.siemens.com/tia-selection-tool

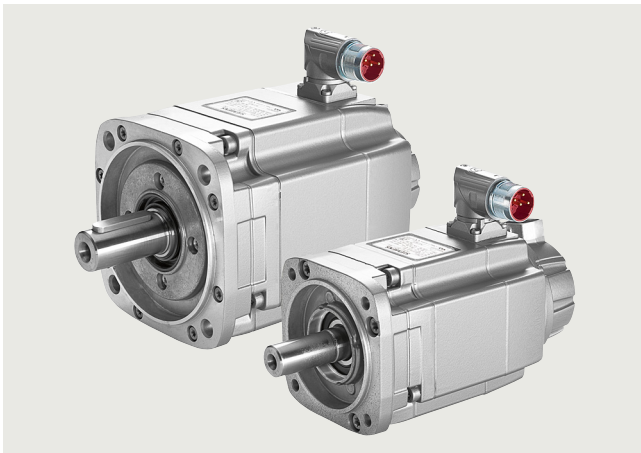
Overview

**SIMOTICS S-1FT2/S-1FK2 feed motors –
for a wide range of uses in industrial environments**

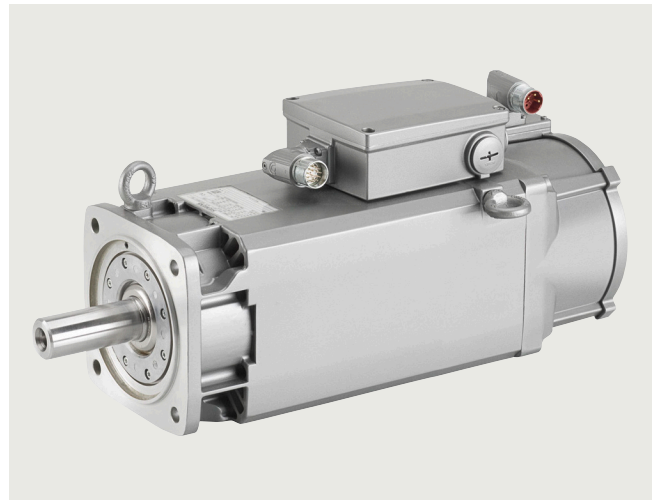
The SIMOTICS S-1FT2/S-1FK2 servomotors are compact permanent-magnet synchronous motors for a wide range of applications in the industrial environment. They are characterized by high power density, degree of protection and overload capability.

**SIMOTICS M-1PH3 spindle motors –
wide power spectrum with low variance**

SIMOTICS M-1PH3 spindle motors is a motor generation that has been developed for universal implementation in plants and machines with motion control applications. Beside offering sufficient speed ranges, SIMOTICS M-1PH3 main spindle motors also deliver the requisite power in the compact class.

**SIMOTICS S-1FK7 feed motors –
maximum precision in the machine**

SIMOTICS S-1FK7 motors are permanent-magnet synchronous motors. The motors excel through their high overload capability, ruggedness, and compact dimensions. The motors are connected through rotatable connectors and pre-assembled cables to ensure flexible, fast and secure connection to the converter.

**SIMOTICS M-1PH8 spindle motors –
peak performance for the spindle**

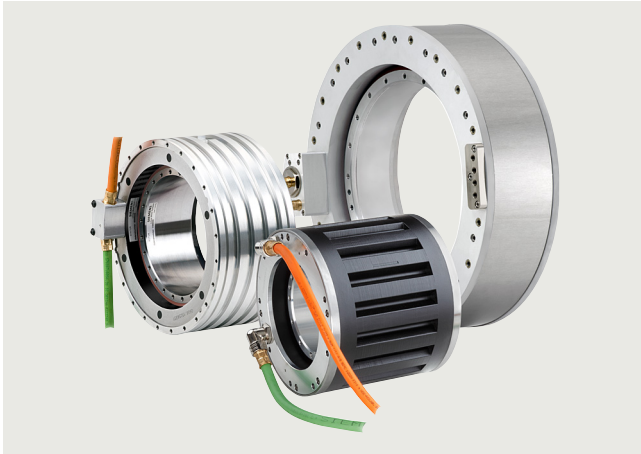
With the SIMOTICS M-1PH8 spindle motors we offer the perfect solution for this purpose. Very fast acceleration times and a wide speed range with high output guarantee maximum productivity of the machine – with speeds of up to 24000 r/min.

Introduction

SIMOTICS motors

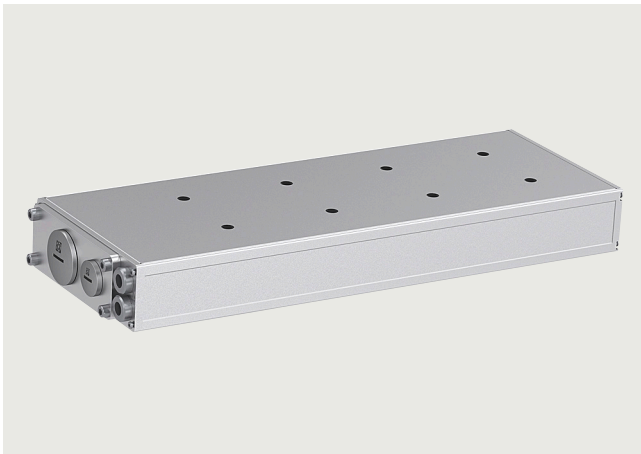
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Overview



SIMOTICS T-1FW6 torque motors

The torque motors satisfy the most exacting demands in precision, performance and dynamic response. Permanent-magnet synchronous motors with a high number of poles are fully integrated in the machine, and mechanical transmission elements such as gearboxes, for example, are omitted, so you benefit from greater flexibility with regard to installation, easier servicing, higher availability and minimal space requirements.



SIMOTICS L-1FN3 linear motors

SIMOTICS L-1FN3 motors are linear drives in compact design with a high power/force density. They are characterized by non-wearing power transmission. SIMOTICS L-1FN3 motors meet the greatest demands for dynamic response, contour precision, and accuracy, and are optimized for operation on high-performance machine tools.



SIMOTICS M-1FE1/1FE2 built-in motors

SIMOTICS M-1FE built-in motors are suitable for the greatest demands for machining quality, precision, and smooth running. Depending on the application, built-in motors are available in a High Torque or High Speed version. Built-in motors are high-performance motor spindles that are used in machine tools with applications for short acceleration times and high speeds.

SINAMICS and SIMOTICS

In combination with the SINAMICS S120/S220 drive systems, the SIMOTICS motors for motion control form a highly dynamic and powerful drive system with outstanding performance – perfectly matched to one another.

We can also provide customized solutions

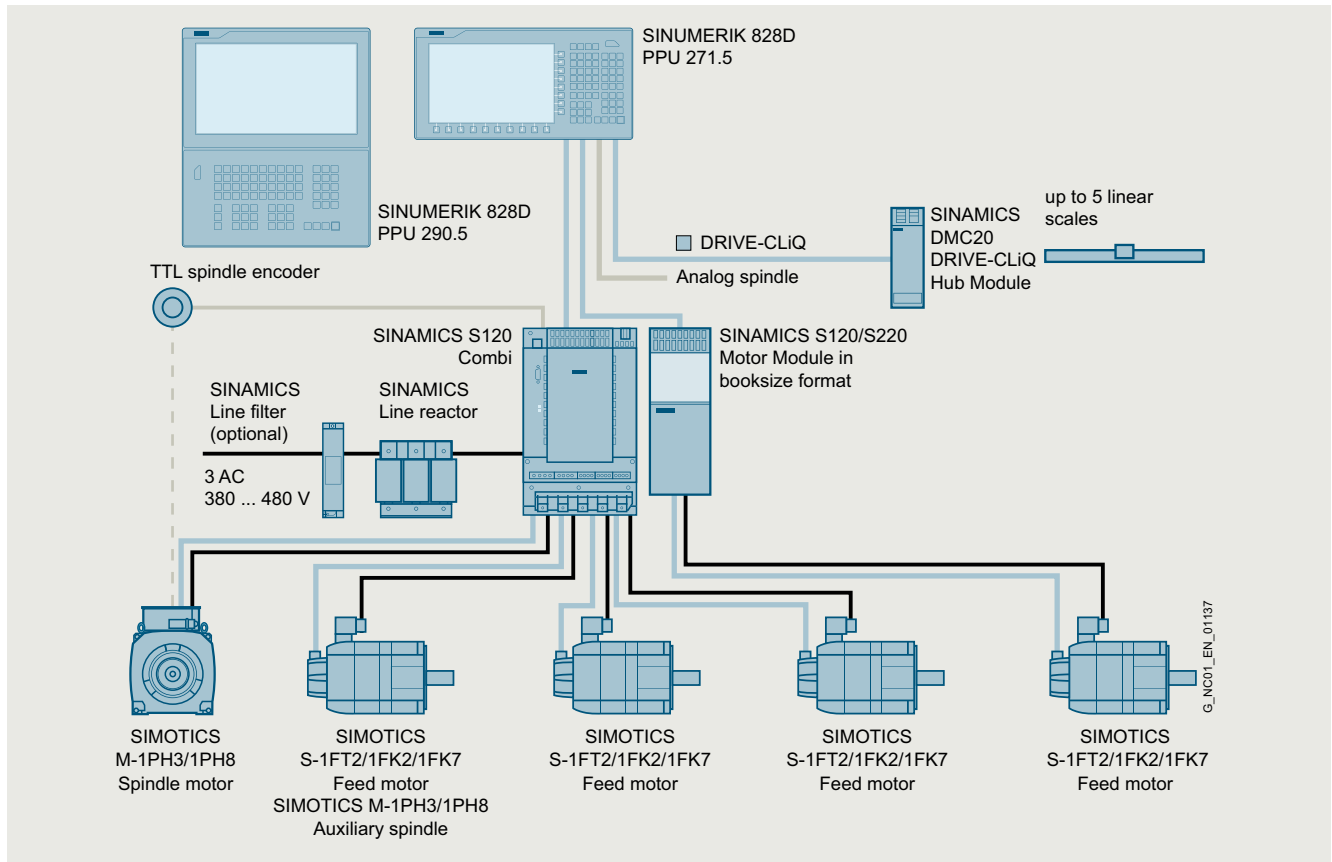
In addition to the range of motors described, we offer a comprehensive range of solutions for feed and spindle applications. Your Siemens sales representative will be happy to advise you on how to configure your individual equipment.

You can find more information, as well as the full range of available motors, on SiePortal:

mall.industry.siemens.com/mall/en/ww/Catalog/Products/10045149

Overview

SINUMERIK 828D with SINAMICS S120 Combi and SIMOTICS motors



Configuration example

The perfect basis for safe machine concepts

With Safety Integrated, the SINUMERIK 828D CNCs offer an optimum platform for the implementation of safe machine concepts. Operation when protective doors are open? A safe speed monitoring function makes it possible to manage requirements of this type.

The Safety Integrated functions of the SINUMERIK 828D conform to Machinery Directive 2006/42/EC. As a result, it is possible to comply cheaply and efficiently with the machine safety regulations applicable in Europe or other countries.

Liability for material defects and OSS Plus

For the worst-case scenario, you will receive a free OSS Plus (Online Service and Support Plus) service contract for a period of 24 months for the SINUMERIK 828D and the associated components (except for complete motor spindles) from Siemens DI. An extension of the OSS Plus service is contractually possible.

Your benefit: We eliminate any defects on our components free of charge on site, i.e. directly at the place of installation of your machine. The fault correction is carried out by repairing and/or replacing faulty components.

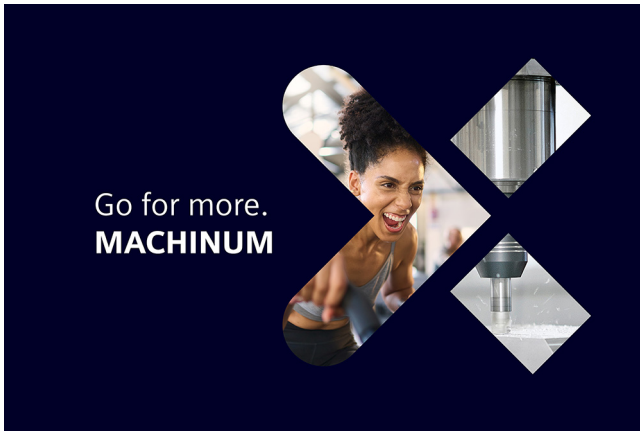
More information about the conditions and the scope of the liability for defects and the OSS Plus service contract can be found under Services.

Introduction

MACHINUM

1

Overview



MACHINUM is the digitalization portfolio based on Siemens Xcelerator designed to elevate productivity and sustainability in part manufacturing. MACHINUM comprises software products to transfer tasks from the real to the virtual machine, to lift the productivity of individual machines and to increase transparency of the entire machine shopfloor.

Using innovative technologies and software makes it easy for MACHINUM to analyze processes, capture production data and make better use of production capacity.

Higher productivity in engineering

Numerous applications help make the mechanical and electrical development of your machines more efficient and optimize the production process.

Efficient production through digital production planning

Tools and NC code are valuable resources. Your digital administration in one software that is linked with the machine control systems, minimizes errors, optimizes setup processes and ensures smooth production. This means production always has timely access to all essential programs and tools.

Increased efficiency in manufacturing

Digitalization enables machine users to ensure the production of high-quality parts and simultaneously increases the productivity of the machine and lowers the production costs.

Increase productivity with the digital twin

Programming can be carried out efficiently away from production through the virtual representation of the machine. This minimizes setup times, optimizes machining processes and fully exploits machine capacity – without any interruptions during operation.

Automatic feedrate adaptation for optimized machining

Adaptive feedrate control and tool monitoring adapt machining to changing conditions in real time. This makes processes such as milling, grinding and turning more efficient, while protecting tools and improving product quality.

MACHINUM in use for SINUMERIK 828Preparation and Implementation of tasks

SinuTrain puts SINUMERIK Operate, including an animated machine operating panel, onto a PC. CNC programs can be directly created here and verified before they are transferred to the real machine thanks to the original SINUMERIK CNC kernel. This enables a high availability of the real machine and thus a higher level of productivity.

Digital twin

Create MyVirtual Machine and Run MyVirtual Machine are now available for SINUMERIK 828:

- Minimization of setup and run-in time on the real machine
- Accurate simulation reduces the risk of collision and accelerates optimization of the part program.

Efficiency and flexibility in production

Analyze MyPerformance calculates the overall equipment efficiency and provides important indicators for measures to increase efficiency. Through the automatic recording of machine data and states, all the data required for optimizing production are provided.

Tool and NC program management

Manage MyResources optimizes shopfloor performance by managing tools and NC programs through a centralized database. These ready-to-use applications are based on Mcenter – the modular and open platform for efficient shopfloor management.

Machine productivity and lower costs for cutting tools

The ACM Suite improves the productivity of the machines, enables unsupervised, automated machining and offers lowest cost of ownership over the lifetime of the machine on which it is installed:

- AdaptiveControl
 - Dynamic feedrate control based on real-time data from current cutting conditions
 - Automatic prevention of abnormal cutting conditions that can lead to damage
- ToolMonitor
 - Reliable tool breakage detection to avoid production stoppages and scrap parts
- ToolLifetimeMonitor
 - True end-of-life (T-EOL) of tools for accurate detection of tool utilization during machining.

More information

More information on digitalization for production with machine tools can be found at:

www.siemens.com/machinum

www.siemens.com/machinetools-digitalization

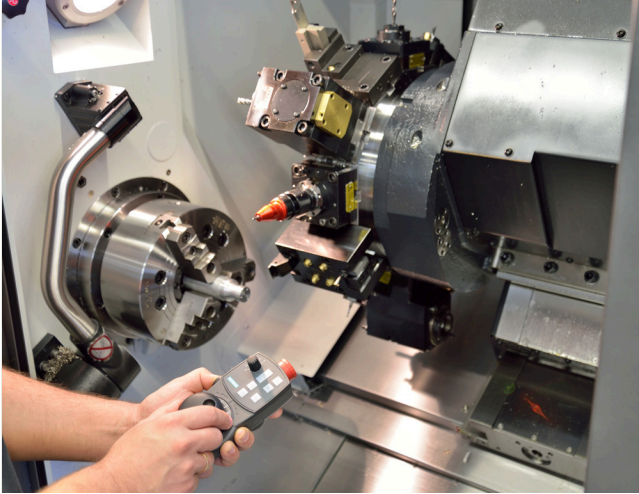
Information on MACHINUM or digitalization options suitable for CNC SINUMERIK 828 can be obtained from your local Siemens office.

Introduction

Drive Based Safety Integrated

1

Overview



SINUMERIK Safety Integrated ensures safe work, for example during setup when the protective doors are open. SINUMERIK 828 controls offer a platform for safe machine concepts in combination with SINAMICS drive systems.

Drive Based 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. As a consequence, the essential requirements relating to functional safety can be implemented simply and cost-effectively.

Available functions include, among others:

- Functions for safe monitoring of standstill
- Functions for safe monitoring of speed

Benefits

- High degree of safety:
Full implementation of the safety functions in Category 3/SIL 2/PL d
- Outstanding flexibility:
Application of practical safety and operating concepts
- Faster commissioning:
Integrated safety functions

Application

For the CNC axes of the SINUMERIK 828D, both the Safety Integrated basic functions (STO, SS1, SBC) and the extended Safety Integrated functions of SINAMICS can be used. The Safety Integrated basic functions are directly controlled via terminals. A SINAMICS S120 TM54F Terminal Module is required for controlling the extended Safety Integrated functions.

For simple positioning tasks, e.g. revolvers, loading systems or tool magazines that require no coordination with the CNC part program, it is possible to connect two auxiliary axes to the SINUMERIK 828D via the I/O interface based on PROFINET using a SINAMICS S120 CU310-2 PN or CU320-2 PN.

The Safety Integrated basic functions of the SINAMICS system can be utilized for these CNC auxiliary axes. The Safety Integrated basic functions are selected by hardware and in 2 channels via terminals on the CU310-2 PN/CU320-2 PN and the Motor Module.

A partially automated acceptance test is provided in SINUMERIK Operate for acceptance testing Safety Integrated functions. All measured data and traces are logged and can be printed out in an acceptance report.

Design

We recommend the following safety relays for the configuration of the safe control logic for individual safety functions:

- SIRIUS 3SK safety relays for configuring a hardware circuit
- SIRIUS 3RK3 Modular Safety System for a graphically parameterizable solution

You will find further information about SIRIUS in SiePortal at:

sieportal.siemens.com

Mode of operation

Clearly structured screen forms are provided in SINUMERIK Operate to assist with the commissioning of Safety Integrated functions.

Safety status information such as, for example, the name of the currently active Safety Integrated function, is transferred to the CNC via the safety info channel (SIC).

The NCK and drive can exchange signals in the opposite direction via the safety control channel (SCC) for the purpose of conducting the safe brake test, for example.

This solution significantly reduces the wiring outlay for the machine manufacturer.

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.

The following Safety Integrated functions are available (terms in accordance with IEC 61800-5-2):

Safety Integrated basic functions (basic version):

- Safe Torque Off (STO)
Suppression of drive pulses, providing safe electronic interruption of the energy supply
- Safe Brake Control (SBC)
Safe brake control of holding brakes which are active in the de-energized state, e.g. motor holding brakes
- Safe Stop 1 (SS1) time-controlled
Safe shutdown of a drive, with subsequent transition into the STO state

The Safety Integrated basic functions are license-free.

The basic functions of Safety Integrated are activated via the terminals of the SINAMICS S120 Combi Power Modules or the SINAMICS S120/S220 Motor Modules and SINUMERIK 828D.

Extended Safety Integrated functions (option):

- Safe Torque Off (STO)
Suppression of drive pulses, providing safe electronic interruption of the energy supply
- Safe Stop 1 (SS1) time-controlled or speed-controlled
Safe shutdown of a drive, with subsequent transition into the STO state
- Safe Stop 2 (SS2)
Safe stopping of the drive with subsequent monitoring for standstill (SOS)
- Safe Operating Stop (SOS)
Monitors drives for standstill – the drives remain fully functional in the position control
- Safely-Limited Speed (SLS)
Monitoring of 4 configurable velocity limit values, e.g. during setup
- Safe Acceleration Monitor (SAM) / Safe Brake Ramp (SBR)
Safe monitoring of the braking process
- Safe Speed Monitor (SSM)
Safe checkback signal when a value falls below a settable speed limit, e.g. for enabling a protective door
- Safely-Limited Position (SLP)
Switchable traversing range limitation (2 ranges)
- Safe Direction (SDI)
Safe monitoring of the direction of motion
- Safe Brake Management (SBM)
 - Safe Brake Control (SBC)
2-channel braking signal – integrated in the SINAMICS S120 Motor Module
 - Safe Brake Test (SBT) → Diagnostics function
Cyclic brake test

The extended Safety Integrated functions require a software license in the form of a CNC option per axis/spindle with Safety functions. A SINAMICS TM54F Terminal Module is required for controlling the extended Safety Integrated functions.

Commissioning support:

- Graphical commissioning with SINUMERIK Operate
For each Safety function there is a clear, graphical display available for fast commissioning
- Integrated acceptance test with SINUMERIK Operate
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

- SINUMERIK 828D
- SINAMICS S120 Combi Power Module or SINAMICS S120/S220 Motor Modules
- Motors with encoders that comply with the Safety Integrated specification:
SIMOTICS M-1PH8 or SIMOTICS S-1FT2/1FK2/1FK7 motors
- Encoder system: If you require information about the use of suitable encoder systems with SINUMERIK Safety Integrated, contact your local Siemens office or regional company.
- Signal cables that comply with the SINAMICS S120/S220 specification: MOTION-CONNECT connection systems
- Controlling the Extended Safety Integrated functions: SINAMICS S120 TM54F Terminal Module
- CNC option with software license per axis/spindle with the Extended Safety Integrated functions
- 3TK28, 3SK or 3RK3 safety relays

More information

For further information about standards, SINUMERIK Safety Integrated functions and safety function calculations, see:

support.industry.siemens.com/cs/document/109478083

Introduction

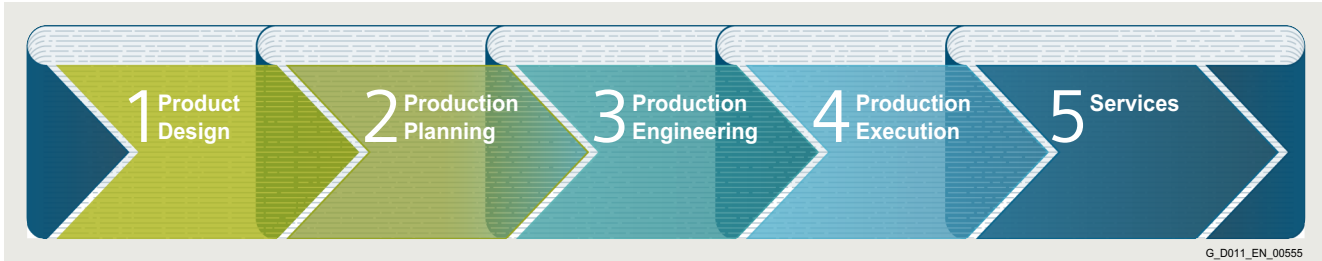
Energy efficiency

1

Overview

Energy is one of the most important cost factors in industry. Operators can, of course, always make savings here and there, but the full potential for saving energy can only be exploited by taking a holistic view of the entire value chain of a system. As an in-

novative partner, we offer industry energy-efficient solutions with products and services for all phases in the product development and production process.



G_D011_EN_00555

5 steps toward higher energy efficiency

Exploit the full potential of energy efficiency in your production with our comprehensive range of products, systems and solutions, that cover all phases of the product development and production process. Our energy efficiency concept aims to continuously and comprehensively reduce the energy usage of machines and plants and so increase the competitiveness of our customers.

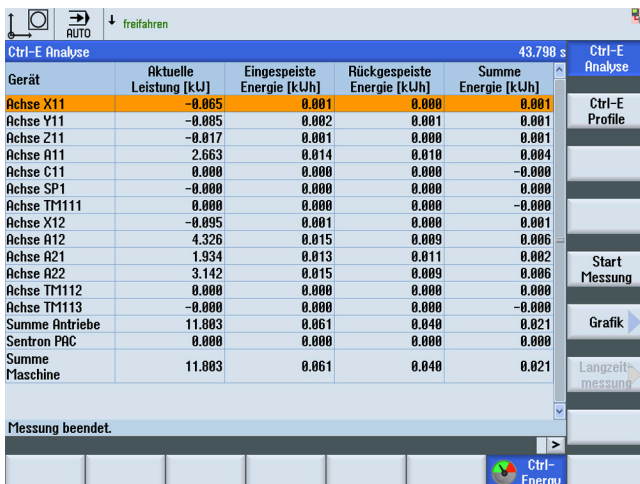
To achieve this, as a leading technology partner, we accompany all phases of the product development and production process – from product design through production planning and engineering – up to the production itself, and all the associated services.

Only the perfect interaction of all components can achieve maximum energy efficiency in production. Our continual innovations ensure that your investments in energy efficiency pay off more quickly.

Energy efficiency with SINUMERIK Ctrl-Energy

Siemens machine tool systems set the standard for energy efficiency in the machine tool: SINUMERIK Ctrl-Energy covers a wide range of highly efficient drive/motor components, CNC/drive functions, software solutions and services.

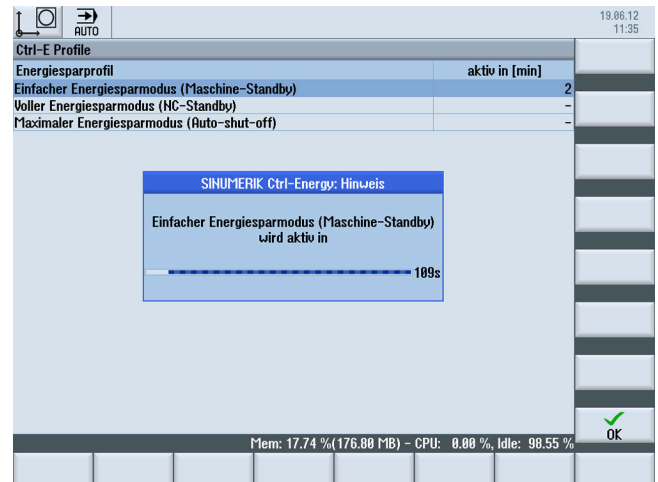
SINUMERIK Ctrl-Energy thus offers energy-efficient solutions for the complete machine lifecycle – from the design phase to full operation. Intelligent functions, such as the analysis of the energy costs of the workpiece, are available to the user: Pressing the shortcut Ctrl + E helps the SINUMERIK save energy.



Representation for a quick overview of the current power and energy consumption



Graphical comparison of two measurements for qualitative evaluation of the energy consumed by a machine tool.



Overview of defined energy saving profiles for a machine tool – warning window in the foreground

Energy monitoring with SENTRON PAC

SENTRON PAC Power Monitoring Devices ensure precise, reproducible and reliable measurement of energy values for infeed, outgoing feeders or individual loads.

Overview of functions



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Important ordering information:

Products, which only have a product ID or both a product ID and article number, can be exclusively ordered using the product ID.

More information is available through your Siemens contact and on the internet at:
www.dex.siemens.com/?selected=industrialsoftware

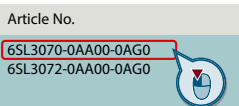
The functionality of SINUMERIK 828D CNCs complies with the export list restrictions. Accordingly, these CNCs do not require official approval in accordance with EU or German law as a result of their type.

The following overview lists all the functions which are available with SINUMERIK 828D CNCs.

The information in the overview of SINUMERIK 828D functions is based on the following software version:

CNC	Software version
SINUMERIK 828D	5.25

Click on an Article No. in the catalog PDF to call it up in SiePortal and to obtain all the information.



Or directly on the internet, e.g.
www.siemens.com/product_catalog_DIMC76SL3070-0AA00-0AG0

Overview of functions

SINUMERIK 828D CNCs

Control structure and configuration

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Control structure and configuration								
Panel-based compact CNC comprising:								
• Compact operator panel CNC		✓	–		✓	–	✓	–
• CNC/PLC control unit		✓	✓		✓	✓	✓	✓
• Closed-loop control for drives		5	5		6	6	6	6
Design, drive-based/PC-based		–	–		–	–	–	–
Operator panel CNC:								
• Horizontal		✓	–		✓	–	✓	–
• Vertical		✓	–		✓	–	✓	–
• Color display		12.1"/ 15.6"	–		12.1"/ 15.6"	–	12.1"/ 15.6"	–
• Integrated QWERTY keyboard with short-stroke keys		✓	–		✓	–	✓	–
SINUMERIK operator panels with TCU		–	–		–	–	–	–
SINUMERIK operator panels with PCU		–	✓		–	✓	–	✓
SINUMERIK 828D:								
• PU 272.5	6FC5370-7AA50-0AA0	–	○		–	○	–	○
• PPU 270.5	6FC5370-6AA50-0AA0	○	–		○	–	○	–
• PPU 271.5	6FC5370-5AA50-0AA0	○	–		○	–	○	–
• PPU 290.5	6FC5370-8AA50-0BA0	○	–		○	–	○	–
System software, export version, on SD card, with license								
• SINUMERIK 828D with PPU 270.5/PPU 271.5/PPU 290.5/PU 272.5:								
- Turning	6FC5835-1GY50-0YA0	○	○		–	–	–	–
- Milling	6FC5835-2GY50-0YA0	○	○		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface	6FC5835-3GY50-0YA0	○	○		–	–	–	–
- Turning	6FC5834-1GY50-0YA0	–	–		○	○	–	–
- Milling	6FC5834-2GY50-0YA0	–	–		○	○	–	–
- G-Tech Cylindrical/G-Tech Surface	6FC5834-3GY50-0YA0	–	–		○	○	–	–
- Turning	6FC5836-1GY50-0YA0	–	–		–	–	○	○
- Milling	6FC5836-2GY50-0YA0	–	–		–	–	○	○
- G-Tech Cylindrical/G-Tech Surface	6FC5836-3GY50-0YA0	–	–		–	–	○	○
Software for SIMATIC IPC SINUMERIK Operate		–	○		–	○	–	○
SINUMERIK Operate Embedded HMI		✓	–		✓	–	✓	–
Windows-based HMI		–	✓		–	✓	–	✓
DRIVE-CLiQ drive interface		✓	✓		✓	✓	✓	✓
PROFINET drive interface (PLC periphery interface)		✓	✓		✓	✓	✓	✓

Overview of functions SINUMERIK 828D CNCs

Control structure and configuration

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Control structure and configuration (continued)									
Numeric Control Extension NX10.3 for applications with up to 9 axes or for reducing the current controller cycle clock to 62.5 µs:	6SL3040-1NC00-0AA0								
• Turning		○	○		○	○	○	○	○
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	○
Numeric Control Extension NX15.3 for applications with up to 12 axes or for reducing the current controller cycle clock to 62.5 µs:	6SL3040-1NB00-0AA0								
• Turning		–	–		○	○	○ ¹⁾	○ ¹⁾	○ ¹⁾
• Milling		–	–		○	○	○ ¹⁾	○ ¹⁾	○ ¹⁾
• G-Tech Cylindrical/G-Tech Surface		–	–		○	○	○ ¹⁾	○ ¹⁾	○ ¹⁾
Machining channel, each additional	6FC5800-0AC10-0YH0	–	–		–	–	○	○	○
Machining channel, maximum:									
• Turning	Basic configuration: 1 machining channel	1	1		1	1	2	2	2
• Milling	Basic configuration: 1 machining channel	1	1		1	1	2	2	2
• G-Tech Cylindrical/G-Tech Surface	Basic configuration: 1 machining channel	1	1		1	1	2	2	2
Mode group, maximum:									
• Turning	Basic configuration: 1 mode group	2	2		2	2	4	4	4
• Milling	Basic configuration: 1 mode group	2	2		2	2	4	4	4
• G-Tech Cylindrical/G-Tech Surface	Basic configuration: 1 mode group	2	2		2	2	4	4	4
Mode group, each additional:	6FC5800-0AC00-0YH0								
• Turning		○	○		○	○	○	○	○
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	○
CNC user memory (buffered) for CNC part programs:									
• Turning		3 MB	3 MB		5 MB	5 MB	10 MB	10 MB	10 MB
• Milling		3 MB	3 MB		5 MB	5 MB	10 MB	10 MB	10 MB
• G-Tech Cylindrical/G-Tech Surface		3 MB	3 MB		5 MB	5 MB	10 MB	10 MB	10 MB
CNC user memory expanded for programs	6FC5800-0AP77-0YH0	–	–		○ 100 MB	○ 100 MB	○ 100 MB	○ 100 MB	○ 100 MB
Execution from external storage EES Only limited by the available memory with the follow- ing options: Execution from external storage EES (6FC5800-0AP75-0YH0/ MCS51100) or expansion of the CNC user memory (6FC5800-0AP77-0YH0)	6FC5800-0AP75-0YH0 MCS51100 Contains the option: CNC user memory expanded for programs 6FC5800-0AP77-0YH0	–	–		○	○	○	○	○

¹⁾ When using 2 × Numeric Control Extensions NX15.3, applications with up to 18 axes are possible.

Overview of functions

SINUMERIK 828D CNCs

Control structure and configuration

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D					
		SW 24x		SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Control structure and configuration (continued)							
HMI user memory additional 256 MB on SD card of the PPU		–	–		–	–	–
Additional CNC user memory 300 MB, extended Max. extension 1000 MB	6FC5800-0AD60-0YH0 Requirement: Execution from external storage EES 6FC5800-0AP75-0YH0	–	–		○	○	○
Axes/spindles or positioning axis/auxiliary spindle:							
• Basic configuration axes/spindles:							
- Turning		3	3		3	3	3
- Milling		4	4		4	4	4
- G-Tech Cylindrical/G-Tech Surface		3	3		3	3	3
• Maximum axes in system (including axes/spindles in machining channel + axes in handling axes channel + PLC positioning axes):							
- Turning		8	8		11	11	18
- Milling		8	8		11	11	16
- G-Tech Cylindrical/G-Tech Surface		8	8		11	11	18
• Maximum number of axes/spindles + PLC positioning axis in machining channel(s):							
- Turning		5	5		6+2	6+2	10+2 ¹⁾
- Milling		5	5		6+2	6+2	8+2 ²⁾
- G-Tech Cylindrical/G-Tech Surface		5	5		6+2	6+2	10+2 ¹⁾
• Maximum number of axes in handling channel(s):		4	4		4	4	4+4
Axis/spindle, each additional	6FC5800-0AC20-0YH0	○	○		○	○	○
Positioning axis/auxiliary spindle, each additional	6FC5800-0AC30-0YH0	○	○		○	○	○
Handling channel, each additional	6FC5800-0AC40-0YH0	○	○		○	○	○
Handling channel, maximum:							
• Turning		1	1		1	1	2
• Milling		1	1		1	1	2
• G-Tech Cylindrical/G-Tech Surface		1	1		1	1	2
PLC-controlled axis		✓	✓		✓	✓	✓
PLC positioning axis, e.g. CU310-2/320-2 PN via I/O interface based on PROFINET, maximum		–	–		2	2	2
Systems and number of the TOOLCARRIER:							
• Turning		–	–		6	6	6
• Milling		1	1		1	1	2
• G-Tech Cylindrical/G-Tech Surface		2	2		2	2	4
CNC lock function	6FC5800-0AP76-0YH0	○	○		○	○	○

¹⁾ Max. number of axes in machining channels: 10 + 2 × positioning axis/auxiliary spindle 6FC5800-0AC30-0YH0.

²⁾ Max. number of axes in machining channels: 8 + 2 × positioning axis/auxiliary spindle 6FC5800-0AC30-0YH0.

Overview of functions

SINUMERIK 828D CNCs

Connectable drives

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Connectable drives									
SINAMICS S120 Motor Modules via DRIVE-CLiQ	See SiePortal	✓	✓		✓	✓	✓	✓	
SINAMICS S120 DRIVE-CLiQ on motor	See Motion Control Encoder measuring systems	✓	✓		✓	✓	✓	✓	
SINAMICS S120 Sensor Module Cabinet-Mounted:	See SiePortal								
• SMC20	6SL3055-0AA00-5BA3	○	○		○	○	○	○	
• SMC30	6SL3055-0AA00-5CA2	○	○		○	○	○	○	
• SMC40	6SL3055-0AA00-5DA0	○	○		○	○	○	○	
SINAMICS S120 Sensor Module External:	See SiePortal								
• SME20	6SL3055-0AA00-5EA3	○	○		○	○	○	○	
• SME25	6SL3055-0AA00-5HA3	○	○		○	○	○	○	
• SME120	6SL3055-0AA00-5JA3	○	○		○	○	○	○	
• SME125	6SL3055-0AA00-5KA3	○	○		○	○	○	○	
SINAMICS S120, supplementary system components:	See SiePortal								
• DMC20 DRIVE-CLiQ Hub Module	6SL3055-0AA00-6AA1	○	○		○	○	○	○	
• DME20 DRIVE-CLiQ Hub Module	6SL3055-0AA00-6AB0	○	○		○	○	○	○	
SINAMICS S120 Combi	See SINAMICS S120 drive system	○	○		○	○	○	○	
SINAMICS S120 Motor Modules Booksize format:	See SINAMICS S120 drive system								
• Internal air cooling	6SL3120-...	○	○		○	○	○	○	
SINAMICS S120 Active Line Modules Booksize format:	See SINAMICS S120 drive system								
• Internal air cooling	6SL3130-...	○	○		○	○	○	○	
SINAMICS S120 Smart Line Modules Booksize format:	See SINAMICS S120 drive system								
• Internal air cooling	6SL3130-...	○	○		○	○	○	○	
SINAMICS S120 Motor Modules Chassis format Internal air cooling	Rated pulse frequency 2 kHz On request	○	○		○	○	○	○	
SINAMICS S220 Motor Modules Booksize format:	See SINAMICS S220 drive system								
• Internal air cooling	6SL5120-...	○	○		○	○	○	○	
SINAMICS S220 Smart Line Modules Booksize format:	See SINAMICS S220 drive system								
• Internal air cooling	6SL5130-...	○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Connectable measuring systems – Connectable motors

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Connectable measuring systems									
Number of measuring systems per axis, maximum	Not valid for PLC drives	2	2		2	2	2	2	
Absolute encoders installed in the motors:									
• SIMOTICS S-1FK2		○	○		○	○	○	○	
• SIMOTICS S-1FT2		○	○		○	○	○	○	
• SIMOTICS S-1FK7		○	○		○	○	○	○	
• SIMOTICS S-1FT7		○	○		○	○	○	○	
• SIMOTICS M-1PH8		○	○		○	○	○	○	
Incremental encoders installed in the motors:									
• SIMOTICS S-1FK7		○	○		○	○	○	○	
• SIMOTICS S-1FT7			○		○	○	○	○	
• SIMOTICS M-1PH3		○	○		○	○	○	○	
• SIMOTICS M-1PH8		○	○		○	○	○	○	
Resolvers installed in SIMOTICS S-1FK7 motors		○	○		○	○	○	○	
Rotary measuring systems with:	See Motion Control Encoder measuring systems Via SINAMICS Sensor Modules SMC								
• sin/cos 1 V _{pp}	6FX2001-3...	○	○		○	○	○	○	
• RS422 (TTL)	6FX2001-2...	○	○		○	○	○	○	
• Distance-coded reference marks		○	○		○	○	○	○	
• EnDat 2.1/EnDat 2.2		○	○		○	○	○	○	
• DRIVE-CLiQ	6FX2001-5...	○	○		○	○	○	○	
Linear measuring systems LMS with:	See SiePortal								
• sin/cos 1 V _{pp}		○	○		○	○	○	○	
• Distance-coded reference marks RS422 (TTL)		○	○		○	○	○	○	
• EnDat 2.1		○	○		○	○	○	○	
Absolute encoder connection with SSI interface		○	○		○	○	○	○	
Certified DQI encoders (DQI 100)	See Motion Control Encoder measuring systems	○	○		○	○	○	○	
Connectable motors									
SIMOTICS S-1FK2 servomotor	(preferred version)	○	○		○	○	○	○	
SIMOTICS S-1FT2 servomotor		○	○		○	○	○	○	
SIMOTICS S-1FK7 servomotor		○	○		○	○	○	○	
SIMOTICS S-1FT7 servomotor		○	○		○	○	○	○	
SIMOTICS M-1PH3 spindle motor	(preferred version)	○	○		○	○	○	○	
SIMOTICS M-1PH8 spindle motor		○	○		○	○	○	○	
SIMOTICS M-1FE1/1FE2 built-in motor		○	○		○	○	○	○	
SIMOTICS L-1FN3 linear motor		○	○		○	○	○	○	
SIMOTICS T-1FW6 built-in torque motor		○	○		○	○	○	○	
Hybrid spindle/motor spindle 2SP1	See SiePortal	○	○		○	○	○	○	
Non-Siemens motor	On request	○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Axis functions

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Axis functions									
Feedrate override		0 ... 200 %	0 ... 200 %		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %	
Feedrate override, axis-specific		0 ... 200 %	0 ... 200 %		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %	
Traversing range, decades		± 9	± 9		± 9	± 9	± 9	± 9	
Rotary axis, turning endlessly		✓	✓		✓	✓	✓	✓	
Velocity, maximum		300 m/s	300 m/s		300 m/s	300 m/s	300 m/s	300 m/s	
Acceleration with jerk limitation		✓	✓		✓	✓	✓	✓	
Programmable acceleration		✓	✓		✓	✓	✓	✓	
Follow-up mode		✓	✓		✓	✓	✓	✓	
Measuring systems 1 and 2, selectable		✓	✓		✓	✓	✓	✓	
Feedrate interpolation		✓	✓		✓	✓	✓	✓	
Separate path feedrate for roundings and chamfers		✓	✓		✓	✓	✓	✓	
Travel to fixed stop		✓	✓		✓	✓	✓	✓	
Travel to fixed stop with Force Control	6FC5800-0AM01-0YH0	○	○		○	○	○	○	
Analog axes/spindles									
• Basic configuration	For more information, go to: https://support.industry.siemens.com/cs/ww/en/view/109475900	1	1		1	1	1	1	
• Maximum configuration via analog axis module (retrofit solution) with 2 analog axes per HLA module and 1 axis/spindle on the PPU/PU		5	5		5	5	5	5	
Analog axis module (retrofit solution)	6FC5300-0BA01-0AA0 Limited function – only for analog axis	2	2		2	2	2	2	
Setpoint exchange:	6FC5800-0AM05-0YH0								
• Turning		–	–		–	–	○	○	
• Milling		–	–		–	–	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	○	○	
Tangential control:	6FC5800-0AM06-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Position switching signals/cam controller		–	–		–	–	–	–	
Advanced Position Control APC ECO	6FC5800-0AM12-0YH0	○	○		○	○	○	○	
Advanced Position Control APC		–	–		–	–	–	–	
Simulated motor encoder	6FC5800-0AD30-0YH0	○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Spindle functions

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Spindle functions									
Spindle speed, analog setpoint	Connection to PPU/PU See analog axes/spindles	1	1		1	1	1	1	
Spindle speed, digital setpoint		✓	✓		✓	✓	✓	✓	
Spindle speed, max. programmable value range Display: ± 999999999.9999		10 ⁶ ... 10 ⁻⁴	10 ⁶ ... 10 ⁻⁴		10 ⁶ ... 10 ⁻⁴	10 ⁶ ... 10 ⁻⁴	10 ⁶ ... 10 ⁻⁴	10 ⁶ ... 10 ⁻⁴	
Spindle override		0 ... 200 %	0 ... 200 %		0 ... 200 %	0 ... 200 %	0 ... 200 %	0 ... 200 %	
Gear stages		5	5		5	5	5	5	
Intermediate gear		✓	✓		✓	✓	✓	✓	
Gear stage selection, automatic		✓	✓		✓	✓	✓	✓	
Oriented spindle stop		✓	✓		✓	✓	✓	✓	
Spindle speed limitation min./max.		✓	✓		✓	✓	✓	✓	
Constant cutting speed		✓	✓		✓	✓	✓	✓	
Spindle control via PLC (positioning, oscillation)		✓	✓		✓	✓	✓	✓	
Changeover to axis mode		✓	✓		✓	✓	✓	✓	
Axis synchronization on-the-fly		✓	✓		✓	✓	✓	✓	
Thread run-in and run-out, programmable		✓	✓		✓	✓	✓	✓	
Thread cutting with constant or variable pitch		✓	✓		✓	✓	✓	✓	
Tapping with compensating chuck/rigid tapping		✓	✓		✓	✓	✓	✓	

Overview of functions

SINUMERIK 828D CNCs

Interpolations

Description		Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x	
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Interpolations									
Linear interpolating axes, maximum simultaneously interpolating			4	4		4	4	4	4
Circle via center point and end point			✓	✓		✓	✓	✓	✓
Circle via intermediate point			✓	✓		✓	✓	✓	✓
Helical interpolation			✓	✓		✓	✓	✓	✓
Universal interpolator NURBS (non-uniform rational B splines)			✓	✓		✓	✓	✓	✓
Continuous-path mode with programmable rounding clearance			✓	✓		✓	✓	✓	✓
Multi-axis interpolation > 4 interpolating axes			–	–		–	–	–	–
Advanced Surface:		6FC5800-0AS07-0YH0							
• Turning			–	–		–	–	–	–
• Milling			✓	✓		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Top Surface:		6FC5800-0AS17-0YH0							
		Requirement: Advanced Surface							
• Turning			–	–		–	–	–	–
• Milling			○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Optimized Top Surface:		NEW 6FC5800-0AH00-0YH0							
		Requirement: Top Surface							
• Turning			–	–		–	–	–	–
• Milling			○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Top Speed plus		6FC5800-0AS62-0YH0							
• Turning			–	–		–	–	–	–
• Milling			○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Surface turning		6FC5800-0AR51-0YH0							
• Turning			–	–		–	–	–	–
• Milling			–	–		○	○	–	–
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Nodding compensation ECO		6FC5800-0AS20-0YH0	○	○		○	○	○	○
• One compensation axis can process 1 influence quantity		No rotary axis possible							
• Adaptive compensation via 3 interpolation points									
Nodding compensation ADVANCED		6FC5800-0AS21-0YH0	○	○		○	○	○	○
• Each compensation axis can process 3 influence quantities		No rotary axis possible							
• Adaptive compensation via 3 interpolation points									
• Unlimited number of compensation axes									
Spline interpolation (A, B and C splines)		6FC5800-0AS16-0YH0	○	○		○	○	○	○
Compressor for 3-axis machining COMPCAD:									
• Turning		Without CYCLE832	✓	✓		✓	✓	✓	✓
• Milling			✓	✓		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		Without CYCLE832	✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

Interpolations

Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Interpolations (continued)									
Polynomial interpolation		–	–		–	–	–	–	
Involute interpolation		–	–		–	–	–	–	
Crank interpolation CRIP		–	–		–	–	–	–	
Interpolation turning	6FC5800-0AP57-0YH0								
• Turning		–	–		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
SMTE cone turning ¹⁾ Requirement: CNC software ≥ SW version 4.95	6FC5800-0AR52-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
SMTE QR Code ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP3	6FC5800-0AR53-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
SMTE Engraving ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP3	6FC5800-0AR54-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Prime Turning TM	6FC5800-0AR56-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
SMTE Chatter avoidance ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP4	NEW 6FC5800-0AR57-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
SMTE Trochoidal Basic ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP4	NEW 6FC5800-0AR58-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Continuous path mode (G64) extended	NEW 6FC5800-0AS37-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	

¹⁾ Regarding delivery, please contact your local Siemens sales office or Regional Company.

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Interpolations (continued)									
Comb grooving	6FC5800-0AS58-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Turning with Y-axis	6FC5800-0AS56-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Advanced Rapid Movement (COMPPATH) Intelligent adaptation of the machine paths outside of the workpiece	6FC5800-0AS64-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Reduced dynamic mode	6FC5800-0AS65-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	

Overview of functions

SINUMERIK 828D CNCs

Couplings

Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Couplings									
Pair of synchronized axes (gantry axes), Basic:	6FC5800-0AS51-0YH0	○	○		○	○	○	○	
• Turning		1	1		1	1	1	1	
• Milling		1	1		1	1	2	2	
• G-Tech Cylindrical/G-Tech Surface		1	1		1	1	1	1	
Main axis/sub axis Basic for drives	6FC5800-0AS52-0YH0	○	○		○	○	○	○	
• Turning		1	1		1	1	2	2	
• Milling		1	1		1	1	3	3	
• G-Tech Cylindrical/G-Tech Surface		1	1		1	1	2	2	
Generic couplings:									
CP-Static, e.g. counterspindle:	6FC5800-0AM75-0YH0								
• 1 × basic synchronous spindle, coupling ratio 1:1, no multi-edge machining:									
- Turning		–	–		–	–	○	○	
- Milling		○	○		○	○	○	○	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
CP-Basic, e.g. multi-edge turning:	6FC5800-0AM72-0YH0								
• 4 axis pairs in simultaneous coupled motion:									
- Turning		○	○		○	○	○	○	
- Milling		–	–		–	–	○	○	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
• 1 × synchronous spindle/multi-edge turning:									
- Turning		○	○		○	○	○	○	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
• Master value coupling/curve table interpolation		–	–		–	–	–	–	
CP-Comfort, e.g. electronic gear:	6FC5800-0AM73-0YH0								
• 4 axis pairs in simultaneous coupled motion:									
- Turning		○	○		○	○	○	○	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
• 1 × synchronous spindle/multi-edge turning:									
- Turning		○	○		○	○	○	○	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
• Electronic gear for 3 leading axes, without curve table, without cascading:									
- Turning		○	○		○	○	○	○	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
• Axial coupling in the machine coordinate system		–	–		–	–	–	–	
• Master value coupling/curve table interpolation		–	–		–	–	–	–	

Overview of functions

SINUMERIK 828D CNCs

Transformations

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Transformations									
Cartesian point-to-point travel PTP		✓	✓		✓	✓	✓	✓	
TRANSMIT/cylinder surface transformation	6FC5800-0AM27-0YH0	○	○		○	○	○	○	
TRANSMIT/TRACYL transformation without Y axis	6FC5800-0AS50-0YH0	○	○		○	○	○	○	
Inclined axis:	6FC5800-0AM28-0YH0								
• Turning	For non-orthogonal Y axis	–	–		○	○	○	○	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical	For non-orthogonal X axis	○	○		○	○	○	○	
• G-Tech Surface		–	–		–	–	–	–	
Inclined axis Basic, fixed angle:	6FC5800-0AS54-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface	For non-orthogonal X axis	○	○		○	○	○	○	
Simple oscillation function, modal:									
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓	
Oscillation function, non-modal, modal and asynchronous:	6FC5800-0AM34-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface	CYCLE4071 ... CYCLE4079	○	○		○	○	○	○	
Concatenated transformations inclined axis TRAANG after cardanic milling head/TRANSMIT/TRACYL:									
• Turning		–	–		✓	✓	✓	✓	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical		✓	✓		✓	✓	✓	✓	
• G-Tech Surface		–	–		–	–	–	–	

Overview of functions

SINUMERIK 828D CNCs

Measuring functions and measuring cycles – Technologies

Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Measuring functions and measuring cycles									
Measuring stage 1 Two probes switching with/without deletion of distance-to-go		✓	✓		✓	✓	✓	✓	
Measuring stage 2 Axial measurement, measurements from synchronized actions, cyclic measurement, fast measurement	6FC5800-0AM32-0YH0								
• Turning		–	–		○	○	○	○	
• Milling		–	–		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		○	○	○	○	
Measuring cycles for drilling/milling and turning Calibration of workpiece probe, workpiece measurement, tool measurement:	6FC5800-0AP28-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Measure kinematics Determine transformation data of rotary axes:	6FC5800-0AP18-0YH0								
• Turning		–	–		–	–	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Logging of measurement results		✓	✓		✓	✓	✓	✓	
Technologies									
Handwheel override		✓	✓		✓	✓	✓	✓	
Contour handwheel	6FC5800-0AM08-0YH0	○	○		○	○	○	○	
Angle head adapter	6FC5800-0AM56-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Multiple feedrates in one block:									
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓	
Continuous dressing, parallel dressing Online modification of the tool offset:									
• Turning/milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓	

Overview of functions

SINUMERIK 828D CNCs

Technologies

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Technologies (continued)								
SINUMERIK MDynamics:								
• Advanced Surface:	6FC5800-0AS07-0YH0							
- Turning		–	–		–	–	–	–
- Milling		✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• Top Surface:	6FC5800-0AS17-0YH0							
- Turning		–	–		–	–	–	–
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• High Speed Settings:								
- Turning		–	–		–	–	–	–
- Milling		✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Top Speed plus	6FC5800-0AS62-0YH0							
• Turning		–	–		–	–	–	–
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Easy connection of robots and handling systems Run MyRobot /EasyConnect		✓	✓		✓	✓	✓	✓
Run MyRobot /Handling	6FC5800-0AP72-0YH0 MCS1190	○	○		○	○	○	○
Optimize MyMachining /AdaptiveControl Standard	6FC5800-0AT01-0YH0 MCS2150							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
Optimize MyMachining /AdaptiveControl Pro	6FC5800-0AT02-0YH0 MCS2151							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○

Overview of functions

SINUMERIK 828D CNCs

Technologies

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Technologies (continued)									
ACM Suite: AMW /ToolMonitor Pro	6FC5800-0AT03-0YH0 MCS2265								
		○	○		○	○	○	○	
		○	○		○	○	○	○	
		○	○		○	○	○	○	
ACM Suite: Multi-spindle extension	6FC5800-0AT04-0YH0 MCS2153								
		○	○		○	○	○	○	
		○	○		○	○	○	○	
		○	○		○	○	○	○	
ACM Suite: Multi-channel extension	6FC5800-0AT05-0YH0 MCS2154								
		○	○		○	○	○	○	
		○	○		○	○	○	○	
		○	○		○	○	○	○	
ACM Suite: Single part extension	6FC5800-0AT06-0YH0 MCS2155								
		○	○		○	○	○	○	
		○	○		○	○	○	○	
		○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Motion-synchronous actions

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x		SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Motion-synchronous actions								
CNC inputs/outputs, high-speed:								
• Digital inputs drives onboard		12	12		12	12	12	12
• Digital inputs or outputs drives onboard, parameterizable		8	8		8	8	8	8
• Digital inputs CNC onboard		8	8		8	8	8	8
• Digital outputs CNC onboard		8	8		8	8	8	8
Synchronized actions and fast auxiliary function output incl. 3 synchronous functions		✓	✓		✓	✓	✓	✓
Positioning axes and spindles via synchronized actions (command axes)		✓	✓		✓	✓	✓	✓
Analog value control in the IPO cycle		–	–		–	–	–	–
Evaluation of internal drive variables, Basic	6FC5800-0AS53-0YH0	○	○		○	○	○	○
Asynchronous subprograms ASUB		✓	✓		✓	✓	✓	✓
Interrupt routines with fast retraction from the contour (with subprogram/ASUB/LIFTFAST)		✓	✓		✓	✓	✓	✓
Cross-mode actions (ASUBs and synchronized actions in all operating modes)		✓	✓		✓	✓	✓	✓
Online tool correction:								
• Turning		–	–		–	–	–	–
• Milling		–	–		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓
Display active synchronized actions in HMI:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○

Overview of functions

SINUMERIK 828D CNCs

Engineering

Description		Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x		
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Engineering										
Program screens, operating areas and user interfaces Create MyHMI /3GL: Program screens, operating areas, and user interfaces in high-level languages 3 languages (en, de, zh) • Single license and for download, without data storage medium Use extended HMI applications Run MyHMI /3GL (maximum 300 MB)		OEM contract required								
		MCS1200	O ¹⁾	O		O ¹⁾	O	O ¹⁾	O	
		6FC5800-0AP60-0YH0 MCS11100	O	O		O	O	O	O	O
Integrate screens in SINUMERIK Operate Run MyScreens • Free screens • > 5 screens, extended functions: - Turning - Milling - G-Tech Cylindrical/G-Tech Surface										
			5	5		5	5	5	5	5
		6FC5800-0AP64-0YH0								
			O	O		O	O	O	O	O
			O	O		O	O	O	O	O
SINUMERIK 828D Run EasyXML: • Turning • Milling • G-Tech Cylindrical/G-Tech Surface		6FC5800-0AQ20-0YH0								
			O	O		O	O	O	O	O
			O	O		O	O	O	O	O
			✓	✓		✓	✓	✓	✓	✓
Analyze MyMachine /SINUMERIK Tuning Center Software for path and axis optimization of a machine tool with SINUMERIK ONE including Diagnostic Trace		MCS2157 See SiePortal	O	O		O	O	O	O	O
Development, commissioning and simulation of virtual machine tools with SINUMERIK 828										
Create MyVirtual Machine /Operate Virtual test environment for SINUMERIK 828		NEW MCS4250f ³⁾ MCS4250n ⁴⁾ MCS4250a ⁵⁾	O ²⁾	O ²⁾		O ²⁾	O ²⁾	O ²⁾	O ²⁾	O ²⁾
Create MyVirtual Machine /Open Virtual test environment for SINUMERIK 828 Extension with an open communications interface		NEW MCS4255f ³⁾ MCS4255n ⁴⁾ MCS4255a ⁵⁾	O ²⁾	O ²⁾		O ²⁾	O ²⁾	O ²⁾	O ²⁾	O ²⁾
Create MyVirtual Machine /3D Virtual test environment for SINUMERIK 828 Extension comprising a Virtual Machine Creator for JobShop applications		NEW MCS4210 ³⁾ MCS4210n ⁴⁾ MCS4210a ⁵⁾	O ²⁾	O ²⁾		O ²⁾	O ²⁾	O ²⁾	O ²⁾	O ²⁾

¹⁾ Applies exclusively to programming the Embedded HMI with Qt. You can obtain the Qt license key directly from: The Qt Company: <https://www.qt.io>

²⁾ In Create MyVirtual Machine, no distinctions are mapped between the hardware types/classes. Projects created with Create/Run MyVirtual Machine can be loaded into SINUMERIK 828 PU/PPU, taking into consideration the HW configurations and constraints.

³⁾ Floating: Server-based licenses, can be used on multiple work stations (not simultaneously); order recommendation.

⁴⁾ Node-locked Server: Server license that is connected to particular clients (work station/PC)
Node-locked Standalone: Local license file that is connected to a particular client (work station/PC)

⁵⁾ Academics: For non-commercial use.

For more information, request the detailed description of licenses.

Overview of functions

SINUMERIK 828D CNCs

CNC programming language

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
CNC programming language								
Programming language DIN 66025 and high-level language expansion		✓	✓		✓	✓	✓	✓
Main program call from main program and subprogram		✓	✓		✓	✓	✓	✓
Subprogram levels, maximum		11	11		11	11	11	11
Interrupt routines, maximum		4	4		4	4	4	4
Number of subprogram passes		≤ 9999	≤ 9999		≤ 9999	≤ 9999	≤ 9999	≤ 9999
Number of levels for skip blocks		2	2		2	2	2	2
Number of levels for skip blocks, maximum:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0	10	10		10	10	10	10
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
Polar coordinates		✓	✓		✓	✓	✓	✓
1/2/3-point contours		✓	✓		✓	✓	✓	✓
Dimensions metric/inch, changeover via operator action or program		✓	✓		✓	✓	✓	✓
Inverse-time feedrate		✓	✓		✓	✓	✓	✓
Auxiliary function output via:								
• M word, max. programmable value range: INT 2 ³¹ -1 ... 2 ³¹		✓	✓		✓	✓	✓	✓
• H word, max. programmable value range: REAL ± 3.4028 ex38, INT -2 ³¹ ... 2 ³¹ -1	Display: ± 999999999,9999	✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

CNC programming language

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
CNC programming language (continued)								
CNC high-level language with:								
• User variables, GUD, configurable		✓	✓		✓	✓	✓	
• Predefined user variables (R-parameters), commentable		3000	3000		3000	3000	3000	
• Predefined global user variables (global R parameters), commentable:								
- Turning		–	–		–	–	100	100
- Milling		–	–		–	–	100	100
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	100	100
• Predefined user variables LUD (R parameters), configurable		✓	✓		✓	✓	✓	✓
• Read/write system variables		✓	✓		✓	✓	✓	✓
• Indirect programming		✓	✓		✓	✓	✓	✓
• Program jumps and branches		✓	✓		✓	✓	✓	✓
• Dynamic jumps RETB		✓	✓		✓	✓	✓	✓
• Program coordination with WAIT, START, INIT:								
- Turning		–	–		–	–	✓	✓
- Milling		–	–		–	–	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	✓	✓
• Arithmetic and trigonometric functions		✓	✓		✓	✓	✓	✓
• Comparison operations and logic combinations		✓	✓		✓	✓	✓	✓
• Macro techniques		✓	✓		✓	✓	✓	✓
• Control structures IF-ELSE-ENDIF		✓	✓		✓	✓	✓	✓
• Control structures WHILE, FOR, REPEAT, LOOP		✓	✓		✓	✓	✓	✓
• Commands to HMI		✓	✓		✓	✓	✓	✓
• STRING functions		✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

CNC programming language

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
CNC programming language (continued)									
Program functions:									
• Dynamic preprocessing buffer (FIFO)		✓	✓		✓	✓	✓		
• Look Ahead, recorded part program blocks:									
- Turning		Without CYCLE832	150	150		300	300	450	450
- Milling with MDynamics Advanced Surface		COMPCAD with CYCLE832	150	150		300	300	450	450
- Milling with MDynamics Top Surface		COMPSURF with CYCLE832	2000	2000		2000	2000	2000	2000
- G-Tech Cylindrical		Without CYCLE832	150	150		300	300	450	450
- G-Tech Surface		Without CYCLE832	150	150		300	300	450	450
• Look Ahead, IPO blocks, buffered:									
- Turning		Max. 150 without CYCLE832	50	50		100	100	150	150
- Milling with MDynamics Advanced Surface		COMPCAD with CYCLE832	50	50		100	100	150	150
- Milling with MDynamics Top Surface		COMPSURF with CYCLE832	200	200		200	200	200	200
- G-Tech Cylindrical		Max. 150 without CYCLE832	50	50		100	100	150	150
- G-Tech Surface		Max. 150 without CYCLE832	50	50		100	100	150	150
• Frame concept			✓	✓		✓	✓	✓	✓
• Inclined-surface machining with swivel cycle:									
- Turning			–	–		–	–	–	–
- Milling			✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface			✓	✓		✓	✓	✓	✓
• Axis/spindle replacement			✓	✓		✓	✓	✓	✓
• Geometry axes, switchable online in the CNC program			✓	✓		✓	✓	✓	✓
• Program preprocessing			✓	✓		✓	✓	✓	✓
Online ISO dialect interpreter:									
• Turning			✓	✓		✓	✓	✓	✓
• Milling			✓	✓		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–

Overview of functions

SINUMERIK 828D CNCs

CNC programming language – Programming support

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
CNC programming language (continued)								
Program/workpiece management:								
Part programs on PPU/PU, maximum number Only limited by the available memory with the following options: Execution from external storage EES (6FC5800-0AP75-0YH0/ MCS51100) or expansion of the CNC user memory (6FC5800-0AP77-0YH0)	In total a maximum of 512 files per directory	750	750		750	750	750	750
Workpieces on PPU/PU, maximum number Only limited by the available memory with the following options: Execution from external storage EES (6FC5800-0AP75-0YH0/ MCS51100) or expansion of the CNC user memory (6FC5800-0AP77-0YH0)	In total a maximum of 256 directories	250	250		250	250	250	250
On USB storage medium, e.g. USB flash drive	Hard disk not possible	✓	✓		✓	✓	✓	✓
On network drive (Windows Share/FTP)		✓	✓		✓	✓	✓	✓
Templates for workpieces, programs and INI files		✓	✓		✓	✓	✓	✓
Job lists		✓	✓		✓	✓	✓	✓
Basic frames, maximum number		1	1		1	1	1	1
Settable offsets, maximum number		50	50		100	100	100	100
Work offsets, programmable (frames)		✓	✓		✓	✓	✓	✓
Work offsets, fit-dependent:	Fit-dependent corrections							
Turning		–	–		–	–	–	–
Milling		–	–		–	–	–	–
G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓
Scratching, determining work offset		✓	✓		✓	✓	✓	✓
Work offsets, external via PLC		✓	✓		✓	✓	✓	✓
Global and local user data		✓	✓		✓	✓	✓	✓
Global program user data		✓	✓		✓	✓	✓	✓
Display and log system variables also via online configurable display		–	–		–	–	–	–
Programming support								
Program editor:								
Programming support for cycles, programGUIDE		✓	✓		✓	✓	✓	✓
CNC editor with editing functions: select, copy, delete		✓	✓		✓	✓	✓	✓
Geometry processor with programming graphics/free contour input (contour calculator)		✓	✓		✓	✓	✓	✓
Screens for 1/2/3-point contours (contour definition programming)		–	–		–	–	–	–
ShopTurn/ShopMill machining step programming:	6FC5800-0AP17-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
programSYNC – multi-channel step sequence programming:	6FC5800-0AP05-0YH0							
- Turning		–	–		–	–	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–

Overview of functions

SINUMERIK 828D CNCs

Programming support

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Programming support (continued)								
• Manual machine functions:	Included in option: ShopTurn/ShopMill machining step programming 6FC5800-0AP17-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• Backup of workpiece setup data:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Multiple clamping of various workpieces:	Included in option: ShopTurn/ShopMill machining step programming 6FC5800-0AP17-0YH0							
- Turning		–	–		–	–	–	–
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Technology cycles for drilling/milling:	Basic scope							
• Turning		✓	✓		✓	✓	✓	✓
• Milling		✓	✓		✓	✓	✓	✓
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Technology cycles for turning:	Basic scope							
• Turning		✓	✓		✓	✓	✓	✓
• Milling		–	–		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Technology cycles for grinding Grinding basic		–	–		–	–	–	–
Extended functions for grinding Grinding advanced:	6FC5800-0AS35-0YH0							
• Dressing (paraxial form-truing) with stock removal cycles (Basic CYCLE95)								
• Cylinder error compensation								
- Turning		–	–		–	–	–	–
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○

Overview of functions

SINUMERIK 828D CNCs

Programming support

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D					
		SW 24x		SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Programming support (continued)							
Advanced technology functions (expansion of the technology cycles for turning and milling):	6FC5800-0AP58-0YH0						
• Pocket milling with free contour definition and islands:							
- Turning		○	○		✓	✓	✓
- Milling		○	○		✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–
• Stock removal cycles with free contour definition:							
- Turning		○	○		✓	✓	✓
- Milling		–	–		–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–
Residual material detection and machining for contour pockets and stock removal:	6FC5800-0AP13-0YH0 Requirement: Advanced technology functions option 6FC5800-0AP58-0YH0						
• Turning		○	○		○	○	○
• Milling		○	○		○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–
Access protection for cycles Lock MyCycles	6FC5800-0AP54-0YH0 MCS11000	○	○		○	○	○
Programming support can be extended, e.g. customer cycles		✓	✓		✓	✓	✓
DXF Reader for PC integrated in SINUMERIK Operate	6FC5800-0AP56-0YH0 MCS41300	○	○		○	○	○
Balance cutting:	6FC5800-0AS05-0YH0						
• Turning		–	–		–	–	○
• Milling		–	–		–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–
Monitoring for maximum tool speed/acceleration	6FC5800-0AS08-0YH0						
• Turning		○	○		○	○	○
• Milling		○	○		○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○
Path acceleration limitation	6FC5800-0AP26-0YH0						
• Turning		○	○		○	○	○
• Milling		○	○		○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○
Configured stop	6FC5800-0AS24-0YH0	○	○		○	○	○

Overview of functions

SINUMERIK 828D CNCs

Simulations

Description		Article No. Product ID	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		Notes	SW 24x			SW 26x		SW 28x	
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Simulations									
Simulation of program X, while program Y is being executed (simulation parallel to machining)			–	–		–	–	–	–
Simulation (finished part) in 2D representation			✓	✓		✓	✓	✓	✓
3D simulation 1 (finished part):		6FC5800-0AP25-0YH0							
• Turning			○	○		○	○	○	○
• Milling			○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Simulation of finished part and working area in 3D representation			–	–		–	–	–	–
Simulation of finished part with collision check in 3D representation			–	–		–	–	–	–
Simultaneous recording (real-time simulation of the current machining operation)		6FC5800-0AP22-0YH0	○	○		○	○	○	○
Simulation of virtual machine tools with SINUMERIK 828 during production									
Run MyVirtual Machine /Operate Control-identical programming station for NC programs or for training and apprenticeship purposes		NEW MCS4220 ¹⁾ MCS4220n ²⁾ MCS4220a ³⁾	○	○		○	○	○	○
Run MyVirtual Machine /Open Extension with an open communications interface for integration into a simulation system		NEW MCS4230 ¹⁾ MCS4230n ²⁾ MCS4230a ³⁾	○	○		○	○	○	○
Run MyVirtual Machine /3D Extension to the virtual machine during work preparation		NEW MCS4240 ¹⁾ MCS4240n ²⁾ MCS4240a ³⁾	○	○		○	○	○	○

¹⁾ Floating: Server-based licenses, can be used on multiple workstations (not simultaneously); order recommendation.

²⁾ Node-locked Server: Server license that is connected to particular clients (work station/PC)
Node-locked Standalone: Local license file that is connected to a particular client (work station/PC)

³⁾ Academics: For non-commercial use.

For more information, request the detailed description of licenses.

Overview of functions

SINUMERIK 828D CNCs

Operating modes

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Operating modes								
JOG:								
• Handwheel selection		✓	✓		✓	✓	✓	✓
• Inch/metric changeover		✓	✓		✓	✓	✓	✓
• Manual measurement of work offset:								
- Turning		✓	✓		✓	✓	✓	✓
- Milling		✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• Additional measuring version beyond the standard scope: Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, 1 circular spigot and rectangular spigot Expansion of the measurement screens via combo box								
- Turning		–	–		–	–	–	–
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• Manual measurement of tool offset:								
- Turning		✓	✓		✓	✓	✓	✓
- Milling		✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓
• Automatic tool/workpiece measurement:								
- Turning		✓	✓		✓	✓	✓	✓
- Milling		✓	✓		✓	✓	✓	✓
- G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓
• Reference point approach, automatic/via CNC program		✓	✓		✓	✓	✓	✓
MDI:								
• Input in text editor		✓	✓		✓	✓	✓	✓
• Load/save MDI program:								
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Input screen forms for technology and positioning, cycle support		✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

Operating modes

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Operating modes (continued)								
Teach-in:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
Automatic:								
• Execution from storage medium on the front USB interface of the operator panel, e.g. card reader, USB flash drive	Hard disk not possible	✓	✓		✓	✓	✓	✓
• Execution from storage medium on the rear USB interface of the operator panel, e.g. card reader, USB flash drive	Hard disk not possible	✓	✓		✓	✓	✓	✓
• Execution from network drive		✓	✓		✓	✓	✓	✓
• Program control		✓	✓		✓	✓	✓	✓
• Program editing		✓	✓		✓	✓	✓	✓
• Overstore:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• DRF offset:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Block search with/without calculation		✓	✓		✓	✓	✓	✓
• Extended block search Program, search pointer, step up and down, interrupt function:	Included in option: Extended operator functions 6FC5800-0AP16-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
Repos (repositioning on the contour):								
• Via operator input/semi-automatically		✓	✓		✓	✓	✓	✓
• Program		✓	✓		✓	✓	✓	✓
Preset:								
• Set actual value		✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

Tools

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Tools								
Tool types:								
• Turning:								
- Turning		✓	✓		✓	✓	✓	
- Milling		✓	✓		✓	✓	✓	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	
• Drilling/milling:								
- Turning		✓	✓		✓	✓	✓	
- Milling		✓	✓		✓	✓	✓	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	
• Groove sawing:								
- Turning		✓	✓		✓	✓	✓	
- Milling		✓	✓		✓	✓	✓	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	
• Grinding/dressing:								
- Turning		–	–		–	–	–	
- Milling		–	–		–	–	–	
- G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	
• Multi-tool:								
- Turning		✓	✓		✓	✓	✓	
- Milling		✓	✓		✓	✓	✓	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	
Tool radius compensations in plane with:								
• Approach and retract strategies		✓	✓		✓	✓	✓	
• Transition circle/ellipse on outer edges		✓	✓		✓	✓	✓	
Configurable intermediate blocks with tool radius compensation active		✓	✓		✓	✓	✓	
Tool radius compensation in 3D representation		–	–		–	–	–	
Tool carrier with orientation capability:								
• Turning		–	–		✓	✓	✓	
• Milling		✓	✓		✓	✓	✓	
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	
Look-ahead detection of contour violations		✓	✓		✓	✓	✓	
Constant grinding wheel peripheral speed GWPS:								
• Turning		–	–		–	–	–	
• Milling		–	–		–	–	–	
• G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	

Overview of functions

SINUMERIK 828D CNCs

Tool management

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Tool management								
Operation with tool management:								
• Real magazines, maximum number:								
- Turning		1	1		1	1	2	2
- Milling		1	1		1	1	2	2
- G-Tech Cylindrical/G-Tech Surface		1	1		2	2	2	2
• Tool list		✓	✓		✓	✓	✓	✓
• Expandable tool list		–	–		–	–	–	–
• Tools in tool list:								
- Turning		128	128		256	256	768	768
- Milling		128	128		256	256	768	768
- G-Tech Cylindrical/G-Tech Surface		128	128		256	256	768	768
• Cutting edges in tool list:								
- Turning		256	256		512	512	1536	1536
- Milling		256	256		512	512	1536	1536
- G-Tech Cylindrical/G-Tech Surface		256	256		512	512	1536	1536
• Tool offset selection via T and D numbers		✓	✓		✓	✓	✓	✓
• Magazine list		✓	✓		✓	✓	✓	✓
• Configurable magazine list		✓	✓		✓	✓	✓	✓
• Magazine data		✓	✓		✓	✓	✓	✓
• Empty location search and location positioning		✓	✓		✓	✓	✓	✓
• Convenient empty location search using softkeys		✓	✓		✓	✓	✓	✓
• Loading and unloading of tools		✓	✓		✓	✓	✓	✓
• Tool cabinet and tool catalog		–	–		–	–	–	–
• Loading and unloading via code carrier system		–	–		–	–	–	–
• Adapter data:								
- Turning		✓	✓		✓	✓	✓	✓
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–		✓	✓	✓	✓
• Location-dependent offsets, reference point on wheel:								
- Turning		–	–		–	–	–	–
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		✓	✓		✓	✓	✓	✓
• Tool life monitoring and workpiece count		✓	✓		✓	✓	✓	✓
• Replacement tools for tool management:		6FC5800-0AM78-0YH0						
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• Multi-tool tool holder		–	–		–	–	–	–

Overview of functions

SINUMERIK 828D CNCs

Tool management – Communication and data management

Description		Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x	
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Tool management (continued)									
Manage tools			–	–		–	–	–	–
Manage MyTools									
Identify tool demand		6FC5800-0AM77-0YH0							
- Turning			○	○		○	○	○	○
- Milling			○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–
Tool identification for loading/unloading tools with code carrier									
• Tool Ident Connection		6FC5800-0AP52-0YH0 MCS51300	○	○		○	○	○	○
Communication and data management									
Transfer data to storage medium on rear USB interface of operator panel, e.g. card reader, USB flash drive		Hard disk not possible	✓	–		✓	–	✓	–
Transfer data to storage medium on front USB interface of operator panel, e.g. card reader, USB flash drive		Hard disk not possible	✓	–		✓	–	✓	–
Transfer process data (WRITE ISOPRINT) to USB flash drive			✓	✓		✓	✓	✓	✓
Manage additional drives via:									
• Ethernet 1 Gbps (Windows Share/Linux/FTP)			✓	✓		✓	✓	✓	✓
• USB 3.1 interface			2	2		2	2	2	2
• USB 2.0 interface		1 × reserved for machine control panel	2	2		2	2	2	2
Peripheral connection via I/O interface based on PROFINET		Only via PP 72/48D PN or PP 72/48D 2/2A PN I/O modules	✓	✓		✓	✓	✓	✓
Connection to an external PROFINET network with SIMATIC PN/PN coupler		6ES7158-3AD10-0XA0	○	○		○	○	○	○
SIMATIC ET 200SP bus adapter BA 2 × RJ45 2 × RJ45 sockets for PROFINET		6ES7193-6AR00-0AA0	○	○		○	○	○	○
SIMATIC bus adapter BA LC/FC Media converter glass FOC/copper 1 × LC FO connection 1 × FastConnect (FC) connection for PROFINET		6ES7193-6AG40-0AA0	○	○		○	○	○	○
Create MyInterface			–	–		–	–	–	–
Access MyBackup			–	–		–	–	–	–
Production data evaluation:									
• Analyze MyPerformance			–	–		–	–	–	–
Host computer connection Server for OPC UA in SINUMERIK Operate Access MyMachine:									
• Access MyMachine /OPC UA Variables/ms, maximum number		6FC5800-0AP67-0YH0	○ 100/200	○ 100/200		○ 100/200	○ 100/200	○ 100/200	○ 100/200
• Access MyMachine /OPC UA - Eco		6FC5800-0AQ67-0YH0	○	○		○	○	○	○

Overview of functions

SINUMERIK 828D CNCs

Operation

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Operation								
SINUMERIK operator panels with PCU/TCU		–	–		–	–	–	–
SINUMERIK PCU 50.5 Windows 7		–	–		–	–	–	–
SIMATIC IPC		See SIMATIC IPC			–	✓	–	✓
SIMATIC Panels		See SIMATIC Panels			–	✓	–	✓
Connection for:								
• Standard monitor (DVI), VGA via ext. adapter, as for PCU 50.5		–	–		–	–	–	–
• SIMATIC OPs		–	–		–	–	–	–
Control unit management:								
• One operator panel per CNC		✓	✓		✓	✓	✓	✓
• Combinations of several operator panels and several CNCs		–	–		–	–	–	–
Handheld units:								
SINUMERIK Handheld Terminal HT 10		6FC5403-0AA21-0AA1	○	○		○	○	○
SINUMERIK Handheld Terminal HT 10 with handwheel		6FC5403-0AA21-1AA1	○	○		○	○	○
• Connection cable for HT 10			○	○		○	○	○
- Length 2 m		6XV1440-4BH20						
- Length 5 m		6XV1440-4BH50						
- Length 8 m		6XV1440-4BH80						
- Length 10 m		6XV1440-4BN10						
- Length 15 m		6XV1440-4BN15						
- Length 20 m		6XV1440-4BN20						
- Length 25 m		6XV1440-4BN25						
• Wall holder for HT 10 handheld terminal		6FC5348-0AA20-0AA0	○	○		○	○	○
• Touch pen for HT 10 ELO touch pen system, including adhesive holder		6AV6881-0AV21-0AA0	○	○		○	○	○
• Touch pen caps for ELO touch pen system		6AV2181-8AV60-0AX0	○	○		○	○	○
• Accessories for Handheld Terminal HT 10								
- SIMATIC HMI connection box standard for SINUMERIK HT 10 without emergency stop circuit bridging, wall mounting, PROFINET and PROFIsafe, connection of safety relay, terminal detection, integrated switch, degree of protection IP65		6AV2125-2AE13-0AX0	○	○		○	○	○
- SIMATIC HMI connection box advanced for SINUMERIK HT 10 with emergency stop circuit bridging, wall mounting, PROFINET and PROFIsafe, connection of safety relay, terminal detection, integrated switch, MRP-Client, IRT, degree of protection IP65		6AV2125-2AE23-0AX0	○	○		○	○	○
- SIMATIC HMI connection box distributed for SINUMERIK HT 10 with emergency stop circuit bridging, with Panel Present signal, wall mounting, PROFINET and PROFIsafe, connection of safety relay, terminal detection, integrated switch, MRP-Client, IRT, degree of protection IP65		6AV2185-5AE23-1AA0	○	○		○	○	○
Mini handheld unit with coiled connecting cable		6FX2007-1AD03	○	○		○	○	○
Mini handheld unit with straight cable		6FX2007-1AD13	○	○		○	○	○
• Connection kit for mini handheld unit, non-assembled without Industrial Ethernet		6FX2006-1BG03	○	○		○	○	○
• Connection kit for mini handheld unit, assembled with PROFINET		6FX2006-1BG20	○	○		○	○	○
• 90° angle socket		6FX2006-1BG56	○	○		○	○	○
• Holder for mini handheld unit		6FX2006-1BG70	○	○		○	○	○

Overview of functions

SINUMERIK 828D CNCs

Operation

Description		Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x	
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Operation (continued)									
Machine control panels:									
• SINUMERIK MCP 1200U-V	NEW	6FC5303-0AF33-1AA1	○	○		○	○	○	
• SINUMERIK MCP 398C		6FC5303-0AF25-0AA0	○	○		○	○	○	
• SINUMERIK MCP 1500U	NEW	6FC5303-0AF34-1AA1	○	○		○	○	○	
• SINUMERIK MCP 1200U-H	NEW	6FC5303-0AF32-1AA1	○	○		○	○	○	
• SINUMERIK MCP Interface PN for customer-specific machine control panel		6FC5303-0AF03-0AA0	○	○		○	○	○	
• SINUMERIK MPP Machine Push Button Panel			–	–		–	–	–	
Electronic handwheels:									
• With 120 mm × 120 mm front panel, 5 V DC		6FC9320-5DB01	○	○		○	○	○	
• With 76.2 mm × 76.2 mm front panel, 5 V DC		6FC9320-5DC01	○	○		○	○	○	
• With 76.2 mm × 76.2 mm front panel, 24 V DC		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, coiled cable		6FC9320-5DE02	○	○		○	○	○	
• Flange socket for portable handwheel		6FC9341-1AQ	○	○		○	○	○	
Connection for electronic handwheels to, maximum:			3	3		3	3	3	
• SINUMERIK PPU/PU			2	2		2	2	2	
• SINUMERIK MCP Interface PN		Use: Manual machine	1	1		1	1	1	
Keyboards:									
• Integrated QWERTY keyboard with short-stroke keys			✓	–		✓	–	✓	
• SINUMERIK keyboards			–	–		–	–	–	
• SINUMERIK ONE KB 1500 full CNC keyboard USB		6FC5303-0AP47-0AA0	○	○		○	○	○	
• SINUMERIK ONE KB 1900 full CNC keyboard USB		6FC5303-0AP47-0BA0	○	○		○	○	○	
• KBPC CG US standard PC keyboard			–	–		–	–	–	
Connection for external storage devices via USB:									
• USB flash drive 32 GB including SIMATIC IPC-BIOS-Manager		6AV6881-0AS42-0AA1	○	○		○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Operation

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Operation (continued)									
Extended operator functions	6FC5800-0AP16-0YH0	○	○		○	○	○	○	
SINUMERIK PCU base software /IPC ≥ V15 for SIMATIC IPC with Microsoft Windows 10 Software option, supply of an electronic license (PDF) Requirement: SIMATIC IPC for SINUMERIK SINUMERIK Operate /PCU (option Q10) or SINUMERIK Operate /PCU Modular (option Q11)	6FC5800-0AP86-1YH0	–	○		–	○	–	○	
SINUMERIK Operate /PC	6FC5800-0AQ01-0YH0	–	○		–	○	–	○	
SINUMERIK Operate /PCU	6FC5800-0AQ10-0YH0	–	○		–	○	–	○	
SINUMERIK Operate /PCU Modular	6FC5800-0AQ11-0YH0	–	○		–	○	–	○	
SINUMERIK Operate Display Manager Multi-window technology for SINUMERIK Operate Single license, without data storage medium Requirement: Resolution > 1920 px × 1080 px	6FC5800-0AP81-0YH0	–	○		–	○	–	○	
Plain text display of user variables		✓	✓		✓	✓	✓	✓	
Multi-channel display:									
• Turning		–	–		–	–	✓	✓	
• Milling		–	–		–	–	✓	✓	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	✓	✓	

Overview of functions

SINUMERIK 828D CNCs

Operation – Monitoring functions

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Operation (continued)								
2D representation of the 3D protection/working areas		✓	✓		✓	✓	✓	✓
Workpiece-related actual value system		✓	✓		✓	✓	✓	✓
Menu selection via the PLC		✓	✓		✓	✓	✓	✓
CNC program messages		✓	✓		✓	✓	✓	✓
Online help for programming, alarms and machine data, expandable		✓	✓		✓	✓	✓	✓
Screen blanking		✓	✓		✓	✓	✓	✓
Access protection		8 levels	8 levels		8 levels	8 levels	8 levels	8 levels
Operating software languages:								
• Chinese Simplified, Chinese Traditional, English, French, German, Italian, Korean, Japanese, Portuguese, Spanish		✓	✓		✓	✓	✓	✓
• Additional languages, use of language extensions		✓	✓		✓	✓	✓	✓
• Language extensions on DVD-ROM for the operating software SINUMERIK Operate and SINUMERIK 828 e.g. Bulgarian, Croatian, Czech, Danish, Dutch, Finnish, Greek, Hindi, Hungarian, Indonesian, Japanese, Malay, Polish, Romanian, Russian, Slovak, Slovene, Swedish, Tamil, Thai, Turkish, Vietnamese	On request	○	○		○	○	○	○
SINUMERIK Collection User, manufacturer, and service documentation for download and displayed in the browser, from CNC SW 5.2x Language: English	NEW 6FC5397-0AE15-2BA0	○	○		○	○	○	○
SINUMERIK Collection User, manufacturer, and service documentation for download and displayed in the browser, from CNC SW 5.2x Language: German	NEW 6FC5397-0AE15-2AA0	○	○		○	○	○	○
Monitoring functions								
Working area limitation		✓	✓		✓	✓	✓	✓
Limit switch monitoring Software and hardware limit switches		✓	✓		✓	✓	✓	✓
Position monitoring		✓	✓		✓	✓	✓	✓
Standstill monitoring		✓	✓		✓	✓	✓	✓
Clamping monitoring		✓	✓		✓	✓	✓	✓
2D/3D protection areas		✓	✓		✓	✓	✓	✓
Protect MyMachine /3D Primitives collision avoidance (machine, working area)	6FC5800-0AS03-0YH0 MCS41200 Only single-channel	○	○		○	○	○	○
Protect MyMachine /3D Primitives collision avoidance 1 additional channel	6FC5800-0AE00-0YH0	–	–		–	–	○	○
Protect MyMachine /3D STL collision avoidance (machine, working area)	6FC5800-0AS02-0YH0	–	–		–	–	–	–
Protect MyMachine /Open interface collision avoidance (machine, working area)	6FC5800-0AS04-0YH0	–	–		–	–	–	–

Overview of functions

SINUMERIK 828D CNCs

Monitoring functions

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Monitoring functions (continued)									
Kinematic chain		✓	✓		✓	✓	✓	✓	
Contour monitoring		✓	✓		✓	✓	✓	✓	
Contour monitoring with tunnel function		–	–		–	–	–	–	
Path length evaluation		–	–		–	–	–	–	
Axis limitation from the PLC		✓	✓		✓	✓	✓	✓	
Spindle speed limitation		✓	✓		✓	✓	✓	✓	
Generator operation		✓	✓		✓	✓	✓	✓	
Extended stop and retract ESR, CNC-controlled and drive-autonomous		6FC5800-0AM61-0YH0							
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Drive-autonomous extended stop and retract ESR, incl. generator operation		6FC5800-0AM60-0YH0		○	○		○	○	
IDM integrated tool monitoring and diagnostics		–	–		–	–	–	–	
Intelligent dynamic control		6FC5800-0AS23-0YH0							
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Intelligent load control		6FC5800-0AS11-0YH0							
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Jerk adaptation		6FC5800-0AS22-0YH0							
• Turning		–	–		–	–	–	–	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
DYNEGMA dynamic energy management		6SL3077-0AA03-0AB0							
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Compensations

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Compensations									
Backlash compensation		✓	✓		✓	✓	✓	✓	
Leadscrew error compensation	Max. 500 interpolation points	✓	✓		✓	✓	✓	✓	
Leadscrew error compensation, bidirectional	6FC5800-0AM54-0YH0 The correctable tolerance band is restricted to 1 mm.	○	○		○	○	○	○	
Measuring system error compensation		✓	✓		✓	✓	✓	✓	
Sag compensation, multi-dimensional	6FC5800-0AM55-0YH0 The correctable tolerance band is restricted to 1 mm.	○	○		○	○	○	○	
Quadrant error compensation:									
• Conventional		✓	✓		✓	✓	✓	✓	
• With neural networks		✓	✓		✓	✓	✓	✓	
Graphic monitoring of the quadrant error compensation using circularity test		✓	✓		✓	✓	✓	✓	
Friction compensation with adaptive characteristics	6FC5800-0AS06-0YH0	○	○		○	○	○	○	
Multi Error Compensation Eco	6FC5800-0AS80-0YH0	○	○		○	○	○	○	
Multi Error Compensation Basic	6FC5800-0AS81-0YH0	○	○		○	○	○	○	
Multi Error Compensation Advanced	6FC5800-0AS82-0YH0	–	–		–	–	○	○	
Temperature compensation		✓	✓		✓	✓	✓	✓	
Feedforward control, velocity-dependent		✓	✓		✓	✓	✓	✓	
Feedforward control, acceleration-dependent:									
• Turning		✓	✓		✓	✓	✓	✓	
• Milling		✓	✓		✓	✓	✓	✓	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Backlash compensation, dynamic		✓	✓		✓	✓	✓	✓	
Cogging torque compensation for 1 axis/spindle	6FC5800-0AD50-0YH0	○	○		○	○	○	○	
Cylinder error compensation:	Included in option: Technology cycles for grinding Grinding advanced 6FC5800-0AS35-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

PLC area

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
PLC area								
SIMATIC S7-300		–	–		–	–	–	–
SIMATIC S7-200 based (integrated)		✓	✓		✓	✓	✓	✓
Cycle time for PLC		9 ms	9 ms		6 ms	6 ms	6 ms	6 ms
Reaction time to process events, terminal to terminal:								
• Turning		7 ms	7 ms		7 ms	7 ms	4 ms	4 ms
• Milling		7 ms	7 ms		7 ms	7 ms	7 ms	7 ms
• G-Tech Cylindrical		7 ms	7 ms		7 ms	7 ms	7 ms	7 ms
• G-Tech Surface		7 ms	7 ms		7 ms	7 ms	7 ms	7 ms
Memory expansion Ladder Steps, maximum	Basic configuration: 24000	100000	100000		100000	100000	100000	100000
Memory expansion to 32000 Ladder Steps	6FC5800-0AD40-0YH0	○	○		○	○	○	○
PLC programming language:								
• Ladder diagram LAD		✓	✓		✓	✓	✓	✓
• Function block diagram FBD		–	–		–	–	–	–
• Statement list STL		–	–		–	–	–	–
PLC programming tool for integrated PLC	On toolbox DVD-ROM (Article No.: 6FC5830-0CY50-0YA8) or toolbox download version (Article No.: 6FC5830-0EY50-0YA8)	○	○		○	○	○	○
PLC Ladder Viewer in SINUMERIK Operate		✓	✓		✓	✓	✓	✓
PLC re-wire Editor in SINUMERIK Operate	INT100/101 only	✓	✓		✓	✓	✓	✓
PLC Ladder Editor in SINUMERIK Operate	PLC program editor	✓	✓		✓	✓	✓	✓
I/O modules:								
• PP 72/48D PN digital I/O module, maximum number:	6FC5311-0AA00-0AA0	○	○		○	○	○	○
- Turning		3	3		4	4	5	5
- Milling		3	3		4	4	5	5
- G-Tech Cylindrical/G-Tech Surface		3	3		5	5	5	5
• PP 72/48D 2/2A PN digital/analog I/O module, maximum number:	6FC5311-0AA00-1AA0	○	○		○	○	○	○
- Turning		3	3		4	4	5	5
- Milling		3	3		4	4	5	5
- G-Tech Cylindrical/G-Tech Surface		3	3		5	5	5	5
• General I/Os via PROFIBUS/PROFINET		–	–		–	–	–	–
• General SIMATIC PROFINET PLC I/Os		–	–		–	–	–	–
• Analog Drive Interface for 4 axes ADI 4	Replaced by retrofit solution: 6FC5300-0BA01-0AA0	–	–		–	–	–	–

Overview of functions

SINUMERIK 828D CNCs

PLC area

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D						
		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
PLC area (continued)								
Digital inputs, maximum		216	216		288	288	360	360
Digital outputs, maximum		144	144		192	192	240	240
Analog inputs, maximum:								
•Turning		6	6		8	8	10	10
•Milling		6	6		8	8	10	10
•G-Tech Cylindrical/G-Tech Surface		6	6		8	8	10	10
Analog outputs, maximum (including PPU output):								
•Turning		7	7		9	9	11	11
•Milling		7	7		9	9	11	11
•G-Tech Cylindrical/G-Tech Surface		7	7		9	9	11	11
Number of PLC alarms and messages								
• PLC alarms/messages		1248	1248		1248	1248	1248	1248
• Extended PLC alarms/messages		1000	1000		1000	1000	1000	1000
Bit memories, number		4096 (512 bytes)	4096 (512 bytes)		4096 (512 bytes)	4096 (512 bytes)	4096 (512 bytes)	4096 (512 bytes)
Timers, number	NEW	512	512		512	512	512	512
Counters, number		256	256		256	256	256	256
Subroutines		256	256		256	256	256	256
FB, FC		–	–		–	–	–	–
DB, highest number, max. number	NEW	128	128		128	128	128	128
Cyclic block		✓	✓		✓	✓	✓	✓
Cyclic block, servo-synchronous		✓	✓		✓	✓	✓	✓
User machine data for configuring the PLC user program		✓	✓		✓	✓	✓	✓
NCVar selector		✓	✓		✓	✓	✓	✓
Import and export of PLC projects PLC file handling via archives		✓	✓		✓	✓	✓	✓
Freely configurable PLC interface		✓	✓		✓	✓	✓	✓

Overview of functions

SINUMERIK 828D CNCs

Safety functions – Commissioning

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Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version ○ Option – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Safety functions									
Drive-based Safety Integrated Safety functions for personnel and machine protection:									
• Safe Torque Off (STO)		✓	✓		✓	✓	✓	✓	✓
• Safe Brake Control (SBC)		✓	✓		✓	✓	✓	✓	✓
• Safe Stop 1 (SS1)		✓	✓		✓	✓	✓	✓	✓
Extended Safety Integrated functions:	6FC5800-0AC50-0YH0	○	○		○	○	○	○	○
• Safe Torque Off (STO)	For one CNC axis/spindle								
• Safe Stop 1 (SS1)									
• Safe Stop 2 (SS2)									
• Safe Operating Stop (SOS)									
• Safely-Limited Speed (SLS)									
• Safe Acceleration Monitor (SAM) / Safe Brake Ramp (SBR)									
• Safe Speed Monitor (SSM)									
• Safely-Limited Position (SLP)									
• Safe Direction (SDI)									
• Safe Brake Management (SBM) - Safe Brake Control (SBC) - Safe Brake Test (SBT)									
SINAMICS S120 Terminal Module Cabinet TM54F for controlling extended Safety Integrated functions	6SL3055-0AA00-3BA0 Required for each PPU/PU and NX	○	○		○	○	○	○	○
Commissioning									
Commissioning software for the drive system integrated:									
• SINAMICS S120		✓	✓		✓	✓	✓	✓	✓
Auto Servo Tuning AST Fully automatic speed and position controller opti- mization		✓	✓		✓	✓	✓	✓	✓
SINUMERIK 828D AST add-on	6FC5800-0AS12-0YB0	○	○		○	○	○	○	○
Commissioning trace integrated Drive optimization without an additional oscilloscope		✓	✓		✓	✓	✓	✓	✓
Standard commissioning via:									
• RS232C serial interface	Hard disk not possible Import/export INI file	–	–		–	–	–	–	–
• USB interface with storage medium, e.g. USB flash drive		✓	✓		✓	✓	✓	✓	✓
• Network drive		✓	✓		✓	✓	✓	✓	✓
• Access MyMachine /P2P for PC/PG	6FC5860-7YC00-0YAO MCS31401	○	○		○	○	○	○	○
STARTER commissioning tool for PC/PG for SINAMICS S120	On toolbox DVD-ROM (Article No.: 6FC5830-0CY50-0YA8) or toolbox download version (Article No.: 6FC5830-0EY50-0YA8)	○	○		○	○	○	○	○
Analyze MyMachine /SINUMERIK Tuning Center	MCS2157	○	○		○	○	○	○	○
SINUMERIK Tuning Center Software version 1.0 SINUMERIK 828D	6FC5862-4YC60-0YAO	○	○		○	○	○	○	○

Overview of functions

SINUMERIK 828D CNCs

Diagnostic functions – Remote control of other systems – Service and maintenance – SINUMERIK Ctrl-Energy

Description		Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x		
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Diagnostic functions										
Alarms and messages			✓	✓		✓	✓	✓	✓	
Action log can be activated for diagnostic purposes			✓	✓		✓	✓	✓	✓	
PLC status			✓	✓		✓	✓	✓	✓	
LAD display			✓	✓		✓	✓	✓	✓	
PLC remote diagnostics via modem			✓	✓		✓	✓	✓	✓	
PLC remote diagnostics via Ethernet			✓	✓		✓	✓	✓	✓	
Remote diagnostics and data transfer:										
• Access MyMachine /P2P RT		6FC5800-0AP30-0YH0 MCS31400	○	○		○	○	○	○	
		Connection of a modem router to X127								
• Access MyMachine /P2P for PC/PG – data transfer between PC/PG and CNCs		6FC5860-7YC00-0YA0 MCS31401	○	○		○	○	○	○	
Remote control of other systems										
Remote desktop control with VNC Viewer			✓	✓		✓	✓	✓	✓	
Service and maintenance										
Integrated service planner for the monitoring of service intervals			✓	✓		✓	✓	✓	✓	
Easy Extend Simply extends optional machine components			✓	✓		✓	✓	✓	✓	
SINUMERIK Ctrl-Energy										
Intelligent standby control of the machine Ctrl-E profiles			✓	✓		✓	✓	✓	✓	
Measurement and evaluation of the total energy consumption of the machine and the drive system Ctrl-E analysis:										
• Transfer of manual values from the PLC			✓	✓		✓	✓	✓	✓	
• SENTRON PAC2200 measuring device for front panel mounting		7KM2200-2EA40-1EA1	○	○		○	○	○	○	
Ctrl-E Advanced Analysis	NEW	6FC5800-0AQ51-0YH0	○	○		○	○	○	○	
Ctrl-E Balanced Spindle Acceleration		6FC5800-0AQ52-0YH0	○	○		○	○	○	○	
Flux reduction:										
• Turning			✓	✓		✓	✓	✓	✓	
• Milling			✓	✓		✓	✓	✓	✓	
• G-Tech Cylindrical/G-Tech Surface			–	–		–	–	–	–	
Reactive-current compensation		Only with SINAMICS S120 Active Line Module	–	–		–	–	–	–	

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Manufacturer options									
Axis/spindle, each additional	6FC5800-0AC20-0YH0	○	○		○	○	○	○	
Handling channel, each additional	6FC5800-0AC40-0YH0	○	○		○	○	○	○	
Positioning axis/auxiliary spindle, each additional	6FC5800-0AC30-0YH0	○	○		○	○	○	○	
Machining channel, each additional	6FC5800-0AC10-0YH0	–	–		–	–	○	○	
Mode group, each additional:	6FC5800-0AC00-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
TRANSMIT/cylinder surface transformation	6FC5800-0AM27-0YH0	○	○		○	○	○	○	
TRANSMIT/TRACYL transformation without Y axis	6FC5800-0AS50-0YH0	○	○		○	○	○	○	
Inclined axis:	6FC5800-0AM28-0YH0								
• Turning	For non-orthogonal Y axis	–	–		○	○	○	○	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical	For non-orthogonal X axis	○	○		○	○	○	○	
• G-Tech Surface		–	–		–	–	–	–	
Inclined axis Basic, fixed angle:	6FC5800-0AS54-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface	For non-orthogonal X axis	○	○		○	○	○	○	
Oscillation function, non-modal, modal and asynchronous:	6FC5800-0AM34-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface	CYCLE4071-CYCLE4079	○	○		○	○	○	○	
Measuring stage 2 Axial measurement, measurements from synchronized actions, cyclic measurement, fast measurement	6FC5800-0AM32-0YH0								
• Turning		–	–		○	○	○	○	
• Milling		–	–		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		○	○	○	○	
Pair of synchronized axes (gantry axes), Basic:	6FC5800-0AS51-0YH0	○	○		○	○	○	○	
• Turning		1	1		1	1	1	1	
• Milling		1	1		1	1	2	2	
• G-Tech Cylindrical/G-Tech Surface		1	1		1	1	1	1	
Travel to fixed stop with Force Control	6FC5800-0AM01-0YH0	○	○		○	○	○	○	
Tangential control:	6FC5800-0AM06-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		–	–	–	–	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Generic coupling CP-Static, e.g. counterspindle:	6FC5800-0AM75-0YH0								
• 1 × basic synchronous spindle, coupling ratio 1:1,									
- Turning		–	–		–	–	○	○	
- Milling		○	○		○	○	○	○	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Manufacturer options (continued)								
Generic coupling CP-Basic, e.g. multi-edge turning:	6FC5800-0AM72-0YH0							
• 4 axis pairs in simultaneous coupled motion:								
- Turning		○	○		○	○	○	○
- Milling		–	–		–	–	○	○
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• 1 × synchronous spindle/multi-edge turning:								
- Turning		○	○		○	○	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Master value coupling/curve table interpolation		–	–		–	–	–	–
Generic coupling CP-Comfort e.g. electronic gear:	6FC5800-0AM73-0YH0							
• 4 axis pairs in simultaneous coupled motion:								
- Turning		○	○		○	○	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• 1 × synchronous spindle/multi-edge turning:								
- Turning		○	○		○	○	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Electronic gear for 3 leading axes, without curve table, without cascading:								
- Turning		○	○		○	○	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○
• Axial coupling in the machine coordinate system		–	–		–	–	–	–
• Master value coupling/curve table interpolation		–	–		–	–	–	–
Leadscrew error compensation, bidirectional	6FC5800-0AM54-0YH0 The correctable tolerance band is restricted to 1 mm.	○	○		○	○	○	○
Sag compensation, multi-dimensional	6FC5800-0AM55-0YH0 The correctable tolerance band is restricted to 1 mm.	○	○		○	○	○	○
Main axis/sub axis Basic for drives	6FC5800-0AS52-0YH0	○	○		○	○	○	○
• Turning		1	1		1	1	2	2
• Milling		1	1		1	1	3	3
• G-Tech Cylindrical/G-Tech Surface		1	1		1	1	2	2
Evaluation of internal drive variables, Basic	6FC5800-0AS53-0YH0	○	○		○	○	○	○

¹⁾ In Create MyVirtual Machine, no distinctions are mapped between the hardware types/classes. Projects created with Create/Run MyVirtual Machine can be loaded into SINUMERIK 828 PU/PPU, taking into consideration the HW configurations and constraints.

²⁾ Floating: Server-based licenses, can be used on multiple work stations (not simultaneously); order recommendation.

³⁾ Node-locked Server: Server license that is connected to particular clients (work station/PC)
Node-locked Standalone: Local license file that is connected to a particular client (work station/PC)

⁴⁾ Academics: For non-commercial use.

For more information, request the detailed description of licenses.

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description		Article No. Product ID Notes	SINUMERIK 828D					
✓ Basic version | ○ Option | – Not available			SW 24x		SW 26x		SW 28x	
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Manufacturer options (continued)								
SINUMERIK Operate Runtime license OA Easy Screen								
Run MyScreens								
> 5 screens, extended functions			6FC5800-0AP64-0YH0					
• Turning				○	○		○	○
• Milling				○	○		○	○
• G-Tech Cylindrical/G-Tech Surface				✓	✓		✓	✓
Extended Safety Integrated functions for one CNC axis/spindle			6FC5800-0AC50-0YH0	○	○		○	○
SINUMERIK 828D Run EasyXML:			6FC5800-0AQ20-0YH0					
• Turning				○	○		○	○
• Milling				○	○		○	○
• G-Tech Cylindrical/G-Tech Surface				✓	✓		✓	✓
Development, commissioning and simulation of virtual machine tools with SINUMERIK 828								
Create MyVirtual Machine /Operate	NEW	MCS4250f ²⁾ MCS4250n ³⁾ MCS4250a ⁴⁾	○ ¹⁾	○ ¹⁾		○ ¹⁾	○ ¹⁾	○ ¹⁾
Virtual test environment for SINUMERIK 828								
Create MyVirtual Machine /Open	NEW	MCS4255f ²⁾ MCS4255n ³⁾ MCS4255a ⁴⁾	○ ¹⁾	○ ¹⁾		○ ¹⁾	○ ¹⁾	○ ¹⁾
Virtual test environment for SINUMERIK 828 Extension with an open communications interface								
Create MyVirtual Machine /3D	NEW	MCS4210 ²⁾ MCS4210n ³⁾ MCS4210a ⁴⁾	○ ¹⁾	○ ¹⁾		○ ¹⁾	○ ¹⁾	○ ¹⁾
Virtual test environment for SINUMERIK 828 Extension comprising a Virtual Machine Creator for JobShop applications								
Access protection for cycles Lock MyCycles		6FC5800-0AP54-0YH0 MCS11000	○	○		○	○	○
Extended stop and retract ESR, CNC-controlled and drive-autonomous			6FC5800-0AM61-0YH0					
• Turning				–	–		–	–
• Milling				–	–		–	–
• G-Tech Cylindrical/G-Tech Surface				○	○		○	○
Drive-autonomous extended stop and retract ESR, incl. generator operation		6FC5800-0AM60-0YH0	○	○		○	○	○
Memory expansion to 32000 Ladder Steps		6FC5800-0AD40-0YH0	○	○		○	○	○
Balance cutting:		6FC5800-0AS05-0YH0						
• Turning				–	–		–	○
• Milling				–	–		–	–
• G-Tech Cylindrical/G-Tech Surface				–	–		–	–

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x		SW 26x		SW 28x			
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Manufacturer options (continued)									
Friction compensation with adaptive characteristics	6FC5800-0AS06-0YH0	○	○		○	○	○	○	
Multi Error Compensation Eco	6FC5800-0AS80-0YH0	○	○		○	○	○	○	
Multi Error Compensation Basic	6FC5800-0AS81-0YH0	○	○		○	○	○	○	
Multi Error Compensation Advanced	6FC5800-0AS82-0YH0	–	–		–	–	○	○	
CNC lock function	6FC5800-0AP76-0YH0	○	○		○	○	○	○	
DYNEGMA dynamic energy management	6SL3077-0AA03-0AB0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Advanced Position Control APC ECO	6FC5800-0AM12-0YH0	○	○		○	○	○	○	
Simulated motor encoder	6FC5800-0AD30-0YH0	○	○		○	○	○	○	
Protect MyMachine /3D Primitives collision avoidance (machine, working area)	6FC5800-0AS03-0YH0 MCS41200 Only single-channel	○	○		○	○	○	○	
Protect MyMachine /3D Primitives collision avoidance 1 additional channel	6FC5800-0AE00-0YH0	–	–		–	–	○	○	
Protect MyMachine /3D STL collision avoidance (machine, working area)	6FC5800-0AS02-0YH0	–	–		–	–	–	–	
Protect MyMachine /Open interface collision avoidance (machine, working area)	6FC5800-0AS04-0YH0	–	–		–	–	–	–	
Nodding compensation ECO • One compensation axis can process one influence quantity • Adaptive compensation via 3 interpolation points	6FC5800-0AS20-0YH0 No rotary axis possible	○	○		○	○	○	○	
Nodding compensation ADVANCED • Each compensation axis can process 3 influence quantities • Adaptive compensation via 3 interpolation points • Unlimited number of compensation axes	6FC5800-0AS21-0YH0 No rotary axis possible	○	○		○	○	○	○	
Setpoint exchange:	6FC5800-0AM05-0YH0								
• Turning		–	–		–	–	○	○	
• Milling		–	–		–	–	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	○	○	
Use extended HMI applications Run MyHMI /3GL (maximum 300 MB)	6FC5800-0AP60-0YH0 MCS11100	○	○		○	○	○	○	
Tool identification for loading/unloading tools with code carrier									
• Tool Ident Connection	6FC5800-0AP52-0YH0 MCS51300	○	○		○	○	○	○	
Interpolation turning	6FC5800-0AP57-0YH0								
• Turning		–	–		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Surface turning	6FC5800-0AR51-0YH0								
• Turning		–	–		–	–	–	–	
• Milling		–	–		○	○	–	–	
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
Manufacturer options (continued)								
SMTE cone turning ¹⁾ Requirement: CNC software ≥ SW version 4.95	6FC5800-0AR52-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
SMTE QR Code ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP3	6FC5800-0AR53-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
SMTE Engraving ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP3	6FC5800-0AR54-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Prime Turning TM	6FC5800-0AR56-0YH0							
• Turning		○	○		○	○	○	○
• Milling		–	–		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
SMTE Chatter avoidance ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP4	NEW 6FC5800-0AR57-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
SMTE Trochoidal Basic ¹⁾ Requirement: CNC software ≥ SW version 4.95 SP4	NEW 6FC5800-0AR58-0YH0							
• Turning		–	–		–	–	–	–
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Continuous path mode (G64) extended	NEW 6FC5800-0AS37-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Comb grooving	6FC5800-0AS58-0YH0							
• Turning		○	○		○	○	○	○
• Milling		–	–		–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–

¹⁾ Regarding delivery, please contact your local Siemens sales office or Regional Company.

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SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description ✓ Basic version ○ Option – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Manufacturer options (continued)									
Intelligent dynamic control	6FC5800-0AS23-0YH0								
• Turning		–	–		–	–	–	–	–
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Intelligent load control	6FC5800-0AS11-0YH0								
• Turning		–	–		–	–	–	–	–
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Jerk adaptation	6FC5800-0AS22-0YH0								
• Turning		–	–		–	–	–	–	–
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Turning with Y-axis	6FC5800-0AS56-0YH0								
• Turning		○	○		○	○	○	○	○
• Milling		–	–		–	–	–	–	–
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Advanced Rapid Movement (COMPPATH) Intelligent adaptation of the machine paths outside of the workpiece	6FC5800-0AS64-0YH0								
• Turning		–	–		–	–	–	–	–
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Reduced dynamic mode	6FC5800-0AS65-0YH0								
• Turning		–	–		–	–	–	–	–
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	–
Run MyRobot /Handling	6FC5800-0AP72-0YH0 MCS1190	○	○		○	○	○	○	○
Optimize MyMachining /AdaptiveControl Standard	6FC5800-0AT01-0YH0 MCS2150								
• Turning		○	○		○	○	○	○	○
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	○
Optimize MyMachining /AdaptiveControl Pro	6FC5800-0AT02-0YH0 MCS2151								
• Turning		○	○		○	○	○	○	○
• Milling		○	○		○	○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	○

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SINUMERIK 828D CNCs

Overview of CNC options > Manufacturer options

Description ✓ Basic version ○ Option – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
Manufacturer options (continued)									
ACM Suite: AMW /ToolMonitor Pro	6FC5800-0AT03-0YH0 MCS2265								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
ACM Suite: Multi-spindle extension	6FC5800-0AT04-0YH0 MCS2153								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
ACM Suite: Multi-channel extension	6FC5800-0AT05-0YH0 MCS2154								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
ACM Suite: Single part extension	6FC5800-0AT06-0YH0 MCS2155								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
SINUMERIK PCU base software /IPC ≥ V15 for SIMATIC IPC with Microsoft Windows 10 Software option, supply of an electronic license (PDF) Requirement: SIMATIC IPC for SINUMERIK SINUMERIK Operate /PCU (option Q10) or SINUMERIK Operate /PCU Modular (option Q11)	6FC5800-0AP86-1YH0	–	○		–	○	–	○	
SINUMERIK Operate /PC	6FC5800-0AQ01-0YH0	–	○		–	○	–	○	
SINUMERIK Operate /PCU	6FC5800-0AQ10-0YH0	–	○		–	○	–	○	
SINUMERIK Operate /PCU Modular	6FC5800-0AQ11-0YH0	–	○		–	○	–	○	
Ctrl-E Advanced Analysis	NEW 6FC5800-0AQ51-0YH0	○	○		○	○	○	○	
Ctrl-E Balanced Spindle Acceleration	6FC5800-0AQ52-0YH0	○	○		○	○	○	○	
SINUMERIK Operate Display Manager Multi-window technology for SINUMERIK Operate Single license, without data storage medium Requirement: Resolution > 1920 px × 1080 px	6FC5800-0AP81-0YH0	–	○		–	○	–	○	
SINUMERIK 828D AST add-on	6FC5800-0AS12-0YB0	○	○		○	○	○	○	

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SINUMERIK 828D CNCs

Overview of CNC options > User options

Description	Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
User options									
Extended functions for grinding Grinding advanced:	6FC5800-0AS35-0YH0								
• Dressing (paraxial form-truing) with stock removal cycles (Basic CYCLE95)									
• Cylinder error compensation									
- Turning		–	–		–	–	–	–	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Advanced technology functions¹⁾ (expansion of the technology cycles for turning and milling):	6FC5800-0AP58-0YH0								
• Pocket milling with free contour definition and islands:									
- Turning		○	○		✓	✓	✓	✓	
- Milling		○	○		✓	✓	✓	✓	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
• Stock removal cycles with free contour definition:									
- Turning		○	○		✓	✓	✓	✓	
- Milling		–	–		–	–	–	–	
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–	
Extended operator functions²⁾	6FC5800-0AP16-0YH0	○	○		○	○	○	○	

¹⁾ The CNC option Advanced technology functions provides you with technology cycles for the following additional machining operations:

- Asymmetric grooves (turning only)
- Drill and thread milling
- Thread milling
- Multi-edge milling
- Engraving
- Extended stock removal along contour with segmentation of blank (turning only)
- Contour grooving and plunge turning (turning only)
- Milling of contour pockets and spigots with up to 12 islands
- Position pattern - hide position
- Asymmetrically turn a shoulder
- DIN thread undercut

²⁾ The operator functions in the basic scope of the SINUMERIK 828D are designed for standard applications.

The CNC option Extended operator functions enables the following additional operator functions:

- Overstore
- Teach-in
- DRF function
- Extended block search
- Extended skip levels > 2
- Backup of workpiece setup data
- Additional measuring version beyond standard scope (only milling)
 - Standard scope workpiece zero: Set edge, align edge, right-angled corner, 1 hole, 1 circular spigot and rectangular spigot
 - Expansion of the measurement screens via combo box
- Synchronized actions softkey
- MDI load/save

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > User options

Description	Article No. Product ID Notes	SINUMERIK 828D						
✓ Basic version | ○ Option | – Not available		SW 24x			SW 26x		SW 28x	
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5
User options (continued)								
Configured stop	6FC5800-0AS24-0YH0	○	○		○	○	○	○
Program editor:								
• ShopTurn/ShopMill machining step programming:	6FC5800-0AP17-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
• programSYNC – multi-channel step sequence programming:	6FC5800-0AP05-0YH0							
- Turning		–	–		–	–	○	○
- Milling		–	–		–	–	–	–
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Residual material detection and machining for contour pockets and stock removal:	6FC5800-0AP13-0YH0 Requirement: Advanced technology functions option 6FC5800-0AP58-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
3D simulation 1 (finished part):	6FC5800-0AP25-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Simultaneous recording (real-time simulation of the current machining operation)	6FC5800-0AP22-0YH0	○	○		○	○	○	○
Measuring cycles for drilling/milling and turning Calibration of workpiece probe, workpiece measure- ment, tool measurement:	6FC5800-0AP28-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Operation with tool management:								
• Replacement tools for tool management:	6FC5800-0AM78-0YH0							
- Turning		○	○		○	○	○	○
- Milling		○	○		○	○	○	○
- G-Tech Cylindrical/G-Tech Surface		–	–		–	–	–	–
Remote diagnostics and data transfer:								
• Access MyMachine /P2P RT	6FC5800-0AP30-0YH0 MCS31400	○	○		○	○	○	○
Contour handwheel	6FC5800-0AM08-0YH0	○	○		○	○	○	○
Angle head adapter	6FC5800-0AM56-0YH0							
• Turning		○	○		○	○	○	○
• Milling		○	○		○	○	○	○
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○

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SINUMERIK 828D CNCs

Overview of CNC options > User options

Description		Article No. Product ID Notes	SINUMERIK 828D							
✓ Basic version | ○ Option | – Not available			SW 24x			SW 26x		SW 28x		
			PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
User options (continued)										
Identify tool demand		6FC5800-0AM77-0YH0								
• Turning			○	○			○	○	○	○
• Milling			○	○			○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–			–	–	–	–
SINUMERIK MDynamics:										
• Advanced Surface:		6FC5800-0AS07-0YH0	–	–			–	–	–	–
- Turning			✓	✓			✓	✓	✓	✓
- Milling			–	–			–	–	–	–
- G-Tech Cylindrical/G-Tech Surface										
• Top Surface:		6FC5800-0AS17-0YH0	–	–			–	–	–	–
- Turning			○	○			○	○	○	○
- Milling			–	–			–	–	–	–
- G-Tech Cylindrical/G-Tech Surface										
Optimized Top Surface:		NEW 6FC5800-0AH00-0YH0								
		Requirement: Top Surface								
• Turning			–	–			–	–	–	–
• Milling			○	○			○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–			–	–	–	–
Top Speed plus		6FC5800-0AS62-0YH0								
• Turning			–	–			–	–	–	–
• Milling			○	○			○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–			–	–	–	–
Spline interpolation (A, B and C splines)		6FC5800-0AS16-0YH0	○	○			○	○	○	○
Measure kinematics		6FC5800-0AP18-0YH0								
Determine transformation data of rotary axes:										
• Turning			–	–			–	–	○	○
• Milling			○	○			○	○	○	○
• G-Tech Cylindrical/G-Tech Surface			–	–			–	–	–	–
Host computer connection Server for OPC UA in SINUMERIK Operate Access MyMachine:										
• Access MyMachine /OPC UA Variables/ms, maximum number		6FC5800-0AP67-0YH0	○ 100/200	○ 100/200			○ 100/200	○ 100/200	○ 100/200	○ 100/200
• SINUMERIK 828D Access MyMachine /OPC UA - Eco		6FC5800-0AQ67-0YH0	○	○			○	○	○	○

¹⁾ Floating: Server-based licenses, can be used on multiple workstations (not simultaneously); order recommendation.

²⁾ Node-locked Server: Server license that is connected to particular clients (work station/PC)
Node-locked Standalone: Local license file that is connected to a particular client (work station/PC)

³⁾ Academics: For non-commercial use.

For more information, request the detailed description of licenses.

Overview of functions

SINUMERIK 828D CNCs

Overview of CNC options > User options

Description ✓ Basic version | ○ Option | – Not available	Article No. Product ID Notes	SINUMERIK 828D							
		SW 24x			SW 26x		SW 28x		
		PPU 27x.5/ 290.5	PU 272.5		PPU 27x.5/ 290.5	PU 272.5	PPU 27x.5/ 290.5	PU 272.5	
User options (continued)									
DXF Reader for PC integrated in SINUMERIK Operate	6FC5800-0AP56-0YH0 MCS41300	○	○		○	○	○	○	
CNC user memory expanded for programs	6FC5800-0AP77-0YH0	–	–		○ 100 MB	○ 100 MB	○ 100 MB	○ 100 MB	
Execution from external storage EES	6FC5800-0AP75-0YH0 MCS51100 Contains the option: CNC user memory expanded for programs 6FC5800-0AP77-0YH0	–	–		○	○	○	○	
Additional CNC user memory 300 MB, extended Max. extension 1000 MB	6FC5800-0AD60-0YH0 Requirement: Execution from external storage EES 6FC5800-0AP75-0YH0	–	–		○	○	○	○	
Monitoring for maximum tool speed/acceleration	6FC5800-0AS08-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Path acceleration limitation	6FC5800-0AP26-0YH0								
• Turning		○	○		○	○	○	○	
• Milling		○	○		○	○	○	○	
• G-Tech Cylindrical/G-Tech Surface		○	○		○	○	○	○	
Simulation of virtual machine tools with SINUMERIK 828 during production									
Run MyVirtual Machine /Operate Control-identical programming station for NC programs or for training and apprenticeship purposes	NEW MCS4220 ¹⁾ MCS4220n ²⁾ MCS4220a ³⁾	○	○		○	○	○	○	
Run MyVirtual Machine /Open Extension with an open communications interface for integration into a simulation system	NEW MCS4230 ¹⁾ MCS4230n ²⁾ MCS4230a ³⁾	○	○		○	○	○	○	
Run MyVirtual Machine /3D Extension to the virtual machine during work preparation	NEW MCS4240 ¹⁾ MCS4240n ²⁾ MCS4240a ³⁾	○	○		○	○	○	○	

Overview of functions

SINUMERIK 828D CNCs

System overview

Product name	SINUMERIK 828D SW 24x		SW 26x	SW 28x
	PPU 27x.5/ PPU 290.5/ PU 272.5		PPU 27x.5/ PPU 290.5/ PU 272.5	PPU 27x.5/ PPU 290.5/ PU 272.5
Number of DRIVE-CLiQ ports	3		3	3
Number of PROFINET ports (PLC periphery interface)	2		2	2
Maximum axes in system (including axes/spindles in machining channel + axes in handling channel + PLC positioning axes)				
• Turning	8		11	18 ²⁾
• Milling	8		11	16 ¹⁾
• G-Tech Cylindrical/G-Tech Surface	8		11	18 ²⁾
Number of axes/spindles (basic scope)				
• Turning	3		3	3
• Milling	4		4	4
• G-Tech Cylindrical/G-Tech Surface	3		3	3
Number of axes with drive-based Safety Integrated, maximum (Extended Safety Integrated functions)				
• Turning	5		6	6 / 12 ²⁾
• Milling	5		6	6 / 12 ¹⁾
• G-Tech Cylindrical/G-Tech Surface	5		6	6 / 12 ²⁾
Maximum number of axes/spindles + PLC positioning axis in machining channel(s)				
• Turning	5		6 + 2	10 + 2
• Milling	5		6 + 2	8 + 2
• G-Tech Cylindrical/G-Tech Surface	5		6 + 2	10 + 2
Maximum number of axes in handling channel(s)				
• Turning	4		4	4 + 4
• Milling	4		4	4 + 4
• G-Tech Cylindrical/G-Tech Surface	4		4	4 + 4
IPO cycle for max. configuration				
• Turning	9 ms		6 ms	6 ms
• Milling	9 ms		6 ms	3 ms
• G-Tech Cylindrical/G-Tech Surface	9 ms		6 ms	3 ms
Minimum block change time, approx.				
• Turning	9 ms		6 ms	6 ms
• Milling	9 ms		6 ms	3 ms
• G-Tech Cylindrical/G-Tech Surface	9 ms		6 ms	3 ms
Minimum block change time with compressor, approx.				
• Turning	9 ms		6 ms	6 ms
• Milling (depending on the part program)	0.9 ms		0.6 ms	0.3 ms
• G-Tech Cylindrical/G-Tech Surface	–		–	–
Position control cycle³⁾				
• Turning	3 ms (125 µs)		3 ms (125 µs)	1.5 ms (125 µs)
• Milling	3 ms (125 µs)		3 ms (125 µs)	3 ms (125 µs)
• G-Tech Cylindrical/G-Tech Surface	3 ms (125 µs)		3 ms (125 µs)	3 ms (125 µs)
PLC cycle time	9 ms		6 ms	6 ms
DRIVE-CLiQ S120: Velocity and current controller clock cycle	125 µs		125 µs	125 µs
Velocity and current controller clock cycle for a high-speed spindle				
Mixed operation without NX: 4 × 125 µs and 1 × 62.5 µs, max. number of axes = 5				
• Turning	–		–	–
• Milling	62.5 µs		62.5 µs	62.5 µs
• G-Tech Cylindrical/G-Tech Surface	62.5 µs		62.5 µs	62.5 µs
SINAMICS S200: Velocity and current controller clock cycle for a high-speed spindle	125 µs		125 µs	125 µs

¹⁾ The maximum number of axes/spindles can be increased to 10;
6 axes/spindles can be connected to the PPU 270.5/271.5 or PPU 290.5 or PU 272.5 and 4 axes/spindles to the NX15.3.

²⁾ The maximum number of axes/spindles can be increased to 12;
6 axes/spindles can be connected to the PPU 270.5/271.5 or PPU 290.5 or PU 272.5 and 6 axes/spindles to the NX15.3.

³⁾ With active Dynamic Servo Control (DSC), the position control cycle corresponds to the current controller cycle of 125 µs.

Product name	SINUMERIK 828D SW 24x		SW 26x	SW 28x
	PPU 27x.5/ PPU 290.5/ PU 272.5		PPU 27x.5/ PPU 290.5/ PU 272.5	PPU 27x.5/ PPU 290.5/ PU 272.5
Non-Volatile Random-Access Memory (NVRAM) for:				
• OEM	512 KB		512 KB	512 KB
• User data	3 MB		5 MB	10 MB
Number of Numeric Control Extensions NX10.3				
• Turning	1 ⁴⁾		2	2
• Milling	1 ⁴⁾		2	2
• G-Tech Cylindrical/G-Tech Surface	1 ⁴⁾		2	2
Number of Numeric Control Extensions NX15.3				
• Turning	1 ⁴⁾		1	2
• Milling	1 ⁴⁾		1	2
• G-Tech Cylindrical/G-Tech Surface	1 ⁴⁾		1	2
Number of I/O modules PP 72/48D PN or PP 72/48D 2/2A PN				
• Turning	3		4	5
• Milling	3		4	5
• G-Tech Cylindrical/G-Tech Surface	3		5	5

⁴⁾ Only for handling channel.

Overview of functions

Notes

2

SINUMERIK CNCs



3/2	SINUMERIK 828D
3/2	PPU 271.5 and PPU 270.5
3/8	PPU 290.5
3/14	PU 272.5
3/20	Numeric Control Extensions NX10.3/NX15.3
3/21	SINUMERIK Operate
3/21	The user interface for efficient machine operation
3/22	Operator control and programming
3/23	SINUMERIK Operate operating software
3/25	Operator components for CNCs
3/25	Introduction
3/27	Operator panels for SINUMERIK
3/27	SIMATIC IPC for SINUMERIK 828
3/29	Operator panel fronts blackline plus
3/29	SIMATIC Industrial Flat Panel for SINUMERIK 828
3/31	SIMATIC Panel with integrated IPC for SINUMERIK 828
3/33	Handheld units
3/33	SINUMERIK HT 10
3/36	Mini handheld unit
3/38	Electronic handwheel
3/40	Machine control panels blackline plus
3/40	SINUMERIK MCP 398C
3/42	Machine control panels in classic design
3/42	SINUMERIK MCP 1200U-V
3/43	SINUMERIK MCP 1500U
3/44	SINUMERIK MCP 1200U-H
3/45	SINUMERIK MCP Interface PN
3/46	Keyboards
3/46	SINUMERIK ONE KB 1900
3/47	SINUMERIK ONE KB 1500
3/48	Industrial switches
3/48	Industrial Ethernet switches - SCALANCE
3/50	SINUMERIK I/O
3/50	SINUMERIK I/O modules PP 72/48D PN and PP 72/48D 2/2A PN
3/52	Terminal strip converter
3/53	Supplementary components
3/53	SIMATIC PN/PN coupler
3/54	SiTOP power supply
3/55	SiTOP PSU100S/PSU300S
3/56	SiTOP PSU6200
3/57	SETRON 7KM PAC2200 measuring devices

SINUMERIK CNCs

SINUMERIK 828D

PPU 271.5 and PPU 270.5

Overview



SINUMERIK 828 PPU 271.5, horizontal



SINUMERIK 828 PPU 270.5, vertical

The SINUMERIK 828D is an operator-panel CNC which combines all the components of a CNC in one unit:

- CNC, PLC, HMI
- 12.1" TFT color display
- Full CNC keyboard (PPU 270.5)
- Closed-loop control for 6 drives

The motors can easily be connected to the digital drive system via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120/S220 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the CNC has been precisely selected to meet the requirements of standard turning, milling and grinding machines - from one-off production runs to industrial scale manufacture. Thanks to the technology-specific variants for turning, milling and grinding, the system parameters are optimized for the machine, making the commissioning process much quicker and easier.

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

Benefits

Benefits for the machine operator

- Maintenance-free operator panel front, e.g. no fan, no battery
- Simple operation using ShopTurn and ShopMill software
- Advanced Surface and Top Surface: Innovative, high-performance CNC functions provide top quality of workpiece surface with minimum machining times
- Unique spectrum of technology cycles - ranging from the machining of any turning and milling contour with residual material detection to in-process measurements and balance cutting
- G-Tech is a grinding package with an extensive scope of CNC functions ranging from the low-cost entry-level model up to highly productive machines
- Animated Elements: Optimum operator guidance thanks to CNC input screens with animated elements
- Access MyMachine /Ethernet permits remote diagnostics from anywhere in the world
- Easy Message: Using an existing Internet connection, Easy Message enables you to be informed by email about certain machine states
- Easy Extend: Flexible handling of machine aggregates, e.g. an A axis/parts machine
- Maintenance scheduler: Signaling of pending maintenance tasks in accordance with specified maintenance intervals

Benefits for the machine manufacturer

- Customized HMI using Create MyHMI /3GL and the Microsoft Windows-based IPC
- High system quality through reduction in hardware interfaces
- Drive-based Safety Integrated for compliance with the machinery directive
- Less complex system thanks to technology-specific system software
- Faster, easier commissioning thanks to preset system parameters
- Automatic system configuration by means of single PLC I/Os
- Service Planner: Integrated planner for machine maintenance intervals
- Easy Archive: Integrated archiving procedure for optimum handling of commissioning updates
- Easy Extend: Integrated wizard for optional machine units
- Simple PLC programming with symbols and comments on the CNC
- No outlay required by dealers and machine manufacturers thanks to free PLC programming tool
- Faults will be remedied for a period of 24 months, following 2nd commissioning on all system components in accordance with the OSS Plus (Online Service and Support Plus) performance description for 36 months

Function

- Operator panel CNC with dedicated system software variants for turning, milling and grinding technologies
- Additional Ethernet interface for connection to factory network
- Additional USB interface for machine control panel
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and a machine control panel
- Easy Message: Integrated mobile radio modem for optimum process monitoring and maximum machine availability via text messages (SMS)
- Integrated PLC editor in SINUMERIK Operate makes it possible to edit the PLC program quickly without any additional PC tools
- CNC options subject to license
- Up to 6 axes/spindles
- Up to 9 axes/spindles with SINAMICS NX10.3
- Up to 12 axes/spindles with SINAMICS NX15.3
- 1 analog spindle
- 1 machining channel,
2 machining channels and 2 handling channels with SW 28x
- 1 mode group,
4 mode groups with SW 28x
- EES function – unlimited expansion of CNC memory
- Integrated tool management with tool life monitoring
- Graphical machining step programming ShopTurn/ShopMill (option)
- Top Surface
- User interface SINUMERIK Operate – same look and feel as SINUMERIK ONE
- Configurable user screens with Run MyScreens (Easy Screen)
- Run MyRobot /EasyConnect for simple interfacing of robots and handling systems
- Integrated data archiving procedure for simple data updates
- NC channel for handling
- Additional PLC ladder steps
- Angle head adapter
- Identify tool demand
- programSYNC
- Path acceleration limitation
- Tool identification for loading/unloading tools with code carrier
- Interpolation turning
- Use extended HMI applications Run MyHMI /3GL
- Intelligent Load Control ILC
- Jerk adaptation
- Intelligent Dynamic Control IDC
- Configured stop
- Surface turning
- Comb grooving
- Top Speed plus
- Dynamic energy management (DYNEGMA, SMART Acc./Dcc.)
- Cone turning
- Multi Error Compensation (MEC)
- Y turning
- Advanced Rapid Movement
- Interpolation turning (IPT)
- SMTE chatter avoidance
- SMTE Trochoidal Basic
- Ctrl-E Balanced Spindle Acceleration
- Ctrl-E Analysis

SINUMERIK CNCs

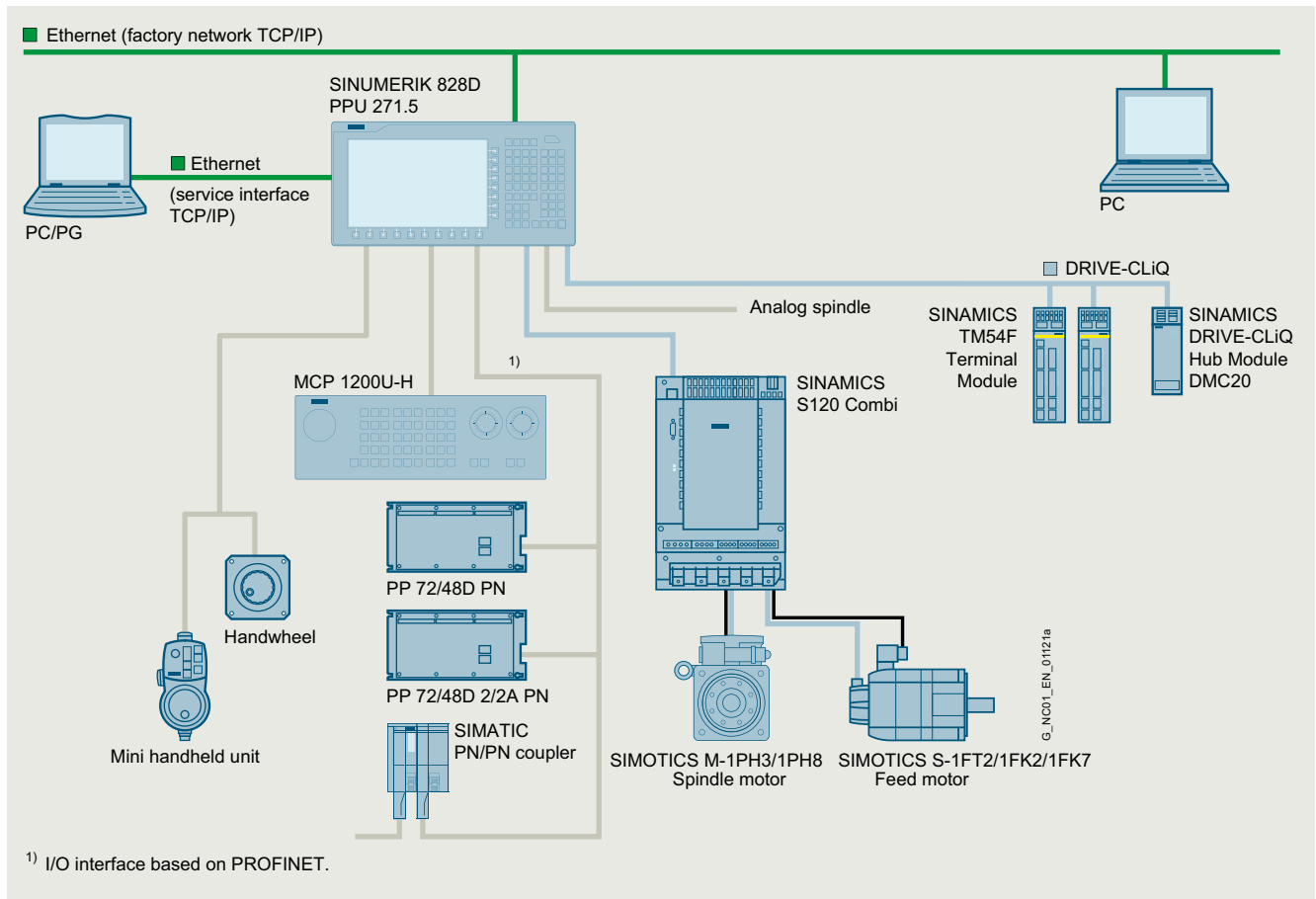
SINUMERIK 828D

PPU 271.5 and PPU 270.5

Integration

The following components can be connected to the SINUMERIK 828D PPU 27x.5:

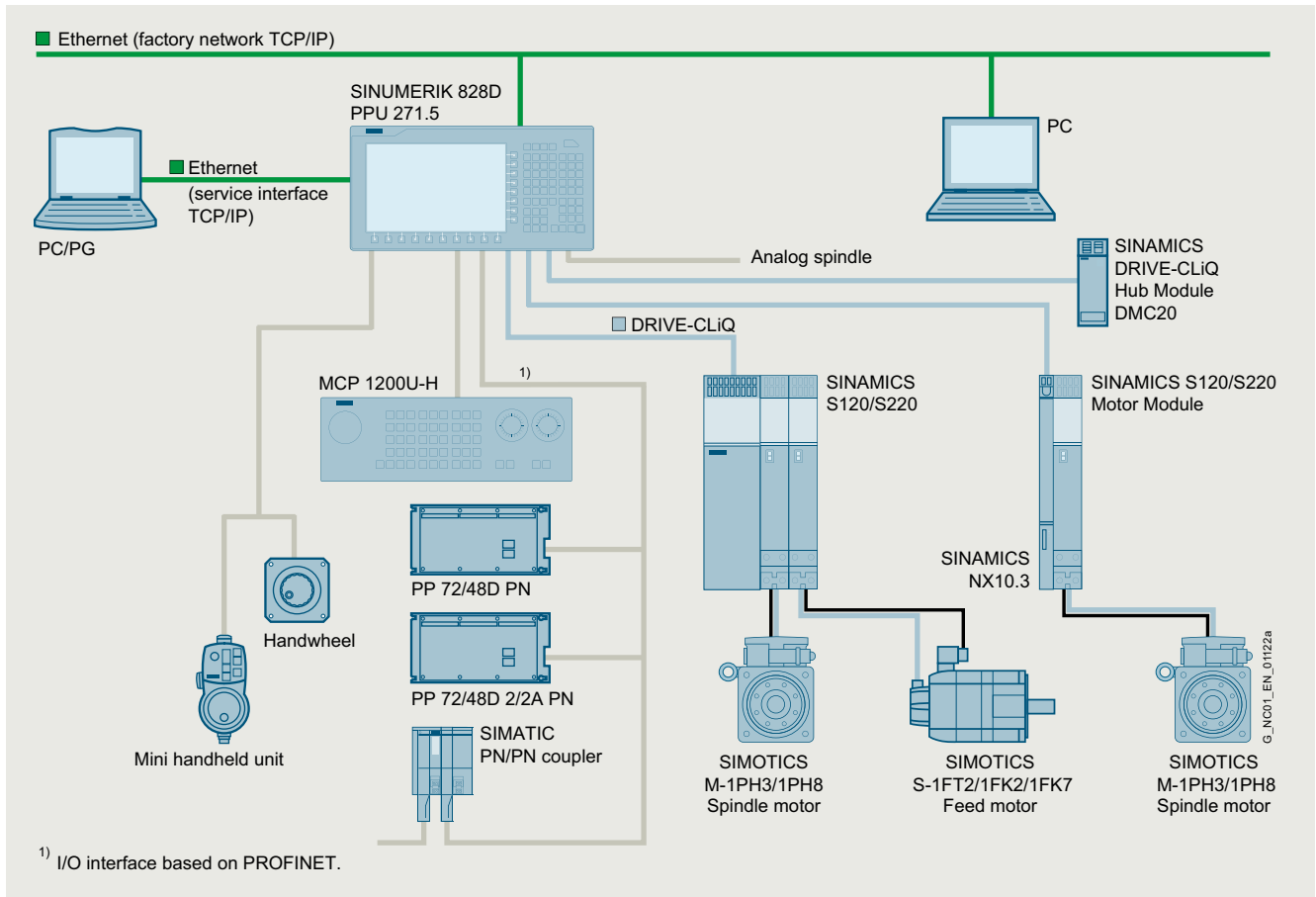
- 2 electronic handwheels¹⁾
- Mini handheld unit with handwheel
- 3 to 5 PP 72/48D PN or PP 72/48D 2/2A PN I/O modules
- SIMATIC PN/PN coupler
- SINUMERIK MCP 1200U-V/1200U-H machine control panels
- SINUMERIK MCP Interface PN
- EasyMessage email client for machine production information
- SENTRON PAC Power Monitoring Devices
- SINAMICS S120/S220 drive system via DRIVE-CLiQ
- SINAMICS Numeric Control Extension NX10.3
- SINAMICS Numeric Control Extension NX15.3
- Expansion of the SINUMERIK 828D system with additional auxiliary axes for loading axes, parts catchers or other auxiliary modules



SINUMERIK 828D PPU 271.5 configuration example with SINAMICS S120 Combi

¹⁾ Third handwheel can be connected via MCP Interface PN. Use: Manual machine.

Integration



SINUMERIK 828D PPU 271.5 configuration example with SINAMICS S120/S220

SINUMERIK CNCs

SINUMERIK 828D

PPU 271.5 and PPU 270.5

Selection and ordering data

Description	Article No.
Hardware components	
SINUMERIK 828D PPU 271.5 horizontal¹⁾ Without system software Note: The connectors are not included in the scope of supply of the PPU.	6FC5370-5AA50-0AA0
SINUMERIK 828D PPU 270.5 vertical¹⁾ Without system software Note: The connectors are not included in the scope of supply of the PPU.	6FC5370-6AA50-0AA0
Software components	
System software SW 24x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5835-1GY50-0YA0 6FC5835-2GY50-0YA0 6FC5835-3GY50-0YA0
System software SW 26x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5834-1GY50-0YA0 6FC5834-2GY50-0YA0 6FC5834-3GY50-0YA0
System software SW 28x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5836-1GY50-0YA0 6FC5836-2GY50-0YA0 6FC5836-3GY50-0YA0
SINUMERIK 828D Toolbox • On DVD-ROM • For download	6FC5830-0CY50-0YA8 6FC5830-0EY50-0YA8
Access MyMachine /P2P Service tool for PC/PG with Microsoft Windows 10, single license, current SW version	6FC5860-7YC00-0YA0 Product ID: MCS31401
Additional languages On DVD-ROM without license • For SINUMERIK Operate up to software version 4.8	On request
SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool) You can find more information about the TIA Selection Tool at:	www.siemens.com/tia-selection-tool

Description	Article No.
Additional hardware components	
SINAMICS Numeric Control Extension • NX10.3 • NX15.3	6SL3040-1NC00-0AA0 6SL3040-1NB00-0AA0
SINAMICS S120 TM54F Terminal Module	6SL3055-0AA00-3BA0
SIMATIC PN/PN coupler For the deterministic data exchange between a max. of 4 PN controllers	6ES7158-3AD10-0XA0
DRIVE-CLiQ signal cable, pre-assembled For PROFINET connection Plug degree of protection IP20 • In fixed lengths ²⁾ • In precise decimeter lengths ²⁾	6SL3060-4A..0-0AA0 6FX2002-1DC00-....
Accessories	
SD card, without license, software version 5.2 To replace a defective system SD card	6FC5830-0GY50-0YA8
SINUMERIK 828D accessory pack Connectors for connecting the cables to the PPU (The connectors are not included in the scope of supply of the PPU.) Set consisting of 7 units, X1, X122, X132, X242, X252, X143.1, X143.2	6FC5348-3AA00-0AA0
Logbook and license certificate SINUMERIK Edition 06.09 Languages: English, German	6FC5095-0AA10-0AP1

More information

The following hardware components are only available in a package and cannot be ordered individually:

- SINUMERIK 828D PPU 271.5/PPU 270.5

When the package is delivered, the SD card containing the system software is already installed in the SINUMERIK.

For more information, please contact your local Siemens office or regional company.

¹⁾ Not available individually, see More information.

²⁾ For complete Article No. and length code, refer to the "MOTION-CONNECT connection systems" section.

Technical specifications

Article No.		6FC5370-5AA50-0AA0	6FC5370-6AA50-0AA0
Product brand name		SINUMERIK	SINUMERIK
Product type designation		828D	828D
Product short term		PPU 271.5	PPU 270.5
Product designation		CNC	CNC
Screen diagonal	in	12.1	12.1
Design of display		TFT color	TFT color
Display resolution	Pixels	1280 × 800	1280 × 800
Design of operator panel		Horizontal	Vertical
Mounting position of operator panel		Vertical	Vertical
Supply voltage at DC	V	24	24
• Relative negative tolerance at 24 V	%	15	15
• Relative positive tolerance at 24 V	%	20	20
Active power consumption maximum	W	60	60
Buffering time in the event of power failure	ms	3	3
• Note		20 ms with SITOP smart power supply	20 ms with SITOP smart power supply
Environmental category acc. to IEC 60721-3-3 (2002)		Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Degree of protection			
• front		IP65	IP65
• rear		IP20	IP20
Relative humidity at 25 °C, during			
• storage	%	10 ... 100	10 ... 100
• transport	%	5 ... 95	5 ... 95
• operation	%	5 ... 90	5 ... 90
Ambient temperature, during			
• storage	°C (°F)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)
• transport	°C (°F)	-20 ... +60 (-4 ... +140)	-20 ... +60 (-4 ... +140)
• operation			
- front	°C (°F)	0 ... 45 (32 ... 113)	0 ... 45 (32 ... 113)
- rear	°C (°F)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)
Width	mm (in)	464 (18.27)	326 (12.83)
Height	mm (in)	237 (9.33)	380 (14.96)
Depth	mm (in)	110 (4.33)	110 (4.33)
Net weight	kg (lb)	4.5 (9.92)	4.5 (9.92)
Certificate of suitability		CE, cULus, EAC	CE, cULus, EAC

SINUMERIK CNCs

SINUMERIK 828D

PPU 290.5

Overview



SINUMERIK 828D PPU 290.5, vertical

The SINUMERIK 828D is an operator-panel CNC which combines all the components of a CNC in one unit:

- CNC, PLC, HMI
- 15.6" multi-touch display in 16:9 format
- Full CNC keyboard
- Closed-loop control for 6 drives

The motors can easily be connected to the digital drive system via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120/S220 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the CNC has been precisely selected to meet the requirements of standard turning, milling and grinding machines - from one-off production runs to industrial scale manufacture. Thanks to the technology-specific variants for turning, milling and grinding, the system parameters are optimized for the machine, making the commissioning process much quicker and easier.

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

Benefits

Benefits for the machine operator

- Maintenance-free operator panel front, e.g. no fan, no battery
- Simple operation using ShopTurn and ShopMill software
- Advanced Surface and Top Surface: Innovative, high-performance CNC functions provide top quality of workpiece surface with minimum machining times
- Unique spectrum of technology cycles - ranging from the machining of any turning and milling contour with residual material detection to in-process measurements and balance cutting
- G-Tech is a grinding package with an extensive scope of CNC functions ranging from the low-cost entry-level model up to highly productive machines
- Animated Elements: Optimum operator guidance thanks to CNC input screens with animated elements
- Access MyMachine /Ethernet permits remote diagnostics from anywhere in the world
- Easy Message: Using an existing Internet connection, Easy Message enables you to be informed by email about certain machine states
- Easy Extend: Flexible handling of machine aggregates, e.g. an A axis/parts machine
- Maintenance scheduler: Signaling of pending maintenance tasks in accordance with specified maintenance intervals

Benefits for the machine manufacturer

- Customized HMI using Create MyHMI /3GL and the Microsoft Windows-based IPC
- High system quality through reduction in hardware interfaces
- Drive-based Safety Integrated for compliance with the machinery directive
- Less complex system thanks to technology-specific system software
- Faster, easier commissioning thanks to preset system parameters
- Automatic system configuration by means of single PLC I/Os
- Service Planner: Integrated planner for machine maintenance intervals
- Easy Archive: Integrated archiving procedure for optimum handling of commissioning updates
- Easy Extend: Integrated wizard for optional machine units
- Simple PLC programming with symbols and comments on the CNC
- No outlay required by dealers and machine manufacturers thanks to free PLC programming tool
- Faults will be remedied for a period of 24 months, following 2nd commissioning on all system components in accordance with the OSS Plus (Online Service and Support Plus) performance description for 36 months

Function

- Operator panel CNC with dedicated system software variants for turning, milling and grinding technologies
- Additional Ethernet interface for connection to factory network
- Additional USB interface for machine control panel
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and a machine control panel
- Easy Message: Integrated mobile radio modem for optimum process monitoring and maximum machine availability via text messages (SMS)
- Integrated PLC editor in SINUMERIK Operate makes it possible to edit the PLC program quickly without any additional PC tools
- CNC options subject to license
- Up to 6 axes/spindles
- Up to 9 axes/spindles with SINAMICS NX10.3
- Up to 12 axes/spindles with SINAMICS NX15.3
- 1 analog spindle
- 1 machining channel,
2 machining channels and 2 handling channels with SW 28x
- 1 mode group,
4 mode groups with SW 28x
- EES function – unlimited expansion of CNC memory
- Integrated tool management with tool life monitoring
- Graphical machining step programming ShopTurn/ShopMill (option)
- Top Surface
- User interface SINUMERIK Operate – same look and feel as SINUMERIK ONE
- Configurable user screens with Run MyScreens (Easy Screen)
- Run MyRobot /EasyConnect for simple interfacing of robots and handling systems
- Integrated data archiving procedure for simple data updates
- NC channel for handling
- Additional PLC ladder steps
- Angle head adapter
- Identify tool demand
- programSYNC
- Path acceleration limitation
- Tool identification for loading/unloading tools with code carrier
- Interpolation turning
- Use extended HMI applications Run MyHMI /3GL
- Intelligent Load Control ILC
- Jerk adaptation
- Intelligent Dynamic Control IDC
- Configured stop
- Surface turning
- Comb grooving
- Top Speed plus
- Dynamic energy management (DYNEGMA, SMART Acc./Dcc.)
- Cone turning
- Multi Error Compensation (MEC)
- Y turning
- Advanced Rapid Movement
- Interpolation turning (IPT)
- SMTE chatter avoidance
- SMTE Trochoidal Basic
- Ctrl-E Balanced Spindle Acceleration
- Ctrl-E Analysis

SINUMERIK CNCs

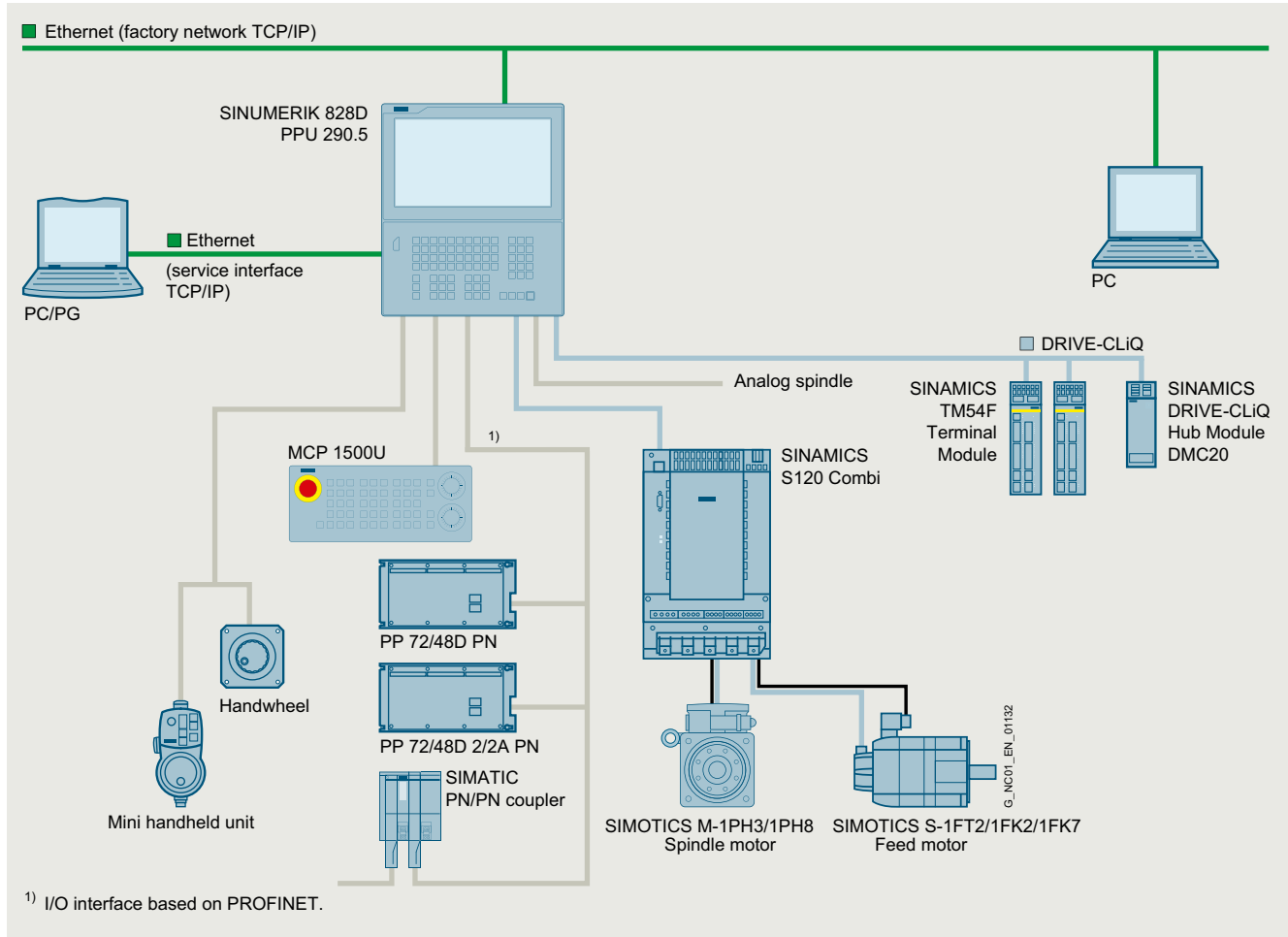
SINUMERIK 828D

PPU 290.5

Integration

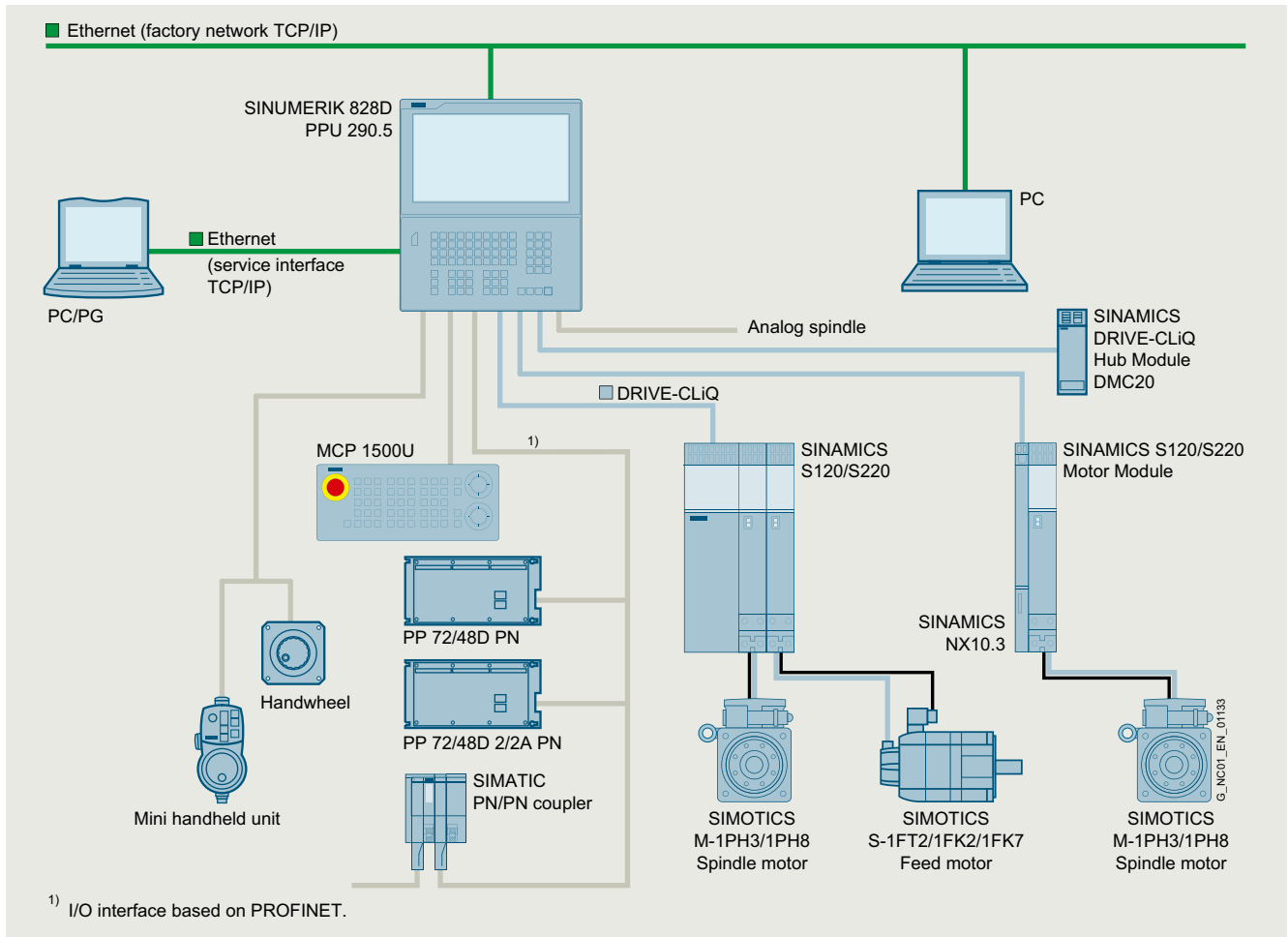
The following components can be connected to the SINUMERIK 828D PPU 290.5:

- 2 electronic handwheels
- Mini handheld unit with handwheel
- 3 to 5 PP 72/48D PN or PP 72/48D 2/2A PN I/O modules
- SIMATIC PN/PN coupler
- SINUMERIK MCP 1500U machine control panel
- SINUMERIK MCP Interface PN
- EasyMessage email client for machine production information
- SENTRON PAC Power Monitoring Devices
- SINAMICS S120/S220 drive system via DRIVE-CLiQ
- SINAMICS Numeric Control Extension NX10.3
- SINAMICS Numeric Control Extension NX15.3
- Expansion of the SINUMERIK 828D system with additional auxiliary axes for loading axes, parts catchers or other auxiliary modules



SINUMERIK 828D PPU 290.5 configuration example with SINAMICS S120 Combi

Integration



SINUMERIK 828D PPU 290.5 configuration example with SINAMICS S120/S220

SINUMERIK CNCs

SINUMERIK 828D

PPU 290.5

Selection and ordering data

Description	Article No.
Hardware components	
SINUMERIK 828D PPU 290.5 vertical¹⁾ Without system software Note: The connectors are not included in the scope of supply of the PPU.	6FC5370-8AA50-0BA0
Software components	
System software SW 24x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5835-1GY50-0YA0 6FC5835-2GY50-0YA0 6FC5835-3GY50-0YA0
System software SW 26x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5834-1GY50-0YA0 6FC5834-2GY50-0YA0 6FC5834-3GY50-0YA0
System software SW 28x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5836-1GY50-0YA0 6FC5836-2GY50-0YA0 6FC5836-3GY50-0YA0
SINUMERIK 828D Toolbox • On DVD-ROM • For download	6FC5830-0CY50-0YA8 6FC5830-0EY50-0YA8
Access MyMachine /P2P Service tool for PC/PG with Microsoft Windows 10, single license, current SW version	6FC5860-7YC00-0YA0 Product ID: MCS31401
Additional languages On DVD-ROM without license • For SINUMERIK Operate up to software version 4.8	On request
SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool) You can find more information about the TIA Selection Tool at:	www.siemens.com/tia-selection-tool

Description	Article No.
Additional hardware components	
SINAMICS Numeric Control Extension • NX10.3 • NX15.3	6SL3040-1NC00-0AA0 6SL3040-1NB00-0AA0
SINAMICS S120 TM54F Terminal Module	6SL3055-0AA00-3BA0
SIMATIC PN/PN coupler For the deterministic data exchange between a max. of 4 PN controllers	6ES7158-3AD10-0XA0
DRIVE-CLiQ signal cable, pre-assembled For PROFINET connection Plug degree of protection IP20 • In fixed lengths ²⁾ • In precise decimeter lengths ²⁾	6SL3060-4A..0-0AA0 6FX2002-1DC00-....
Accessories	
SD card, without license, software version 5.2 To replace a defective system SD card	6FC5830-0GY50-0YA8
SINUMERIK 828D accessory pack Connectors for connecting the cables to the PPU (The connectors are not included in the scope of supply of the PPU.) Set consisting of 7 units, X1, X122, X132, X242, X252, X143.1, X143.2	6FC5348-3AA00-0AA0
Logbook and license certificate SINUMERIK Edition 06.09 Languages: English, German	6FC5095-0AA10-0AP1

More information

The following hardware components are only available in a package and cannot be ordered individually:

- SINUMERIK 828D PPU 290.5

When the package is delivered, the SD card containing the system software is already installed in the SINUMERIK.

For more information, please contact your local Siemens office or regional company.

¹⁾ Not available individually, see More information.

²⁾ For complete Article No. and length code, refer to the "MOTION-CONNECT connection systems" section.

Technical specifications

Article No.	6FC5370-8AA50-0BA0
Product brand name	SINUMERIK
Product type designation	828D
Product short term	PPU 290.5
Product designation	CNC
Screen diagonal	15.6 in
Design of display	TFT color
Display resolution	1920 × 1080 pixels
Design of operator panel	Vertical
Mounting position of operator panel	Vertical
Supply voltage at DC	24 V
• Relative negative tolerance at 24 V	15 %
• Relative positive tolerance at 24 V	20 %
Active power consumption maximum	60 W
Buffering time in the event of power failure	3 ms
• Note	20 ms with SITOP smart power supply
Environmental category acc. to IEC 60721-3-3 (2002)	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Degree of protection	
• front	IP65
• rear	IP20
Relative humidity at 25 °C, during	
• storage	10 ... 100 %
• transport	5 ... 95 %
• operation	5 ... 90 %
Ambient temperature, during	
• storage	-25 ... +55 °C (-13 ... +131 °F)
• transport	-20 ... +60 °C (32 ... 113 °F)
• operation	
- front	0 ... 45 °C (32 ... 113 °F)
- rear	0 ... 55 °C (32 ... 131 °F)
Width	416 mm (16.38 in)
Height	470 mm (18.50 in)
Depth	105 mm (4.13 in)
Net weight	6.5 kg (14.3 lb)
Certificate of suitability	CE, cULus, EAC

SINUMERIK CNCs

SINUMERIK 828D

PU 272.5

Overview



SINUMERIK 828D PU 272.5

The SINUMERIK 828D is a customized CNC solution for different technologies in the medium performance range.

The SINUMERIK 828 PU (Processing Unit) is a CNC which combines the following components in one unit:

- CNC
- PLC
- Closed-loop control for 6 drives (standard)

This design provides a high degree of robustness by eliminating the need for hardware interfaces between the CNC electronics module and the operator panel.

In order to guarantee that operation is as low-maintenance as possible, the SINUMERIK 828 PU has no wearing parts such as fans or back-up batteries.

The motors can easily be connected to the digital drive system via DRIVE-CLiQ. In combination with the modular structure of the SINAMICS S120/S220 drive system, this design is conceived to ensure very simple and rugged installation with minimum wiring overhead.

The performance range of the CNC has been precisely selected to meet the requirements of standard turning, milling and grinding machines - from one-off production runs to industrial scale manufacture. Thanks to the technology-specific variants for turning, milling and grinding, the system parameters are optimized for the machine, making the commissioning process much quicker and easier.

Benefits

Benefits for the machine operator

- Maintenance-free operator panel front, e.g. no fan, no battery
- Simple operation using ShopTurn and ShopMill software
- Advanced Surface and Top Surface: Innovative, high-performance CNC functions provide top quality of workpiece surface with minimum machining times
- Unique spectrum of technology cycles - ranging from the machining of any turning and milling contour with residual material detection to in-process measurements and balance cutting
- G-Tech is a grinding package with an extensive scope of CNC functions ranging from the low-cost entry-level model up to highly productive machines
- Animated Elements: Optimum operator guidance thanks to CNC input screens with animated elements
- Access MyMachine /Ethernet permits remote diagnostics from anywhere in the world
- Easy Message: Using an existing Internet connection, Easy Message enables you to be informed by email about certain machine states
- Easy Extend: Flexible handling of machine aggregates, e.g. an A axis/parts machine
- Maintenance scheduler: Signaling of pending maintenance tasks in accordance with specified maintenance intervals

Benefits for the machine manufacturer

- Customized HMI using Create MyHMI /3GL and the Microsoft Windows-based IPC
- High system quality through reduction in hardware interfaces
- Drive-based Safety Integrated for compliance with the machinery directive
- Less complex system thanks to technology-specific system software
- Faster, easier commissioning thanks to preset system parameters
- Automatic system configuration by means of single PLC I/Os
- Service Planner: Integrated planner for machine maintenance intervals
- Easy Archive: Integrated archiving procedure for optimum handling of commissioning updates
- Easy Extend: Integrated wizard for optional machine units
- Simple PLC programming with symbols and comments on the CNC
- No outlay required by dealers and machine manufacturers thanks to free PLC programming tool
- Faults will be remedied for a period of 24 months, following 2nd commissioning for all system components in accordance with the OSS Plus contract performance description (Online Service and Support Plus) for 36 months

Function

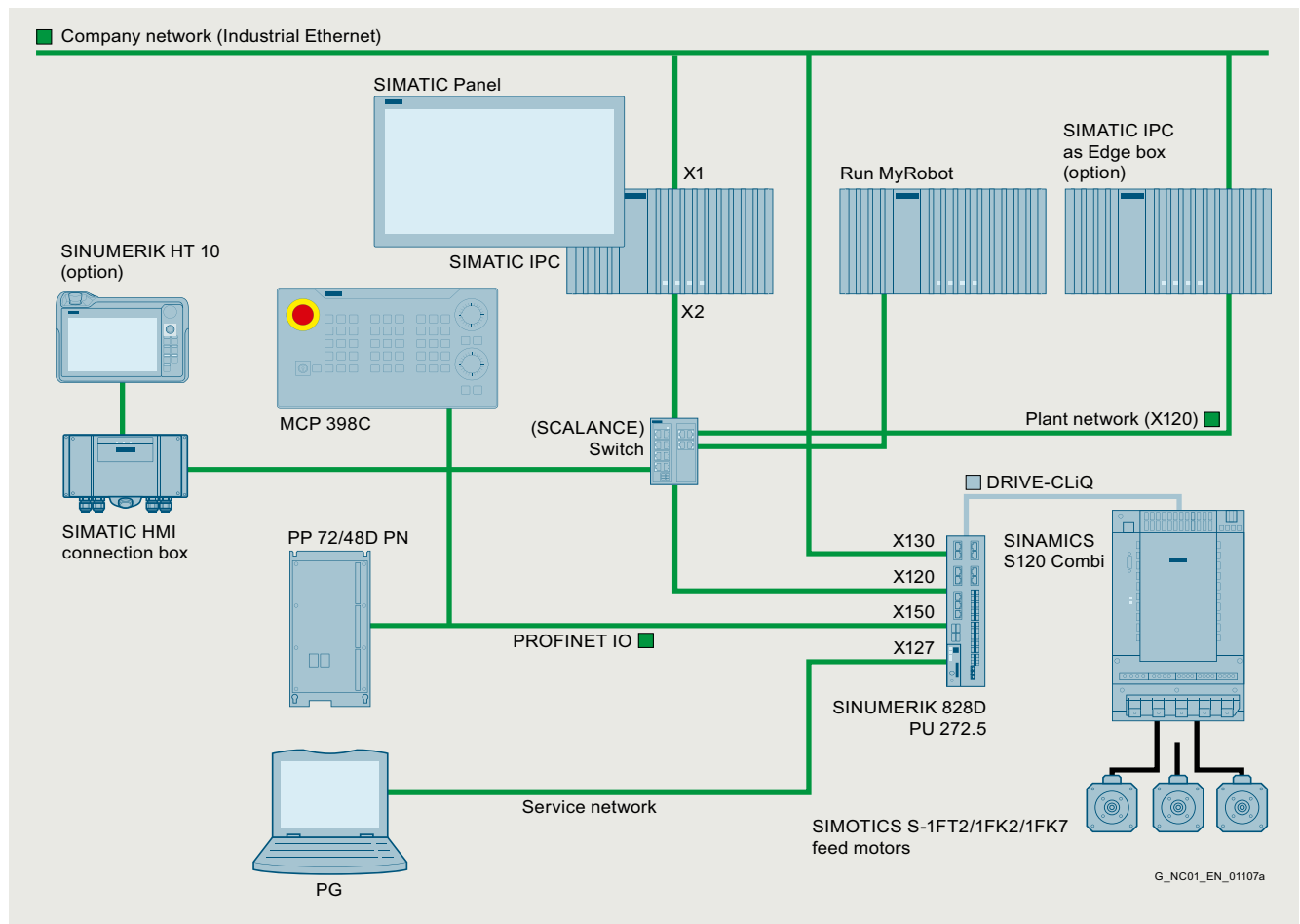
- Operator panel CNC with dedicated system software variants for turning, milling and grinding technologies
- Additional Ethernet interface for connection to factory network
- Additional USB interface for machine control panel
- Integrated PLC based on the SIMATIC S7-200 command set with ladder logic programming
- I/O interface based on PROFINET for the connection of PLC I/O devices and a machine control panel
- Connection of a GSM/GPRS modem: Easy Message (option)
- Integrated PLC editor in SINUMERIK Operate makes it possible to edit the PLC program quickly without any additional PC tools
- CNC options subject to license
- Up to 6 axes/spindles
- Up to 9 axes/spindles with SINAMICS NX10.3
- Up to 12 axes/spindles with SINAMICS NX15.3
- 1 analog spindle
- 1 machining channel,
2 machining channels and 2 handling channels with SW 28x
- 1 mode group,
4 mode groups with SW 28x
- EES function – unlimited expansion of CNC memory
- Integrated tool management with tool life monitoring
- Graphical machining step programming ShopTurn/ShopMill (option)
- Top Surface
- User interface SINUMERIK Operate – same look and feel as SINUMERIK ONE
- Configurable user screens with Run MyScreens (Easy Screen)
- Run MyRobot /EasyConnect for simple interfacing of robots and handling systems
- Integrated data archiving procedure for simple data updates
- NC channel for handling
- Additional PLC ladder steps
- Angle head adapter
- Identify tool demand
- programSYNC
- Path acceleration limitation
- Tool identification for loading/unloading tools with code carrier
- Interpolation turning
- Use extended HMI applications Run MyHMI /3GL
- Intelligent Load Control ILC
- Jerk adaptation
- Intelligent Dynamic Control IDC
- Configured stop
- Surface turning
- Comb grooving
- Top Speed plus
- Dynamic energy management (DYNEGMA, SMART Acc./Dcc.)
- Cone turning
- Multi Error Compensation (MEC)
- Y turning
- Advanced Rapid Movement
- Interpolation turning (IPT)
- SMTE chatter avoidance
- SMTE Trochoidal Basic
- Ctrl-E Balanced Spindle Acceleration
- Ctrl-E Analysis

PU 272.5

Integration

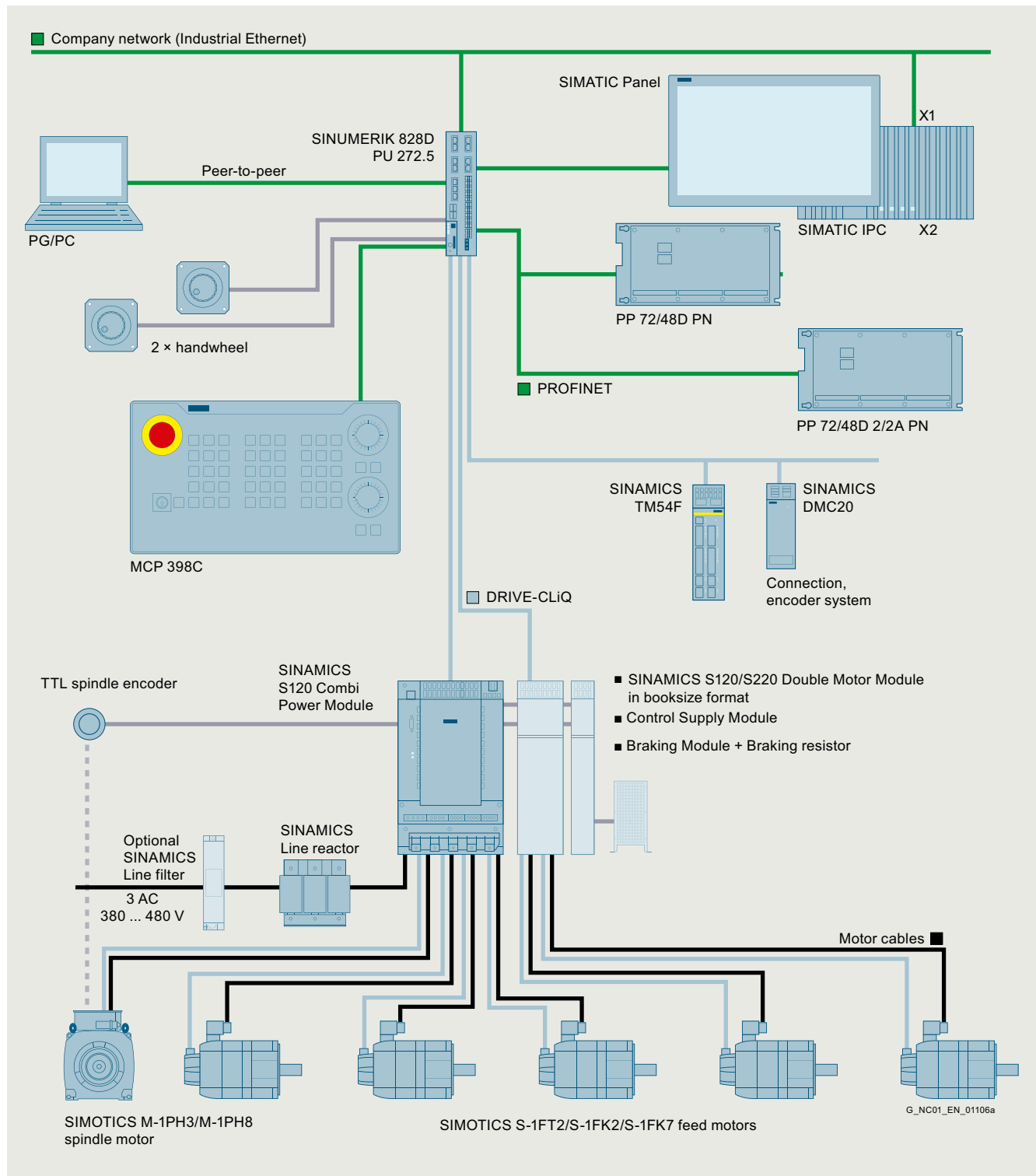
The following components can be connected to the SINUMERIK 828D PU 272.5 :

- 2 electronic handwheels¹⁾
- Mini handheld unit with handwheel
- 3 to 5 PP 72/48D PN or PP 72/48D 2/2A PN I/O modules
- SIMATIC PN/PN coupler
- SINUMERIK MCP 398C machine control panel
- SINUMERIK MCP Interface PN
- SINUMERIK HT 10 handheld terminal
- SIMATIC IPC (Industrial PC)
- SENTRON PAC Power Monitoring Devices
- SINAMICS S120/S220 drive system via DRIVE-CLiQ
- SINAMICS Numeric Control Extension NX10.3
- SINAMICS Numeric Control Extension NX15.3
- Expansion of the SINUMERIK 828D system with additional auxiliary axes for loading axes, parts catchers or other auxiliary modules



SINUMERIK 828D PU 272.5 configuration example with SINAMICS S120 Combi

¹⁾ Third handwheel can be connected via MCP Interface PN. Use: Manual machine.

Integration


SINUMERIK 828D PU 272.5 configuration example with SINAMICS S120 Combi with 6 axes

SINUMERIK CNCs

SINUMERIK 828D

PU 272.5

Selection and ordering data

Description	Article No.
Hardware components	
SINUMERIK 828D PU 272.5 modular¹⁾ Without system software Note: The connectors are not included in the scope of supply of the PU.	6FC5370-7AA50-0AA0
Software components	
System software SW 24x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5835-1GY50-0YA0 6FC5835-2GY50-0YA0 6FC5835-3GY50-0YA0
System software SW 26x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5834-1GY50-0YA0 6FC5834-2GY50-0YA0 6FC5834-3GY50-0YA0
System software SW 28x¹⁾ On SD card with license software version 5.2 Export • Turning • Milling • G-Tech Cylindrical/ G-Tech Surface	6FC5836-1GY50-0YA0 6FC5836-2GY50-0YA0 6FC5836-3GY50-0YA0
SINUMERIK 828D Toolbox Export software version 5.2 • On DVD-ROM • For download	6FC5830-0CY50-0YA8 6FC5830-0EY50-0YA8
Access MyMachine /P2P For PC/programming device on CD-ROM current software version	6FC5860-7YC00-0YA0 Product ID: MCS31401
Language extensions On DVD-ROM without license • For SINUMERIK Operate software version 5.23	On request

Description	Article No.
Additional hardware components	
SINAMICS Numeric Control Extension • NX10.3 • NX15.3	6SL3040-1NC00-0AA0 6SL3040-1NB00-0AA0
SINAMICS S120 TM54F Terminal Module	6SL3055-0AA00-3BA0
SIMATIC PN/PN coupler For deterministic data exchange between a max. of 4 PN controllers per subnet	6ES7158-3AD10-0XA0
DRIVE-CLiQ signal cable, pre-assembled For PROFINET connection Connector degree of protection IP20 • In fixed lengths ²⁾ • In precise decimeter lengths ²⁾	6SL3060-4A..0-0AA0 6FX2002-1DC00-....
Accessories	
SD card, without license, software version 5.2 To replace a defective system SD card	6FC5830-0GY50-0YA8
SINUMERIK 828D accessory pack Connectors for connecting the cables to the PU (The connectors are not included in the scope of supply of the PU.) Set consisting of 7 units, X1, X122, X132, X242, X252, X143.1, X143.2	6FC5348-3AA00-0AA0
DIN rail for SINUMERIK 828D PU 272.5	6FC5348-1AA00-0AA0
Logbook and license certificate SINUMERIK Edition 06.09 Languages: English, German	6FC5095-0AA10-0AP1

More information

The following hardware components are only available in a package and cannot be ordered individually:

- SINUMERIK 828D PU 272.5

When the package is delivered, the SD card containing the system software is already installed in the SINUMERIK.

For more information, please contact your local Siemens office or regional company.

¹⁾ Not available individually, see More information.

²⁾ For complete Article No. and length code, refer to the "MOTION-CONNECT connection systems" section.

Technical specifications

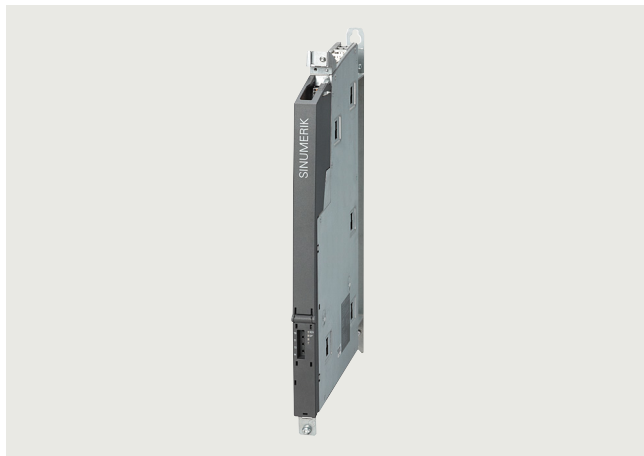
Article No.	6FC5370-7AA50-0AA0
Product brand name	SINUMERIK
Product type designation	828D
Product short term	PU 272.5
Product designation	CNC
Supply voltage at DC	24 V
• Relative negative tolerance at 24 V	15 %
• Relative positive tolerance at 24 V	20 %
Active power consumption maximum	41 W
Buffering time in the event of power failure	3 ms
• Note	20 ms with SITOP smart power supply
Environmental category acc. to IEC 60721-3-3 (2002)	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Degree of protection	IP20
Relative humidity at 25 °C, during	
• storage	5 ... 95 %
• transport	5 ... 95 %
• operation	5 ... 90 %
Ambient temperature, during	
• storage	-25 ... +55 °C (-13 ... +131 °F)
• transport	-20 ... +60 °C (-4 ... +140 °F)
• operation	0 ... 55 °C (32 ... 131 °F)
Width	74 mm (2.91 in)
Height	220 mm (8.66 in)
Depth	345 mm (13.58 in)
Net weight	2.3 kg (5.07 lb)
Certificate of suitability	CE, cULus, EAC

SINUMERIK CNCs

SINUMERIK 828D

Numeric Control Extensions NX10.3/NX15.3

Overview



The NX10.3/NX15.3 Numeric Control Extensions are used with SINUMERIK 828D for applications with several axes/spindles. NX10.3/NX15.3 also allow the drive-end computing performance for the SINAMICS drives within the SINUMERIK 828D to be increased.

The modules have the same design as the SINAMICS S120/S220 components. With a width of only 25 mm (0.98 in), the modules are also ideal for installation in compact machines.

Function

The drive control can be expanded modularly with 3 or 6 additional axes/spindles by means of Numeric Control Extensions. Each NX10.3 module can control up to 3 additional axes/spindles and each NX15.3 module can control up to 6 additional axes/spindles with the SINUMERIK 828D CNC.

The SINUMERIK 828D CNC performs the coordinate transformation, motion control and PLC control. Data management for the NX10.3/NX15.3 modules is located exclusively on the SINUMERIK 828D, making it much easier to replace components.

Integration

One NX10.3 or one NX15.3 module can be operated in an axis grouping with SINUMERIK 828D PPU 271.5/270.5/PPU 290.5 or PU 272.5:

- 1 NX10.3 module:
 - The maximum number of axes/spindles can be increased to 9, up to 6 of which can be connected to the PPU/PU and up to 3 to the NX10.3.
- 1 NX15.3 module:
 - The maximum number of axes/spindles can be increased to 12, up to 6 of which can be connected to the PPU/PU and up to 6 to the NX15.3.

The NX10.3/NX15.3 modules are connected to the SINUMERIK 828D via DRIVE-CLiQ cables. This ensures that the drive control retains high performance and remains clock-synchronized. The communications interfaces on the SINUMERIK 828D remain available for other connections.

More information

An Environmental Product Declaration (EPD) is available as PDF for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product. You can find more information about NX10.3 and NX 15.3 on the internet at:

support.industry.siemens.com/cs/ww/en/view/109988481
support.industry.siemens.com/cs/ww/en/view/109988482

Selection and ordering data

Description	Article No.
SINAMICS Numeric Control Extension NX10.3 Extension of drive control For SINUMERIK 828D Up to 3 axes	6SL3040-1NC00-0AA0
SINAMICS Numeric Control Extension NX15.3 Extension of drive control For SINUMERIK 828D Up to 6 axes	6SL3040-1NB00-0AA0

Technical specifications

Article No.		6SL3040-1NC00-0AA0	6SL3040-1NB00-0AA0
Product brand name		SINAMICS	SINAMICS
Product short term		NX10.3	NX15.3
Product designation		Numeric Control Extension	Numeric Control Extension
Number of axes maximum		3	6
Number of digital inputs		6	6
Number of digital inputs/outputs parameterizable		4	4
Supply voltage at DC rated value	V	24	24
Consumed current typical	A	0.3	0.3
• Note		Ignoring digital outputs and DRIVE-CLiQ supply	Ignoring digital outputs and DRIVE-CLiQ supply
Output current maximum	A	3.35	3.35
Degree of protection		IP20 / UL open type	IP20 / UL open type
Environmental category acc. to IEC 60721-3-3		Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during			
• storage	%	5 ... 95	5 ... 95
• transport	%	5 ... 95	5 ... 95
• operation	%	5 ... 95	5 ... 95
Ambient temperature, during			
• storage	°C (°F)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)
• transport	°C (°F)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)
• operation	°C (°F)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)
Width	mm (in)	25 (0.98425)	25 (0.98425)
Height	mm (in)	414 (16.29921)	414 (16.29921)
Depth	mm (in)	272 (10.70866)	272 (10.70866)
Net weight	kg (lb)	2.58 (5.68793)	2.58 (5.68793)
Certificate of suitability		CE, cULus	CE, cULus

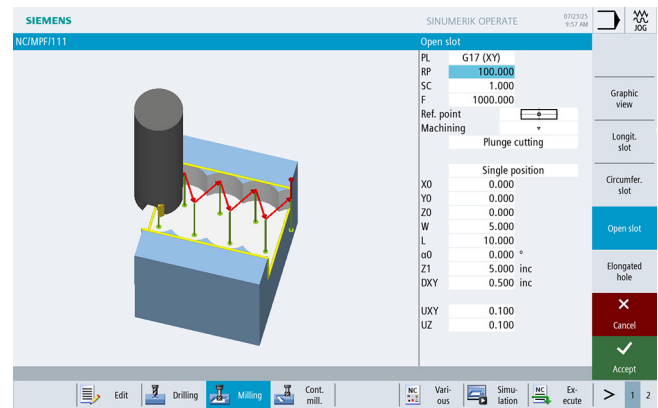
Overview

SINUMERIK Operate – perfect for all programming tasks

With various programming methods, SINUMERIK supports all worldwide promoted CNC programming methods – from single part production to mass production.

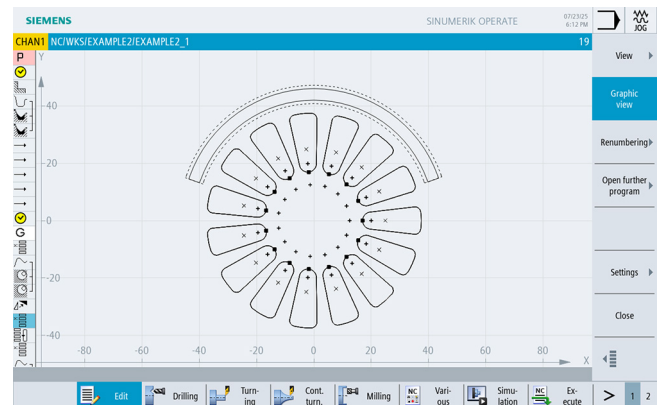
For mass production ...

Shortest machining times for mass production combined with the greatest degree of flexibility for special applications: SINUMERIK CNCs make this possible with advanced CNC programming with high-level language elements. With programGUIDE, SINUMERIK CNC programs can be easily combined with powerful technology and measuring cycles. Even classic ISO codes can be programmed. This makes SINUMERIK especially attractive to operators who prefer this classic type of program.



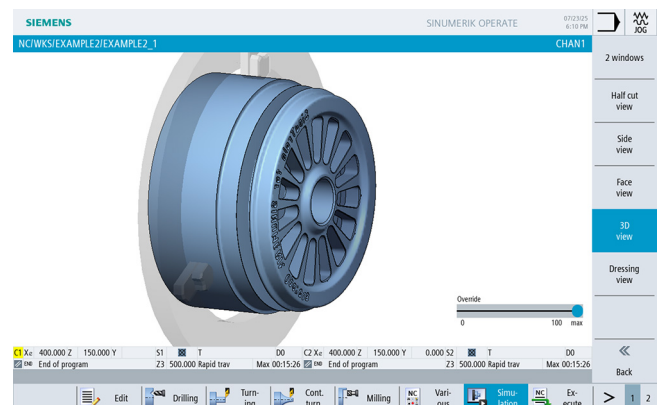
... and small series

The programming times is a crucial productivity factor for small series and single parts. ShopMill and ShopTurn machining step programming is unbeatable in these fields. Processes such as drilling, centering, plunging and pocket milling are represented as machining steps. In this way, CNC programs are extremely compact and easily read, even for complex machining operations. All geometric elements in a CNC program are shown to scale thanks to the dynamic broken-line graphics, the only one of its kind on the market.



Process safety through CNC simulation

SINUMERIK CNC simulation guarantees maximum process safety by using the real geometries of the loaded tools. Of course the simulation displays an exact image of the desired machining – not just brilliant 3D representations. SINUMERIK CNC simulation simulates every type of machining, such as face and cylinder surfaces, swiveled workpiece planes or even machining in multiple machining channels. Even very large part programs can be displayed on screen within seconds with the Quickview for mold-making.



SINUMERIK CNCs

SINUMERIK Operate

Operator control and programming

Overview

User-friendly operating and programming made easy

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

Operation

The numerous functions in SINUMERIK Operate ensure a high level of user-friendliness for the SINUMERIK controls. These include:

- Modern touch and gesture control
- Working with animated elements
- Pre-configured side screen

Setup

Thanks to an intelligent JOG mode and intuitive tool management in SINUMERIK Operate, all of the typical setup functions feature interactive, graphical support. This reduces the unproductive time to an absolute minimum.

- **Measuring:** The measuring of tools and workpieces is optimally supported in the intelligent JOG mode.
- **Zero points:** Integrated measuring cycles ensure the accuracy of the workpieces in the running machining process. Tool geometries or zero offsets are corrected fully automatically.
- **Optimizing programs** when running in several channels
- **Tool management:** Tool data and magazine position information is displayed very clearly on one screen.
- **Operator protection:** The intelligent system functions of SINUMERIK Safety Integrated allow user-friendly operation with the highest degree of safety for the operator and the machine.

Programming

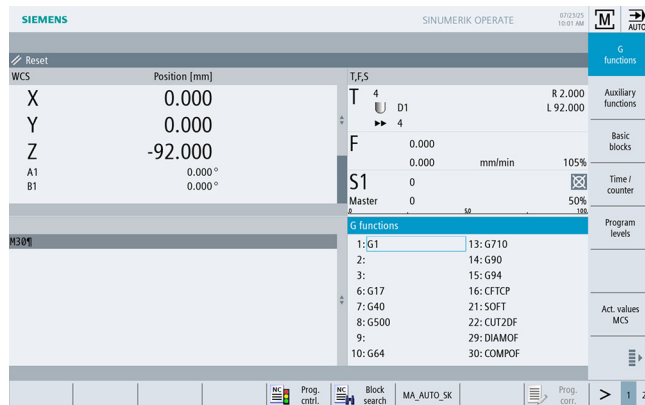
SINUMERIK Operate offers the right programming for each task: DIN ISO for large series and the shortest cycle times and graphical programming for faster programming times for individual parts.

- **CNC high-level language:** Uniquely fast programming of multi-version workpieces and full flexibility in the workpiece spectrum
- **ProgramGUIDE:** User-friendly combination of SINUMERIK CNC programs with high-performance technology and measuring cycles
- **Machining step programming(ShopMill/ShopTurn):** Fast and easy programming of complex components, input and programming of each contour directly at the machine by means of a SINUMERIK contour calculator

Diagnostics

Machine failures can lead to serious losses in production, particularly in large series manufacturing. In case of an incident, SINUMERIK Operate provides intelligent diagnostic resources to ensure that machines can be made operationally ready again as quickly as possible. In addition to tools for bus diagnostics of drive, I/O and network components, a powerful trace function is available for recording and diagnosing NC, PLC and drive signals.

Overview



SINUMERIK Operate operating software for SINUMERIK 828D

The CNC user interface for efficient machine operation

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

- Machine operation
- Programming
- Diagnostics
- Startup

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

Programming of the part programs is optimally supported by a modern text editor with integrated programGUIDE 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

- Simple and quick to master
- Operate and program intuitively and clearly with animated elements
- CNC programming for the highest degree of productivity using programGUIDE
- Machining step programming for the shortest programming time with ShopMill/ShopTurn
- Help always available from help texts for each edit box on the operator screen form, and functions for efficient production, e.g. Help key, tooltips, search shortcut CTRL+F, UNDO
- Confident programming supported by simulation
- Open for user-generated screens and user-defined operating philosophies and concepts

Function

- Modern text editor with many helpful functions
- ProgramGUIDE with Animated Elements – perfect support for integrating cycles in part programs
- Shopfloor-oriented technology cycles for drilling, milling, and turning
- Comprehensive measuring cycles (option)
- Automatic creation of measurement records
- Residual material detection and machining for contour pockets and stock removal (option)
- 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
- Multiple clamping of identical or different workpieces (ShopMill/ShopTurn is required)
- Quickview for mold-making programs
- Quick checking of part programs
 - Integrated 2D simulation for turning and milling
 - 3D simulation (option)
- Simultaneous recording of current machining (option)
- Integrated tool management for one magazine
- Access to external programs through network drives
- Data storage and execution from external memories (option)
- Implement user-defined operating philosophies and concepts with SINUMERIK Integrate Create MyHMI (option)
- Powerful new functions support the entire workflow:
 - Set-up, programming, tool and program management for complete machining
 - Multi-channel capability with ShopTurn for multi-channel machines, including program synchronization with programSYNC, and much more
 - Display and analysis of energy consumption

Integration

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

- SINUMERIK 828D:
PU 272.5

The separate SINUMERIK Operate operating software can be used for:

- SIMATIC IPC Windows 10
- PC with Windows 10 (64-bit) operating system

Selection and ordering data

Description	Article No.	Description	Article No.
SINUMERIK 828D SINUMERIK Operate operating software For SIMATIC IPC Windows 10 Languages: Chinese Simplified, English, French, German, Italian, Spanish • Using SINUMERIK 828D SINUMERIK Operate /PCU Software option Single license without data storage medium • Using SINUMERIK 828D SINUMERIK Operate /PCU Modular Software option Single license without data storage medium	Is supplied on toolbox DVD-ROM 6FC5800-0AQ10-0YH0 6FC5800-0AQ11-0YH0	Language extensions¹⁾ On DVD-ROM Without license Languages: Bulgarian, Chinese Traditional, Croatian, Czech, Danish, Dutch, Greek, Hungarian, Japanese, Korean, Polish, Portuguese/Brazilian, Romanian, Russian, Slovakian, Swedish, Turkish • For SINUMERIK 828D software version 5.23	On request
SINUMERIK 828D SINUMERIK Operate operating software For PC with Microsoft Windows 10 (64-bit) Languages: Chinese Simplified, English, French, German, Italian, Spanish • Using SINUMERIK Operate /PC software option Single license without data storage medium	Is supplied on toolbox DVD-ROM 6FC5800-0AQ01-0YH0	Residual material detection and machining for contour pockets and stock removal Software option • Single license without data storage medium ShopMill/ShopTurn Machining step programming Software option • Single license without data storage medium DXF Reader Software option • Single license without data storage medium Simultaneous recording of current machining Real-time simulation of current machining Software option • Single license without data storage medium 3D simulation 1 (finished part) Simulation of finished part Software option • Single license without data storage medium Display Manager Integration of 3rd-party applications in the operator interface Software option • Single license without data storage medium Requirement: Resolution > 1920 px × 1080 px	6FC5800-0AP13-0YH0 6FC5800-0AP17-0YH0 6FC5800-0AP56-0YH0 Product ID: MCS41300 6FC5800-0AP22-0YH0 6FC5800-0AP25-0YH0 6FC5800-0AP81-0YH0
		Execution from external storage EES for example from local network, server, USB Software option • Single license without data storage medium	6FC5800-0AP75-0YH0 Product ID: MCS51100

1) Please inquire about available software versions.

Overview

Operator components for CNCs

The Siemens range offers numerous solutions for CNC operator components. It encompasses easy-to-operate devices which can be individually combined for operator components, such as SINUMERIK operator panels, SIMATIC operator components, and supplementary components depending on the machine concept.

Operator panels for SINUMERIK

Operator panels for SINUMERIK can be assembled individually using SINUMERIK and SIMATIC products. They are available with various performance levels and designs, and in miscellaneous display sizes. Operator panels for SINUMERIK are available in the following variants:

SIMATIC Industrial Flat Panel IFP for SINUMERIK

The SIMATIC IFPs can be combined directly with a SIMATIC IPC. They can be connected to the SINUMERIK PU via a SIMATIC IPC. SIMATIC IFPs are available in various display sizes, with multi-touch operation. They can be positioned up to 30 m away from the SIMATIC IPC.

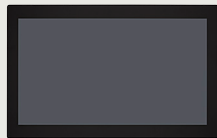
SIMATIC Panels with integrated IPC for SINUMERIK

The SIMATIC IPC277G is a compact unit comprising an operating unit (SIMATIC Industrial Flat Panel) with an integrated computing unit. It can be connected directly to a SINUMERIK PU and supplemented with a SIMATIC IFP as required.

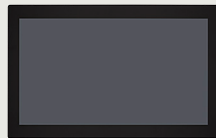
SIMATIC IPC for SINUMERIK

The SIMATIC IPC for SINUMERIK can be combined with the SIMATIC Industrial Flat Panel. It can be connected to a SINUMERIK PU. In the distributed configuration, the SIMATIC IPC can be positioned at distances up to 100 m from the operator panel in the control cabinet.

Operator panel fronts blackline plus



SIMATIC
IFP 1500/1900/2200



SIMATIC IPC277G



SIMATIC IPC227G
Nanobox PC

Operator panel fronts blackline plus

The SINUMERIK and SIMATIC IFP series operator panels facilitate the monitoring and operation duties of the machine operator. With their touch screens, they open the way to a new machine operating philosophy. In conjunction with the state-of-the-art SINUMERIK Operate user interface, touch and gesture control are establishing themselves in production.

An operator panel is made up of an operator panel front and a SIMATIC IPC or a SIMATIC Panel with integrated IPC.

- Modern 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 configuration through spatial separation of operator panel and SIMATIC IPC

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.

SINUMERIK CNCs

Operator components for CNCs

Introduction

Overview

Supplementary operator components

The complementary, tried and tested operator control components such as handheld units, machine control panels, Push Button Panels, electronic handwheels, keyboards, and card readers can be used with the SIMATIC IPC.

Machine control panel blackline plus



SINUMERIK MCP 398C



SINUMERIK expansion modules EM 66, EM 131, EM 187

Machine control panels - USB communication



SINUMERIK MCP 1200U-V



SINUMERIK MCP 1500U



SINUMERIK MCP 1200U-H

Keyboards



SINUMERIK KB 310C



SINUMERIK ONE KB 1900
full CNC keyboard



SINUMERIK ONE KB 1500
full CNC keyboard

Handheld units



SINUMERIK HT 10



SINUMERIK
mini handheld unit



Electronic
handwheel

Handheld units

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

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

Machine control panels

SINUMERIK machine control panels are available in the blackline plus and classic designs. They can be used with SIMATIC IPC for SINUMERIK.

SINUMERIK machine control panels can be adapted and expanded individually with the SINUMERIK expansion panel, SIRIUS ACT 3SU1, and laser labeling for machine-specific applications.

- Ergonomic machine control thanks to well-conceived design
- Machine-specific adaptations through variable labeling
- Additionally integrable control devices

Keyboards

The keyboards allow convenient and user-friendly input of programs and texts.

- Ergonomic keyboard
- CNC-specific supplements

Overview



SIMATIC IPC227G Nanobox PC

The SIMATIC IPC227G Nanobox PC is a high-performance, compact PC platform working directly alongside machines and processes in the industrial environment. All interfaces for communication are integrated via Ethernet.

The SIMATIC IPC227G Nanobox PC is available with the Microsoft Windows 10 IoT operating system.

The licenses for the SINUMERIK Operate operating software and the PCU base software must be ordered separately.

Benefits

- High productivity for data acquisition and data processing thanks to high-performance Intel Atom/Xeon processor technology
- Extremely compact for space-saving installation in all installation and mounting positions
- Outstanding industrial functionality due to the utilization of solid-state drive for mass storage
- High system availability reduces failures due to robustness (highly resistant against vibrations and shocks), low maintenance costs
- Maximum investment security due to extended period of service and support

Design

SIMATIC IPC227G

- Intel Atom dual core/Intel Atom quad core processor technology:
 - SIMATIC IPC227G with Microsoft Windows 10 IoT Enterprise LTSC 2019, 64 bit
- **Standard performance:** Intel Atom X6211E, 2 threads/4 GB DDR4 SO-DIMM
- **High performance:** Intel Atom X6414RE, 4 threads/16 GB DDR4 SO-DIMM
 - With internal solid-state drive 256 GB or higher.

Now also available with preinstalled PCU base software.

Interfaces (accessible from one side):

- 3 × Industrial Ethernet 10/100/1000 Mbps (RJ45 socket)
- 4 × USB 3.1
- 2 × DisplayPort

Function

- Integrated, parameterizable monitoring functions
- Enhanced reporting (diagnostics/messages) via Ethernet, e-mail, sms text messages

Integration

SIMATIC IPC227G can be employed for:

- SINUMERIK 828D:
 - With CNC control SINUMERIK PU 272.5
- SIMATIC Flat Panels IFP1500/IFP1900/IFP2200

Selection and ordering data

Description	Article No.
SIMATIC IPC227G Nanobox PC 4 × USB V3.1, 3 × 10/100/1000 Mbps Ethernet, 256 GB or higher SATA solid-state drive	6ES7647-8CD11-2AB0 6ES7647-8CE21-2AB0
• Atom X6211E (2-core), work memory 4 GB, Microsoft Windows 10 IoT Enterprise 2019 LTSC (64 bit) Requirement: SINUMERIK PCU base software /IPC (option P86) • Atom X6413E (4-core), work memory 8 GB, Microsoft Windows 10 IoT Enterprise 2019 LTSC (64 bit) Requirement: SINUMERIK PCU base software /IPC (option P86)	
SINUMERIK PCU base software /IPC For SIMATIC IPC, software option, delivery of a license	6FC5800-0AP86-1YH0
Accessories	
USB 1.1/2.0 extension, type A For console installation Degree of protection IP66 $d = 22 \text{ mm}$ (0.87 in), length 1 m (3.28 ft)	6FC5347-0AF01-1AA0
Mounting set for wall mounting • For SIMATIC IPC227G	6ES7648-1AA50-0XV0
Mounting set for vertical mounting • For SIMATIC IPC227G	6ES7648-1AA50-0XW0
Assembly set for DIN rail) • For SIMATIC IPC227G	6ES7648-1AA50-0XU0

SINUMERIK CNCs

Operator components for CNCs

Operator panels for SINUMERIK

SIMATIC IPC for SINUMERIK 828**Technical specifications**

Article No.	6ES7647-8CD11-2AB0	6ES7647-8CE21-2AB0
Product brand name	SIMATIC	
Product family	IPC	
Product category	Box PC	
Product type designation	IPC227G	
Supply voltage		
Type of supply voltage	24 V DC	
Operating systems		
preinstalled operating system	Windows 10 IoT Enterprise 2019 LTSC, 64 bit, MUI	
Processor		
Processor type	Intel Atom X6211E dual core	Intel Atom 6211E / X6413E quad core
Memory		
Type of memory	DDR4 SO-DIMM	
Main memory	4 GB	8 GB
Capacity of main memory, max.	16 GB	
Interfaces		
Number of industrial Ethernet interfaces	3 × Ethernet (RJ45)	
USB port	4 × USB 3.1	
Connection for keyboard/mouse	USB / USB	
serial interface	2 × COM (RS232/485/422; selectable)	
Video interfaces		
Graphics interface	2 × DisplayPort	
Degree and class of protection		
IP degree of protection	IP40	
Ambient conditions		
Relative humidity	Tested according to IEC 60068-2-78, IEC 60068-2-30	
• Operation	5% to 85% at 30 °C (86 °F) (no condensation)	
• Storage/transport	5% to 95% at 25 °C/55 °C (77 °F/131 °F) (no condensation)	
Dimensions		
Width	191 mm (7.52 in)	
Height	100 mm (3.94 in)	
Depth	64 mm (2.52 in)	
Certificates of suitability		
Certificate of suitability	CE, cULus, RCM, KC approval, FCC	
EMC	CE, EN 61000-6-4:2007, EN 61000-6-2:2005	

Overview

Industrial Flat Panels are LCD monitors in robust industrial design with widescreen format and featuring multitouch operation.

They are ideal for installation in machines, control cabinets, consoles and platforms, or in racks.

The Flat Panels are secured on the rear with special mounting clips included in the scope of supply.

The extended versions can be moved to a distance of up to 100 m from the IPC using a transceiver unit.

Benefits

- Low space requirement and low weight
- Long service life due to rugged industrial design
- Lower energy requirement
- Working free from fatigue
- Well structured operator control and monitoring thanks to various display sizes

Design

- Robust aluminum front, multi-touch display with anti-glare and hardened mineral glass screen
- TFT display in sizes 15", 19" and 22", each featuring 1920 × 1080 pixels, 16 million colors

Interfaces:

- 1 × Ext-Link for transceiver unit (HDBaseT)
- 2 × USB 2.0 type A (rear)
- 1 × DVI-D
- 1 × DisplayPort V1.2

Integration

SIMATIC Flat Panels in conjunction with SIMATIC IPC can be used for:

- SINUMERIK 828D
- via IPC to PU 272.5

Selection and ordering data

Description	Article No.
SIMATIC IFP1500 V2 extended neutral Industrial Flat Panel 15" display (16:9) Full HD, multi-touch • Extended version up to 100 m (328 ft)	6AV7863-5MA10-2NA0
SIMATIC IFP1900 V2 extended neutral Industrial Flat Panel 19" display (16:9) Full HD, multi-touch • Extended version up to 100 m (328 ft), not including transmission module and cable set	6AV7863-6MA10-2NA0
SIMATIC IFP2200 V2 extended neutral Industrial Flat Panel 22" display (16:9) Full HD, multi-touch • Extended version up to 100 m (328 ft), not including transmission module and cable set	6AV7863-4MA10-2NA0
Accessories	
Mounting clips (steel) For SIMATIC Industrial Flat Panels with 15", 19" and 22" displays Sheet thickness 2 ... 6 mm (0.08 ... 0.24 in)	6AV6671-8XK00-0AX3
USB 1.1/2.0 extension, type A For console installation Degree of protection IP66 d = 22 mm (0.87 in), length 1 m (3.28 ft)	6FC5347-0AF01-1AA0
Cable set For SIMATIC IFP.... V2 extended neutral (CAT6 cable, host module V2 (HDBaseT)) • Length 10 m (32 ft) • Length 15 m (49 ft) • Length 20 m (65 ft) • Length 30 m (98 ft)	6AV7860-1EX21-0AB1 6AV7860-1EX21-5AB1 6AV7860-1EX22-0AB1 6AV7860-1EX23-0AB1
Non-assembled cable, without connector • By the meter and non-assembled, without connector	6XV1878-2C
CAT6 connector 2 units	6AV7860-1EY00-0AA0
Transmission module • HDBaseT transceiver unit, individual	6AV7860-3EH00-0AA0

SINUMERIK CNCs

Operator components for CNCs

Operator panel fronts blackline plus

SIMATIC Industrial Flat Panel for SINUMERIK 828

Technical specifications

Article No.		6AV7863-5MA10-2NA0	6AV7863-6MA10-2NA0	6AV7863-4MA10-2NA0
Product brand name		SIMATIC	SIMATIC	SIMATIC
Product family		IPC	IPC	IPC
Product type designation		IFP1500 V2	IFP1900 V2	IFP2200
Short designation		SIMATIC IFP1500 V2 ext.	SIMATIC IFP1900 V2 ext.	SIMATIC IFP2200 V2
Screen diagonal	in	15.6	18.5	21.5
Design of display		TFT widescreen display, LED backlighting	TFT widescreen display, LED backlighting	TFT widescreen display, LED backlighting
Monitor keyboard		Yes	Yes	Yes
On Screen Display (OSD) configuration		-, Adjustable by means of software	-, Adjustable by means of software	-, Adjustable by means of software
Screen resolution of the display	pixel	1 920 × 1 080	1 920 × 1 080	1 920 × 1 080
Supply voltage				
Type of supply voltage		DC	DC	DC
Rated value (DC)	V	24	24	24
Power loss				
Power loss, max.	W	30	35	30
Power loss, typ.	W	24	29	24
Degree of protection				
IP (at the front)		IP65	IP65	IP65
IP (rear)		IP20	IP20	IP20
Ambient conditions				
Relative humidity × Operation, max.	%	90	90	90
Ambient temperature during stor- age/transportation		-	-	-
• min.	°C (°F)	-20 (-4)	-20 (-4)	-20 (-4)
• max.	°C (°F)	60 (140)	60 (140)	60 (140)
Dimensions				
Width of the housing front	mm (in)	398 (15.67)	464 (18.27)	529 (20.83)
Height of housing front	mm (in)	257 (10.12)	294 (11.57)	331 (13.03)
Mounting cutout, width	mm (in)	382 (15.04)	448 (17.64)	513 (20.2)
Mounting cutout, height	mm (in)	241 (9.49)	278 (10.94)	315 (12.4)
Overall depth	mm (in)	63.4 (2.5)	63.4 (2.5)	63.4 (2.5)
Weights				
Weight (without packaging)	kg (lb)	4 (8.82)	5 (11.02)	6.4 (14.11)
Certificate of suitability				
CE mark		Yes	Yes	Yes
cULus		Yes	Yes	Yes
RCM (formerly C-TICK)		Yes	Yes	Yes
KC approval		-	-	-

SIMATIC Panel with integrated IPC for SINUMERIK 828**Overview**

The SIMATIC IPC277G is a high-performance compact unit comprising an operating unit (SIMATIC Flat Panel) with an integrated computing unit. SIMATIC IPC277G is rugged and reliable, provides the openness of a PC, and is designed for use on the machine. The operating unit is available as a 15" or 19" multi-touch display.

The licenses for the operating software SINUMERIK Operate and the PCU base software must be ordered separately.

Benefits

- Highly suitable for use in industrial applications due to robust and compact construction, withstanding intense vibration and shock loads
- Maximum investment security for long-term machine concepts due to guaranteed availability of spare parts for all components
- High system availability minimizes downtimes through efficient self-diagnostics and no maintenance requirements for components such as fans and hard disks
- Outstanding industrial functionality due to integrated PROFINET interface

Design

The SIMATIC IPC277G is connected to the SINUMERIK PU via Ethernet.

Panel PC variants for SINUMERIK

- SIMATIC IPC277G with Microsoft Windows 10 IoT Enterprise LTSC 2019, 64 bit
 - 15" multi-touch device (capacitive glass touch), full HD
Intel Atom x6211E dual core/1.30 GHz/4 GB
Internal solid-state drive 256 GB Eco
 - 19" multi-touch device (capacitive glass touch), full HD
Intel Atom x6413E quad core/1.50 GHz/8 GB
Internal solid-state drive 256 GB Eco

Interfaces:

- 3 × Ethernet 10/100/1000 Mbps (RJ45 socket)
- 4 × USB 3.1
- 2 × DisplayPort
- 1 × M.2 SSD slot for M.2 NVMe/SATA SSD module

Integration

SIMATIC IPCs can be used for:

- SINUMERIK 828D: PU 272.5
- SIMATIC Panel for SINUMERIK Microsoft Windows 10

Selection and ordering data

Description	Article No.
SIMATIC IPC277G With neutral front; 4 × USB (rear), Ethernet (10/100/1000), 3 × Gigabit Ethernet (IE/PN), internal mass storage: SATA 256 GB solid-state drive, without SIMATIC software	
• 15" multi-touch display (1366 × 768), Intel Atom® x6211E dual core, 1.3 GHz, Memory configuration: 4 GB; Microsoft Windows 10 IoT Enterprise 2019 LTSC (64 bit)	6AV7886-0DD11-2AB0
• 19" multi-touch display (1366 × 768), Intel Atom® x6413E quad core, 1.5 GHz, Memory configuration: 8 GB, Microsoft Windows 10 IoT Enterprise 2019 LTSB (64 bit)	6AV7886-0EE21-2AB0
SINUMERIK PCU base software /IPC For SIMATIC IPC, software option, delivery of a license	6FC5800-0AP86-1YH0
Accessories	
USB 1.1/2.0 extension, type A For console installation Degree of protection IP66 $d = 22\text{ mm}$ (0.87 in), length 1 m (3.28 ft)	6FC5347-0AF01-1AA0

SINUMERIK CNCs

Operator components for CNCs

Operator panel fronts blackline plus

SIMATIC Panel with integrated IPC for SINUMERIK 828**Technical specifications**

Article No.	6AV7886-0DD11-2AB0	6AV7886-0EE21-2AB0
Product brand name	SIMATIC	
Product family	IPC	
Product category	Panel PC	
Product type designation	IPC277G	
Supply voltage		
Type of supply voltage	24 V DC	
Input current		
max. input current	5.0 A at 24 V	
Operating systems		
preinstalled operating system	Windows 10 Enterprise, Windows 10 IoT Enterprise 2019 LTSC, 64 bit, MUI	
Processor		
Processor type	Intel Atom X6211E	Intel Atom X6413E
Memory		
Type of memory	DDR4 SO-DIMM	
Main memory	4 GB	8 GB
Capacity of main memory, max.	16 Gbyte	
Interfaces		
Number of industrial Ethernet interfaces	3 × Ethernet (RJ45)	
USB port	4 × USB 3.1	
Connection for keyboard/mouse	USB / USB	
serial interface	2 × COM (RS232/485/422; selectable)	
Video interfaces		
Graphics interface	2 × DisplayPort	
Degree and class of protection		
IP degree of protection	IP20 (enclosure) IP55 (front)	
Ambient conditions		
Relative humidity		
• Operation	up to 85% at 30 °C (86 °F), no condensation gradient ≤ 10 °C/h	
• Storage/transport	up to 90% at 25 °C/55 °C (77 °F/131 °F), no condensation gradient ≤ 20 °C/h	
Temperature		
• during operation for vertical installation in horizontal format	0 °C to +50 °C (32 °F to 122 °F)	0 °C to +45 °C (32 °F to 113 °F)
• during operation for inclined installation in horizontal format vertical inclination max. ±45 °	0 °C to +45 °C (32 °F to 113 °F)	0 °C to +40 °C (32 °F to 104 °F)
• during operation for upright installation in vertical format, (power supply is located at the top)	0 °C to +45 °C (32 °F to 113 °F)	0 °C to +40 °C (32 °F to 104 °F)
• during storage/transport	-20 °C to +60 °C (-4 °F to +140 °F)	
Dimensions		
Width	398 mm (15.67 in)	464 mm (18.27 in)
Height	257 mm (10.12 in)	294 mm (11.57 in)
Depth	105 mm (4.13 in)	105 mm (4.13 in)
Net weight	5290 g (11.66 lb)	6680 g (14.73 lb)
Certificates of suitability		
Certificate of suitability	CE, cULus, RCM, KC approval, FCC, UKCA, EAC	
EMC	CE, EN 61000-6-3 +A1, CAN/CSA-CISPR 22:10, EN 61000-6-1, EN 61000-6-2, NAMUR NE 21	

Overview



The mobile handheld terminal SINUMERIK HT 10 is the new multifunctional handheld terminal in the SINUMERIK blackline plus design. It allows convenient handling, which is achieved by its ergonomic, lightweight design and the 10" multi-touch display.

The SINUMERIK HT 10 combines the functions of an operator panel and a machine control panel in one device. It can therefore be used to set up, operate and monitor a machine. As it is based on the thin client principle, the SINUMERIK HT 10 can be used as a secondary operator panel. The screen contents are transmitted via Industrial Ethernet from the SINUMERIK PPU/PU to the handheld terminal.

The SINUMERIK HT 10 is optimally designed for the requirements of the machine tool market.

For installation in the control cabinet the SINUMERIK HT 10 is connected to the SINUMERIK connection module PN Basic or the SIMATIC HMI connection box compact.

For mobile monitoring/operation, the SINUMERIK HT 10 can be connected via a connection box outside the control cabinet at any location in the system.

The following SIMATIC HMI connection boxes are suitable for this:

- Standard
- Advanced
- Decentralized

Benefits

- Mobility for operator control and monitoring
- Ergonomic design, low weight and can rest on the left forearm
- Multi-touch operation and gesture control via touch screen, can also be operated when operators are wearing gloves
- Integrated operating philosophy for a stationary operator panel (e.g. display manager)
- Automatic emergency stop override in conjunction with the SIMATIC HMI connection box advanced or the SIMATIC HMI connection box decentralized, which can simply be plugged and unplugged during operation
- Wall holder as an optional accessory: The HT 10 can be kept securely and operated as a stationary operator panel in the wall holder.

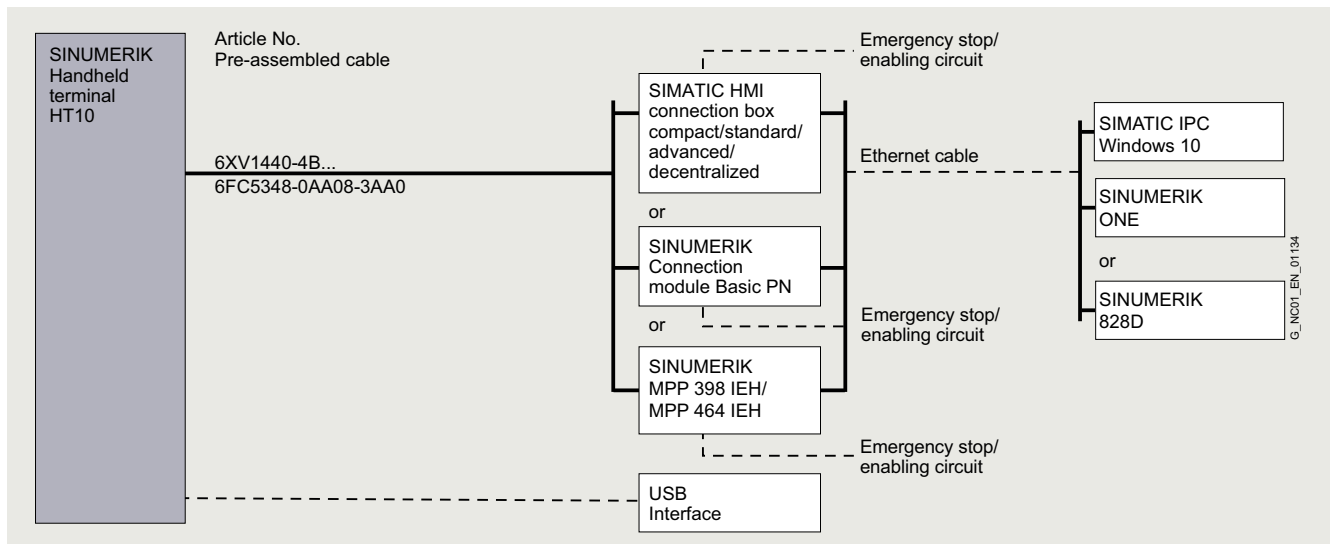
Design

- 10.1" TFT multi-touch display
- Rotary override switch (19 positions)
- Handwheel (only for SINUMERIK HT 10H 6FC5403-0AA21-1AA1)
- 7 mechanical function keys with LED feedback via the key
- Touchkeys: User-defined key functions on predefined, reserved area of the screen, selectable with the U key
- Unlit emergency stop button (2-channel)
- Handle with enabling button (3 positions) and USB interface

Integration

The SINUMERIK HT 10 handheld terminal can be used for:

- SINUMERIK 828D



Connection overview for SINUMERIK HT 10

SINUMERIK CNCs

Operator components for CNCs

Handheld units

SINUMERIK HT 10

Selection and ordering data

Description	Article No.
SINUMERIK HT 10 handheld terminal Based on the thin client principle Operating software in the SINUMERIK NCU/PCU/PU or SIMATIC IPC	6FC5403-0AA21-0AA1
SINUMERIK HT 10H handheld terminal with handwheel Based on the thin client principle Operating software in the SINUMERIK NCU/PCU/PU or SIMATIC IPC	6FC5403-0AA21-1AA1
Accessories	
SIMATIC HMI connection box compact Degree of protection IP65 (front) For Mobile Panels, installation in control cabinet, PROFINET and PROFIsafe, safety relay connec- tion, connection point recognition	6AV2125-2AE03-0AX0
SIMATIC HMI connection box standard Degree of protection IP65 (all round) For Mobile Panels, wall-mounted, PROFINET and PROFIsafe, safety relay connection, connection point recognition, integrated switch	6AV2125-2AE13-0AX0
SIMATIC HMI connection box advanced Degree of protection IP65 (all round) For Mobile Panels, wall-mounted, PROFINET and PROFIsafe, safety relay connection, emergency stop circuit bridging, connection point recognition, integrated switch, MRP client, IRT	6AV2125-2AE23-0AX0
SIMATIC HMI connection box decentralized Degree of protection IP65 (all round) For Mobile Panels, wall-mounted, PROFINET and PROFIsafe, safety relay connection, emergency stop circuit bridging, connection point recognition, integrated switch, MRP client, IRT, Panel Present	6AV2185-5AE23-1AA0
SINUMERIK connection module Basic PN Degree of protection IP65 (all round) For mounting in control cabinet, no automatic emergency stop circuit bridging, Panel Present Signal	6FC5303-0AA01-1AA0

Description	Article No.
Accessories (continued)	
Wall holder For safe storage of the SINUMERIK HT 10, also suitable for stationary operation	6FC5348-0AA20-0AA0
Touch pen system For the SINUMERIK HT 10	6AV6881-0AV21-0AA0
Touch pen replacement caps For touch pen system	6AV2181-8AV60-0AX0
Signal cable For Mobile Panels PROFINET as well as SINUMERIK HT 2/HT 10 Ethernet • Length 2 m (6.56 ft) • Length 5 m (16.4 ft) • Length 8 m (26.2 ft) • Length 10 m (32.8 ft) • Length 15 m (49.2 ft) • Length 20 m (65.6 ft) • Length 25 m (82 ft)	6XV1440-4BH20 6XV1440-4BH50 6XV1440-4BH80 6XV1440-4BN10 6XV1440-4BN15 6XV1440-4BN20 6XV1440-4BN25
Spiral connection cable For SINUMERIK HT 2/HT 8/HT 10 Length 1.5 m (4.92 ft), stretches to 3.5 m (11.5 ft)	6FC5348-0AA08-3AA0

Technical specifications

Article No.		6FC5403-0AA21-0AA1	6FC5403-0AA21-1AA1
Product brand name		SINUMERIK	SINUMERIK
Product short term		HT 10	HT 10
Product designation		Handheld terminal	Handheld terminal
Product feature		Without handwheel	With handwheel
Screen diagonal	in	10.1	10.1
Design of the display		TFT color display	TFT color display
Screen resolution of the display	pixel	1280 × 800	1280 × 800
Supply voltage at DC	V	24	24
Transmission link maximum	m (ft)	25 (82.021)	25 (82.021)
Protection class without shaft input		IP65	IP65
Environmental category acc. to IEC 60721-3-3		Condensation, ice formation, dripping water, spraying water, splashing water and water jets are not permitted	Condensation, ice formation, dripping water, spraying water, splashing water and water jets are not permitted
Relative humidity at 25 °C (77 °F), during			
• storage	%	5 ... 95	5 ... 95
• transport	%	5 ... 95	5 ... 95
• operation	%	5 ... 95	5 ... 95
Ambient temperature, during			
• storage	°C (°F)	-20 ... +55 (-4 ... +131)	-20 ... +55 (-4 ... +131)
• transport	°C (°F)	-20 ... +55 (-4 ... +131)	-20 ... +55 (-4 ... +131)
• operation	°C (°F)	0 ... 45 (32 ... 113)	0 ... 45 (32 ... 113)
Width	mm (in)	327 (12.87402)	327 (12.87402)
Height	mm (in)	102 (4.01575)	102 (4.01575)
Depth	mm (in)	232 (9.13386)	232 (9.13386)
Net weight	kg (lb)	1.5 (3.30693)	1.5 (3.30693)
• note		Without connecting cable	Without connecting cable
Certificate of suitability		CE, cULus, EAC, KC, RCM	CE, cULus, EAC, KC, RCM

SINUMERIK CNCs

Operator components for CNCs
Handheld units

Mini handheld unit

Overview



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

Benefits

- Mobile positioning of axes
- Easy graduation of coarse, medium and fine infeed facilitates fast, increment-precise positioning
- Rugged and compact design

Design

- Emergency stop implemented in 2 channels with 4-wire connection
- 3-position enabling button implemented in 2 channels with 3-wire connection
- Rapid traverse key and 2 $\pm$ keys
- 1 handwheel to traverse the axes in jog mode
- Facility to connect rotary switches for selecting up to 5 axes
- 3 function keys for customized applications – user-assignable with slide-in labels for inscribing
- Interface for connection kit (accessory)
- Optional angle socket for a cable outlet direction rotated through 90° (accessory). The angle socket can only be used in conjunction with the non-assembled connection kit.
- Mounting with integrated magnetic clamp or a holder (accessory)

Integration

The mini-handheld unit can be used for:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
Mini handheld unit for SINUMERIK 3-step enabling button incl. magnetic clamps and connecting cable with metal connector	
• Coiled connecting cable Length 2.1 m (6.89 ft), stretches to 3.5 m (11.48 ft)	6FX2007-1AD03
• Straight cable Length 5 m (16.41 ft)	6FX2007-1AD13
Accessories	
Connection kit for mini handheld unit, non-assembled Connection socket for self-assembly Version with metal connector for connection to machine control panel <u>without</u> Industrial Ethernet, with terminator	6FX2006-1BG03
Connection kit for mini handheld unit, assembled Connection socket wired up Version with metal connector for connection to machine control panel <u>with</u> Industrial Ethernet, with terminator	6FX2006-1BG11
Connection kit for mini handheld unit, assembled Version with metal connector for connection to machine control panel <u>with</u> PROFINET, with terminator for SINUMERIK 828D	6FX2006-1BG20
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

Technical specifications

Article No.		6FX2007-1AD03	6FX2007-1AD13
Product brand name		SINUMERIK	SINUMERIK
Product designation		Mini handheld unit	Mini handheld unit
Product feature		With coiled cable	With straight cable
Supply voltage at DC	V	24	24
Supply voltage at DC			
• for handwheel	V	5	5
• note		For emergency stop button, enabling buttons and switching signals	For emergency stop button, enabling buttons and switching signals
Design of the interface		RS422	RS422
Number of pulses per revolution maximum		100	100
Transmission link of the handheld unit to the NCU/PCU maximum	m (ft)	25 (82.02)	25 (82.02)
• note		When using the handwheel	When using the handwheel
Protection class without shaft input		IP65	IP65
Environmental category according to IEC 60721-3-3		Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during			
• storage	%	5 ... 95	5 ... 95
• transport	%	5 ... 95	5 ... 95
• operation	%	5 ... 95	5 ... 95
Ambient temperature, during			
• storage	°C (°F)	-20 ... +60 (-4 ... +140)	-20 ... +60 (-4 ... +140)
• transport	°C (°F)	-20 ... +60 (-4 ... +140)	-20 ... +60 (-4 ... +140)
• operation	°C (°F)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)
Width	mm (in)	90 (3.54)	90 (3.54)
Height	mm (in)	67 (2.64)	67 (2.64)
Depth	mm (in)	180 (7.09)	180 (7.09)
• note		With emergency stop button	With emergency stop button
Net weight	kg (lb)	0.5 (1.1)	0.5 (1.1)
• note		Without connecting cable	Without connecting cable
Certificate of suitability		CE / UL	CE / UL

SINUMERIK CNCs

Operator components for CNCs
Handheld units

Electronic handwheel

Overview



Electronic handwheels with front panel and handwheel portable in housing

The electronic handwheels enable an axis to be traversed manually. The axis selected via the CNC can be positioned so that the axes are parallel.

The portable electronic handwheel is intended for use directly at the machine.

Benefits

- Positioning of axes
- Rugged and compact housing variant

Design

- Handwheels for installation by user – with or without front panel (the front panel can be removed)
- Portable handwheel in housing:
 - Connection by means of a spiral cable
 - Mounting with integrated magnetic clamp or a holder (accessory)

Function

The electronic handwheels feature a magnetic latching facility which enables increment-precise traversing.

The handwheels generate 5 V DC TTL signals.

Integration

The electronic handwheel can be used for:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
Electronic handwheel	
• With front panel 120 mm × 120 mm (4.72 in × 4.72 in), with setting wheel, 5 V DC, RS422	6FC9320-5DB01
• With front panel 76.2 mm × 76.2 mm (3 in × 3 in), with setting wheel 5 V DC, RS422	6FC9320-5DC01
• Without front panel, with small setting wheel 5 V DC, RS422	6FC9320-5DM00
• Without front panel, without setting wheel, for installation, 5 V DC, RS422	6FC9320-5DF01
• Portable in housing, with setting wheel, 5 V DC, RS422 spiral cable, length 2.5 m (8.20 ft)	6FC9320-5DE02
Adapter set	6FC9320-5DN00
For installation in front panel with 3-point fixing	
Flange socket	6FC9341-1AQ
Installation socket, 9-pin, socket for portable handwheel	
Holder	6FX2006-1BG70
For mini handheld units 6FX2007-1AD.3 and electronic handwheel in housing 6FC9320-5DE02	
Signal cable, pre-assembled	6FX8002-2BB01-1A..
For connecting an electronic handwheel to the P(P)U Length max. 3 m (9.84 ft) ¹⁾	

¹⁾ For complete Article No. and length code, refer to the "MOTION-CONNECT connection systems" section.

Technical specifications

Article No.		6FC9320-5DB01	6FC9320-5DC01	6FC9320-5DM00	6FC9320-5DF01	6FC9320-5DE02
Product brand name		SINUMERIK	SINUMERIK	SINUMERIK	SINUMERIK	SINUMERIK
Product designation		Electronic handwheel	Electronic handwheel	Electronic handwheel	Electronic handwheel	Electronic handwheel
Product feature		With front panel 120 mm x 120 mm (4.72 in x 4.72 in)	With front panel 76.2 mm x 76.2 mm (3 in x 3 in)	Without front panel, with setting wheel	Without front panel, without setting wheel	Portable in housing with coiled cable
Supply voltage at DC	V	5	5	5	5	5
Consumed current maximum	mA	60	60	60	60	80
Design of the interface		TTL / RS 422	TTL / RS 422	TTL / RS 422	TTL / RS 422	TTL / RS 422
Phase displacement angle between signal A and signal B	°	90	90	90	90	90
Number of pulses per revolution maximum		100	100	100	100	100
Minimum actuating torque in directions of actuation	N·m	0.08	0.04	0.04	0.04	0.04
Electrical output frequency maximum	kHz	2	2	2	2	2
Transmission link of the handheld unit to the NCU/PCU maximum	m (ft)	25 (82.02)	25 (82.02)	25 (82.02)	25 (82.02)	20 (65.62)
Degree of protection		-	-	-	-	IP65
Degree of protection						
• front		IP65	IP65	IP65	IP65	-
• rear		IP50	IP50	IP50	IP50	-
Environmental category according to IEC 60721-3-3		Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during						
• storage	%	5 ... 95	5 ... 95	5 ... 95	5 ... 95	5 ... 95
• transport	%	5 ... 95	5 ... 95	5 ... 95	5 ... 95	5 ... 95
• operation	%	5 ... 95	5 ... 95	5 ... 95	5 ... 95	5 ... 95
Ambient temperature, during						
• storage	°C (°F)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)	-25 ... +55 (-13 ... +131)
• transport	°C (°F)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)
• operation	°C (°F)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)	0 ... 55 (32 ... 131)
Outer diameter of the enclosure	mm (in)	- ()	- ()	58.5 (2.3)	50 (1.97)	- ()
Width	mm (in)	120 (4.72)	76.2 (3)	- ()	- ()	85 (3.35)
Height	mm (in)	120 (4.72)	76.2 (3)	- ()	- ()	160 (6.3)
Depth	mm (in)	81.8 (3.22)	81.8 (3.22)	83.8 (3.3)	64.3 (2.53)	67 (2.64)
Net weight	kg (lb)	0.7 (1.54)	0.4 (0.88)	0.3 (0.66)	0.2 (0.44)	0.3 (0.66)
• note		-	-	-	-	Without connecting cable
Certificate of suitability		CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus

SINUMERIK CNCs

Operator components for CNCs
Machine control panels

Machine control panel blackline plus > SINUMERIK MCP 398C

Overview



The SINUMERIK MCP 398C machine control panel enables user-friendly operation of the machine functions on complex machining stations. It is suitable for machine-level operation of milling, turning, grinding and special machines.

In addition to the standard elements for machine control, freely assignable slots can be integrated with the EM 66, EM 131 or EM 187 expansion modules for connecting further control devices, e.g. for pushbuttons, USB interface, Ethernet interface. The EM 131 also has space for a third override switch, a handwheel or other operator controls. The function of the SINUMERIK MCP 398C can be extended considerably by fitting additional keys and the EKS identification system (Euchner).

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 secured from the rear using special clamps supplied with the panel.

Design

Operator controls:

- Mechanical short-stroke keys
- Operating mode and function keys:
 - 50 keys with assigned LEDs, 17 of which are freely assignable customer keys in the standard assignment
 - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied)
- Spindle control with spindle override (rotary switch with 16 positions)
- Feedrate control with feedrate/rapid traverse override (rotary switch with 23 positions)
- Keyswitch (four positions and three different keys)
- Emergency stop pushbutton, two contact blocks (1 NO + 1 NC each)

Interfaces:

- 2 Ethernet interfaces (transmission rate for IE and PN: 10/100 Mbps)
- 9 customer-specific inputs, e.g. for illuminated pushbuttons
- 6 customer-specific outputs
- 2 handwheels (sub-D)
- 1 rotary override switch

Extensions:

- EM 66 for 19" operator panels: 3 to 4 slots for control devices ($d = 22 \text{ mm}$ or 16 mm)
- EM 131 for 22" operator panels: 6 slots for control devices ($d = 22 \text{ mm}$ or 16 mm) + 1 slot for rotary switch/handwheel
- EM 187 for 24" operator panels: 8 slots for control devices ($d = 22 \text{ mm}$ or 16 mm) + 1 slot for rotary switch/handwheel

Integration

The SINUMERIK MCP 398C machine control panel can be used with:

- SINUMERIK 828D

SINUMERIK CNCs

Operator components for CNCs
Machine control panels

Machine control panel blackline plus > SINUMERIK MCP 398C

Selection and ordering data

Description	Article No.
SINUMERIK MCP 398C machine control panel Mechanical short-stroke keys Connection PROFINET/Industrial Ethernet Width 398 mm (15.67 in)	6FC5303-0AF25-0AA0
SINUMERIK EM 66 expansion module Width 66 mm (2.60 in)	6FC5303-0AF30-0AA0
SINUMERIK EM 131 expansion module Width 131 mm (5.16 in)	6FC5303-0AF31-0AA0
SINUMERIK EM 187 expansion module Width 187 mm (7.36 in)	6FC5303-0AF28-0AA0
Accessories	
Square key cover, for labeling (1 set) 90 × ergo gray, 20 × medium gray, 20 × red, 20 × yellow, 20 × green	6FC5248-0AF12-0AA0
Square key cover, for labeling 90 × transparent	6FC5248-0AF21-0AA0
Set of key caps SINUMERIK key covers, square, for inscription • 500 × ergo gray (light basic) • 500 × mid-gray (medium basic)	6FC5348-0AF00-0AA0 6FC5348-0AF01-0AA0
Emergency stop mushroom pushbutton 22 mm (0.87 in) with holder Plastic, round, red, positive latching, rotate to unlatch	6FC5347-0AF20-1AA1
Contact block with 2 contacts Screw terminal, 2-pole 1 NO contact + 1 NC contact	6FC5347-0AF20-2AA1
Spindle/rapid traverse override, electronic rotary switch 1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials ¹⁾	6FC5247-0AF12-1AA0
Feedrate/rapid traverse override, electronic rotary switch 1 × 23G, T=32, cap, button, pointer, and rapid traverse and feedrate dials ²⁾	6FC5247-0AF13-1AA0
Cable set (1 set = 60 units) For additional machine control panel control devices Length 500 mm (19.69 in)	6FC5247-0AA35-0AA0
Signal cable, pre-assembled For connecting an electronic handwheel Length max. 25 m (82 ft) ³⁾	6FX8002-2CP00-....

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

Technical specifications

Article No.	6FC5303-0AF25-0AA0
Product brand name	SINUMERIK
Product short term	MCP 398C
Product designation	Machine control panel
Supply voltage at DC	24 V
Active power consumption maximum	29.3 W
Transmission link maximum	100 m (109.36133 yd)
Degree of protection	
• front	IP54
• rear	IP00
• note	Mounting frame IP65
Environmental category acc. to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during	
• storage	5 ... 95 %
• transport	5 ... 95 %
• operation	5 ... 95 %
Ambient temperature, during	
• 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)
Width	398 mm (15.66929 in)
Height	225 mm (8.85827 in)
Depth	110.4 mm (4.34646 in)
• Note	With connector for handwheel connection
Installation depth	63 mm (2.48032 in)
• Note	With connector for handwheel connection clearance + 10 mm (0.39 in)
Mounting surface	
• section width	379.5 mm (14.94095 in)
• section height	206.5 mm (8.12992 in)
Net weight	1.7 kg (3.74786 lb)
Certificate of suitability	CCC / CE / EAC / KC / RCM / UL

More information

An Environmental Product Declaration (EPD) is available as PDF for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product:

support.industry.siemens.com/cs/ww/en/view/109971656

¹⁾ 16G: Latching at position 16; T=24: 24 positions for 360°

²⁾ 23G: Latching at position 23; T=32: 32 positions for 360°

³⁾ For complete article number and length code, see MOTION-CONNECT connection systems.

SINUMERIK CNCs

Operator components for CNCs
Machine control panels

Machine control panels in classic design > SINUMERIK MCP 1200U-V

Overview



The SINUMERIK MCP 1200U-V machine control panel enables user-friendly operation of the machine functions. It can be used with a SINUMERIK 828D CNC for machine-related operation of turning, grinding and milling machines.

All keys are designed with replaceable covers for machine-specific adaptations. The key caps can be freely inscribed using laser.

The emergency stop mushroom pushbutton can be ordered as an accessory.

Design

Operator control and display elements:

- Operating mode and function keys:
 - 49 keys with LEDs
 - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied)
 - Default key assignment includes 16 freely assignable customer keys
- Spindle control with spindle override (electronic rotary switch with 15 positions)
- Feedrate control with feedrate/rapid traverse override (electronic rotary switch with 18 positions)

Key type:

- Mechanical keys

Interface:

- USB 2.0 for communication with the SINUMERIK P(P)U:
Transmission rate 12 Mbps

Expansion options:

- 1 slot for emergency stop button ($d = 22$ mm)
- 4 slots for control devices e.g. switches ($d = 16$ mm)
- Digital inputs X51, X52, X55, e.g. connection of mini handheld unit

Integration

The SINUMERIK MCP 1200U-V machine control panel can be used with:

- SINUMERIK 828D
- PPU 270.5

Selection and ordering data

Description	Article No.
SINUMERIK MCP 1200U-V machine control panel Mechanical keys, USB 2.0 connection Width 326 mm (12.8 in) Including USB cable, length 0.8 m (31.5 in), and 30 gray blank key caps and 9 gray marked key caps	6FC5303-0AF33-1AA1
Accessories	
Emergency stop mushroom pushbutton 22 mm (0.87 in) without holder Plastic, round, red, positive latching, rotate to unlatch	3SU1000-1HB20-0AA0
Holder For mushroom pushbutton	3SU1500-0AA10-0AA0
Contact block with 2 contacts Screw terminals for front panel mounting 1 NO contact + 1 NC contact	3SU1400-1AA10-1FA0
SINUMERIK override spindle/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-1AA0
SINUMERIK override feedrate/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-0AA0
Cable set (1 set = 60 units) For additional machine control panel control devices Length 500 mm (19.69 in)	6FC5247-0AA35-0AA0

Technical specifications

Article No.	6FC5303-0AF33-1AA1
Product brand name	SINUMERIK
Product short term	MCP 1200U-V
Product designation	Machine control panel
Supply voltage at DC • note	5 V Via USB interface of P(P)U
Active power consumption maximum	2.5 W
Degree of protection • front • rear	IP54 IP00
Environmental category according to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during • storage • transport • operation	5 ... 95 % 5 ... 95 % 5 ... 90 %
Ambient temperature, during • storage • transport • operation - front - rear	-40 ... +70 °C (-40 ... +158 °F) -40 ... +70 °C (-40 ... +158 °F) 0 ... 45 °C (32 ... 113 °F) 0 ... 55 °C (32 ... 131 °F)
Width	326 mm (12.83 in)
Height	175 mm (6.89 in)
Depth	53 mm (2.09 in)
Net weight	1.36 kg (2.98 lb)
Certificate of suitability	CE, cULus, EAC, KCC, RCM

Overview

The SINUMERIK MCP 1500U machine control panel enables user-friendly operation of the machine functions. It can be used with a SINUMERIK 828D CNC for machine-related operation of turning, grinding and milling machines.

All keys are designed with replaceable covers for machine-specific adaptations. The key caps can be freely inscribed using laser.

The emergency stop mushroom pushbutton can be ordered as an accessory.

DesignOperator control and display elements:

- Operating mode and function keys:
 - 50 keys with LEDs
 - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied)
 - Default key assignment includes 15 freely assignable customer keys
- Spindle control with spindle override (electronic rotary switch with 15 positions)
- Feedrate control with feedrate/rapid traverse override (electronic rotary switch with 18 positions)

Key type:

- Mechanical keys

Interface:

- USB 2.0 for communication with the SINUMERIK P(P)U: Transmission rate 12 Mbps

Expansion options:

- 1 slot for emergency stop button ($d = 22$ mm)
- 2 slots for control devices e.g. switches ($d = 16$ mm)
- Digital inputs X51, X52, X55, e.g. connection of mini handheld unit

Integration

The SINUMERIK MCP 1500U machine control panel can be used with:

- SINUMERIK 828D
 - PPU 290.5

Selection and ordering data

Description	Article No.
SINUMERIK MCP 1500U machine control panel Mechanical keys, USB 2.0 connection Width 398 mm (15.6 in) Including USB cable, length 0.8 m (31.5 in), and 30 gray blank key caps and 9 gray marked key caps	6FC5303-0AF34-1AA1
Accessories	
Emergency stop mushroom pushbutton 22 mm (0.87 in) without holder Plastic, round, red, positive latching, rotate to unlatch	3SU1000-1HB20-0AA0
Holder For mushroom pushbutton	3SU1500-0AA10-0AA0
Contact block with 2 contacts Screw terminals for front panel mounting 1 NO contact + 1 NC contact	3SU1400-1AA10-1FA0
SINUMERIK override spindle/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-1AA0
SINUMERIK override feedrate/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-0AA0
Cable set (1 set = 60 units) For additional machine control panel control devices Length 500 mm (19.69 in)	6FC5247-0AA35-0AA0

Technical specifications

Article No.	6FC5303-0AF34-1AA1
Product brand name	SINUMERIK
Product short term	MCP 1500U
Product designation	Machine control panel
Supply voltage at DC • note	5 V Via USB interface of P(P)U
Active power consumption maximum	2.5 W
Degree of protection • front • rear	IP54 IP00
Environmental category according to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during • storage • transport • operation	5 ... 95 % 5 ... 95 % 5 ... 90 %
Ambient temperature, during • storage • transport • operation - front - rear	-40 ... +70 °C (-40 ... +158 °F) -40 ... +70 °C (-40 ... +158 °F) 0 ... 45 °C (32 ... 113 °F) 0 ... 55 °C (32 ... 131 °F)
Width	398 mm (15.67 in)
Height	166 mm (6.54 in)
depth	53 mm (2.09 in)
Net weight	1.64 kg (3.62 lb)
Certificate of suitability	CE, cULus, EAC, KCC, RCM

SINUMERIK CNCs

Operator components for CNCs
Machine control panels

Machine control panels in classic design > SINUMERIK MCP 1200U-H

Overview



The SINUMERIK MCP 1200U-H machine control panel enables user-friendly operation of the machine functions. It can be used with a SINUMERIK 828D CNC for machine-related operation of turning, grinding and milling machines.

All keys are designed with replaceable covers for machine-specific adaptations. The key caps can be freely inscribed using laser.

The emergency stop mushroom pushbutton can be ordered as an accessory.

Design

Operator control and display elements:

- Operating mode and function keys:
 - 50 keys with LEDs
 - Direction keys for milling machines with rapid traverse override (key covers for direction keys for turning machines are supplied)
 - Default key assignment includes 15 freely assignable customer keys
 - Keys for individual use.
- Spindle control with spindle override (electronic rotary switch with 15 positions)
- Feedrate control with feedrate/rapid traverse override (electronic rotary switch with 18 positions)

Key type:

- Mechanical keys

Interface:

- USB 2.0 for communication with the SINUMERIK P(P)U:
Transmission rate 12 Mbps

Expansion options:

- 1 slot for emergency stop button ($d = 22$ mm)
- 2 slots for control devices e.g. switches ($d = 16$ mm)
- Digital inputs X51, X52, X55, e.g. connection of mini handheld unit

Integration

The SINUMERIK MCP 1200U-H machine control panel can be used with:

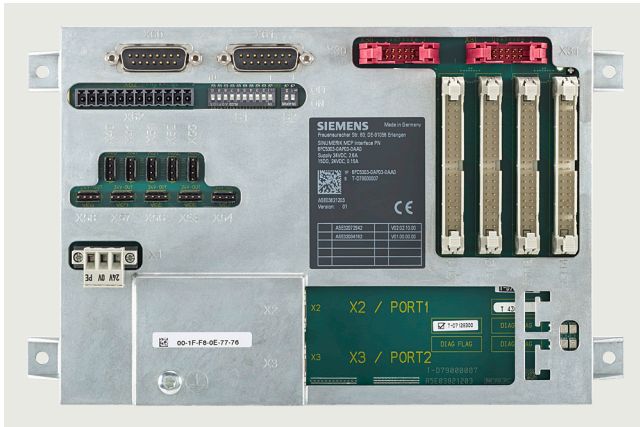
- SINUMERIK 828D
- PPU 271.5

Selection and ordering data

Description	Article No.
SINUMERIK MCP 1200U-H machine control panel Mechanical keys, USB 2.0 connection Width 464 mm (18.3 in) Including USB cable, length 0.8 m (31.5 in), and 30 gray blank key caps and 9 gray marked key caps	6FC5303-0AF32-1AA1
Accessories	
Emergency stop mushroom pushbutton 22 mm (0.87 in) without holder Plastic, round, red, positive latching, rotate to unlatch	3SU1000-1HB20-0AA0
Holder For mushroom pushbutton	3SU1500-0AA10-0AA0
Contact block with 2 contacts Screw terminals for front panel mounting 1 NO contact + 1 NC contact	3SU1400-1AA10-1FA0
SINUMERIK override spindle/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-1AA0
SINUMERIK override feedrate/rapid traverse, electronic rotary switch, 5 V DC	6FC5347-0AF11-0AA0
Cable set (1 set = 60 units) For additional machine control panel control devices Length 500 mm (19.69 in)	6FC5247-0AA35-0AA0

Technical specifications

Article No.	6FC5303-0AF32-1AA1
Product brand name	SINUMERIK
Product short term	MCP 1200U-H
Product designation	Machine control panel
Supply voltage at DC • note	5 V Via USB interface of P(P)U
Active power consumption maximum	2.5 W
Degree of protection • front • rear	IP54 IP00
Environmental category according to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during • storage • transport • operation	5 ... 95 % 5 ... 95 % 5 ... 90 %
Ambient temperature, during • storage • transport • operation - front - rear	-40 ... +70 °C (-40 ... +158 °F) -40 ... +70 °C (-40 ... +158 °F) 0 ... 45 °C (32 ... 113 °F) 0 ... 55 °C (32 ... 131 °F)
Width	464 mm (18.27 in)
Height	155 mm (6.10 in)
depth	53 mm (2.09 in)
Net weight	1.8 kg (3.97 lb)
Certificate of suitability	CE, cULus, EAC, KCC, RCM

Overview

The SINUMERIK MCP Interface PN enables customer-specific machine control panels to be connected via PROFINET.

On the SINUMERIK MCP Interface PN, digital inputs, outputs, connections for rotary override switches and handwheels are provided as well as two Industrial Ethernet interfaces for communication.

Design

You can connect the following operator controls to the SINUMERIK MCP Interface PN:

- 80 single keys
- 64 LEDs
- 2 handwheels
- 2 rotary override switches
- 1 Mini handheld unit

The following inputs/outputs are also available:

- 9 digital inputs (5 V)
- 6 digital inputs (24 V)
- 15 digital outputs (24 V each 0.15 A)

Integration

The SINUMERIK MCP Interface PN can be used for:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
SINUMERIK MCP Interface PN For connection of customer-specific machine control panels over PROFINET	6FC5303-0AF03-0AA0
Accessories	
Feedrate/rapid traverse override electronic rotary switch 1 × 23G, T=32, cap, button, pointer, and rapid traverse and feedrate dials ¹⁾	6FC5247-0AF13-1AA0
Spindle/rapid traverse override electronic rotary switch 1 × 16G, T=24, cap, button, pointer, and rapid traverse and spindle dials ²⁾	6FC5247-0AF12-1AA0
Cable set (1 set = 60 units) For additional control devices Length 500 mm (19.69 in)	6FC5247-0AA35-0AA0

Technical specifications

Article No.	6FC5303-0AF03-0AA0
Product brand name	SINUMERIK
Product designation	MCP Interface PN
Supply voltage at DC	24 V
Active power consumption maximum	62.4 W
• Note	All connectable operator controls, own requirement 2.4 W
Degree of protection	IP00
Environmental category acc. to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during	
• storage	5 ... 95 %
• transport	5 ... 95 %
• operation	5 ... 95 %
Ambient temperature, during	
• 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)
Width	242 mm (9.52756 in)
Height	152 mm (5.98425 in)
Depth	36 mm (1.41732 in)
Net weight	0.557 kg (1.22798 lb)
Certificate of suitability	CE, cULus, EAC

More information

An Environmental Product Declaration (EPD) is available as PDF for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product:

support.industry.siemens.com/cs/ww/en/view/109971661

¹⁾ 23G: Latching at position 23; T=32: 32 positions for 360°

²⁾ 16G: Latching at position 16; T=24: 24 positions for 360°

SINUMERIK CNCs

Operator components for CNCs
Keyboards

SINUMERIK ONE KB 1900

Overview



The SINUMERIK ONE KB 1900 full CNC keyboard permits user-friendly and convenient input of programs and text with short-stroke keys.

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

Design

Operator controls (fixed layout):

- Standard/US QWERTY layout
- 64 mechanical short-stroke keys
- Alpha block with special characters and cross cursor
- Numeric block with special characters

Interface:

- X125 USB 2.0 High Speed

Integration

The SINUMERIK ONE KB 1900 full CNC keyboard can be used for:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
SINUMERIK ONE KB 1900 full CNC keyboard with mechanical short-stroke keys Connection USB 2.0 High Speed Width 464 mm	6FC5303-0AP47-0BA0

Technical specifications

Article No.	6FC5303-0AP47-0BA0
Product brand name	SINUMERIK ONE
Product short term	KB 1900
Product designation	Full CNC keyboard
Power supply	USB 5 V
Max. current consumption	0.5 A
Degree of protection according to EN 60529	
• front	IP65
• rear	IP00
Environmental category acc. to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during	
• storage	5 ... 90%
• transport	5 ... 90%
• operation	5 ... 90%
Ambient temperature, during	
• storage	-40 ... +70 °C (-40 ... +158 °F)
• transport	-40 ... +70 °C (-40 ... +158 °F)
• operation	
- front	0 ... 45 °C (32 ... 113 °F)
- rear	0 ... 55 °C (32 ... 131 °F)
Width	464 mm (18.27 in)
Height	135 mm (5.31 in)
Depth	37 mm (1.46 in)
Net weight	1.7 kg (3.75 lb)
Certificate of suitability	CE / UL / EAC

Overview



The SINUMERIK ONE KB 1500 full CNC keyboard permits user-friendly and convenient input of programs and text with short-stroke keys.

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

Design

Operator controls (fixed layout):

- Standard/US QWERTY layout
- 64 mechanical short-stroke keys
- Alpha block with special characters and cross cursor
- Numeric block with special characters

Interface:

- X125 USB 2.0 High Speed

Integration

The SINUMERIK ONE KB 1500 full CNC keyboard can be used for:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
SINUMERIK ONE KB 1500 full CNC keyboard with mechanical short-stroke keys Connection USB 2.0 High Speed Width 398 mm	6FC5303-0AP47-0AA0

Technical specifications

Article No.	6FC5303-0AP47-0AA0
Product brand name	SINUMERIK ONE
Product short term	KB 1500
Product designation	Full CNC keyboard
Power supply	USB 5 V
Max. current consumption	0.5 A
Degree of protection according to EN 60529	
• front	IP65
• rear	IP00
Environmental category acc. to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during	
• storage	5 ... 90%
• transport	5 ... 90%
• operation	5 ... 90%
Ambient temperature, during	
• storage	-40 ... +70 °C (-40 ... +158 °F)
• transport	-40 ... +70 °C (-40 ... +158 °F)
• operation	
- front	0 ... 45 °C (32 ... 113 °F)
- rear	0 ... 55 °C (32 ... 131 °F)
Width	398 mm (15.67 in)
Height	135 mm (5.31 in)
Depth	37 mm (1.46 in)
Net weight	1.5 kg (3.31 lb)
Certificate of suitability	CE / UL / EAC

SINUMERIK CNCs

Industrial switches

Industrial Ethernet switches - SCALANCE

Overview



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

Application

SCALANCE XB005

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

SCALANCE X005/XC108

- 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 XC208/X208PRO

- For configuring Industrial Ethernet networks in line, star or ring topologies (8 electrical ports):
 - SCALANCE XC208 for installation in the control cabinet
 - SCALANCE X208PRO, specially for use outside the control cabinet
- The 8 RJ45 sockets of the SCALANCE XC208 are industry-compatible and feature additional securing collars for connection to the IE FC RJ45 plug 180
- The 8 PROFINET-compatible M12 sockets of the SCALANCE X208PRO are designed with IP65 degree of protection for connection to the IE M12 plug PRO or the pre-assembled IE M12 connecting cable
- The SCALANCE X208PRO can be installed on a DIN rail/S7-300 rail or as a compact flat or upright model directly on the installation or machine.
- Status information can be read in any mounting position thanks to the inclined row of LEDs.
- Power can also be supplied to the SCALANCE X208PRO from outside the control cabinet from the PS791-1PRO power supply module at 230 V AC.

Selection and ordering data

Description	Article No.
Industrial Ethernet switch SCALANCE XB005 unmanaged With 5 × 10/100 Mbps 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 Mbps RJ45 ports for configuring small star and line topologies IP30 degree of protection	6GK5005-0BA10-1AA3
Industrial Ethernet switch SCALANCE XC108 unmanaged With 8 × 10/100 Mbps RJ45 ports for configuring star and line topologies IP20 degree of protection	6GK5108-0BA00-2AC2
Industrial Ethernet switch SCALANCE XC208 managed With 8 × 10/100 Mbps RJ45 ports for configuring line, star and ring topologies IP20 degree of protection	6GK5208-0BA00-2AC2
Industrial Ethernet switch SCALANCE X208PRO managed With 8 × 10/100 Mbps RJ45 ports for configuring line, star and ring topologies IP65/IP67 degree of protection incl. 8 × RJ45 and 3 × M12 dust protection caps	6GK5208-0HA10-2AA6
Ethernet connection technology	
IE FC RJ45 plug 180 RJ plug connector for Industrial Ethernet with robust metal casing and integrated insulation displacement contacts; with 180° outgoing cable	6GK1901-1BB10-2AA0
IE FC standard cable GP 2 × 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC Outlet RJ45/ IE FC RJ45 plug; PROFINET-compatible; with UL approval; sold by the meter; max. length 1000 m (3281 ft), minimum order quantity 20 m (65.62 ft)	6XV1840-2AH10
IE FC trailing cable GP 2 × 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 20 m (65.62 ft)	6XV1840-3AH10

Technical specifications

Article No.		6GK5005-0BA00-1AB2	6GK5005-0BA10-1AA3	6GK5108-0BA00-2AC2	6GK5208-0BA00-2AC2	6GK5208-0HA10-2AA6
Product type designation		XB005	X005	XC108	XC208	X208PRO
Transfer rate	• 1	Mbit/s	10	10	10	10
	• 2	Mbit/s	100	100	100	100
Number of electrical connections						
• for signaling contact		-	-	1	1	1
• for network components or terminal equipment		5	5	8	8	8
• for redundant voltage supply		-	-	1	1	1
• for power supply		1	1	1	1	1
• for signaling contact		-	-	1	1	1
Type of electrical connection						
• for signaling contact		-	-	2-pole terminal block	2-pole terminal block	5-pin M12 socket (b-coded)
• for network components or terminal equipment		RJ45 port	RJ45 port	RJ45 port	-	M12 port, 4-pin, D-coded
• for power supply		3-pole terminal block	2-pole terminal block	4-pole terminal block	4-pole terminal block	4-pin M12 interface (A-coded)
Design of the removable storage C-PLUG		-	-	-	Yes	Yes
Type of voltage of the supply voltage		AC/DC	DC	DC	DC	DC
Supply voltage						
• external		V	24	24	24	24
• external		V	19.2 ... 28.8	18 ... 32	9.6 ... 31.2	18 ... 32
Consumed current maximum		A	0.07	0.08	-	0.185
Power loss [W] at DC at 24 V		W	1.68	2	3	4.4
Protection class IP			IP20	IP30	IP20	IP65/67
Ambient temperature						
• during storage		°C (°F)	-40 ... +80 (-40 ... +176)	-40 ... +80 (-40 ... +176)	-40 ... +85 (-40 ... +185)	-40 ... +70 (-40 ... +158)
• during transport		°C (°F)	-40 ... +80 (-40 ... +176)	-40 ... +80 (-40 ... +176)	-40 ... +85 (-40 ... +185)	-40 ... +70 (-40 ... +158)
• during operation		°C (°F)	-10 ... +60 (14 ... +140)	-40 ... +75 (-40 ... +167)	-40 ... +70 (-40 ... +158)	-40 ... +70 (-40 ... +158)
Width		mm (in)	45 (1.77165)	40 (1.5748)	60 (2.36221)	90 (3.54331)
Height		mm (in)	100 (3.93701)	125 (4.92126)	147 (5.7874)	125 (4.92126)
Depth		mm (in)	87 (3.4252)	124 (4.88189)	125 (4.92126)	124 (4.88189)
Net weight		kg (lb)	0.165 (0.36376)	0.55 (1.21254)	0.85 (1.87393)	1 (2.20462)
Certificate of suitability			EN 61000-6-2, EN 61000-6-4	EN 61000-6-2, EN 61000-6-4	-	EN 61000-6-2, EN 61000-6-4
• CE marking			Yes	Yes	Yes	Yes
• C-Tick			Yes	Yes	-	Yes
• KC approval			Yes	Yes	-	Yes
• E1 approval			-	No	-	-
• E1 approval			-	No	-	-

More information

Further information on the SIMATIC NET components, such as the Industrial Ethernet SCALANCE Electrical Line Switches and the Industrial Ethernet FC TP Standard/Trailing Cable, can be found in SiePortal.

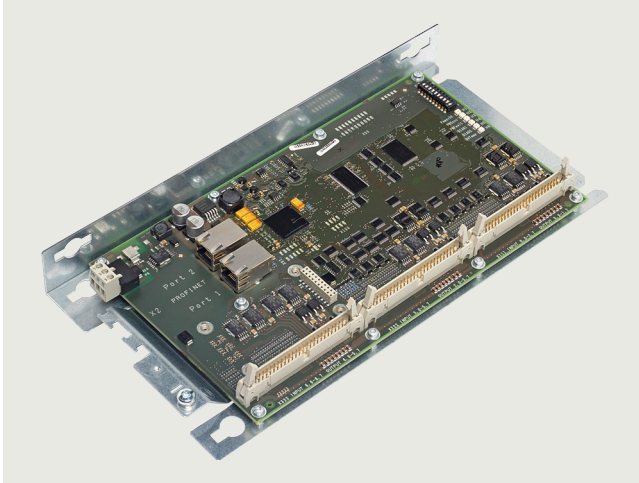
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SINUMERIK CNCs

SINUMERIK I/O

SINUMERIK I/O modules PP 72/48D PN and PP 72/48D 2/2A PN

Overview



SINUMERIK PP 72/48D PN I/O module

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

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

Benefits

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

Integration

The SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules can be used for the following CNCs:

- SINUMERIK 828D

Selection and ordering data

Description	Article No.
SINUMERIK PP 72/48D PN I/O module 72 digital inputs and 48 digital outputs	6FC5311-0AA00-0AA0
SINUMERIK PP 72/48D 2/2A PN I/O module 72 digital inputs and 48 digital outputs 2 analog inputs and 2 analog outputs	6FC5311-0AA00-1AA0
Accessories	
Terminal strip converter For 1-to-1-connection of ID connector to screw terminals 50-pin	6EP5406-5AA00
Cable set for self-assembly Ribbon cable, 50-pin length 6 m (19.7 ft) with 8 insulation displacement connectors, 50-pin and strain relief clamp	6EP5306-5BG00
DRIVE-CLiQ signal cable, pre-assembled For PROFINET connection Connector with degree of protection IP20 • In fixed lengths ¹⁾ • In precise decimeter lengths ¹⁾	6SL3060-4A..0-0AA0 6FX2002-1DC00-....

¹⁾ For complete article number and length code, see MOTION-CONNECT connection systems.

Technical specifications

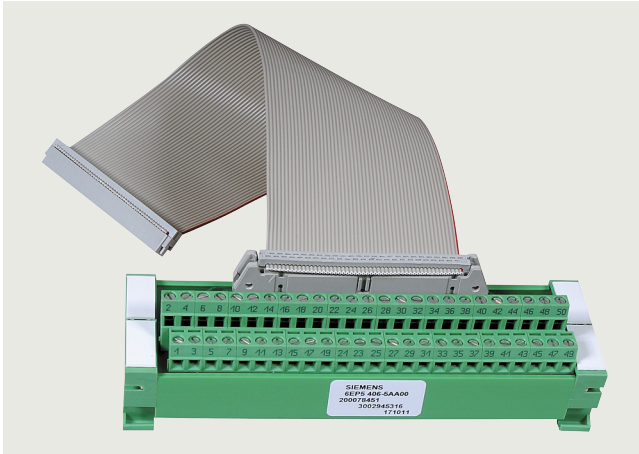
Article No.	6FC5311-0AA00-0AA0	6FC5311-0AA00-1AA0
Product brand name	SINUMERIK	SINUMERIK
Product short term	PP 72/48D PN	PP 72/48D 2/2A PN
Product designation	I/O module	I/O module
Supply voltage at DC	24 V	24 V
Active power consumption maximum	17 W	19 W
• Note	-	Without digital outputs
Number of digital inputs	72	72
Number of digital outputs	48	48
Number of analog inputs	-	2
Number of analog outputs	-	2
Degree of protection	IP00	IP00
Environmental category acc. to IEC 60721-3-3	Condensation and icing excluded. Low air temperature 0 °C (32 °F).	Condensation and icing excluded. Low air temperature 0 °C (32 °F).
Relative humidity at 25 °C (77 °F), during		
• storage	5 ... 95 %	5 ... 95 %
• transport	5 ... 95 %	5 ... 95 %
• operation	5 ... 95 %	5 ... 95 %
Ambient temperature, during		
• storage	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
• transport	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
• operation	0 ... 55 °C (32 ... 131 °F)	0 ... 55 °C (32 ... 131 °F)
Width	150 mm (5.90551 in)	150 mm (5.90551 in)
Height	300 mm (11.81102 in)	300 mm (11.81102 in)
Depth	35 mm (1.37795 in)	35 mm (1.37795 in)
Net weight	0.9 kg (1.98416 lb)	0.9 kg (1.98416 lb)
Certificate of suitability	CE, cULus	CE, cULus

SINUMERIK CNCs

SINUMERIK I/O

Terminal strip converter

Overview



Terminal strip converter

The terminal strip converter allows to connect process signals directly inside the control cabinet which requires a significantly reduced wiring effort.

Design

Connection of the PLC process signals:

- Screw terminals:
 - 24 digital inputs
 - 16 digital outputs

Connection to the SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules:

- Ribbon cable, 50-pin
- Insulation displacement connector

Installation in a control cabinet:

- Mounting rail

Selection and ordering data

Description	Article No.
Terminal strip converter For 1-to-1-connection of IDC connector to screw terminals 50-pin	6EP5406-5AA00
Cable set for self-assembly Ribbon cable, 50-pin, length 6 m (19.7 ft), with 8 insulation displacement connectors, 50-pin and strain relief clamp	6EP5306-5BG00

Overview



The SIMATIC PN/PN coupler is used whenever easy-to-configure, fast (deterministic) data exchange between PROFINET controllers is required.

Data transmission can be performed both beyond network boundaries as well as within a single network side.

Benefits

- Fast deterministic data exchange between CPUs with PROFINET controller, even beyond network boundaries
- Configuration with two PROFINET devices completely independent of the communication technology
- Very simple configuration of the data exchange via virtual IO modules or alternatively via data records for larger amounts of data
- Simultaneous data transfer to up to 3 CPUs on own network side and/or up to 4 CPUs on opposite network side
- Easy to integrate into any PROFINET network with 2 ports per network side

Design

The SIMATIC PN/PN coupler features an enclosure and is snapped onto a DIN rail (7.5 mm or 15 mm). 2 galvanically isolated plug-in connections are available for the power supply.

Accessories (not included in the PN/PN coupler scope of supply):

- SIMATIC bus adapter
- Labelling strips
- Strain relief
- Connector

Note:

The SIMATIC bus adapter is mandatory for operation with the SINUMERIK 828!

Integration

The SIMATIC PN/PN coupler can be used for the following CNC:

- SINUMERIK 828D

Function

The SIMATIC PN/PN coupler provides the output data of the writing CPU as input data to the receiving CPUs within a PN cycle. Both fail-safe data (via F_SendDP/F_ReceiveDP of a SIMATIC F-CPU only) and standard data can be transmitted.

2 basically different methods are available for data transmission:

- Data exchange via virtual I/O modules (coupling modules)
- Data record transfer

The PN/PN coupler provides extensive diagnostic information about LEDs, interrupts and status bytes. In this way, errors can be quickly located and commissioning and downtimes minimized.

The PN/PN coupler supports a variety of SIMATIC bus adapters for flexible connection to PROFINET.

Selection and ordering data

Description	Article No.
SIMATIC PN/PN coupler For deterministic data exchange between max. 4 PN controllers per subnet	6ES7158-3AD10-0XA0
Accessories	
SIMATIC bus adapter BA LC/FC Media converter FOC/copper 1 × LC FO connection 1 × FastConnect (FC) connection for PROFINET	6ES7193-6AG40-0AA0
SIMATIC ET 200SP bus adapter 2 × RJ45 sockets for PROFINET	6ES7193-6AR00-0AA0

Technical specifications

Article No.	6ES7158-3AD10-0XA0
Product brand name	SIMATIC
Product type designation	PN/PN coupler
Product designation	PN/PN coupler
Supply voltage for DC	24 V
Current consumption, max.	360 mA
Power loss, typ.	4 W
Mains/voltage failure stored energy time	10 ms
Transmission rate, max.	100 Mbps
Degree of protection	IP20
Ambient temperature, during	
• operation	
- for horizontal installation	0 ... 60 °C (32 ... 140 °F)
- for vertical installation	0 ... 50 °C (32 ... 122 °F)
Width	100 mm (3.94 in)
Height	117 mm (4.61 in)
Depth	74 mm (2.91 in)
• Note	With mounting rail
Net weight	0.2 kg (0.44 lb)
Certificate of suitability	Network loading class 3 / Security level 1 Test Cases V1.1.4

More information

Additional information is available on the internet in SiePortal at: sieportal.siemens.com

SINUMERIK CNCs

Supplementary components

SITOP power supply

Overview



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.

SITOP does not require much space on the standard mounting rail and offers a high level of functionality. Thanks to the extra power, 1.5 times the rated current for 5 seconds, large loads can also be switched on without any problems.

Benefits

- High efficiency
- High overload capability
- Narrow width and easy installation
- Exact output voltage and low residual ripple
- Integrated short-circuit protection and safe electrical separation
- National and international approvals
- No release of silicone

More information

You can find additional information in SiePortal or on the internet at:

sieportal.siemens.com

www.siemens.com/sitop

Technical specifications

Article No.		6EP1334-2BA20	6EP1336-2BA10	6EP1434-2BA20	6EP1436-2BA10
Product brand name		SITOP	SITOP	SITOP	SITOP
Product short term		PSU100S	PSU100S	PSU300S	PSU300S
Product designation		Stabilized power supply 1-phase	Stabilized power supply 1-phase	Stabilized power supply 3-phase	Stabilized power supply 3-phase
Voltage range for AC	V V	85 ... 132 170 ... 264	85 ... 132 176 ... 264	340 ... 550	340 ... 550
Line frequency range	Hz	47 ... 63	47 ... 63	47 ... 63	47 ... 63
Rated output current for DC	A	10	20	10	20
Rated output voltage for DC	V	24	24	24	24
Total tolerance, static	%	± 3	± 3	± 3	± 3
Mains buffering at $I_{out rated}$, minimal	ms	20 (at U_{in} = 120 V or 230 V)	20 (at U_{in} = 120 V or 230 V)	6 (at U_{in} = 400 V)	6 (at U_{in} = 400 V)
Degree of protection		IP20	IP20	IP20	IP20
Humidity class according to EN 60721		Climate class 3K3, without condensation	Climate class 3K3, without condensation	Climate class 3K3, without condensation	Climate class 3K3, without condensation
Ambient temperature, during					
• storage	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
• transport	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
• operation	°C (°F)	-25 ... +70 (-13 ... +158)	0 ... 70 (32 ... 158)	-25 ... +70 (-13 ... +158)	0 ... 70 (32 ... 158)
Width	mm (in)	70 (2.76)	115 (4.53)	70 (2.76)	90 (3.54)
Height	mm (in)	125 (4.92)	145 (5.71)	125 (4.92)	145 (5.71)
Depth	mm (in)	120 (4.72)	150 (5.91)	120 (4.72)	150 (5.91)
Net weight	kg (lb)	0.8 (1.76)	2.4 (5.29)	0.7 (1.54)	1.6 (3.53)
Certificate of suitability		CB / CE / cCSAus / cULus	CB / CE / cCSAus / cULus	CB / CE / cCSAus / cULus	CB / CE / cCSAus / cULus

Selection and ordering data

Description	Article No.
SITOP PSU100S 24 V DC, 1-phase Input voltage: 120 V/230 V AC • 10 A • 20 A	6EP1334-2BA20 6EP1336-2BA10
SITOP PSU300S 24 V DC, 3-phase Input voltage: 400 ... 500 V 3 AC • 10 A • 20 A	6EP1434-2BA20 6EP1436-2BA10

More information

Environmental Product Declaration (EPD)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product:

You can find more information on the internet at:

support.industry.siemens.com/cs/ww/en/view/109824793

SINUMERIK CNCs

Supplementary components
SITOP power supply

SITOP PSU6200**Technical specifications**

Article No.		6EP3334-7SB00-3AX0	6EP3336-7SB00-3AX0	6EP3434-7SB00-3AX0	6EP3436-7SB00-3AX0
Product brand name		SITOP	SITOP	SITOP	SITOP
Product short term		PSU6200	PSU6200	PSU6200	PSU6200
Product designation		Stabilized power supply 1-phase	Stabilized power supply 1-phase	Stabilized power supply 3-phase	Stabilized power supply 3-phase
Voltage range for AC	V	85 ... 264	85 ... 264	323 ... 576	323 ... 576
Line frequency range	Hz	47 ... 63	47 ... 63	47 ... 63	47 ... 63
Rated output current for DC	A	10	20	10	20
Rated output voltage for DC	V	24	24	24	24
Total tolerance, static	%	± 3	± 3	± 3	± 3
Mains buffering at $I_{out rated}$, minimal	ms	45 (at $U_{in} = 230$ V)	25 (at $U_{in} = 230$ V)	30 (at $U_{in} = 400$ V)	25 (at $U_{in} = 400$ V)
Degree of protection		IP20	IP20	IP20	IP20
Humidity class according to EN 60721		Climate class 3K3, without condensation	Climate class 3K3, without condensation	Climate class 3K3, without condensation	Climate class 3K3, without condensation
Ambient temperature, during					
• storage	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
• transport	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
• operation	°C (°F)	-25 ... +70 (-13 ... +158)	0 ... 70 (32 ... 158)	-25 ... +70 (-13 ... +158)	0 ... 70 (32 ... 158)
Width	mm (in)	45 (1.77)	70 (2.76)	45 (1.77)	70 (2.76)
Height	mm (in)	135 (5.31)	135 (5.31)	135 (5.31)	135 (5.31)
Depth	mm (in)	125 (4.92)	155 (6.10)	155 (6.10)	155 (6.10)
Net weight	kg (lb)	0.9 (1.98)	1.5 (3.31)	0.9 (1.98)	1.5 (3.31)
Certificate of suitability		CE, cULus (UL 508, CSA C22.2 No. 107.1), File E197259, cCSAus (CSA C22.2 No. 60950-1, UL 60950-1)			

Selection and ordering data

Description	Article No.
SITOP PSU6200 24 V DC, 1-phase Input voltage: 120 V/230 V AC • 10 A • 20 A	6EP3334-7SB00-3AX0 6EP3336-7SB00-3AX0
SITOP PSU6200 24 V DC, 3-phase Input voltage: 400 ... 500 V 3 AC • 10 A • 20 A	6EP3434-7SB00-3AX0 6EP3436-7SB00-3AX0

More informationEnvironmental Product Declaration (EPD)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product.
The EPD PDF provides brief and concise information about the ecological properties of a product:

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support.industry.siemens.com/cs/ww/en/view/109824796

SENTRON 7KM PAC2200 measuring devices
Overview


7KM PAC2200 measuring device, direct measurement, LAN

The 7KM PAC2200 measuring devices function as versatile energy meters for the standard mounting rail and indicate the most important measured values directly on the display. Integrated communication interfaces via Modbus TCP, Modbus RTU or M-Bus provide a flexible connection to power monitoring systems. The integrated web server (Modbus TCP version) is used for simple, device-independent visualization of measured values. The devices are incorporated in the familiar and simple system environment of powerconfig and powermanager.

The 7KM PAC2200 measuring devices meet the high requirements of IEC 61557-12 with class 1%. International approvals enable use all over the world.

Benefits

- Wide range of use
 - Large scope of functions and services, e.g. measurement in 50 and 60 Hz supplies
 - Calculation and storage of the last measuring period demand for active power and reactive power for simple generation of load profiles using software. (1 ... 60 minutes)
 - Threshold value monitoring and averaging
- **Connection**
 - For use in TN and TT supplies
 - Voltage measurement direct 480 V UL-L, CATIII
- Compact construction
 - Mounting on standard mounting rail with 6 MW
- Comprehensive recording of consumption
 - Energy meter for active energy, reactive energy and apparent energy, high and low tariffs, import and export
- Host of communication options
 - Integration in any energy management system or automation system via Modbus TCP, Modbus RTU or M-Bus
 - Digital input and output

Selection and ordering data

Description	Article No.
SENTRON PAC2200 measuring device	7KM2200-2EA40-1EA1
Standard mounting rail device with screw terminals	

Technical specifications

Article No.	7KM2200-2EA40-1EA1
Product brand name	SENTRON
Product short term	7KM PAC2200
Product designation	Measuring device
Operating voltage	• between L and L 3 ... 480 V • between N and L 3 ... 276 V
Operating frequency rated value	45 ... 65 Hz
Operational current rated value	65 A
Protection class	Safety class II
Degree of pollution	2
Degree of protection acc. to IEC 60529	- front IP40 - rear IP20
Installation altitude above sea level	max. 2000 m above sea level
Relative humidity (average annual value)	< 75 % RH
Ambient temperature during	- storage -40 °C ... +70 °C (-40 ... +158 °F) - transport -40 °C ... +70 °C (-40 ... +158 °F) - operation -25 °C ... +55 °C (-13 ... 131 °F)
Device mounting position	Any
Width	108 mm (4.25 in)
Height	97 mm (3.82 in)
Depth	71 mm (2.80 in)
Net weight	528 g (1.16 lb)
Certificate of suitability	CE, EAC, RCM, UKCA

More information
Environmental Product Declaration (EPD)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product. The EPD PDF provides brief and concise information about the ecological properties of a product.

You can find more information on the internet at:

support.industry.siemens.com/cs/ww/en/view/109967777

More information is available in SiePortal at:

mall.industry.siemens.com/mall/ww/en/Catalog/Products/10044505

SINAMICS S120/S220 drive system



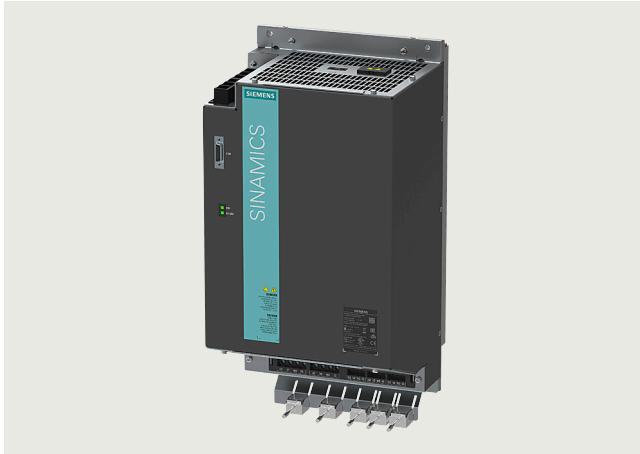
4/2	SINAMICS S120 Combi
4/2	Power Modules
4/8	Line reactors
4/9	Line filters
4/10	SINAMICS S120 in booksize format
4/10	<u>Line Modules</u>
4/10	Smart Line Modules
4/13	Line reactors
4/14	Line filters
4/15	Recommended line-side components
4/16	Active Line Modules
4/20	Active Interface Modules
4/22	Basic Line Filters
4/23	Recommended line-side components
4/24	Basic Line Modules
4/27	Line reactors
4/28	Line filters
4/29	Recommended line-side components
4/30	<u>Motor Modules</u>
4/30	Single Motor Modules
4/36	Double Motor Modules
4/40	Series motor reactors
4/41	<u>DC link components</u>
4/41	Braking Module
4/42	Braking resistors
4/43	Capacitor Module
4/44	Control Supply Module
4/45	DC link rectifier adapter
4/45	DC link adapter
4/46	SINAMICS S220 in booksize format
4/47	<u>Line Modules</u>
4/47	Smart Line Modules
4/51	Line reactors
4/53	Line filters
4/54	Recommended line-side components
4/55	<u>Motor Modules</u>
4/55	Single Motor Modules
4/63	Double Motor Modules
4/67	Supplementary system components
4/67	DMC20 DRIVE-CLiQ Hub Module
4/68	DME20 DRIVE-CLiQ Hub Module
4/69	TM54F Terminal Module
4/71	<u>Encoder system connection</u>
4/71	SMC20 Sensor Module Cabinet-Mounted
4/72	SMC30 Sensor Module Cabinet-Mounted
4/73	SMC40 Sensor Module Cabinet-Mounted
4/74	SME125 Sensor Module External

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules

Overview



SINAMICS S120 Combi Power Module, frame type Bxx

SINAMICS S120 Combi is a very compact and rugged drive concept tailored for compact turning and milling machines. SINAMICS S120 Combi integrates a line infeed with regenerative feedback capability, power units for spindle and feed motors as well as a TTL encoder interface into a single Power Module.

The SINAMICS S120 Combi Power Modules are optimized as a drive for 3 to 6 axes in machine tools. The Power Modules are available in frame types B01, B02, B11 to B14, B16 and B17 with external air cooling. SINAMICS S120/S220 Motor Modules in booksize format can be used to expand Power Modules frame types Bxx.

Benefits

- Compact multi-axis module with line infeed with regenerative feedback capability and power units for 3 or 4 axes
- Customized drive system for compact standard turning and milling machines
- Requires very little mounting space in control cabinet incl. fan unit, shield terminals and ventilation clearances
- Optimized for weak supply networks with frequent undervoltage, network imbalances and large frequency fluctuations
- Optimized for harsh operating conditions with increased cabinet temperature and increased humidity
- Rugged Power Modules resistant to short circuits, overvoltage and ground faults
- Rugged and easy-to-fit screw-type terminals with integrated shield connection for the power cables
- Perfectly designed for expansion using additional Motor Modules in booksize format
- Low energy consumption thanks to state-of-the-art 400-V technology
- Excellent dynamic response and machining precision thanks to Dynamic Servo Control (DSC)
- Simple cabling due to intelligent DRIVE-CLiQ interface
- Very simple commissioning thanks to predefined topologies

Function

- Power Module with 3 or 4 integrated power units
 - B11 to B13: 3 axes
 - B01, B02, B14, B16 and B17: 4 axes
- Integrated line infeed with regenerative feedback capability
- Integrated TTL encoder interface
- Integrated motor brake control for one axis
- Integrated fan power supply
- Line connection voltage 380 to 480 V 3 AC
- Supply types TT, TN and IT
- Integrated shield connection clamps
- No mounting effort for frame types Bxx thanks to the fan integrated in the heat sink
- Increased availability thanks to fan monitoring
- Derating only from 45 °C cabinet temperature
- Power cables are connected via screw-type terminals

Integration

The following components can be connected to the SINAMICS S120 Combi drive system:

- SINUMERIK 828D
- 3 or 4 spindles/feed motors
- 3 or 4 motor encoders
- 3 or 4 direct encoders via DMC20
- Direct spindle encoder directly to TTL or sin/cos via SMC20
- Integrated fan for frame types Bxx
- Up to 2 additional SINAMICS S120 Motor Modules in booksize format
 - connection via connection kit for expansion axes
- Braking Module with braking resistor via DC link connection
- Control Supply Module
- 1 safe motor brake control
- 5 or 6 DRIVE-CLiQ sockets
- 24 V electronics power supply via connector
- 1 safe standstill input for the infeed (Enable Pulses)
- 1 safe standstill input for the spindle and feeds (Enable Pulses)
- 1 temperature sensor input for the spindle
- PE connections

The scope of supply of the SINAMICS S120 Combi Power Modules includes:

- SINAMICS S120 Combi Power Module
- Accessories pack consisting of:
 - 3 DRIVE-CLiQ dust protection blanking plugs
 - Connector X224 for the electronics power supply
 - Connector X11 for motor brake control
 - Connector X21 Enable Pulses infeed
 - Connector X22 Enable Pulses temperature sensor – axes
 - 5 shield terminals for power cables
 - Warning labels in 36 languages

Selection and ordering data
SINAMICS S120 Combi Power Module

Rated power Infeed kW	Rated output current Spindle A	Rated output current Feed 1 A	Rated output current Feed 2 A	Rated output current Feed 3 A	Article No.	Frame type
3-axis Power Module						
16	18	9	9	-	6SL3111-3VE21-6FC1	B11
16	24	9	9	-	6SL3111-3VE21-6EC1	B12
20	30	9	9	-	6SL3111-3VE22-0HC1	B13
4-axis Power Module						
16	18	9	9	9	6SL3111-4VE21-6FC1	B14
16	24	12	9	9	6SL3111-4VE21-6EC1	B01
16	24	12	9	9	6SL3111-4VE21-6ED1	B02
16	24 ¹⁾	12	9	9	6SL3111-4VE21-6ED2	B17
20	30	12	9	9	6SL3111-4VE22-0HC1	B16

Description	Article No.
Accessories	
Connection kit for expansion axes For connecting SINAMICS S120 Motor Modules in booksize format for expansion axes to SINAMICS S120 Combi Power Modules	6SL3161-3XP00-0AA0

Technical specifications

Article No.	6SL3111-3VE2-.... 6SL3111-4VE2-....
Product brand name	SINAMICS
Product type designation	S120 Combi
Product designation	Power Module
DC link voltage²⁾	1.35 × line voltage
Output voltage	0 ... 0.7 × DC link voltage
Line power factor at rated power	
• Fundamental cos φ ₁	> 0.96
• Total λ	0.64 ... 0.90
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 to EN 61800-3
Degree of protection	IP20
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) with derating
Certificate of suitability	CE, cURus
Safety Integrated	Safety Integrity Level 2 (SIL 2) acc. to IEC 61508 Performance Level d (PL d) acc. to ISO 13849-1 Control Category 3 acc. to ISO 13849-1

¹⁾ Pulse frequency 4 kHz/8 kHz.

²⁾ The DC link voltage adjusts itself to the mean value of the rectified line voltage.

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules

Technical specifications

Article No.		6SL3111-3VE21-6FC1	6SL3111-3VE21-6EC1	6SL3111-3VE22-0HC1
Product brand name		SINAMICS		
Product type designation		S120 Combi		
Product designation		3-axis Power Module with external air cooling		
Infeed				
• Rated power P_{rated} (S1)	kW	16	16	20
• Infeed power P_{S6} (40 %)	kW	21	21	26.5
• Peak infeed power P_{max}	kW	35	35	40
Regenerative feedback				
• Rated power P_{rated} (S1)	kW	16	16	20
• Peak regenerative feedback power P_{max}	kW	35	35	40
Supply voltages				
• Line voltage 3 AC	V	380 ... 480 ± 10 %	380 ... 480 ± 10 %	380 ... 480 ± 10 %
• Line frequency	Hz	45 ... 66	45 ... 66	45 ... 66
• Electronics power supply DC	V	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)
Rated input current				
• At 400 V 3 AC	A	28	28	34
• At 380 V 3 AC	A	29	29	35
• At 480 V 3 AC	A	25	25	30
• At 400 V 3 AC I_{S6} (40 %)	A	35.5	35.5	44
• At 400 V 3 AC peak current	A	56	56	63.5
Pulse frequency	kHz	4	4	4
Output voltage AC	V	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage
Spindle				
• Rated output current AC I_{rated}	A	18	24	30
• Intermittent-duty operating current AC I_{S6} (40 %)	A	24	32	40
• Peak current AC I_{max}	A	36	48	56
Rated power				
• At 540 V DC link voltage	kW	8.7	11.7	14.4
• At 600 V DC link voltage	kW	9.7	13	16
Feed 1/Feed 2				
• Rated output current AC I_{rated}	A	9	9	9
• Intermittent-duty operating current AC I_{S6} (40 %)	A	12	12	12
• Peak current AC I_{max}	A	18	18	18
Rated power				
• At 540 V DC link voltage	kW	4.3	4.3	4.3
• At 600 V DC link voltage	kW	4.8	4.8	4.8
Output for expansion axis				
• DC link output current DC I_{rated}	A	40	40	40
• DC link voltage	V	460 ... 720	460 ... 720	460 ... 720
• Electronics output current for an expansion axis 24 V DC	A	20	20	20
Electronics current consumption at 24 V DC				
• Without external fan module	A	1.5	1.5	1.5
• With external fan module	A	2.3	2.3	2.3
Total power loss, incl. electronics losses				
• Internal	kW	0.091	0.091	0.102
• External	kW	0.379	0.446	0.532
Ambient temperature, max.				
• Without derating	°C (°F)	45 (113)	45 (113)	45 (113)
• With derating	°C (°F)	55 (131)	55 (131)	55 (131)
DC link voltage				
• Overvoltage trip DC	V	460 ... 720	460 ... 720	460 ... 720
• Undervoltage trip DC	V	820 ± 2 %	820 ± 2 %	820 ± 2 %
	V	380 ± 2 %	380 ± 2 %	380 ± 2 %

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules

Technical specifications

Article No.		6SL3111-3VE21-6FC1	6SL3111-3VE21-6EC1	6SL3111-3VE22-0HC1
Product brand name		SINAMICS		
Product type designation		S120 Combi		
Product designation		3-axis Power Module with <u>external</u> air cooling		
Circuit breaker (IEC)				
• Motor starter protector Type		3RV2031-4UA..	3RV2031-4UA..	3RV2041-4JA..
• Circuit breaker Type		3VA1140-6....	3VA1140-6....	3VA1163-6....
		3VA5150-4....	3VA5150-4....	3VA5160-4....
		3VA5150-5....	3VA5150-5....	3VA5160-5....
		3VA5150-6....	3VA5150-6....	3VA5160-6....
		3VA5250-5....	3VA5250-5....	3VA5260-5....
		3VA5250-6....	3VA5250-6....	3VA5260-6....
• Rated current	A	35	35	63
• Rated short-circuit current SCCR at 480 V 3 AC, resulting	kA	65	65	65
Fuses (IEC)				
• LV HRC line fuse		3NA3814	3NA3814	3NA3822
• Rated current	A	35	35	63
Circuit breaker (UL)				
• Type E combination motor controller (NKJH)		3RV2031-4UA..	3RV2031-4UA..	3RV2041-4JA..
• Circuit breaker (DIVQ)		3VA5150-4....	3VA5150-4....	3VA5160-4....
		3VA5150-5....	3VA5150-5....	3VA5160-5....
		3VA5150-6....	3VA5150-6....	3VA5160-6....
		3VA5250-5....	3VA5250-5....	3VA5260-5....
		3VA5250-6....	3VA5250-6....	3VA5260-6....
• Rated current	A	35	35	60
• Rated short-circuit current SCCR at 480 V 3 AC, resulting	kA	65	65	65
Fuses (UL)¹⁾				
• Rated current	A	35	35	60
Cooling air requirement	m ³ /h (ft ³ /h)	160 (5650)	160 (5650)	160 (5650)
Width	mm (in)	260 (10.23)	260 (10.23)	260 (10.23)
Height	mm (in)	523 (20.59)	523 (20.59)	523 (20.59)
Depth	mm (in)	299 (11.77)	299 (11.77)	299 (11.77)
Net weight	kg (lb)	18.8 (41.45)	18.8 (41.45)	19 (41.89)
Frame type		B11	B12	B13

¹⁾ Any UL/cUL-compliant listed (JDDZ/7) fuse rated Class J, T, CF, or CC from any manufacturer may be used..

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules

Technical specifications

Article No.		6SL3111-4VE21-6FC1	6SL3111-4VE21-6EC1	6SL3111-4VE21-6ED1	6SL3111-4VE21-6ED2	6SL3111-4VE22-0HC1
Product brand name		SINAMICS				
Product type designation		S120 Combi				
Product designation		4-axis Power Module with <u>external</u> air cooling				
Infeed						
• Rated power P_{rated} (S1)	kW	16	16	16	16	20
• Infeed power P_{S6} (40 %)	kW	21	21	21	21	26.5
• Peak infeed power P_{max}	kW	35	35	35	35	40
Regenerative feedback						
• Rated power P_{rated} (S1)	kW	16	16	16	16	20
• Peak regenerative feedback power P_{max}	kW	35	35	35	35	40
Supply voltages						
• Line voltage 3 AC	V	380 ... 480 ± 10 %	380 ... 480 ± 10 %	380 ... 480 ± 10 %	380 ... 480 ± 10 %	380 ... 480 ± 10 %
• Line frequency	Hz	45 ... 66	45 ... 66	45 ... 66	45 ... 66	45 ... 66
• Electronics power supply DC	V	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)	24 (20.4 ... 28.8)
Rated input current						
• At 400 V 3 AC	A	28	28	28	28	34
• At 380 V 3 AC	A	29	29	29	29	35
• At 480 V 3 AC	A	25	25	25	25	30
• At 400 V 3 AC I_{S6} (40 %)	A	35.5	35.5	35.5	35.5	44
• At 400 V 3 AC peak current	A	56	56	56	56	63.5
Pulse frequency	kHz	4	4	4	4 (8) ¹⁾	4
Output voltage AC	V	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage	0 ... 0.7 × DC link voltage
Spindle						
• Rated output current AC I_{rated}	A	18	24	24	24	30
• Intermittent-duty operating current AC I_{S6} (40 %)	A	24	32	32	32 at 4 kHz (19.2 at 8 kHz) ¹⁾	40
• Peak current AC I_{max}	A	36	48	48	72	56
Rated power						
• At 540 V DC link voltage	kW	8.7	11.7	11.7	11.7	14.4
• At 600 V DC link voltage	kW	9.7	13	13	13	16
Feed 1						
• Rated output current AC I_{rated}	A	9	12	12	12	12
• Intermittent-duty operating current AC I_{S6} (40 %)	A	12	16	16	16	16
• Peak current AC I_{max}	A	18	24	36	36	24
Rated power						
• At 540 V DC link voltage	kW	4.3	5.8	5.8	5.8	5.8
• At 600 V DC link voltage	kW	5.8	6.5	6.5	6.5	6.5
Feed 2/Feed 3						
• Rated output current AC I_{rated}	A	9	9	9	9	9
• Intermittent-duty operating current AC I_{S6} (40 %)	A	12	12	12	12	12
• Peak current AC I_{max}	A	18	18	27	27	18
Rated power						
• At 540 V DC link voltage	kW	4.3	4.3	4.3	4.3	4.3
• At 600 V DC link voltage	kW	4.8	4.8	4.8	4.8	4.8
Output for expansion axis						
• DC link output current DC I_{rated}	A	40	40	40	40	40
• DC link voltage	V	460 ... 720	460 ... 720	460 ... 720	460 ... 720	460 ... 720
• Electronics output current for an expansion axis 24 V DC	A	20	20	20	20	20
Electronics current consumption at 24 V DC						
• Without external fan module	A	1.6	1.6	1.6	1.6	1.6
• With external fan module	A	2.4	2.3	2.3	2.4	2.4
Total power loss, incl. electronics losses						
• Internal	kW	0.547	0.659	0.659	0.805	0.733
• External	kW	0.1	0.1	0.1	0.116	0.113
	kW	0.447	0.559	0.559	0.689	0.520

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules

Technical specifications

Article No.		6SL3111-4VE21-6FC1	6SL3111-4VE21-6EC1	6SL3111-4VE21-6ED1	6SL3111-4VE21-6ED2	6SL3111-4VE22-0HC1
Product brand name		SINAMICS				
Product type designation		S120 Combi				
Product designation		4-axis Power Module with <u>external</u> air cooling				
Ambient temperature, max.						
• Without derating	°C (°F)	45 (113)	45 (113)	45 (113)	45 (113)	45 (113)
• With derating	°C (°F)	55 (131)	55 (131)	55 (131)	55 (131)	55 (131)
DC link voltage	V	460 ... 720	460 ... 720	460 ... 720	460 ... 720	460 ... 720
• Overvoltage trip DC	V	820 ± 2 %	820 ± 2 %	820 ± 2 %	820 ± 2 %	820 ± 2 %
• Undervoltage trip DC	V	380 ± 2 %	380 ± 2 %	380 ± 2 %	380 ± 2 %	380 ± 2 %
Circuit breaker (IEC)						
• Motor starter protector Type		3RV2031-4UA..	3RV2031-4UA..	3RV2031-4UA..	3RV2031-4UA..	3RV2041-4JA..
• Circuit breaker Type		3VA1140-6....	3VA1140-6....	3VA1140-6....	3VA1140-6....	3VA1163-6....
		3VA5150-4....	3VA5150-4....	3VA5150-4....	3VA5150-4....	3VA5160-4....
		3VA5150-5....	3VA5150-5....	3VA5150-5....	3VA5150-5....	3VA5160-5....
		3VA5150-6....	3VA5150-6....	3VA5150-6....	3VA5150-6....	3VA5160-6....
		3VA5250-5....	3VA5250-5....	3VA5250-5....	3VA5250-5....	3VA5260-5....
		3VA5250-6....	3VA5250-6....	3VA5250-6....	3VA5250-6....	3VA5260-6....
• Rated current	A	35	35	35	35	63
• Rated short-circuit current SCCR at 480 V 3 AC, resulting	kA	65	65	65	65	65
Fuses (IEC)						
• LV HRC line fuse		3NA3814	3NA3814	3NA3814	3NA3814	3NA3822
• Rated current	A	35	35	35	35	63
Circuit breaker (UL)						
• Type E combination motor controller (NKKJH)		3RV2031-4UA..	3RV2031-4UA..	3RV2031-4UA..	3RV2031-4UA..	3RV2041-4JA..
• Circuit breaker (DIVQ)		3VA5150-4....	3VA5150-4....	3VA5150-4....	3VA5150-4....	3VA5160-4....
		3VA5150-5....	3VA5150-5....	3VA5150-5....	3VA5150-5....	3VA5160-5....
		3VA5150-6....	3VA5150-6....	3VA5150-6....	3VA5150-6....	3VA5160-6....
		3VA5250-5....	3VA5250-5....	3VA5250-5....	3VA5250-5....	3VA5260-5....
		3VA5250-6....	3VA5250-6....	3VA5250-6....	3VA5250-6....	3VA5260-6....
• Rated current	A	35	35	35	35	60
• Rated short-circuit current SCCR at 480 V 3 AC, resulting	kA	65	65	65	65	65
Fuses (UL)²⁾						
• Rated current	A	35	35	35	35	60
Cooling air requirement	m ³ /h (ft ³ /h)	160 (5650)	160 (5650)	160 (5650)	160 (5650)	160 (5650)
Width	mm (in)	260 (10.23)	260 (10.23)	260 (10.23)	260 (10.23)	260 (10.23)
Height	mm (in)	523 (20.59)	523 (20.59)	523 (20.59)	523 (20.59)	523 (20.59)
Depth	mm (in)	299 (11.77)	299 (11.77)	299 (11.77)	299 (11.77)	299 (11.77)
Net weight	kg (lb)	19.3 (42.55)	19.6 (43.2)	19.6 (43.2)	19.3 (42.55)	19.3 (42.55)
Frame type		B14	B01	B02	B17	B16

¹⁾ Changeover to 8 kHz only possible for the spindle.

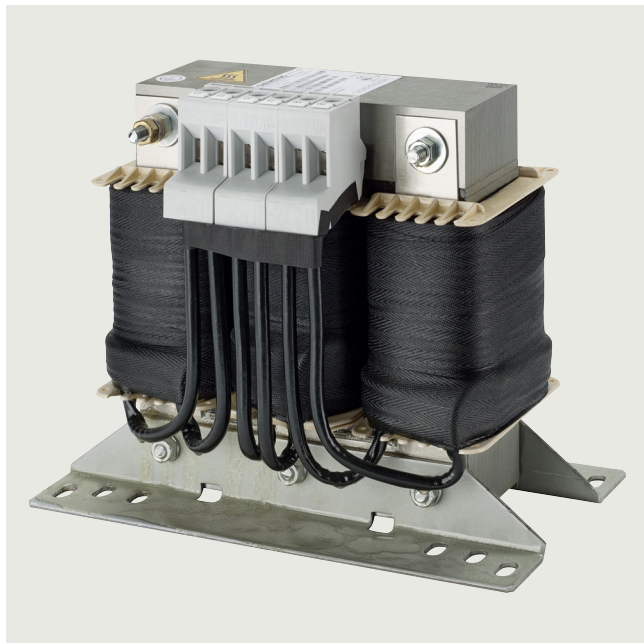
²⁾ Any UL/cUL-compliant listed (JDDZ/7) fuse rated Class J, T, CF, or CC from any manufacturer may be used..

SINAMICS S120/S220 drive system

SINAMICS S120 Combi

Power Modules > Line reactors

Overview



Line reactor

SINAMICS S120 Combi Power Modules cannot operate without line reactors. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for SINAMICS S120 Combi			SINAMICS line reactor	
Rated power Infeed kW	Power Module Type	Frame type	Rated power kW	Article No.
16	6SL3111-3VE21-6FC1	B11	16	6SL3100-0EE21-6AB0
16	6SL3111-3VE21-6EC1	B12		
16	6SL3111-4VE21-6FC1	B14		
16	6SL3111-4VE21-6EC1	B01		
16	6SL3111-4VE21-6ED1	B02		
16	6SL3111-4VE21-6ED2	B17		
20	6SL3111-3VE22-0HC1	B13	20	6SL3100-0EE22-0AA0
20	6SL3111-4VE22-0HC1	B16		

Technical specifications

Article No.		6SL3100-0EE21-6AB0	6SL3100-0EE22-0AA0
Product brand name		SINAMICS	SINAMICS
Product designation		Line reactor	Line reactor
Line voltage 380 ... 480 V 3 AC			
Rated power	kW	16	20
Rated current	A	28	33
Power loss	kW	0.075	0.098
Line/load connection 1U1, 1V1, 1W1/1U2, 1V2, 1W2		Screw-type terminals	
• Conductor cross-section	mm ²	4	10
PE connection		Screw-type terminals	
• Conductor cross-section	mm ²	4	10
Degree of protection		IP20	IP20
Width	mm (in)	219 (8.62)	219 (8.62)
Height	mm (in)	176 (6.93)	176 (6.93)
Depth	mm (in)	120 (4.72)	130 (5.12)
Net weight	kg (lb)	10.7 (23.6)	10.9 (24)
Certificate of suitability		cURus	cURus

Overview



Line filter

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 suitable only for direct connection to TN systems.

The use of other makes of line filter can lead to malfunctions or irreparable damage to equipment.

Note:

According to product standard IEC 61800-3, RFI suppression commensurate with the relevant rated conditions must be provided and is a legal requirement in the EU (EMC Directive). Line filters and line reactors are required for this purpose.

The 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.

Selection and ordering data

Suitable for SINAMICS S120 Combi			SINAMICS line filter
Rated power Infeed	Power Module		Article No.
kW	Type	Frame type	
16	6SL3111-3VE21-6FC1	B11	6SL3000-0BE21-6DA0
16	6SL3111-3VE21-6EC1	B12	
20	6SL3111-3VE22-0HC1	B13	
16	6SL3111-4VE21-6FC1	B14	
16	6SL3111-4VE21-6EC1	B01	
16	6SL3111-4VE21-6ED1	B02	
16	6SL3111-4VE21-6ED2	B17	
20	6SL3111-4VE22-0HC1	B16	

Technical specifications

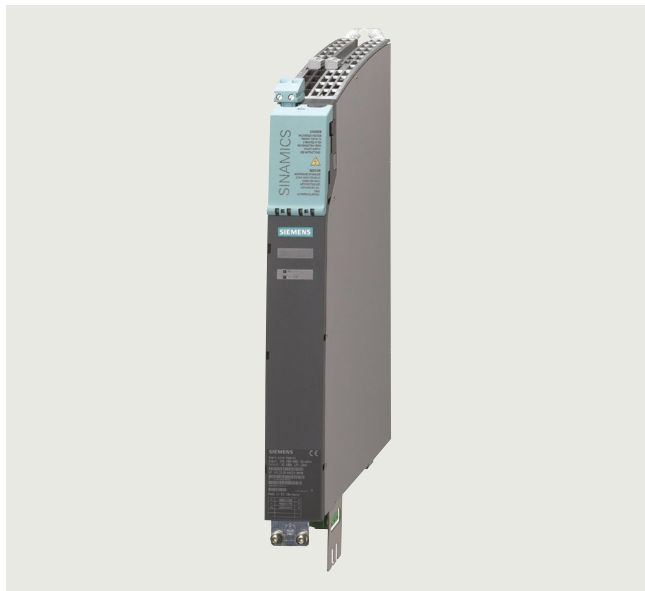
Article No.	6SL3000-0BE21-6DA0		
Product brand name	SINAMICS		
Product designation	Line filter		
Rated current	36 A		
Rated infeed power	10 kW	16 kW	20 kW
Power loss at rated operation	0.012 kW	0.015 kW	0.016 kW
Line/load connection L1, L2, L3/U, V, W	Screw-type terminals		
• Conductor cross-section	10 mm ²		
PE connection	M6 screw stud		
Degree of protection	IP20		
Width	50 mm (1.97 in)		
Height	429 mm (16.89 in)		
Depth	226 mm (8.90 in)		
Net weight	5 kg (11 lb)		
Certificate of suitability	cURus		

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules

Overview



Smart Line Modules are stall-protected, line-commutated in-feed/regenerative feedback units (diode bridge for incoming supply; stall-protected, line-commutated regenerative feedback via IGBTs) with 100 % continuous regenerative feedback power. The regenerative feedback capability of the modules can be deactivated by means of a digital input (Smart Line Modules 5 kW and 10 kW) or by means of parameterization (Smart Line Modules 16 kW to 55 kW). Smart Line Modules are designed for connection to grounded TN/TT systems and non-grounded IT systems.

The DC link is pre-charged via integrated precharging resistors.

The associated line reactor is required for operating a Smart Line Module.

Design

The Smart Line Modules in booksize format feature the following connections and 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 earth) connections
- 2 digital inputs (only for Smart Line Modules 5 kW and 10 kW)
- 1 digital output (only for Smart Line Modules 5 kW and 10 kW)
- 3 DRIVE-CLiQ sockets (only for Smart Line Modules 16 kW to 55 kW)
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC (only for Smart Line Modules 16 kW to 55 kW, Pt1000 can be used from firmware V4.7 HF17)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The signal cable shield can be connected to the Line Module by means of a shield connection terminal, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connecting the module to the adjacent Control Unit on the left with the drive control, length 0.11 m (4.33 in) (only for Smart Line Modules 16 kW to 55 kW)
- 2 blanking plugs for closing unused DRIVE-CLiQ sockets (only for Smart Line Modules 16 kW to 55 kW)
- DRIVE-CLiQ cable (length depends on Smart Line Module width) for connection to the adjacent Motor Module, length = width of Smart Line Module + 0.11 m (4.33 in)
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs and outputs
- Connector X22 for digital inputs and outputs (only for Smart Line Modules 5 kW and 10 kW)
- Connector X1 for line connection (only for Smart Line Modules 5 kW and 10 kW)
- 1 set of warning labels in 36 languages

Selection and ordering data

SINAMICS S120 Smart Line Module in booksize format		SINAMICS S220 Smart Line Module in booksize format	
Rated power kW (hp)	Internal air cooling Article No.	C/D type	Internal air cooling Article No.
5 (5)	6SL3130-6AE15-0AB1		
10 (10)	6SL3130-6AE21-0AB1		
16 (18)	—	C type	6SL5130-6UE21-6AC0
		D type	6SL5130-6UE21-6AD0
24 (27)	—	C type	6SL5130-6UE22-4AC0
		D type	6SL5130-6UE22-4AD0
36 (40)	—	C type	6SL5130-6UE23-6AC0
		D type	6SL5130-6UE23-6AD0
55 (60)	—	C type	6SL5130-6UE25-5AC0
		D type	6SL5130-6UE25-5AD0

Further information (technical data, accessories, etc.) about SINAMICS S220 Smart Line Modules in booksize format can be found in the section SINAMICS S220 built-in units in booksize format.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules

Selection and ordering data

Description	Article No.
Accessories	
DC link rectifier adapter For direct infeed of DC link voltage - Screw-type terminals 0.5 ... 10 mm² For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in), 75 mm (2.95 in) and 100 mm (3.94 in) - Screw-type terminals 35 ... 120 mm² For Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0

Description	Article No.
Accessories for re-ordering	
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
Terminal Kit (Plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), dust protection blanking plugs) For DRIVE-CLiQ port For Smart Line Modules with a width of 50 mm (1.97 in)	6SL3163-8KB00-0AA1 6SL3166-3AB00-0AA0
Warning labels in 36 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. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Technical specifications

Article No.	6SL313...
Product designation	Smart Line Module in booksize format
Line voltage (up to 2000 m (6562 ft) above sea level)	380 ... 480 V 3 AC ±10 % (in operation -15 % <1 min)
Line frequency	47 ... 63 Hz
SCCR (short-circuit current rating)	65 kA in conjunction with the recommended Class J fuse, or circuit breaker according to UL489 / CSA 22.2 No. 5-02 see recommended line-side components
Line power factor at rated power - Fundamental power factor (cos Φ_1) - Total (λ)	>0.96 0.65 ... 0.9
Overvoltage category according to EN 60664-1	Class III
DC link voltage, approx.	1.35 x line voltage ¹⁾
Electronics power supply	24 V DC -15 %/+20 %
Radio interference suppression - Standard - With line filter	No radio interference suppression Category C2 to EN 61800-3 Total cable length up to 350 m (1148 ft) (shielded)

Article No.	6SL313...
Product designation	Smart Line Module in booksize format
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of conformity	CE (Low Voltage and EMC Directives)
Certificate of suitability	cULus

¹⁾ The DC link voltage is maintained at the mean value of the rectified line voltage.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules

Technical specifications

Article No.		6SL3130-6AE15-0AB1		6SL3130-6AE21-0AB1	
Product designation		Smart Line Module in booksize format with <u>internal</u> air cooling			
Line voltage 380 ... 480 V 3 AC					
Infeed/regenerative feedback power					
• Rated power P_{rated}					
- At 380 V 3 AC		kW	5		10
- At 460 V 3 AC ²⁾		(hp)	(5)		(10)
• For S6 duty (40 %) P_{S6}		kW	6.5		13
• P_{max}		kW	10		20
DC link current					
• At 540/600 V DC		A	9.3/8.3		18.5/16.6
• For S6 duty (40 %)		A	11		22
• Maximum		A	16.6		33.2
Input current					
• Rated current at 380/400/480 V 3 AC		A	8.6/8.1/6.7		17/16.2/12.8
• For S6 duty (40 %) at 400 V		A	10.6		21.1
• At 400 V max.		A	15.7		31.2
Current requirement		A	0.8		0.9
24 V DC electronics power supply, max.					
Current carrying capacity					
• 24 V DC busbars		A	20		20
• DC link busbars		A	100		100
DC link capacitance					
• Smart Line Module		μF	220		330
• Drive line-up, max.		μF	6000		6000
Power loss ¹⁾		kW	0.08		0.14
Cooling air requirement		m ³ /s (ft ³ /s)	0.008 (0.3)		0.008 (0.3)
Sound pressure level		dB	<60		<60
L_{pA} (1 m)					
Line connection			Screw-type terminals (X1)		Screw-type terminals (X1)
U1, V1, W1					
• Conductor cross-section		mm ²	2.5 ... 6		2.5 ... 6
Shield connection			Shield connection plate integrated into the connector		Shield connection plate integrated into the connector
PE connection			M5 screw		M5 screw
Cable length, max.					
(total of all motor power cables and DC link)					
• Shielded		m (ft)	350 (1148)		350 (1148)
• Unshielded		m (ft)	560 (1837)		560 (1837)
Degree of protection			IP20		IP20
Dimensions					
• Width		mm (in)	50 (1.97)		50 (1.97)
• Height		mm (in)	380 (14.96)		380 (14.96)
• Depth		mm (in)	270 (10.63)		270 (10.63)
Weight, approx.		kg (lb)	4.7 (10.4)		4.8 (10.6)

¹⁾ Power loss of Smart Line Module at rated output 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.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules > Line reactors

Overview



Line reactor

Line reactors are required in order for the Smart Line Modules to function. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for Smart Line Module		SINAMICS line reactor
Rated power Smart Line Module	Booksize format Internal air cooling	Article No.
kW (hp)	Type	
5 (5)	6SL3130-6AE15-0AB1	
10 (10)	6SL3130-6AE21-0AB1	6SL3000-0CE15-0AA0
		6SL3000-0CE21-0AA0

Technical specifications

Article No.		6SL3000-0CE15-0AA0		6SL3000-0CE21-0AA0	
Product designation		Line reactor			
Line voltage 380 ... 480 V 3 AC					
Rated current		A	14		28
Power loss		kW	0.062		0.116
Line/load connection 1U1, 1V1, 1W1 / 1U2, 1V2, 1W2		mm²	Screw-type terminals		Screw-type terminals
• Conductor cross-section			4		10
PE connection			M4 screw		M4 screw
Degree of protection			IP20		IP20
Dimensions					
• Width		mm (in)	150 (5.91)		177 (6.97)
• Height		mm (in)	175 (6.89)		196 (7.72)
• Depth		mm (in)	66.5 (2.62)		86 (3.39)
Weight, approx.		kg (lb)	3.7 (8.16)		7.5 (16.5)
Certificate of suitability			cURus		cURus
Suitable for Smart Line Module in booksize format		Type	6SL3130-6AE15-0AB1		6SL3130-6AE21-0AB1
• Rated power of the Smart Line Module		kW (hp)	5 (5)		10 (10)

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules > Line filters

Overview



Line filter

In plants with stringent 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 only suitable for direct connection to

TN line systems. The use of other makes of line filter can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for Smart Line Module		SINAMICS Line filter
Rated power Smart Line Module	Suitable for Smart Line Module	Article No.
kW (hp)		
5 (5)	6SL3130-6AE15-0AB1	6SL3000-0HE15-0AA0
10 (10)	6SL3130-6AE21-0AB1	6SL3000-0HE21-0AA0

Technical specifications

Article No.		6SL3000-0HE15-0AA0	6SL3000-0HE21-0AA0
Product designation		Line filter	
Line voltage 380 ... 480 V 3 AC			
Rated current	A	12	24
Power loss	kW	0.02	0.02
Line/load connection	mm ²	Screw-type terminals	Screw-type terminals
L1, L2, L3 / U, V, W			
• Conductor cross-section		10	10
PE connection		M6 screw studs according to DIN 46234	M6 screw studs according to DIN 46234
Degree of protection		IP20	IP20
Dimensions			
• Width	mm (in)	60 (2.36)	60 (2.36)
• Height	mm (in)	285 (11.22)	285 (11.22)
• Depth	mm (in)	122 (4.80)	122 (4.80)
Weight, approx.	kg (lb)	2.1 (4.63)	2.3 (5.07)
Certificate of suitability		cURus	cURus
Suitable for Smart Line Module in booksize format	Type	6SL3130-6AE15-0AB1	6SL3130-6AE21-0AB1
• Rated power of the Smart Line Module	kW (hp)	5 (5)	10 (10)

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Smart Line Modules > Recommended line-side components

Selection and ordering data

Suitable line-side power components are assigned depending on the power rating of the Smart Line Module.

Additional information about the line-side power components can be found in SiePortal.

The tables below list recommended components.

Assignment of line-side power components to Smart Line Modules in booksize format

Suitable for Smart Line Module		Line contactor	LV HRC fuse (gL/gG)			UL/CSA fuse, Class J ¹⁾		
Rated power kW (hp)	Booksize format Internal air cooling Type		Rated current	Size	Article No.	Rated current	Size mm (in)	Reference No.
5 (5)	6SL3130-6AE15-0AB1	3RT2023... ¹⁾	16 A	000	3NA3805	17.5 A	21 × 57 (0.83 × 2.24)	AJT17-1/2
10 (10)	6SL3130-6AE21-0AB1	3RT2026... ¹⁾	35 A	000	3NA3814	35 A	27 × 60 (1.06 × 2.36)	AJT35

Recommendations on further overcurrent protection devices are available at:

support.industry.siemens.com/cs/document/109749282

* See SiePortal for Article No. supplements.

¹⁾ Not suitable for 3NP and 3KL switch disconnectors.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules

Overview



Active Line Module in booksize format

Active Line Modules are self-commutated infeed/regenerative feedback units (with IGBTs in the infeed and regenerative feedback directions) that generate a controlled DC link voltage. This means that the connected Motor Modules are decoupled from the line voltage. Line voltage fluctuations within the permissible supply tolerances have no effect on the motor voltage. Active Line Modules are designed for connection to grounded star (TN, TT) and non-grounded symmetrical (IT) supply systems.

The DC link is pre-charged via integrated precharging resistors.

In order to operate an Active Line Module, an associated Active Interface Module is required.

Design

The Active Line Modules in booksize format feature the following connections and 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 earth) connections
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC (Pt1000 can be used from firmware V4.7 HF17)

The status of the Active Line Modules is indicated via two multi-color LEDs.

For the Active Line Module with a width of 100 mm (3.94 in), the shield of the power connection cable can be connected to the integrated shield connection plate by means of a shield connection clamp or hose clip, e.g. Weidmüller type KLBÜ CO 4. The shield connection clamp must not be used as a strain relief mechanism. Shield connection sets are available for the 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) wide Active Line Modules.

The signal cable shield can be connected to the Active Line Module by means of a shield connection clamp, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Active Line Modules includes:

- DRIVE-CLiQ cable for connection to the adjacent Control Unit on the left for drive control, length 0.11 m (4.33 in)
- DRIVE-CLiQ cable (length depends on Active Line Module width) for connection to the adjacent Motor Module, length = width of Active Line Module + 0.11 m (4.33 in)
- 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
- Fan insert for Active Line Modules of 80 kW (100 hp) and 120 kW (150 hp) (the voltage for the fan unit is supplied by the Active Line Module)
- 1 set of warning labels in 36 languages

Integration

The Active Line Module receives its control information via DRIVE-CLiQ from:

- SINUMERIK 828D
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules

Selection and ordering data

SINAMICS S120 Active Line Module in booksize format	
Rated power	Internal air cooling
kW (hp)	Article No.
16 (18)	6SL3130-7TE21-6AA4
36 (40)	6SL3130-7TE23-6AA3
55 (60)	6SL3130-7TE25-5AA3
80 (100)	6SL3130-7TE28-0AA3
120 (150)	6SL3130-7TE31-2AA3

Description	Article No.
Accessories	
Shield connection plate For Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in) 200 mm (7.87 in) 300 mm (11.81 in)	6SL3162-1AF00-0AA1 6SL3162-1AH01-0AA0 6SL3162-1AH00-0AA0
DC link rectifier adapter For direct infeed of DC link voltage - Screw-type terminals 0.5 ... 10 mm² For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in), 75 mm (2.95 in) and 100 mm (3.94 in) - Screw-type terminals 35 ... 120 mm² For Line Modules and Motor Modules in booksize format with a width of 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0
Accessories for re-ordering	
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
Terminal Kit (Plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), dust protection blanking plugs) For DRIVE-CLiQ port For Active Line Modules with a width of 100 mm (3.94 in) 150 mm (5.91 in) 200 mm (7.87 in) 300 mm (11.8 in)	6SL3163-8FD00-0AA0 6SL3163-8GF00-0AA0 6SL3163-8HH00-0AA0 6SL3163-8JM00-0AA0
Warning labels in 36 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. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules

Technical specifications

Article No.	6SL3130-7TE...
Product designation	Active Line Module in booksize format
Line voltage (up to 2000 m (6562 ft) above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (in operation -15% < 1 min)
Line frequency	47 ... 63 Hz
SCCR (short-circuit current rating)	65 kA in conjunction with the recommended Class J fuse, or circuit breaker according to UL489 / CSA 22.2 No. 5-02 see recommended line-side components
Line power factor • Active mode - Fundamental power factor ($\cos \varphi_1$) - Total (λ) • Smart Mode - Fundamental power factor - Overall	1 (factory setting), can be altered by inputting a reactive current setpoint 1 (factory setting) >0.96 0.65 ... 0.9
Overvoltage category 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 kept in proportion to the line voltage at 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: $1.35 \times$ line voltage (Smart Mode) ¹⁾
Electronics power supply	24 V DC -15% $+20\%$
Radio interference suppression • Standard (Active Line Module + Active Interface Module) • With line filter	Category C3 to EN 61800-3 up to 350 m (1148 ft) total cable length 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
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of conformity	CE (Low Voltage and EMC Directives)
Certificate of suitability	cULus

¹⁾ Active Mode can also be selected if the connected motors are suitable for > 650 V DC.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules

Technical specifications

Article number		6SL3130-7TE21-6AA4	6SL3130-7TE23-6AA3	6SL3130-7TE25-5AA3	6SL3130-7TE28-0AA3	6SL3130-7TE31-2AA3
Product type designation	Active Line Module in booksize format with <u>internal</u> air cooling					
Line voltage 380 ... 480 V 3 AC						
Infeed/regenerative feedback power • Rated power P_{rated} • At 380 V 3 AC • At 460 V 3 AC ⁵⁾ • For S6 duty P_{S6} (40 %) • P_{max}	kW (hp) kW kW	16 (18) 21 35	36 (40) 47 70	55 (60) 71 91 (110 ¹⁾)	80 (100) 106 131	120 (150) 145 175
DC link current • At 600 V DC • For S6 duty (40 %) • Maximum	A A A	27 35 59	60 79 117	92 121 152 (176 ¹⁾)	134 176 218	200 244 292
Input current • Rated current at 380/400/480 V 3 AC • For S6 duty (40 %) at 400 V • At 400 V max.	A A A	26/25/21 32 54	58/55/46 71 107	88/84/70 108 139 (168 ¹⁾)	128/122/102 161 200	192/182/152 220 267
Current requirement 24 V DC electronics power supply, max.	A	1.1	1.5	1.9	2	2.5
Current carrying capacity • 24 V DC busbars • DC link busbars	A A	20 100	20 200	20 200	20 200	20 200
DC link capacitance • Active Line Module • Drive line-up, max.	μF μF	710 20000	1410 20000	1880 20000	2820 20000	3995 20000
Power loss ²⁾	kW	0.28	0.67	0.95	1.38	2.24
Cooling air requirement	m ³ /s (ft ³ /s)	0.016 (0.57)	0.031 (1.09)	0.044 (0.155)	0.144 (5.09)	0.144 (5.09)
Sound pressure level L_{pA} (1 m)	dB	<60	<65	<60	<73	<73
Line connection U1, V1, W1 • Conductor cross-section, max.	mm ²	Screw-type terminals (X1) 2.5 ... 10	M6 screw studs (X1) 2.5 ... 50	M8 screw studs (X1) 2.5 ... 95, 2 × 35	M8 screw studs (X1) 2.5 ... 120, 2 × 50	M8 screw studs (X1) 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 • Unshielded	m (ft) m (ft)	630 (2067) ³⁾ 850 (2789)	630 (2067) ³⁾ 850 (2789)	1000 (3281) 1500 (4922)	1000 (3281) 1500 (4922)	1000 (3281) 1500 (4922)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions • Width • Height - With fan ⁴⁾ • Depth	mm (in) mm (in) mm (in) mm (in)	100 (3.94) 380 (14.96) – 270 (10.63)	150 (5.91) 380 (14.96) – 270 (10.63)	200 (7.87) 380 (14.96) – 270 (10.63)	300 (11.81) 380 (14.96) 629 (24.76) 270 (10.63)	300 (11.81) 380 (14.96) 629 (24.76) 270 (10.63)
Weight, approx.	kg (lb)	7 (15.4)	10 (22.0)	16 (35.3)	23 (50.7)	23 (50.7)

¹⁾ Higher peak output is possible in combination with the Active Interface Module 6SL3100-0BE25-5AB0 (for operating cycle constraints, see [SINAMICS S120 Manual](#)).

²⁾ Power loss of the Active Line Module at rated power including losses of the 24 V DC electronics power supply

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

⁴⁾ The fan is supplied together with the Active Line Module and must be installed before the Active Line Module is commissioned.

⁵⁾ Nominal hp ratings are provided for ease of assigning components only. The Line Module outputs are dependent on the Motor Module loading and are to be dimensioned accordingly.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules > Active Interface Modules

Overview



Active Interface Modules for 16 kW, 36 kW, 55 kW and 80 kW/120 kW

The Active Interface Modules combine with the Active Line Modules to form a functional unit and are required 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 with respect to 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 supply systems).

Design

The scope of supply of the Active Interface Modules includes:

- Connector X21 for temperature evaluation and fan control
- Connector X24 for connecting the 24 V supply for the integrated fan
- DRIVE-CLiQ cable for connecting the Control Unit to the Active Line Module; length of the DRIVE-CLiQ cable = width of the Active Interface Module + 0.11 m (4.33 in)
- Shield connection plate for Active Interface Module 16 kW
- 1 set of warning signs in 36 languages

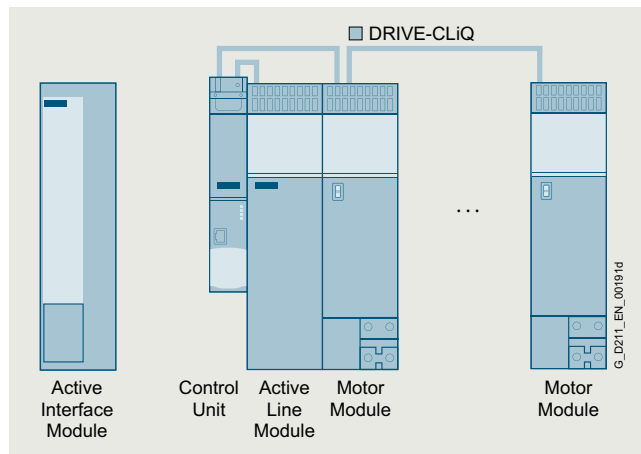
Integration

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.

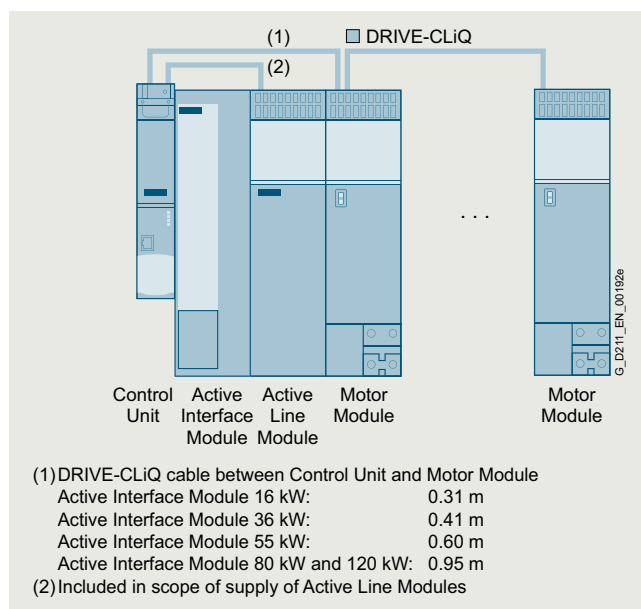
If the Active Line Module is connected over a separate DRIVE-CLiQ line, the DRIVE-CLiQ cable marked with (1) must be ordered. A DRIVE-CLiQ cable suitable for connection (2) is included in the scope of supply of the Active Line Module.

For DRIVE-CLiQ cables for different configurations, see section MOTION-CONNECT connection systems.

Integration



Separate Active Interface Module



Active Interface Module integrated in the drive line-up

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 disconnected from the Control Unit over the "Fan off" input. It is only permissible to switch off the fan when the infeed of the drive system is not operating, otherwise the Active Interface Module will overheat.

The thermostatic switch installed in the Active Interface Module is evaluated over the connected Active Line Module.

The power cables between the Active Interface Module and Active Line Module must be shielded if limit values for interference suppression are to be complied with.

The cable shield can be routed over the shield connection plate (accessories) to the Active Interface Module or Active Line Module.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules > Active Interface Modules

Technical specifications

Article number		6SL3100-0BE21-6AB0	6SL3100-0BE23-6AB0	6SL3100-0BE25-5AB0	6SL3100-0BE28-0AB0	6SL3100-0BE31-2AB0
Product type designation	Active Interface Module					
Line voltage 380 ... 480 V 3 AC						
Rated current	A	26	58	88	128	192
Current requirement 24 V DC electronics power supply, max.	A	0.25	0.49	0.6	1.2	1.2
Internal resistance Digital input "Fan off" (X21/Pin 4)	Ω	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %	1440 ±10 %
Power loss	kW	0.27	0.34	0.38	0.49	0.585
Cooling air requirement	m³/s (ft³/s)	0.03 (1.1)	0.04 (1.4)	0.083 (2.9)	0.167 (5.9)	0.167 (5.9)
Sound pressure level L _{pA} (1 m)	dB	57	60	66	68	68
Line supply/load connection L1, L2, L3/U2, V2, W2 • Conductor cross-section	mm²	Connector 16	Screw terminals 50	Screw terminals 50	M8 screw studs 2.5 ... 120 or 2 × 50	M8 screw studs 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	M6 screw	M6 screw	M8 screw	M8 screw
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions • Width • Height • Depth	mm (in) mm (in) mm (in)	100 (3.94) 380 (14.96) 270 (10.63)	150 (5.91) 380 (14.96) 270 (10.63)	200 (7.87) 380 (14.96) 270 (10.63)	300 (11.81) 380 (14.96) 270 (10.63)	300 (11.81) 380 (14.96) 270 (10.63)
Weight, approx.	kg (lb)	11.6 (25.6)	19 (41.9)	23.2 (51.2)	31.9 (70.3)	36.6 (80.7)
Certificate of suitability		cURus	cURus	cURus	cURus	cURus

4

Selection and ordering data

Suitable for Active Line Module		SINAMICS S120 Active Interface Module
Rated power Active Line Module kW (hp)	Booksize format Internal air cooling Type	Article No.
16 (18)	6SL3130-7TE21-6AA4	6SL3100-0BE21-6AB0
36 (40)	6SL3130-7TE23-6AA3	6SL3100-0BE23-6AB0
55 (60)	6SL3130-7TE25-5AA3	6SL3100-0BE25-5AB0
80 (100)	6SL3130-7TE28-0AA3	6SL3100-0BE28-0AB0
120 (150)	6SL3130-7TE31-2AA3	6SL3100-0BE31-2AB0
Description		Article No.
Accessories		
Shield connection plate ¹⁾		
• For Active Interface Module 36 kW (40 hp)		6SL3163-1AF00-0AA0
• For Active Interface Module 55 kW (60 hp)		6SL3163-1AH00-0AA0
• For Active Interface Module 80 kW (100 hp) and 120 kW (150 hp)		6SL3163-1AM00-0AA0
DRIVE-CLiQ cable, pre-assembled		
Degree of protection of connector IP20/IP20		
• For Active Interface Module 16 kW (18 hp), 0.31 m (1.02 ft) in length		6SL3060-4AK00-0AA0
• For Active Interface Module 36 kW (40 hp), 0.41 m (1.35 ft) in length		6SL3060-4AP00-0AA0
• For Active Interface Module 55 kW (60 hp), 0.6 m (1.97 ft) in length		6SL3060-4AU00-0AA0
• For Active Interface Module 80 kW (100 hp) and 120 kW (150 hp), 0.95 m (3.12 ft) in length		6SL3060-4AA10-0AA0

Description	Article No.
Accessories for re-ordering	
Terminal Kit (plug-in terminals, DRIVE-CLiQ jumper) • For Active Interface Module 16 kW (18 hp) • For Active Interface Module 36 kW (40 hp) • For Active Interface Module 55 kW (60 hp) • For Active Interface Modules 80 kW (100 hp) and 120 kW (150 hp)	6SL3160-8CD10-0AA0 6SL3160-8DF10-0AA0 6SL3160-8EH10-0AA0 6SL3160-8FM10-0AA0
Warning labels in 36 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. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0

¹⁾ For Active Interface Module 16 kW, included in scope of supply.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules > Basic Line Filters

Overview



Basic Line Filter

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.

With the Basic Line Filters in combination with the Active Interface Modules, the limits for the interference voltages can be extended to Category C2 (EN 61800-3) or, retaining Category C3, longer total cable lengths are possible for the configuration.

Selection and ordering data

Suitable for Active Line Module		SINAMICS Basic Line Filter
Rated power Active Line Module kW (hp)	Booksize format Internal air cooling Type	
16 (18)	6SL3130-7TE21-6AA4	6SL3000-0BE21-6DA0
36 (40)	6SL3130-7TE23-6AA3	6SL3000-0BE23-6DA1
55 (60)	6SL3130-7TE25-5AA3	6SL3000-0BE25-5DA0
80 (100)	6SL3130-7TE28-0AA3	6SL3000-0BE28-0DA0
120 (150)	6SL3130-7TE31-2AA3	6SL3000-0BE31-2DA0

Technical specifications

Article No.		6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA1	6SL3000-0BE25-5DA0	6SL3000-0BE28-0DA0	6SL3000-0BE31-2DA0
Product designation		Basic Line Filter				
Line voltage 380 ... 480 V 3 AC						
Rated current	A	36	74	105	132	192
Power loss	kW	0.016	0.02	0.043	0.056	0.073
Line supply/load connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
L1, L2, L3 / U, V, W • 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)	17.5 (38.6)	18.5 (40.8)
Certificate of suitability		cURus	cURus	cURus	cURus	cURus
Suitable for Active Line Module in booksize format	Type	6SL3130-7TE21-6AA4	6SL3130-7TE23-6AA3	6SL3130-7TE25-5AA3	6SL3130-7TE28-0AA3	6SL3130-7TE31-2AA3
• Rated power of the Active Line Module	kW (hp)	16 (18)	36 (40)	55 (60)	80 (100)	120 (150)

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Active Line Modules > Recommended line-side components

Selection and ordering data

Suitable line-side power components are assigned depending on the power rating of the Active Line Modules.

Additional information about the line-side power components can be found in SiePortal.

The tables below list recommended components.

Assignment of line-side power components to Active Line Modules in booksize format

Suitable for Active Line Module		Line contactor	LV HRC fuse (gL/gG)			UL/CSA fuse, Class J ¹⁾		
Rated power	Booksize format Internal air cooling		Rated current		Article No.	Available from: Mersen www.ep.mersen.com		Reference No.
kW (hp)	Type	Type		Size		Rated current	Size mm (in)	
16 (18)	6SL3130-7TE21-6AA4	3RT2028-.... ^{*)}	35 A	000	3NA3814	35 A	27 × 60 (1.06 × 2.36)	AJT35
36 (40)	6SL3130-7TE23-6AA3	3RT2038-.... ^{*)}	80 A	000	3NA3824	80 A	29 × 117 (1.14 × 4.61)	AJT80
55 (60)	6SL3130-7TE25-5AA3	3RT1054-.... ^{*)}	125 A	1	3NA3132	125 A	41 × 146 (1.61 × 5.75)	AJT125
80 (100)	6SL3130-7TE28-0AA3	3RT1056-.... ^{*)}	160 A	1	3NA3136	175 A	41 × 146 (1.61 × 5.75)	AJT175
120 (150)	6SL3130-7TE31-2AA3	3RT1065-.... ^{*)}	250 A	1	3NA3144	250 A	54 × 181 (2.13 × 7.13)	AJT250

Recommendations on further overcurrent protection devices are available at:

support.industry.siemens.com/cs/document/109749282

* See SiePortal for Article No. supplements.

¹⁾ Not suitable for 3NP and 3KL switch disconnectors.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Basic Line Modules

Overview



Basic Line Modules in booksize format

Basic Line Modules are used for applications in which no energy is returned to the supply or where the energy exchange between motor and generator axes takes place in the DC link. Basic Line Modules can only feed energy from the supply system into the DC link, energy cannot be fed back into the supply system. The DC link voltage is directly derived from the 3-phase line voltage via a 6-pulse bridge circuit. Basic Line Modules are suitable for connection to grounded, star TN, TT and non-grounded symmetrical IT supply systems. The connected Motor Modules are pre-charged over the integrated pre-charging resistors (20 kW and 40 kW) or through activation of the thyristors (100 kW).

The 20 kW and 40 kW Basic Line Modules are equipped with an integrated brake chopper and can be directly used for applications in generating mode after connecting an external braking resistor. A Braking Module is only required with a 100 kW Basic Line Module in generating mode.

Design

The Basic Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 power 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 (25 hp) and 40 kW (50 hp) Basic Line Modules only)
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC (Pt1000 can be used from firmware V4.7 HF17)

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 adjacent Control Unit on the left for drive control, length 0.11 m (4.33 in)
- DRIVE-CLiQ cable (length depends on Basic Line Module width) for connection to the adjacent Motor Module, length = width of Basic Line Module + 0.11 m (4.33 in)
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- 1 set of warning labels in 36 languages

Integration

The Basic Line Module receives its control information via DRIVE-CLiQ from:

- SINUMERIK 828
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

Technical specifications

Article No.	6SL313...
Product designation	Basic Line Module in booksize format
Line voltage (up to 2000 m (6562 ft) above sea level)	380 ... 480 V 3 AC $\pm 10\%$ (-15 % < 1 min)
Line frequency	47 ... 63 Hz
SCCR (short-circuit current rating)	65 kA in conjunction with the recommended Class J fuse, or circuit breaker according to UL489 / CSA 22.2 No. 5-02 see recommended line-side components
Line power factor at rated power	
• Fundamental ($\cos \varphi_1$)	> 0.96
• Total (λ)	0.75 ... 0.93
Overvoltage category according to EN 60664-1	Class III
DC link voltage, approx.	$1.35 \times \text{line voltage}^1$
Electronics power supply	24 V DC -15 %/+20 %

Article No.	6SL313...
Product designation	Basic Line Module in booksize format
Radio interference suppression	
• Standard	No radio interference suppression
- 20 kW and 40 kW Basic Line Modules	Category C3 to EN 61800-3 Total cable length up to 350 m (1148 ft) (shielded)
- 100 kW Basic Line Module	Category C2 to EN 61800-3 Total cable length up to 350 m (1148 ft) (shielded)
• With line filter	
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, > 40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of conformity	CE (Low Voltage and EMC Directives)
Certificate of suitability	cULus

¹⁾ The DC link voltage is unregulated and load-dependent.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Basic Line Modules

Technical specifications

Article No.	6SL3130-1TE22-0AA0		6SL3130-1TE24-0AA0		6SL3130-1TE31-0AA0	
Product type designation	Basic Line Modules in booksize format with <u>internal</u> air cooling					
Line voltage 380 ... 480 V 3 AC						
Power • Rated power P_{rated} - At 380 V 3 AC - At 460 V 3 AC ²⁾ • For S6 duty (40 %) P_{S6} • P_{max}	kW (hp) kW kW	20 (25) 26 60	40 (50) 52 120	100 (125) 130 175		
Braking power with external braking resistor • $P_{Bmax.}$ (=2 × P_{rated}) • Continuous braking power P_d (=0.25 × P_{rated})	kW kW	40 5	80 10	– –		
DC link current • At 600 V DC • For S6 duty (40 %) • Maximum	A A A	33.5 43 100	67 87 200	167 217 292		
Input current • Rated current at 380 V 3 AC • Maximum	A A	35 100	70 188	172 290		
Activation threshold Braking module	V	774	774	–		
Resistance value of the external braking resistor	Ω	≥14.8	≥7.4	–		
Cable length, max. to braking resistor	m (ft)	15 (50)	15 (50)	–		
Connection for braking resistor (X2) • Conductor cross-section, max.	mm ²	Screw terminals 0.5 ... 4	Screw terminals 0.5 ... 10	– –		
Current requirement, max. 24 V DC electronic power supply	A	1	1.4	2		
Current carrying capacity • 24 V DC busbars • DC link busbars	A A	20 100	20 200	20 200		
DC link capacitance • Basic Line Module • Drive line-up, max.	μF μF	940 20000	1880 20000	4100 50000		
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		
Line connection U1, V1, W1 • Conductor cross-section, max.	mm ²	Screw-type terminals 0.5 ... 16	Screw-type terminals 10 ... 50	M8 screw stud 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 power cables and DC link) • Shielded/unshielded	m (ft)	630/850 (2067/2789)	630/850 (2067/2789)	1000/1500 (3281/4922)		
Degree of protection		IP20	IP20	IP20		
Dimensions • Width • Height • Depth	mm (in) mm (in) mm (in)	100 (3.94) 380 (14.96) 270 (10.63)	150 (5.91) 380 (14.96) 270 (10.63)	200 (7.87) 380 (14.96) 270 (10.63)		
Weight, approx.	kg (lb)	6.8 (14.9)	11.3 (24.9)	15.8 (34.8)		

¹⁾ Power loss of Basic Line Module at rated output 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.

SINAMICS S120/S220 drive system

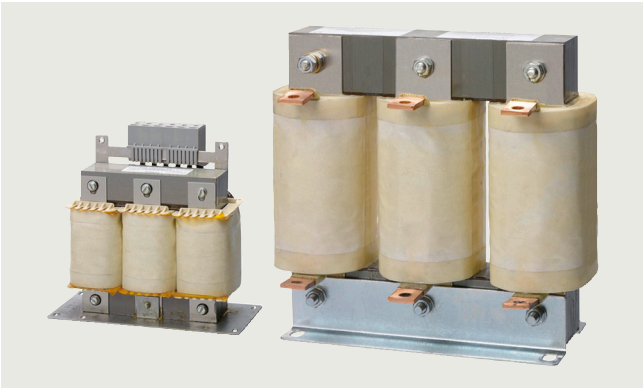
SINAMICS S120 in booksize format

Line Modules > Basic Line Modules**Selection and ordering data**

SINAMICS S120 Basic Line Modules in booksize format	
Rated power	Internal air cooling
kW (hp)	Article No.
20 (25)	6SL3130-1TE22-0AA0
40 (50)	6SL3130-1TE24-0AA0
100 (125)	6SL3130-1TE31-0AA0

Description	Article No.
Accessories	
Shield connection plate For Line Modules and Motor Modules in booksize format • With a width of 150 mm (5.91 in) • With a width of 200 mm (7.87 in)	6SL3162-1AF00-0AA1 6SL3162-1AH01-0AA0
DC link rectifier adapter For direct infeed of DC link voltage • Screw-type terminals 0.5 ... 10 mm² For Line Modules and Motor Modules in booksize format with a width of 50 mm, 75 mm and 100 mm (1.97 in, 2.95 in and 3.94 in) • Screw-type terminals 35 ... 120 mm² For Line Modules and Motor Modules in booksize format with a width of 150 mm, 200 mm and 300 mm (5.91 in, 7.87 in and 11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0
Accessories for re-ordering	
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
Terminal Kit (plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), dust protection blanking plugs) For DRIVE-CLiQ port For Basic Line Modules with a width of • 100 mm (3.94 in) • 150 mm (5.91 in) • 200 mm (7.87 in)	6SL3163-8LD00-0AA0 6SL3163-8GF00-0AA0 6SL3163-8HH00-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Overview



20 kW (25 hp) and 100 kW (125 hp) line reactors

Line reactors reduce low-frequency line harmonic distortions and offload the semiconductors of the Basic Line Module. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for Basic Line Module		SINAMICS line reactor
Rated power Basic Line Module	Booksize format	Article No.
kW (hp)	Type	
20 (25)	6SL3130-1TE22-0AA0	
40 (50)	6SL3130-1TE24-0AA0	
100 (125)	6SL3130-1TE31-0AA0	6SL3000-OCE22-0AA0
		6SL3000-OCE24-0AA0
		6SL3000-OCE31-0AA0

Technical specifications

Article number		6SL3000-OCE22-0AA0	6SL3000-OCE24-0AA0	6SL3000-OCE31-0AA0
Product type designation		Line reactor		
Line voltage 380 ... 480 V 3 AC				
Rated current	A	37	74	185 (7.28)
Power loss at 50/60 Hz	kW	0.13/0.154	0.27/0.32	0.48/0.565
Line/load connection		Screw-type terminals	Screw-type terminals	Flat connector for M8 screw
• Conductor cross-section	mm ²	0.5 ... 16	2.5 ... 35	–
PE connection		M4 screw	M6 screw studs	M8 screw studs
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)	239 (9.41)	228 (8.98)
• Depth	mm (in)	100 (3.94)	105 (4.13)	138 (5.43)
Weight, approx.	kg (lb)	5.2 (11.5)	11.2 (24.7)	21.7 (47.9)
Certificate of suitability		cURus	cURus	cURus
Suitable for Basic Line Module in booksize format	Type	6SL3130-1TE22-0AA0	6SL3130-1TE24-0AA0	6SL3130-1TE31-0AA0
• Rated power of the Basic Line Module	kW (hp)	20 (25)	40 (50)	100 (125)

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Basic 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. The line filters are suitable for TN and TT supply systems grounded at the neutral point. The use of other makes of line reactor can lead to malfunctions or irreparable damage to equipment.

Selection and ordering data

Suitable for Basic Line Modules		SINAMICS Line filter
Rated power Basic Line Module	Booksize format	Article No.
kW (hp)	Type	
20 (25)	6SL3130-1TE22-0AA0	
40 (50)	6SL3130-1TE24-0AA0	
100 (125)	6SL3130-1TE31-0AA0	6SL3000-0BE31-2DA0

Technical specifications

Article number		6SL3000-0BE21-6DA0	6SL3000-0BE23-6DA1	6SL3000-0BE31-2DA0
Product type designation		Line filter		
Line voltage 380 ... 480 V 3 AC				
Rated current	A	36	74	192
Power loss	kW	0.016	0.026	0.043
Line/load connection L1, L2, L3 / U, V, W • Conductor cross-section	mm ²	Screw-type terminals	Screw-type terminals	Screw-type terminals
		10	35	95
PE connection		M6 screw stud	M6 screw stud	M10 screw stud
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	50 (1.97)	75 (2.95)	150 (5.91)
• Height	mm (in)	429 (16.89)	433 (17.05)	479 (18.86)
• Depth	mm (in)	226 (8.90)	226 (8.90)	226 (8.90)
Weight, approx.	kg (lb)	5 (11.3)	7.5 (16.5)	18.5 (40.8)
Certificate of suitability		cURus	cURus	cURus
Suitable for Basic Line Module in booksize format	Type	6SL3130-1TE22-0AA0	6SL3130-1TE24-0AA0	6SL3130-1TE31-0AA0
• Rated power of the Basic Line Module	kW (hp)	20 (25)	40 (50)	100 (125)

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Line Modules > Basic Line Modules > Recommended line-side components

Selection and ordering data

Suitable line-side power components are assigned depending on the power rating of the Basic Line Module.

Additional information about the line-side power components can be found in SiePortal.

The tables below list recommended components.

Assignment of line-side power components to Basic Line Modules in booksize format

Suitable for Basic Line Module		Line contactor	LV HRC fuse (gL/gG)			UL/CSA fuse, Class J ¹⁾		
Rated power	Booksize format					Available from: Mersen www.ep.mersen.com		
kW (hp)	Type 6SL3130-...	Type	Rated current	Size	Article No.	Rated current	Size mm (in)	Reference No.
20 (25)	1TE22-0AA0	3RT2028-.... ^{*)}	63 A	000	3NA3822	60 A	27 × 60 (1.06 × 2.36)	AJT60
40 (50)	1TE24-0AA0	3RT2038-.... ^{*)}	100 A	000	3NA3830	100 A	29 × 117 (1.14 × 4.61)	AJT100
100 (125)	1TE31-0AA0	3RT2056-.... ^{*)}	250 A	1	3NA3144	250 A	54 × 181 (2.13 × 7.13)	AJT250

Recommendations on further overcurrent protection devices are available at:

support.industry.siemens.com/cs/document/109749282

* See SiePortal for Article No. supplements.

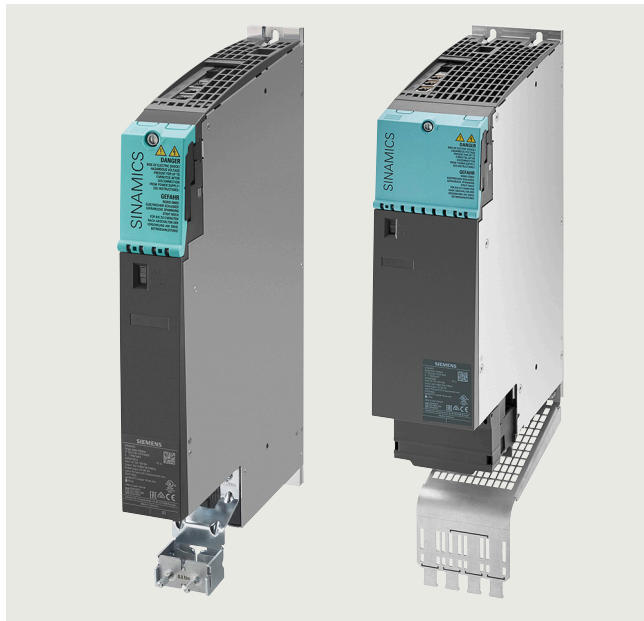
¹⁾ Not suitable for 3NP and 3KL switch disconnectors.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Single Motor Modules

Design



Single Motor Module in booksize format C/D type, 3 A to 30 A (left)
Single Motor Module in booksize format C type, 45 A and 60 A, with optional shield connection plate

Motor Modules in booksize format C/D types, 3 A to 60 A

Rated current	3 A	5 A	9 A	18 A	24 A	30 A	45 A	60 A
 D types								
Single Motor Modules	3 A / 9 A 50 mm (1.97 in)	5 A / 15 A 50 mm (1.97 in)	9 A / 27 A 50 mm (1.97 in)	18 A / 54 A 50 mm (1.97 in)	24 A / 72 A 50 mm (1.97 in)	30 A / 90 A 100 mm (3.94 in)	—	—
Double Motor Modules	2 x 3 A / 2 x 9 A 50 mm (1.97 in)	2 x 5 A / 2 x 15 A 50 mm (1.97 in)	2 x 9 A / 2 x 27 A 50 mm (1.97 in)	2 x 18 A / 2 x 54 A 100 mm (3.94 in)	—	—	—	—
 C types								
Rated current / maximum current in A 50 mm (1.97 in) or 100 mm (3.94 in) widths			Single Motor Modules	18 A / 36 A 50 mm (1.97 in)	24 A / 48 A 50 mm (1.97 in)	30 A / 56 A 100 mm (3.94 in)	45 A / 90 A 100 mm (3.94 in)	60 A / 120 A 100 mm (3.94 in)
			Double Motor Module	2 x 18 A / 2 x 36 A 100 mm (3.94 in)	—	—	—	—

G_PM21_EN_00266a

Overview of available Single Motor Modules in booksize format C/D types

- C type: Optimized for continuous load with up to 200 % overload (continuous motion)
- D type: Optimized for highly dynamic, intermittent duty cycles with up to 300 % overload (discontinuous motion)

Devices in booksize format C/D types are optimized for multi-axis applications and are mounted next to one another. The connection for the common DC link is an integral feature. The device is internally air cooled.

The Motor Modules in booksize format C/D types have been developed to be fully compatible with the booksize series regarding spare parts and offer the following advantages:

- The portfolio is extended by Single Motor Modules 18 A (C type), 24 A (C/D types) and 30 A (D type), as well as by a Double Motor Module 18 A (D type).

The Single Motor Modules in booksize format feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 electronics power supply connection via integrated 24 V DC bars
- 3 DRIVE-CLiQ sockets
- 1 motor connection via connector X1 for C/D type 3 A to 30 A (not included in the scope of delivery)
- 1 safe standstill input
- 1 safe motor brake control
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC (Pt1000 can be used from firmware V4.7 HF17)
- 2 PE (protective earth) connections – a PE connection is integrated in the connector for C/D types 3 A to 30 A

The status of the Motor Modules is indicated via two multi-color LEDs.

Motor Modules 3 A to 30 A are supplied with a mounted shield connection plate. The associated shield connection clamp can be found in the Terminal Kit supplied. A shield connection plate is optionally available for Motor Modules 45 A to 200 A. On these modules, the motor cable shield can be connected using a shield connection clamp or a hose clip.

- The width of Motor Modules 45 A and 60 A has been reduced from 150 mm to 100 mm, which makes a significant contribution toward saving space in the cabinet
- The amount of space required beneath the Motor Modules has been reduced thanks to improvements in the design and a new motor plug connector
- With the new motor plug connector design, the brake conductors and the PE connection are integrated directly in the plug connector
- The motor connections on the Double Motor Module are located side by side, resulting in a significantly improved level of accessibility
- The fan can be simply replaced without having to remove the Motor Module

The signal cable shield can be connected to the Motor Module by means of a shield connection clamp, e.g. Weidmüller type KLBUE 3-8 SC.

Design

The scope of delivery of the Motor Modules includes:

- DRIVE-CLiQ cable appropriate to the width of the Motor Module for connection to the adjacent Motor Module, length = width of Motor Module + 0.06 m (0.20 ft)
- 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 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 shield connection plate with shield connection clamp (for Motor Modules 3 A to 30 A)
- 1 set of warning labels in 36 languages

Integration

The Single Motor Module communicates via DRIVE-CLiQ with:

- SINUMERIK 828D
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

Technical specifications

Article No.	6SL3120-1TE...
Product type designation	Single Motor Module in booksize format
DC link voltage (up to 2000 m (6562 ft) above sea level)	510 ... 720 V DC (line voltage 380 ... 480 V 3 AC)
Output frequency	0 ... 650 Hz ^{1) 2)}
Electronics power supply	24 V DC -15 %/+20 %
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, >40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of conformity	CE (Low-Voltage and EMC Directives)
Certificate of suitability	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, Performance Level d (PL d) and Category 3 according to ISO 13849-1

¹⁾ 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 derating.

²⁾ The output frequency is currently limited to 550 Hz. The specified values apply to systems with license for high output frequency. For further information, refer to: support.industry.siemens.com/cs/document/104020669

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.	6SL3120-...	–	–	–	1TE21-8AC0
Product designation	Single Motor Module in booksize format <u>internal</u> air cooling C type				
Article No.	6SL3120-...	1TE13-0AD0	1TE15-0AD0	1TE21-0AD0	1TE21-8AD0
Product designation	Single Motor Module in booksize format <u>internal</u> air cooling D type				
DC link voltage 510 ... 720 V DC					
Output current					
• Rated current I_{rated}	A	3	5	9	18
• Base-load current I_H	A	2.6	4.3	7.7	15.3
• For S6 duty (40 %) I_{S6}	A	4	6.7	12	24
• I_{max}					
- C type	A	–	–	–	36
- D type	A	9	15	27	54
Type rating ¹⁾					
• Based on I_{rated}	kW (hp)	1.6 (1.5)	2.7 (3)	4.8 (5)	9.7 (10)
• Based on I_H	kW (hp)	1.4 (1)	2.3 (2.5)	4.1 (5)	8.2 (10)
Rated pulse frequency	kHz	4	4	4	4
DC link current I_d ²⁾	A	3.6	6	11	22
Current carrying capacity					
• DC link busbars	A	100 ³⁾	100 ³⁾	100 ³⁾	100 ³⁾
• 24 V DC busbars ⁴⁾	A	20	20	20	20
DC link capacitance	μF	110	110	110	220
Current requirement	A	0.75	0.75	0.75	0.75
At 24 V DC, max.					
Power loss ⁵⁾	kW	0.03/0.05	0.04/0.07	0.06/0.1	0.14/0.19
typ. ⁶⁾ /max.					
Cooling air requirement	m ³ /s (ft ³ /s)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)
Sound pressure level	dB	<60	<60	<60	<60
L_{pA} (1 m)					
Motor connection		Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²
U2, V2, W2					
PE connection		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
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)	50 (1.97)
• Height	mm (in)	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)
Weight, approx.	kg (lb)	4.6 (10.1)	4.6 (10.1)	4.6 (10.1)	4.6 (10.1)

¹⁾ Rated power of a typical standard asynchronous (induction) motor at 400 V DC link voltage.

²⁾ Rated DC link current for dimensioning an external DC connection.

³⁾ With reinforced DC link bridges, (Article No. 6SL3162-2BB00-0AA0) 200 A is possible (see [Accessories](#)).

⁴⁾ If, due to a number of Line Modules 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).

⁵⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁶⁾ At max. motor cable length 30 m (98.43 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁷⁾ Connector not included in scope of delivery (see [Accessories](#)).

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.	6SL3120-...	1TE22-4AC0	1TE23-0AC0	1TE24-5AC0	1TE26-0AC0
Product designation	Single Motor Module in booksize format <u>internal</u> air cooling C type				
Article No.	6SL3120-...	1TE22-4AD0	1TE23-0AD0	–	–
Product designation	Single Motor Module in booksize format <u>internal</u> air cooling D type				
DC link voltage 510 ... 720 V DC					
Output current					
• Rated current I_{rated}	A	24	30	45	60
• Base-load current I_H	A	20.4	25.5	38	51
• For S6 duty (40 %) I_{S6}	A	32	40	60	80
• I_{max}					
- C type	A	48	56	90 ⁸⁾	120 ⁸⁾
- D type	A	72	90	–	–
Type rating ¹⁾					
• Based on I_{rated}	kW (hp)	12.9 (15)	16 (20)	24 (30)	32 (40)
• Based on I_H	kW (hp)	10.9 (15)	13.7 (18)	21 (25)	28 (40)
Rated pulse frequency	kHz	4	4	4	4
DC link current $I_d^{2)}$	A	29	36	54	72
Current carrying capacity					
• DC link busbars	A	100 ³⁾	200	200	200
• 24 V DC busbars ⁴⁾	A	20	20	20	20
DC link capacitance	μF	390	705	1230	1410
Current requirement	A	1.0	0.8	0.9	0.9
At 24 V DC, max.					
Power loss ⁵⁾	kW	0.19/0.20	0.26/0.31	0.34/0.36	0.46/0.48
typ. ⁶⁾ /max.					
Cooling air requirement	m ³ /s (ft ³ /s)	0.0147 (0.52)	0.0155 (0.55)	0.0233 (0.82)	0.0233 (0.82)
Sound pressure level	dB	<68	<60	<71	<71
L_{pA} (1 m)					
Motor connection		Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁷⁾ , 1.5 ... 6 mm ²	M6 screw studs (X1)	M6 screw studs (X1)
U2, V2, W2					
Shield connection		At the shield connection plate of the Motor Mod- ules	At the shield connection plate of the Motor Mod- ules	See Accessories	See Accessories
PE connection		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	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A
Motor cable length, max.					
• Shielded	m (ft)	70 (230)	100 (328)	100 (328)	100 (328)
• Unshielded	m (ft)	100 (328)	150 (492)	150 (492)	150 (492)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	50 (1.97)	100 (3.94)	100 (3.94)	100 (3.94)
• Height	mm (in)	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)
Weight, approx.	kg (lb)	4.7 (10.4)	7.9 (17.4)	8.5 (18.7)	8.6 (19)

¹⁾ Rated power of a typical standard asynchronous (induction) motor at 400 V DC link voltage.

²⁾ Rated DC link current for dimensioning an external DC connection.

³⁾ With reinforced DC link bridges, (Article No. 6SL3162-2BB00-0AA0) 200 A is possible ([see Accessories](#)).

⁴⁾ If, due to a number of Line Modules 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).

⁵⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁶⁾ At max. motor cable length 30 m (98.43 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁷⁾ Connector not included in scope of delivery ([see Accessories](#)).

⁸⁾ The specified values are valid as from firmware V4.8.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.	6SL3120-...	1TE28-5AA3	1TE31-3AA3	1TE32-0AA4
Product designation	Single Motor Module in booksize format <u>internal</u> air cooling			
DC link voltage 510 ... 720 V DC				
Output current				
• Rated current I_{rated}	A	85	132	200
• Base-load current I_H	A	68	105	141
• For S6 duty (40 %) I_{S6}	A	110	150	230
• I_{max}	A	141	210	282
Type rating ¹⁾				
• Based on I_{rated}	kW (hp)	46 (60)	71 (100)	107 (150)
• Based on I_H	kW (hp)	37 (50)	57 (75)	76 (100)
Rated pulse frequency	kHz	4	4	4
DC link current I_d ²⁾	A	102	158	200
Current carrying capacity				
• DC link busbars	A	200	200	200
• 24 V DC busbars ³⁾	A	20	20	20
DC link capacitance	μF	1880	2820	3995
Current requirement	A	1.5	1.5	1.5
At 24 V DC, max.				
Power loss ⁴⁾	kW	0.77/0.79	1.26/1.29	2.03/2.09
typ. ⁵⁾ /max.				
Cooling air requirement	m ³ /s (ft ³ /s)	0.044 (1.6)	0.144 (5.1)	0.144 (5.1)
Sound pressure level	dB	<60	<73	<73
L_{pA} (1 m)				
Motor connection		M8 screw studs (X1)	M8 screw studs (X1)	M8 screw studs (X1)
U2, V2, W2				
• Conductor cross-section, max.	mm ²	2.5 ... 95, 2 × 35	2.5 ... 120, 2 × 50	2.5 ... 120, 2 × 50
Shield connection		See Accessories	See Accessories	See Accessories
PE connection		M6 screw	M8 screw	M8 screw
Motor brake connection		Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A
Motor cable length, max.				
• Shielded	m (ft)	100 (328)	100 (328)	100 (328)
• Unshielded	m (ft)	150 (492)	150 (492)	150 (492)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	200 (7.87)	300 (11.81)	300 (11.81)
• Height	mm (in)	380 (14.96)	380 (14.96)	380 (14.96)
- With fan ⁶⁾	mm (in)	–	629 (24.76)	629 (24.76)
• Depth	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)
Weight, approx.	kg (lb)	14.8 (32.6)	21 (46.3)	21 (46.3)

¹⁾ Rated power of a typical standard asynchronous (induction) motor at 400 V DC link voltage.

²⁾ Rated DC link current for dimensioning an external DC connection.

³⁾ If, due to a number of Line Modules 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).

⁴⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁵⁾ At max. motor cable length 30 m (98.43 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁶⁾ The fan is supplied with the Motor Module and must be installed before the Motor Module is commissioned.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Single Motor Modules

Selection and ordering data

SINAMICS S120 Single Motor Module in booksize format

Rated output current A	Type rating kW (hp)	Article No.	C type Article No.	D type Article No.
DC link voltage 510 ... 720 V DC				
3	1.6 (1.5)	–	–	6SL3120-1TE13-0AD0
5	2.7 (3)	–	–	6SL3120-1TE15-0AD0
9	4.8 (5)	–	–	6SL3120-1TE21-0AD0
18	9.7 (10)	–	6SL3120-1TE21-8AC0	6SL3120-1TE21-8AD0
24	12.9 (15)	–	6SL3120-1TE22-4AC0	6SL3120-1TE22-4AD0
30	16 (20)	–	6SL3120-1TE23-0AC0	6SL3120-1TE23-0AD0
45	24 (30)	–	6SL3120-1TE24-5AC0	–
60	32 (40)	–	6SL3120-1TE26-0AC0	–
85	46 (60)	6SL3120-1TE28-5AA3	–	–
132	71 (100)	6SL3120-1TE31-3AA3	–	–
200	107 (150)	6SL3120-1TE32-0AA4	–	–

Description	Article No.
Accessories	
Power connector (X1) with screw-type terminal At Motor Module end, with screw-type terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MA00-0AC0
Power connector (X1) with push-in connection with snap-in actuators At Motor Module end, with spring-loaded terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MB00-0AC0
Shield connection plate For Motor Modules in booksize format with a width of 100 mm (3.94 in) (Motor Modules in booksize format C type 45 A/60 A) 200 mm (7.87 in) 300 mm (11.81 in)	6SL3162-1AD00-0AA0 6SL3162-1AH01-0AA0 6SL3162-1AH00-0AA0
Shield connection clamp For Motor Modules in booksize format C type with rated output current of 45 A/60 A - Diameter 3 ... 14 mm (0.12 ... 0.55 in) - Diameter 20 ... 35 mm (0.79 ... 1.38 in)	8WH9130-0MA00 8WH9130-0PA00
DC link rectifier adapter For direct infeed of DC link voltage - Screw-type terminals 0.5 ... 10 mm² For Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in) ¹⁾ - Screw-type terminals 35 ... 120 mm² For Motor Modules in booksize format with a width of 200 mm or 300 mm (7.87 in and 11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 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
Reinforced DC link bridge 6 mm (0.24 in) For replacement of the DC link bridge in Single Motor Modules 3 A ... 24 A Double Motor Modules 2 x 3 A ... 2 x 9 A	6SL3162-2BB00-0AA0

Description	Article No.
Accessories for re-ordering	
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Terminal Kit for Motor Modules C/D types, 3 A to 30 A (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), shield connection clamp with pressure plate, dust protection blanking plugs, coding plug for X1) For Motor Modules with a width of 50 mm (1.97 in), C/D type 100 mm (3.94 in), C/D type	6SL3162-8AC00-0AA0 6SL3162-8BE00-0AA0
Terminal Kit for Motor Modules 45 A to 200 A (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), dust protection blanking plugs) For Motor Modules with a width of 100 mm (3.94 in), C type 200 mm (7.87 in) 300 mm (11.81 in)	6SL3162-8BG00-0AA0 6SL3162-8DH00-0AA0 6SL3162-8EM00-0AA0
Shield connection clamp For Single Motor Modules in booksize format C/D types with rated output current of 3 A to 30 A	6SL3162-0AQ00-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0
Replacement fan For Motor Modules with a width of 50 mm (1.97 in), C/D type (3 A ... 18 A) 50 mm (1.97 in), C/D type (24 A) 100 mm (3.94 in), C/D type (30 A) 100 mm (3.94 in), C type (45 A and 60 A) 200 mm (7.87 in) (85 A) 300 mm (11.81 in) (132 A and 200 A)	6SL3162-0AN00-0AA0 6SL3162-0AS00-0AA0 6SL3162-0AP00-0AA0 6SL3162-0AT00-0AA0 6SL3162-0AH00-0AA1 6SL3162-0AM00-0AA0

¹⁾ NOTICE: The DC link rectifier adapter must not be used for Motor Modules C type, 45 A and 60 A.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Double Motor Modules

Design



Double Motor Module in booksize format C/D type

Motor Modules in booksize format C/D types, 2 × 3 A to 2 × 18 A

Rated current	3 A	5 A	9 A	18 A	24 A	30 A	45 A	60 A
D types								
Single Motor Modules	3 A / 9 A 50 mm (1.97 in)	5 A / 15 A 50 mm (1.97 in)	9 A / 27 A 50 mm (1.97 in)	18 A / 54 A 50 mm (1.97 in)	24 A / 72 A 50 mm (1.97 in)	30 A / 90 A 100 mm (3.94 in)	–	–
Double Motor Modules	2 × 3 A / 2 × 9 A 50 mm (1.97 in)	2 × 5 A / 2 × 15 A 50 mm (1.97 in)	2 × 9 A / 2 × 27 A 50 mm (1.97 in)	2 × 18 A / 2 × 54 A 100 mm (3.94 in)	–	–	–	–
C types								
Rated current / maximum current in A 50 mm (1.97 in) or 100 mm (3.94 in) widths	Single Motor Modules	18 A / 36 A 50 mm (1.97 in)	24 A / 48 A 50 mm (1.97 in)	30 A / 56 A 100 mm (3.94 in)	45 A / 90 A 100 mm (3.94 in)	60 A / 120 A 100 mm (3.94 in)		
	Double Motor Module	2 × 18 A / 2 × 36 A 100 mm (3.94 in)	–	–	–	–		

G_PM21_EN_00267a

Overview of available Double Motor Modules in booksize format C/D types

- C type: Optimized for continuous load with up to 200 % overload (continuous motion)
- D type: Optimized for highly dynamic, intermittent duty cycles with up to 300 % overload (discontinuous motion)

Devices in booksize format C/D types are optimized for multi-axis applications and are mounted next to one another. The connection for the common DC link is an integral feature. The device is internally air cooled.

The Motor Modules in booksize format C/D types have been developed to be fully compatible with the booksize series regarding spare parts and offer the following advantages:

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 busbars
- 4 DRIVE-CLiQ sockets
- 2 motor connections via connectors X1 and X2 (not included in the scope of delivery)
- 2 safe standstill inputs (1 input per axis)
- 2 safe motor brake controls
- 2 temperature sensor inputs for KTY84-130, Pt1000 or PTC (Pt1000 can be used from firmware V4.7 HF17)
- 1 PE (protective earth) connection

The status of the Motor Modules is indicated via two multi-color LEDs.

The Motor Modules are supplied with a mounted shield connection plate. The associated shield connection clamp can be found in the Terminal Kit supplied.

- The amount of space required beneath the Motor Modules has been reduced thanks to improvements in the design and a new motor plug connector
- With the new motor plug connector design, the brake conductors and the PE connection are integrated directly in the plug connector
- The motor connections on the Double Motor Module are located side by side, resulting in a significantly improved level of accessibility
- The fan can be simply replaced without having to remove the Motor Module
- The Double Motor Module 2 × 18 A is available with double and treble overload

The signal cable shield can be connected to the Motor Module by means of a shield connection clamp, e.g. Weidmüller type KLBUE 3-8 SC.

Design

The scope of delivery of the Motor Modules includes:

- DRIVE-CLiQ cable appropriate to the width of the Motor Module for connection to the adjacent Motor Module, length = width of Motor Module + 0.06 m (0.20 ft)
- 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 supplied from the internal voltage levels for cooling the power unit
- 1 shield connection plate with shield connection clamp
- 1 set of warning labels in 36 languages

Integration

The Double Motor Module communicates via DRIVE-CLiQ with:

- SINUMERIK 828D
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

Technical specifications

Article No.	6SL3120-2TE...
Product type designation	Double Motor Module in booksize format
DC link voltage (up to 2000 m (6562 ft) above sea level)	510 ... 720 V DC (line voltage 380 ... 480 V 3 AC)
Output frequency	0 ... 650 Hz ^{1) 2)}
Electronics power supply	24 V DC -15 %/+20 %
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	0 ... 40 °C (32 ... 104 °F) without derating, >40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of conformity	CE (Low-Voltage and EMC Directives)
Certificate of suitability	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, Performance Level d (PL d) and Category 3 according to ISO 13849-1

¹⁾ 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 derating.

²⁾ The output frequency is currently limited to 550 Hz. The specified values apply to systems with license for high output frequency.
For further information, refer to:
support.industry.siemens.com/cs/document/104020669

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Double Motor Modules

Technical specifications

Article No.	6SL3120-...	–	–	–	2TE21-8AC0
Product designation	Double Motor Module in booksize format <u>internal</u> air cooling C type				
Article No.	6SL3120-...	2TE13-0AD0	2TE15-0AD0	2TE21-0AD0	2TE21-8AD0
Product designation	Double Motor Module in booksize format <u>internal</u> air cooling D type				
DC link voltage 510 ... 720 V DC					
Output current					
• Rated current I_{rated}	A	2 × 3	2 × 5	2 × 9	2 × 18
• For S6 duty (40 %) I_{S6}					
- C type	A	–	–	–	2 × 24
- D type	A	2 × 4	2 × 6.7	2 × 12	2 × 24
• Base-load current I_H	A	2 × 2.6	2 × 4.3	2 × 7.7	2 × 15.3
• I_{max}					
- C type	A	–	–	–	2 × 36
- D type	A	2 × 9	2 × 15	2 × 27	2 × 54
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	200
• 24 V DC busbars ³⁾	A	20	20	20	20
DC link capacitance	μF	220	220	220	705
Current requirement At 24 V DC, max.	A	0.9	0.9	0.9	1.1
Power loss ⁴⁾ typ. ⁵⁾ /max.	kW	0.05/0.1	0.08/0.13	0.15/0.19	0.28/0.35
Cooling air requirement	m³/s (ft³/s)	0.009 (0.32)	0.009 (0.32)	0.009 (0.32)	0.0155 (0.55)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<60	<60
Motor connection U2, V2, W2		2 × plug-in connector (X1, X2) ⁶⁾ , 2 × (1.5 ... 6 mm²)	2 × plug-in connector (X1, X2) ⁶⁾ , 2 × (1.5 ... 6 mm²)	2 × plug-in connector (X1, X2) ⁶⁾ , 2 × (1.5 ... 6 mm²)	2 × plug-in connector (X1, X2) ⁶⁾ , 2 × (1.5 ... 6 mm²)
PE connection		M5 screw	M5 screw	M5 screw	M5 screw
Motor brake connection		Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor connector (X1, X2), 24 V DC, 2 A
Motor cable length, max.					
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	70 (230)
• Unshielded	m (ft)	75 (246)	75 (246)	75 (246)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	100 (3.94)
• Height	mm (in)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)
• Depth	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
Weight, approx.	kg (lb)	4.7 (10.4)	4.7 (10.4)	4.7 (10.4)	7.7 (17.0)

¹⁾ Rated power of a typical standard asynchronous (induction) motor at 400 V DC link voltage.

²⁾ Rated DC link current for dimensioning an external DC connection.

³⁾ If, due to a number of Line Modules 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).

⁴⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁵⁾ At max. motor cable length 30 m (98.43 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁶⁾ Connector not included in scope of delivery (see [Accessories](#)).

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Double Motor Modules

Selection and ordering data

SINAMICS S120 Double Motor Module in booksize format			
Rated output current	Type rating	Internal air cooling C type	Internal air cooling D type
A	kW (hp)	Article No.	Article No.
DC link voltage 510 ... 720 V DC			
2 × 3	2 × 1.6 (2 × 1.5)	–	6SL3120-2TE13-0AD0
2 × 5	2 × 2.7 (2 × 3)	–	6SL3120-2TE15-0AD0
2 × 9	2 × 4.8 (2 × 5)	–	6SL3120-2TE21-0AD0
2 × 18	2 × 9.7 (2 × 10)	6SL3120-2TE21-8AC0	6SL3120-2TE21-8AD0

Description	Article No.
Accessories	
Power connector (X1/X2) with screw-type terminal At Motor Module end, with screw-type terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MA00-0AC0
Power connector (X1/X2) with push-in connection with snap-in actuators At Motor Module end, with spring-loaded terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MB00-0AC0
DC link rectifier adapter For direct infeed of DC link voltage Screw-type terminals 0.5 ... 10 mm ² For Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	6SL3162-2BD00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 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
Reinforced DC link bridge 6 mm (0.24 in) For replacement of the DC link bridge in Single Motor Modules 3 A ... 24 A Double Motor Modules 2 × 3 A ... 2 × 9 A	6SL3162-2BB00-0AA0

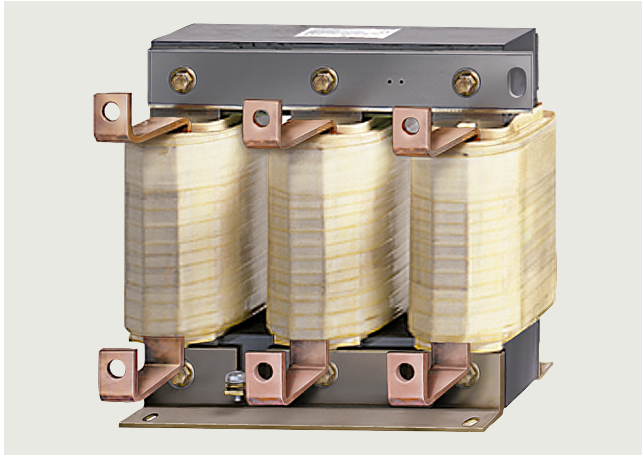
Description	Article No.
Accessories	
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Terminal Kit (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), shield connection clamp with pressure plate, dust protection blanking plugs, coding plug for X1 and X2) For Motor Modules with a width of 50 mm (1.97 in), C/D type 100 mm (3.94 in), C/D type	6SL3162-8AD00-0AA0 6SL3162-8BF00-0AA0
Shield connection clamp For Double Motor Modules in booksize format C/D types	6SL3162-0AR00-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0
Replacement fan For Motor Modules with a width of 50 mm (1.97 in), C/D type 100 mm (3.94 in), C/D type	6SL3162-0AN00-0AA0 6SL3162-0AP00-0AA0

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

Motor Modules > Series motor reactors

Overview



A series reactor in the form of a three-limb iron-cored reactor may be required in the case of special motors with low leakage inductance (for which the controller settings are insufficient). Motors with a low leakage inductance are, from experience, motors that can achieve high stator frequencies > 300 Hz or motors with a high rated current > 85 A.

The series motor reactors are designed for a pulse frequency of 4 kHz or 8 kHz output from the Motor Module. Higher pulse frequencies are not permissible.

The series motor reactor must be installed as close as possible to the Motor Module.

The voltage drop across a series reactor depends on the motor current and the motor frequency. If an unregulated infeed is used, the maximum rated motor voltage depends on the connected line supply voltage. If these guide values are observed, lower reductions in power in the upper speed range of the motor can be achieved.

The surface temperature of the series motor reactor can reach up to 100 °C (212 °F). This additional heat source must be taken into account in the system.

The notes in the Configuration Manual for the motors used must be observed.

Selection and ordering data

Suitable for Motor Module in booksize format	Series motor reactor		
Internal air cooling	Rated current	Rated inductance	Article No.
External air cooling	A	mH	
Type	6SL3120-.....-.....	108	0.1
			4EU3951-0AR00-4B

Technical specifications

Article No.	4EU3951-0AR00-4B
Product designation	Series motor reactor
Input voltage 380 ... 480 V 3 AC (DC link voltage 510 ... 720 V DC)	
Rated current	108 A
Rated inductance	0.1 mH
Power loss	454 W
Continuous current I_{thmax} , therm. perm.	120 A
Continuous frequency therm. perm.	1400 Hz
Pulse frequency, max.	8 kHz
Relative voltage drop at the series motor reactor At I_{thmax} and V_{rated}	38 %
Ambient temperature	40 °C (104 °F)
Connection to Motor Module/motor	Flat-type terminal
PE connection	M8 screw
Degree of protection	IP00
Width	410 mm (16.14 in)
Height	385 mm (15.16 in)
Depth	174 mm (6.85 in)
Net weight	68 kg (150 lb)
Certificate of suitability	cURus

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

DC link components > Braking Module

Overview



Braking Module in booksize format

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 into heat loss in an external braking resistor. Braking Modules function autonomously.

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 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
- 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 earth) connections

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

Selection and ordering data

Description	Article No.
Braking Module in booksize format	6SL3100-1AE31-0AB1
Accessories	
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0

Technical specifications

Article No.	6SL3100-1AE31-0AB1
Product designation	Braking Module in booksize format Internal air cooling
DC link voltage 510 ... 720 V DC)	
Rated power P_{DB}	1.5 kW ¹⁾
Peak power P_{max}	100 kW ¹⁾
Activation threshold	770 V
Cable length to braking resistor, max.	10 m (32.81 ft)
DC link capacitance	110 μ F
Current requirement with 24 V DC, max.	0.5 A
Digital inputs In accordance with IEC 61131-2 Type 1	
• Voltage	-3 V ... +30 V
• Low level (an open digital input is interpreted as "low")	-3 V ... +5 V
• High level	15 ... 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Conductor cross-section, max.	1.5 mm ²
Digital outputs (continuously 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)
Certificate of suitability	cURus

¹⁾ Connecting Braking Modules in the booksize format in parallel should be avoided, as it cannot be guaranteed that the power will be evenly divided between the modules.

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

DC link components > Braking resistors

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. Mounting the braking resistor outside the control cabinet or switchgear room allows the power losses to be dissipated, thereby allowing a corresponding reduction in the level of air conditioning required.

Selection and ordering data

Power P_{DB}/P_{max}	Suitable for	Braking resistor Article No.
0.3 kW/25 kW	Braking Module 6SL3100-1AE31-0AB1	6SN1113-1AA00-0DA0
1.5 kW/100 kW	Braking Module 6SL3100-1AE31-0AB1	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

Technical specifications

Article No.	6SN1113-1AA00-0DA0			6SL3100-1BE31-0AA0		6SE7023-2ES87-2DC0		6SE7028-0ES87-2DC0	
Product designation	Braking resistor for Braking Module in booksize format					Braking resistor for Basic Line Module in booksize format			
DC link voltage 510 ... 720 V DC									
Resistance	Ω	17		5.7		20		8	
Rated power P_{DB}	kW	0.3		1.5		5		12.5	
Peak power P_{max}	kW	25		100		30		75	
Load duration for peak output t_a	s	0.1	0.4	1	2	15		15	
Cycle duration of braking duty cycle t	s	11.5	210	68	460	90		90	
Power connections		—			—		M6 screw stud		M6 screw stud
PE connection		—			—		M6 screw stud		M6 screw stud
Thermostatic switch (NC contact)	mm ²	—			—		Screw-type terminals		Screw-type terminals
• Switching capacity AC		—			—		250 V/max. 10 A		250 V/max. 10 A
• Switching capacity DC		—			—		42 V/0.2 A		42 V/0.2 A
• Conductor cross-section		—			—		2.5		1.5
Degree of protection		IP54 ¹⁾		IP20		IP20		IP20	
Dimensions									
• Width	mm (in)	80 (3.15)		193 (7.60)		450 (17.72)		745 (29.33)	
• Height	mm (in)	210 (8.27)		410 (16.1)		305 (12.01)		305 (12.01)	
• Depth	mm (in)	53 (2.09)		240 (9.45)		485 (19.09)		485 (19.09)	
Weight, approx.	kg (lb)	3.4 (7.50)		5.6 (12.3)		17 (37.5)		27 (59.5)	
Certificate of suitability		cULus		—		UL, CSA		UL, CSA	

¹⁾ Braking resistor with connected 1.5 mm² shielded cable, length 3 m (9.84 ft).

Overview



Capacitor Module in booksize format

Capacitor Modules are used to increase the DC link capacitance to bridge momentary power losses.

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.

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

Selection and ordering data

Description	Article No.
Capacitor Module Internal air cooling	6SL3100-1CE14-0AA0
Accessories for re-ordering	
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0

Technical specifications

Article No.	6SL3100-1CE14-0AA0
Product designation	Capacitor Module in booksize format
DC link voltage 510 ... 720 V DC)	
Capacitance	4000 µF
Current carrying capacity • 24 V DC busbars • DC link busbars	20 A 100 A
PE connection	M5 screw
Dimensions • Width • Height • Depth, with spacer (included in scope of supply)	100 mm (3.94 in) 380 mm (14.96 in) 270 mm (10.63 in)
Weight, approx.	7.2 kg (16 lb)
Certificate of suitability	cULus

SINAMICS S120/S220 drive system

SINAMICS S120 in booksize format

DC link components > Control Supply Module

Overview



Control Supply Module in booksize format

The Control Supply Module in booksize format provides a 24 V to 28.8 V DC power supply that can be set using an integrated potentiometer via the line or DC link. The Control Supply Module can either be operated individually or in a parallel connection with a maximum of 10 devices. A DIP switch on the top of the module is used to change over in the de-energized state (details of connection for parallel operation are given in the manual for booksize modules).

Using the Control Supply Module, it is possible for example to make specific emergency retraction movements in the event of a power 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 mm², max. fuse protection 20 A)
- 1 integrated potentiometer for setting the output voltage
- 1 digital output to signal the error-free state
- 1 DIP switch to change over between single and parallel mode
- 2 PE (protective earth) connections

The status of the Control Supply Modules is indicated via two multi-color LEDs.

Selection and ordering data

Description	Article No.
Control Supply Module in booksize format	6SL3100-1DE22-0AA1
Internal air cooling	
Accessories for re-ordering	
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, IR, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0

Technical specifications

Article No.	6SL3100-1DE22-0AA1
Product designation	Control Supply Module in booksize format
DC link voltage 510 ... 720 V DC) Line voltage 380 ... 480 V 3 AC	
Rated input current	
• At 400 V 3 AC	≤2 A
• At 600 V DC	1.1 A
DC link voltage range	300 ... 882 V DC (operation in 300 ... 430 V DC range is permitted temporarily for < 1 min)
Radio interference suppression (standard)	Category C2 to EN 61800-3
Rated output voltage	24 V ... 28.8 V DC (adjustable via potentiometer)
Rated output current	20 A
Current carrying capacity	
• 24 V DC busbars	20 A
• DC link busbars	100 A
Line connection	Screw-type terminals
L1, L2, L3 (X1)	
• Conductor cross-section	0.2 ... 4 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)
Certificate of suitability	cULus

Overview

DC link rectifier adapter



DC link rectifier adapter for unit widths of 50 mm (1.97 in) and 100 mm (3.94 in)



DC link rectifier adapter for unit widths of 150 mm ... 300 mm (5.91 in ... 11.81 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 via an external DC busbar. The DC link rectifier adapter is mounted on the DC link busbars of the Motor Module. The DC link cables are routed from above.

DC link adapter



DC link adapter (multi-tier) for all unit widths

If a multi-tier Motor Module configuration is used, a DC link adapter can be provided for linking the DC links of two drive line-ups. The DC link adapter is mounted sideways on the DC link busbars of the Motor Module. Installation is possible on the right or left side of the Motor Module. The marking of the poles (DCN and DCP) at the DC link adapter matches the side chosen for installation. The DC link cables are routed from behind. The DC link adapter (multi-tier) cannot be used in combination with the reinforced DC link busbars for Motor Modules ≤ 100 mm wide. DC link adapters are supplied in sets of 2 units.

Selection and ordering data

Description	Article No.
DC link rectifier adapter For direct infeed of DC link voltage For Line Modules and Motor Modules in booksize format with a width of 50 mm (1.97 in) and 100 mm (3.94 in) 100 mm (3.94 in), 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in) 150 mm (5.91 in), 200 mm (7.87 in) and 300 mm (11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BE00-0AA0 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

Technical specifications

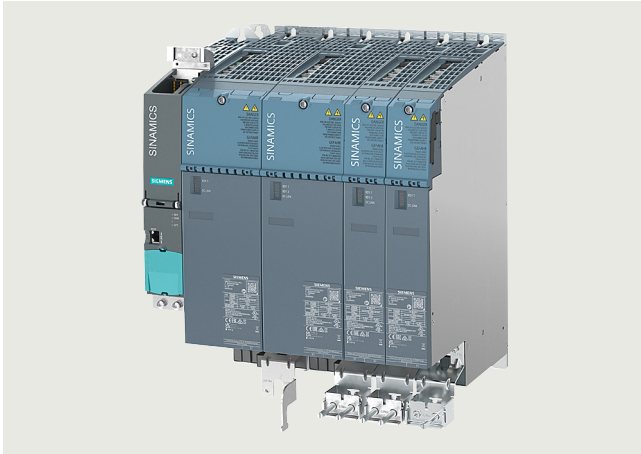
Article No.	6SL3162-2BD00-0AA0	6SL3162-2BE00-0AA0	6SL3162-2BM00-0AA0	6SL3162-2BM01-0AA0
Product designation	DC link rectifier adapter			DC link adapter set
Connection	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm ² 0.5 ... 10	35	35 ... 120	35 ... 120
Current carrying capacity	A 43	75	200	200
Weight, approx.	kg (lb) 0.06 (0.13)	0.12 (0.26)	0.48 (1.06)	0.76 (1.68)
Certificate of suitability	cURus	cURus	cURus	cURus
Suitable for Line Modules and Motor Modules	Formats Booksize	Booksize	Booksize	Booksize

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

System overview

Overview



SINAMICS S220 Smart Line Module between Control Unit CU320-2 and SINAMICS S220 Motor Modules, in booksize format

With SINAMICS S120 booksize format, Siemens is one of the world's leading suppliers of drive solutions for machine tools/production machines and General Motion Control applications. Used in a wide variety of areas, industries and applications, Siemens delivers outstanding customer benefits and industry know-how with SINAMICS S120.

The requirements that drive solutions need to meet are continually changing and increasing. Machine solutions need to be perfectly tailored to one another, offer the highest level of functionality and quality, while being economic and simple to implement across the board.

With SINAMICS S220 booksize format, Siemens is enhancing the proven SINAMICS S120 series with considerably more powerful functions and exceptionally compact modules and is providing answers to future requirements. SINAMICS S220 is the reliable, robust, and innovative high-performance solution that meets all the requirements for IoT and industrial security.

SINAMICS S220 Smart Line Modules and Motor Modules are the first steps in innovating the proven SINAMICS S120 range.

Smart Line Modules and Motor Modules are an integral part of the SINAMICS S220 in booksize format and are characterized by the highest level of performance, maximum flexibility, high degree of user-friendliness and being fit for digitalization. They are available in two versions (C and D type). Their higher power density, greater overload capability, and precise dimensioning mean that economical machine solutions can be implemented.

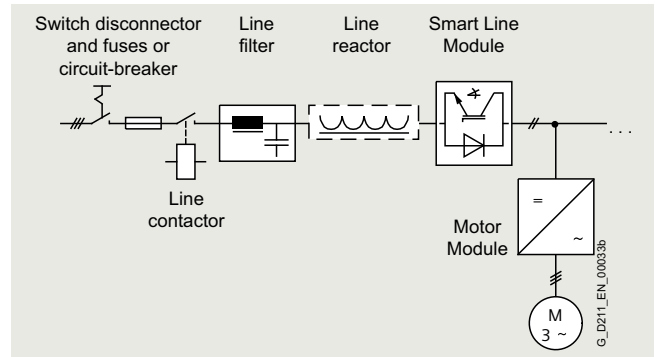
SINAMICS S220 Motor Modules are distinguished by their extremely compact design. The module width has been reduced by up to 50 %, significantly reducing the space required in the control cabinet and in turn reducing costs. Extra slim Motor Modules are also available and allow users to select the exact modules for their application.

Thanks to their innovative mechanical design, Smart Line Modules and Motor Modules are simple and reliable to install and extremely robust.

Operation of SINAMICS S220 Smart Line Modules and Motor Modules is possible with a CU320-2 Control Unit (as of SINAMICS firmware V5.2 SP3 HF10).

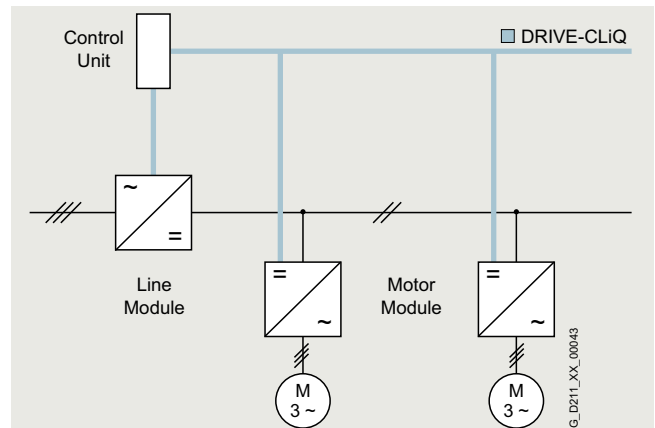
Smart Line Modules

Smart Line Modules can supply energy and return regenerative energy to the supply system. A Braking Module and braking resistor are required only if the drives need to be decelerated in a controlled manner 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 optionally installed in order to ensure compliance with the limits stipulated for Category C2 in EN 61800-3.



Motor Modules

A voltage DC link and an inverter for supplying a motor are integrated in the Motor Module.



A Motor Module (available as a Single Motor Module and Double Motor Module) is a power unit (inverter). It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor(s).

Drive dimensioning in the TIA Selection Tool

Application-specific requirements can be determined using drive technology dimensioning in the TIA Selection Tool. This can include motors, gearboxes and converters. The tool supports the configuration and dimensioning of control functions with an open and closed control loop. The technical documentation with features of the technical drive system, as well as a product list for ordering via SiePortal can also be compiled.

You can find more information about the TIA Selection Tool at www.siemens.com/tia-selection-tool

Virtualization

The DriveSim Designer virtualization solution makes it possible to simulate all SINAMICS S220 device types in a realistic manner, with minimum work for parameter setting and simple handling.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules

Overview



SINAMICS S220 Smart Line Module, in booksize format

Smart Line Modules are stall-protected, line-commutated in-feed/regenerative feedback units (diode bridge for incoming supply; stall-protected, line-commutated regenerative feedback via IGBTs) with 100 % continuous regenerative feedback power. The regenerative capability of the modules can be deactivated by means of parameterization. Smart Line Modules are designed for connection to grounded TN/TT and non-grounded IT supply systems.

- C type: Optimized for continuous load with up to 200 % overload (continuous motion)
- D type: Optimized for highly dynamic, intermittent duty cycles with up to 300 % overload (discontinuous motion)

The DC link is pre-charged via integrated precharging resistors.

The associated line reactor is required for operating a Smart Line Module.

Design

The Smart Line Modules in booksize format feature the following connections and interfaces as standard:

- 1 power connection via screw-type or push-in terminals (not included in the scope of supply for Smart Line Modules 16 kW to 24 kW).
The power connection of 36 kW and 55 kW Smart Line Modules is made via bolts.
- 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 earth) connections
- 3 DRIVE-CLiQ sockets
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC (Pt1000 can be used from firmware V4.7 HF17)

The status of the Smart Line Modules is indicated via two multi-color LEDs.

The signal cable shield can be connected to the Line Module by means of a shield terminal, e.g. Weidmüller type KLBÜ 3-8 SC.

The scope of supply of the Smart Line Modules includes:

- DRIVE-CLiQ cable for connection to the adjacent Control Unit on the left for drive control, length 0.11 m
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- DRIVE-CLiQ cable (length depends on Smart Line Module width) for connection to the adjacent Motor Module, length = width of Smart Line Module + 0.11 m
- Jumper plug for connecting the 24 V DC busbar to the adjacent Motor Module
- 24 V terminal adapter (X24)
- Connector X21 for digital inputs and outputs
- 1 set of warning labels in 36 languages

Technical specifications

Article No.	Smart Line Module in booksize format
Product designation	6SL5130-...
Line voltage (up to 4000 m (13124 ft) above sea level)	380 ... 480 V 3 AC ± 10 % (in operation - 15 % < 1 min)
Line frequency	50/60 Hz (47 ... 63 Hz)
SCCR (short-circuit current rating)	100 kA in conjunction with the recommended Class J fuse, or circuit breaker according to UL489 / CSA 22.2 No. 5-02 see recommended line-side components
Line power factor at rated power	
• Fundamental ($\cos \varphi_1$)	>0.98
• Total (λ)	0.65 ... 0.9
Overvoltage category according to EN 60664-1	Class III
DC link voltage, approx.	495 ... 720 V (typ. $1.35 \times$ line voltage) ¹⁾
Electronics power supply	24 V DC -15 %/+20 %
Radio interference suppression	
• Standard	No radio interference suppression
• With line filter	Category C2 to EN 61800-3 Total cable length up to 750 m (2460 ft) (shielded)
Cooling method	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	-10 ... +40 °C (14 ... 104 °F) without derating, >40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of Conformity	CE (Low-Voltage and EMC Directives)
Certificate of suitability	cULus

¹⁾ The DC link voltage is maintained at the mean value of the rectified line voltage.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules

Technical specifications

Article No.		6SL5130-6UE21-6AC0	6SL5130-6UE21-6AD0	6SL5130-6UE22-4AC0	6SL5130-6UE22-4AD0
Product designation		Smart Line Module in booksize format with <u>internal</u> air cooling			
Line voltage 380 ... 480 V 3 AC					
Power data		C type	D type	C type	D type
• Rated power P_N					
- At 380 V 3 AC	kW	16.0	16.0	24	24
- At 400 V 3 AC	kW	16.8	16.8	25.3	25.3
- At 480 V 3 AC	kW	20.2	20.2	30	30
• Maximum power P_{max}					
- At 380 V 3 AC	kW	35	48	48	72
- At 400 V 3 AC	kW	37	51	51	76
- At 480 V 3 AC	kW	51	61	61	91
Input data					
• Rated current	A	29	29	43	43
• Maximum current	A	62	86	86	129
Output data					
• Rated DC current	A	33	33	49	49
• Maximum DC current	A	71	97	97	146
Current demand	A	0.7	0.7	0.7	0.7
24 V DC electronics power supply, max.					
Current carrying capacity					
• 24 V DC busbars	A	20	20	20	20
• DC link busbars	A	200	200	200	200
DC link capacitance					
• Smart Line Module	μF	820	820	940	940
• Drive line-up, max.	μF	20000	20000	20000	20000
Power loss ¹⁾	kW	0.15	0.15	0.2	0.2
Cooling air requirement	m³/h (ft³/h)	77 (2719)	77 (2719)	77 (2719)	77 (2719)
Sound pressure level	dB	<70	<70	<70	<70
L_{pA} (1 m)					
Line connection		Screw-type terminals (X1)	Screw-type terminals (X1)	Screw-type terminals (X1)	Screw-type terminals (X1)
U1, V1, W1					
• Conductor cross-section	mm²	6 ... 16	6 ... 16	6 ... 16	6 ... 16
Shield connection		6SL5166-1BD00-0AA0	6SL5166-1BD00-0AA0	6SL5166-1BD00-0AA0	6SL5166-1BD00-0AA0
PE connection		M5 screw	M5 screw	M5 screw	M5 screw
Cable length, max.					
(total of all motor power cables and DC link)					
• Shielded	m (ft)	1000 (3281)	1000 (3281)	1000 (3281)	1000 (3281)
• Unshielded	m (ft)	1200 (3937)	1200 (3937)	1200 (3937)	1200 (3937)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)
• Height	mm (in)	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)
Weight, approx.	kg (lb)	8.2 (18.1)	8.2 (18.1)	8.2 (18.1)	8.2 (18.1)

¹⁾ Power loss of Smart Line Module at rated output including losses of 24 V DC electronics power supply.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules

Technical specifications

Article No.		6SL5130-6UE23-6AC0	6SL5130-6UE23-6AD0	6SL5130-6UE25-5AC0	6SL5130-6UE25-5AD0
Product designation		Smart Line Module in booksize format with <u>internal</u> air cooling			
Line voltage 380 ... 480 V 3 AC					
Power data		C type	D type	C type	D type
• Rated power P_N					
- At 380 V 3 AC	kW	36	36	55	55
- At 400 V 3 AC	kW	38	38	58	58
- At 480 V 3 AC	kW	45	45	69	69
• Maximum power P_{max}					
- At 380 V 3 AC	kW	72	108	110	164
- At 400 V 3 AC	kW	76	114	116	174
- At 480 V 3 AC	kW	91	136	139	208
Input data					
• Rated current	A	64	64	98	98
• Maximum current	A	128	192	196	294
Output data					
• Rated DC current	A	72	72	111	111
• Maximum DC current	A	145	218	222	334
Current demand	A	2.3	2.3	2.3	2.3
24 V DC electronics power supply, max.					
Current carrying capacity					
• 24 V DC busbars	A	20	20	20	20
• DC link busbars	A	250	250	250	250
DC link capacitance					
• Smart Line Module	μF	1410	1410	2115	2115
• Drive line-up, max.	μF	20000	20000	20000	20000
Power loss ¹⁾	kW	0.4	0.4	0.65	0.65
Cooling air requirement	m³/h (ft³/h)	155 (5474)	155 (5474)	155 (5474)	155 (5474)
Sound pressure level	dB	<75	<75	<75	<75
L_{pA} (1 m)					
Line connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
U1, V1, W1		(X1)	(X1)	(X1)	(X1)
• Conductor cross-section	mm²	10 ... 50	10 ... 50	25 ... 70	25 ... 70
Shield connection		6SL5166-1AF00-0AA0	6SL5166-1AF00-0AA0	6SL5166-1AF00-0AA0	6SL5166-1AF00-0AA0
PE connection		M8 screw	M8 screw	M8 screw	M8 screw
Cable length, max.					
(total of all motor power cables and DC link)					
• Shielded	m (ft)	1000 (3281)	1000 (3281)	1000 (3281)	1000 (3281)
• Unshielded	m (ft)	1200 (3937)	1200 (3937)	1200 (3937)	1200 (3937)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	150 (5.91)	150 (5.91)	150 (5.91)	150 (5.91)
• Height	mm (in)	422 (16.61)	422 (16.61)	422 (16.61)	422 (16.61)
• Depth	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)	270 (10.63)
Weight, approx.	kg (lb)	14.9 (32.85)	14.9 (32.85)	15.4 (33.96)	15.4 (33.96)

¹⁾ Power loss of Smart Line Module at rated output including losses of 24 V DC electronics power supply.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules

Selection and ordering data

SINAMICS S220 Smart Line Module in booksize format			
Rated power at 380 V kW	Maximum power at 380 V kW	C/D type	Internal air cooling Article No.
Line voltage 380 ... 480 V 3 AC			
16	35	C type	6SL5130-6UE21-6AC0
	48	D type	6SL5130-6UE21-6AD0
24	48	C type	6SL5130-6UE22-4AC0
	72	D type	6SL5130-6UE22-4AD0
36	72	C type	6SL5130-6UE23-6AC0
	108	D type	6SL5130-6UE23-6AD0
55	110	C type	6SL5130-6UE25-5AC0
	165	D type	6SL5130-6UE25-5AD0

Description	Article No.
Accessories	
Shield connection plate For Smart Line Modules in booksize format - with a width of 100 mm (3.94 in) - with a width of 150 mm (5.91 in)	6SL5166-1BD00-0AA0 6SL5166-1AF00-0AA0
Shield terminal For shield connection on the shield connection plate - Diameter 3 ... 20 mm (0.12 ... 0.79 in) - Diameter 20 ... 35 mm (0.79 ... 1.38 in)	8WH9130-0NA00 8WH9130-0PA00
DC link rectifier adapter For direct infeed of DC link voltage - Screw-type terminals 0.5 ... 10 mm² For Line Modules and Motor Modules in booksize format with a width of 50 mm, 75 mm and 100 mm (1.97 in, 2.95 in and 3.94 in) - Screw-type terminals 10 ... 35 mm² For Line Modules and Motor Modules in booksize format with a width of 100 mm, 150 mm, 200 mm and 300 mm (3.94 in, 5.91 in, 7.87 in and 11.81 in)	6SL3162-2BD00-0AA0 6SL3162-2BE00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 120 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0
Connector with screw-type terminal For 16 kW and 24 kW Smart Line Modules in booksize format Screw-type terminals 6 ... 16 mm ²	6SL5166-2NA00-0AA0
Connector with push-in connection For 16 kW and 24 kW Smart Line Modules in booksize format Push-in type terminals 6 ... 16 mm ²	6SL5166-2NB00-0AA0

Description	Article No.
Accessories for re-ordering	
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	6SL3162-2AA00-0AA0
24 V jumper plug For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Terminal Kit (Plug-in terminals, DRIVE-CLiQ jumper (length = module width + 110 mm (4.33 in)), dust protection blanking plugs) For DRIVE-CLiQ port For Smart Line Modules in booksize format with a width of 100 mm (3.94 in) 150 mm (5.91 in)	6SL5166-8AD03-0AA0 6SL5166-8AF01-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LV, MT, NL, NO, PL, PT, RO, RU, SE, SI, SK, TR, CN, ID, IL, JP, KR, SA, TH, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

More information

Identification link according to IEC 61406 for SINAMICS S220

The ID link contains the article and serial number of the product. As a QR code, it replaces the previous data matrix code on the nameplate and takes you with the URL directly to a product information page on the internet with access to the technical documentation, data sheet, certificates, FAQs, product notifications, and catalogs. Paper package inserts become superfluous since the information is available electronically directly via the QR code, even years later. In this way, we are making a valuable contribution to the preservation of our environment. You don't need an additional app. Simply scan the QR code with your smartphone or tablet. According to IEC 61406, the QR code of an ID link is marked with a frame and a triangle at the bottom right.

With their globally unique identifiers, Siemens products are ready for Industry 4.0.

The ID serves as a connection to the administration shell with which modules of the digital twin can be provided.

The latest technical documentation as well as further technical specifications are available on the internet at:

www.siemens.com/sinamics-s220/documentation

and in the Siemens Product Configurator:

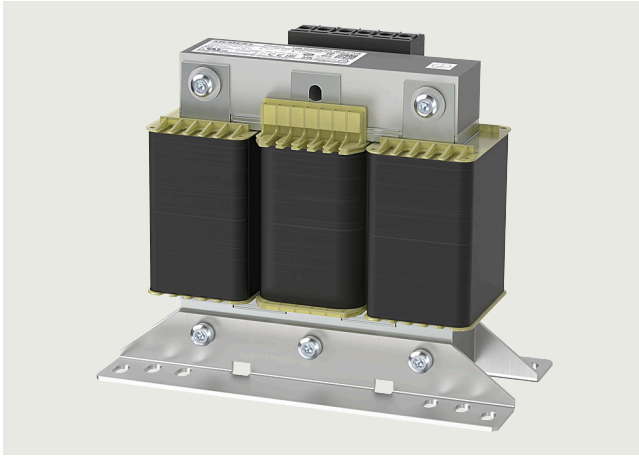
www.siemens.com/sinamics-s220/configuration

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules > Line reactors

Overview



Line reactors are always to be provided for operation of Smart Line Modules, as line harmonics can occur on converters that damage/disturb other loads connected to the same line supply. Line reactors limit the line harmonics to permissible values. Line reactors that are not permissible can damage the Smart Line Modules.

Selection and ordering data

Suitable for Smart Line Module		SINAMICS Line reactor
Rated power Smart Line Module	Booksize format Internal air cooling	Article No.
kW	Type	
16	6SL5130-6UE21-6AC0	6SL3100-0EE21-6AA0
	6SL5130-6UE21-6AD0	6SL5100-0EE21-6AD0
24	6SL5130-6UE22-4AC0	6SL5100-0EE22-4AC0
	6SL5130-6UE22-4AD0	6SL5100-0EE22-4AD0
36	6SL5130-6UE23-6AC0	6SL5100-0EE23-6AC0
	6SL5130-6UE23-6AD0	6SL5100-0EE23-6AD0
55	6SL5130-6UE25-5AC0	6SL5100-0EE25-5AC0
	6SL5130-6UE25-5AD0	6SL5100-0EE25-5AD0

4

Technical specifications

Article No.		6SL3100-0EE21-6AA0	6SL5100-0EE21-6AD0	6SL5100-0EE22-4AC0	6SL5100-0EE22-4AD0
Product designation		Line reactor for Smart Line Modules in booksize format			
Line voltage 380 ... 480 V 3 AC					
Rated current	A	29	29	43.5	43.5
Power loss	W	90	90	92	92
Line/load connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals
1U1, 1V1, 1W1 / 1U2, 1V2, 1W2 • Conductor cross-section	mm ²	2.5 ... 10	2.5 ... 16	2.5 ... 16	2.5 ... 16
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	219 (8.62)	219 (8.62)	219 (8.62)	219 (8.62)
• Height	mm (in)	176 (6.93)	176 (6.93)	195 (7.68)	195 (7.68)
• Depth	mm (in)	110.5 (4.35)	110.5 (4.35)	126 (4.96)	126 (4.96)
Weight, approx.	kg (lb)	9.0 (19.9)	9.0 (19.9)	15.5 (34.2)	15.5 (34.2)
Certificate of suitability		cURus	cURus	cURus	cURus
Suitable for Smart Line Module in booksize format	Type	6SL5130-6UE21-6AC0	6SL5130-6UE21-6AD0	6SL5130-6UE22-4AC0	6SL5130-6UE22-4AD0
• Rated power of the Smart Line Module	kW	16 C type	16 D type	24 C type	24 D type

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules > Line reactors

Technical specifications

Article No.		6SL3100-0EE23-6AC0	6SL5100-0EE23-6AD0	6SL5100-0EE25-5AC0	6SL5100-0EE25-5AD0
Product designation		Line reactor for Smart Line Modules in booksize format			
Line voltage 380 ... 480 V 3 AC					
Rated current	A	64	64	103	103
Power loss	W	90	90	190	190
Line/load connection 1U1, 1V1, 1W1 / 1U2, 1V2, 1W2 • Conductor cross-section	mm ²	Screw terminals	Screw terminals	Screw terminals	Screw terminals
		10 ... 50	10 ... 50	25 ... 70	25 ... 70
PE connection		M8 screw	M8 screw	M8 screw	M8 screw
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	225 (8.68)	225 (8.68)	300 (11.81)	300 (11.81)
• Height	mm (in)	235 (9.25)	235 (9.25)	280 (11.02)	280 (11.02)
• Depth	mm (in)	114 (4.49)	114 (4.49)	153 (6.02)	153 (6.02)
Weight, approx.	kg (lb)	18.0 (39.7)	18.0 (39.7)	35.5 (78.26)	35.5 (78.26)
Certificate of suitability		cURus	cURus	cURus	cURus
Suitable for Smart Line Module in booksize format	Type	6SL5130-6UE23-6AC0	6SL5130-6UE23-6AD0	6SL5130-6UE25-5AC0	6SL5130-6UE25-5AD0
• Rated power of the Smart Line Module	kW	36 C type	36 D type	55 C type	55 D type

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules > Line filters

Overview



In conjunction with line reactors and a consistent EMC-compliant system design, line filters limit the conducted electromagnetic emissions generated by the Smart Line Modules to the limit values according to IEC 61800-3. Line filters are only suitable for direct connection to TN line systems.

Selection and ordering data

Suitable for Smart Line Module		SINAMICS Line filter
Rated power Smart Line Module	Booksize format Internal air cooling	Article No.
kW	Type	
16	6SL5130-6UE21-6AC0 6SL5130-6UE21-6AD0	6SL5100-0HE21-6DD0
24	6SL5130-6UE22-4AC0 6SL5130-6UE22-4AD0	6SL5100-0HE22-4DD0
36	6SL5130-6UE23-6AC0 6SL5130-6UE23-6AD0	6SL5100-0HE23-6DD0
55	6SL5130-6UE25-5AC0 6SL5130-6UE25-5AD0	6SL5100-0HE25-5DD0

Technical specifications

Article No.		6SL5100-0HE21-6DD0	6SL5100-0HE22-4DD0	6SL5100-0HE23-6DD0	6SL5100-0HE25-5DD0
Product designation		Line filter		Line filter	
Line voltage 380 ... 480 V 3 AC					
Rated current	A	30	44	73	105
Power loss	W	12.0	22.0	28	38
Line/load connection L1, L2, L3 / U, V, W • Conductor cross-section	mm ²	Screw terminals	Screw terminals	Screw terminals	Screw terminals
		6 ... 16	6 ... 16	16 ... 50	16 ... 50
PE connection		M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	50 (1.97)	50 (1.97)	74 (2.91)	74 (2.91)
• Height	mm (in)	398 (15.67)	398 (15.67)	409 (16.10)	409 (16.10)
• Depth	mm (in)	205 (8.07)	205 (8.07)	225 (8.86)	225 (8.86)
Weight, approx.	kg (lb)	5 (11.0)	5 (11.0)	7.2 (15.9)	7.8 (17.2)
Certificate of suitability		cURus	cURus	cURus	cURus
Suitable for Smart Line Module in booksize format • Rated power of the Smart Line Module	Type kW	6SL5130-6UE21-6AC0 6SL5130-6UE21-6AD0 16	6SL5130-6UE22-4AC0 6SL5130-6UE22-4AD0 24	6SL5130-6UE23-6AC0 6SL5130-6UE23-6AD0 36	6SL5130-6UE25-5AC0 6SL5130-6UE25-5AD0 55

SINAMICS S20/S220 drive system

SINAMICS S220 in booksize format

Line Modules > Smart Line Modules > Recommended line-side components

Selection and ordering data

Suitable line-side power components are assigned depending on the power rating of the Smart Line Modules.

Additional information about the line-side power components can be found in SiePortal.

The tables below list recommended components.

Assignment of line-side power components to Smart Line Modules in booksize format

Suitable for Smart Line Module in		Line contactor	LV HRC fuse (gL/gG)			UL/CSA fuse, Class J ¹⁾		
Rated power kW	Booksize format Type		Rated current A	Size	Article No.	Rated current A	Size mm (in)	Reference No.
16	6SL5130-6UE21-6AC0 6SL5130-6UE21-6AD0	3RT2035-.... ^{*)}	40	000	3NA3817	40	27 × 60 (1.06 × 2.36)	AJT40
24	6SL5130-6UE22-4AC0 6SL5130-6UE22-4AD0	3RT2037-.... ^{*)}	65	000	3NA3824	80	27 × 117 (1.06 × 4.61)	AJT80
36	6SL5130-6UE23-6AC0 6SL5130-6UE23-6AD0	3RT2038-.... ^{*)}	80	000	3NA3824	80	27 × 117 (1.06 × 4.61)	AJT80
55	6SL5130-6UE25-5AC0 6SL5130-6UE25-5AD0	3RT1054-.... ^{*)}	115	000	3NA3132	125	41 × 146 (1.61 × 5.75)	AJT125

Recommendations on further overcurrent protection devices are available at:

support.industry.siemens.com/cs/document/109804134

* See SiePortal for Article No. supplements.

¹⁾ Not suitable for 3NP and 3KL switch disconnectors.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

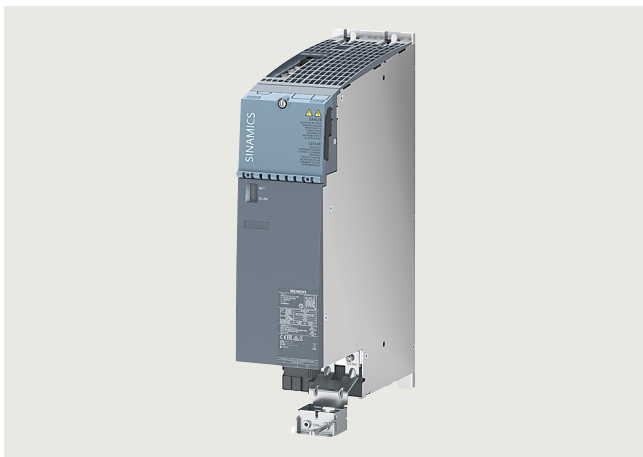
Overview



Single Motor Module in booksize format C/D types, 3 A to 24 A and 30 A slim



Single Motor Module in booksize format C/D types, 85 A and 132 A



Single Motor Module in booksize format C/D types, 30 A



Single Motor Module in booksize format C/D types 200 A



Single Motor Module in booksize format C type, 45 A and 60 A

A Motor Module is a power unit (inverter). It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor(s).

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Overview

Motor Modules in booksize format C/D types, 3 A to 200 A

Rated current	3 A	5 A	9 A	18 A	24 A	30 A	45 A	60 A	85 A	132 A	200 A
 D types											
Single Motor Modules	3 A / 9 A 50 mm (1.97 in)	5 A / 15 A 50 mm (1.97 in)	9 A / 27 A 50 mm (1.97 in)	18 A / 54 A 50 mm (1.97 in)	24 A / 72 A 50 mm (1.97 in)	30 A / 90 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	85 A / 170 A 150 mm (5.90 in)	132 A / 264 A 150 mm (5.90 in)	200 A / 400 A 200 mm (87.9 in)
Double Motor Modules	2 x 3 A / 2 x 9 A 50 mm (1.97 in)	2 x 5 A / 2 x 15 A 50 mm (1.97 in)	2 x 9 A / 2 x 27 A 50 mm (1.97 in)	2 x 18 A / 2 x 54 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	—	—	—	—	—
 C types											
Rated current / maximum current in A	Single Motor Modules	18 A / 36 A 50 mm (1.97 in)	24 A / 48 A 50 mm (1.97 in)	30 A / 56 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	45 A / 90 A 100 mm (3.94 in)	60 A / 120 A 100 mm (3.94 in)	85 A / 141 A 150 mm (5.90 in)	132 A / 210 A 150 mm (5.90 in)	200 A / 282 A 200 mm (87.9 in)		
	Double Motor Module	2 x 18 A / 2 x 54 A ¹⁾ 2 x 36 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	—	—	—	—	—		

¹⁾ (slim)

G_PM21_EN_00708

Overview of Single Motor Modules in booksize format C/D types

- C type: Optimized for continuous load with up to 200 % overload (continuous motion)
- D type: Optimized for highly dynamic, intermittent duty cycles (discontinuous motion):
 - with 300 % overload for Motor Modules up to 30 A (discontinuous motion)
 - with 200 % overload for the Motor Modules 85 A, 132 A, and 200 A

Devices in booksize format C/D types are optimized for multi-axis applications and are mounted next to one another. The connection for the common DC link is an integral feature. The device is internally air cooled.

The Motor Modules in booksize format C/D types are a further development of the booksize series and offer the following advantages:

- The portfolio is extended by more compact Single Motor Modules 85 A, 132 A and 200 A (C/D types) as well as very narrow (slim) 50 mm (1.97 in) wide Single Motor Modules 30 A and Double Motor Modules 18 A.
- The amount of space required beneath the Motor Modules has been reduced thanks to improvements in the design.
- In the motor plug connector, the brake conductors and the PE connection are integrated directly in the plug connector.
- The motor connections on the Double Motor Module are located side by side, resulting in a significantly improved level of accessibility.
- The fan can be simply replaced without having to remove the Motor Module.

The signal cable shield can be connected to the Motor Module by means of a shield connection clamp, e.g. Weidmüller type KLBUE 3-8 SC.

Design

The Single Motor Modules in booksize format feature the following connections and interfaces as standard:

- 2 DC link connections via integrated DC link busbars
- 1 electronics power supply connection via integrated 24 V DC bars
- 3 DRIVE-CLiQ sockets
- 1 motor connection via connector X1 for C/D type 3 A to 30 A (not included in the scope of delivery)
- 1 safe stop input
- 1 safe motor brake control
- 1 temperature sensor input for KTY84-130, Pt1000 or PTC
- 2 PE (protective earth) connections – a PE connection is integrated in the connector for C/D types 3 A to 30 A

The status of the Motor Modules is indicated via two multi-color LEDs.

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable appropriate to the width of the Motor Module for connection to the adjacent Motor Module, length = width of Motor Module + 0.06 m (2.36 in)
- Jumper for connecting the 24 V DC busbar to the adjacent Motor Module
- Connector X21
- Connector X11 for the motor brake connection (for Motor Modules 45 A to 200 A)
- 2 blanking plugs for sealing unused DRIVE-CLiQ sockets
- Fan insert for the 85 A, 132 A, and 200 A Motor Modules (the voltage for the fan insert is supplied by the Motor Module)
- 1 shield connection plate with shield connection clamp (for Motor Modules 3 A to 30 A)
- 1 set of warning labels in 36 languages

Integration

The Single Motor Module communicates via DRIVE-CLiQ with:

- SINUMERIK 828D
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

Technical specifications

Article No.	6SL5120-1UE...
Product designation	Single Motor Module in booksize format
DC link voltage (up to 2000 m (6562 ft) above sea level)	495 ... 720 V DC (line voltage 380 ... 480 V 3 AC)
Output frequency	0 ... 650 Hz ^{1) 2)}
Electronic power supply	24 V DC -15%/+20%
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	-10 ... 40 °C (14 ... 104 °F) without derating, >40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of Conformity	CE (Low-Voltage and EMC Directives)
Certificate of suitability	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, Performance Level d (PL d) and Category 3 according to EN ISO 13849-1

¹⁾ 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 derating.

²⁾ The output frequency is currently limited to 550 Hz. The specified values apply to systems with license for high output frequency.
For further information, refer to:
support.industry.siemens.com/cs/document/104020669

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.		–	–	–	6SL5120-1UE21-8AC0 ^{*)}
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling C type			
Article No.		6SL5120-1UE13-0AD0 ^{*)}	6SL5120-1UE15-0AD0 ^{*)}	6SL5120-1UE21-0AD0 ^{*)}	6SL5120-1UE21-8AD0 ^{*)}
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling D type			
DC link voltage 495 ... 720 V DC					
Output current					
• Rated current I_N	A	3	5	9	18
• For S6 duty (40%) I_{S6}	A	4	6.7	12	24
• I_{max}					
- C type	A	–	–	–	36
- D type	A	9	15	27	54
Rated power ¹⁾					
• Based on IEC ²⁾	kW	1.1	2.2	4	7.5
• Based on NEC ³⁾	hp	1.5	3	5	10
Rated pulse frequency	kHz	4	4	4	4
DC link current I_d⁴⁾	A	3.7	6.2	11.2	22.5
Current carrying capacity					
• DC link busbars	A	100 ⁵⁾	100 ⁵⁾	100 ⁵⁾	100 ⁵⁾
• 24 V DC busbars ⁶⁾	A	20	20	20	20
DC link capacitance	µF	110	110	110	220
Current requirement	A	0.7	0.75	0.8	1
At 24 V DC, max.					
Power loss ⁸⁾	kW	0.03/0.05	0.04/0.07	0.06/0.1	0.14/0.19
typ. ⁶⁾ /max.					
Cooling air requirement	m ³ /h (ft ³ /h)	18 (636)	20 (706)	22 (777)	33 (1165)
Motor connection					
U2, V2, W2		Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²
PE connection		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
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)	50 (1.97)
• Height	mm (in)	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)
Weight, approx.	kg (lb)	4.6 (10.1)	4.6 (10.1)	4.6 (10.1)	4.6 (10.1)

* Available soon

¹⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC.

²⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC according to IEC 60947-4-1:2018 Annex G Table G.1.

³⁾ Rated power of a standard asynchronous motor at 460 V 3 AC according to NEC Table 430.250.

⁴⁾ Rated DC link current for dimensioning an external DC connection.

⁵⁾ With reinforced DC link bridges, (Article No. 6SL3162-2BB00-0AA0) 200 A is possible (see [Accessories](#)).

⁶⁾ If, due to a number of Line Modules 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).

⁷⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁸⁾ At max. motor cable length 30 m (98.4 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁹⁾ Connector not included in scope of delivery (see [Accessories](#)).

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.		6SL5120-1UE22-4AC0 ¹⁾	6SL5120-1UE23-0SC0	6SL5120-1UE23-0AC0 ¹⁾	6SL5120-1UE24-5AC0	6SL5120-1UE26-0AC0	
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling C type					
Article No.		6SL5120-1UE22-4AD0	6SL5120-1UE23-0SD0	6SL5120-1UE23-0AD0	–	–	
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling D type					
DC link voltage 495 ... 720 V DC							
Output current							
• Rated current I_N	A	24	30	30	45	60	
• For S6 duty (40%) I_{S6}	A	32	40	40	60	80	
• I_{max}							
- C type	A	48	56	56	90	120	
- D type	A	72	90	90	–	–	
Rated power ¹⁾							
• Based on IEC ²⁾	kW	11	15	15	22	30	
• Based on NEC ³⁾	hp	15	20	20	30	40	
Rated pulse frequency		kHz	4	4	4	4	
DC link current I_d ⁴⁾		A	30	37	37	56	75
Current carrying capacity							
• DC link busbars	A	100 ⁵⁾	100 ⁵⁾	200	200	200	
• 24 V DC busbars ⁶⁾	A	20	20	20	20	20	
DC link capacitance		μF	390	705	705	1230	1410
Current requirement		A	1.0	1.2	0.75	1.0	01.0
At 24 V DC, max.							
Power loss ⁷⁾		kW	0.19/0.20	0.27/0.31	0.26/0.31	0.34/0.36	0.46/0.48
typ. ⁸⁾ /max.							
Cooling air requirement		m ³ /h (ft ³ /h)	33 (1165)	33 (1165)	58 (2048)	64 (2260)	64 (2260)
Motor connection			Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	Plug-in connector (X1) ⁹⁾ , 1.5 ... 6 mm ²	M6 screw studs (X1)	M6 screw studs (X1)
U2, V2, W2							
Shield support			At the shield connection plate of the Motor Modules	At the shield connection plate of the Motor Modules	At the shield connection plate of the Motor Modules	See Accessories	See Accessories
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	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A
Motor cable length, max.							
• Shielded	m (ft)	70 (230)	100 (328)	100 (328)	100 (328)	100 (328)	
• Unshielded	m (ft)	100 (328)	150 (492)	150 (492)	150 (492)	150 (492)	
Degree of protection			IP20	IP20	IP20	IP20	
Dimensions							
• Width	mm (in)	50 (1.97)	50 (1.97)	100 (3.94)	100 (3.94)	100 (3.94)	
• 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)	4.7 (10.4)	4.6 (10.1)	7.9 (17.4)	8.5 (18.7)	8.6 (19)

* Available soon

¹⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC.²⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC according to IEC 60947-4-1:2018 Annex G Table G.1.³⁾ Rated power of a standard asynchronous motor at 460 V 3 AC according to NEC Table 430.250.⁴⁾ Rated DC link current for dimensioning an external DC connection.⁵⁾ With reinforced DC link bridges, (Article No. 6SL3162-2BB00-0AA0) 200 A is possible ([see Accessories](#)).⁶⁾ If, due to a number of Line Modules 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).⁷⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.⁸⁾ At max. motor cable length 30 m (98.4 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.⁹⁾ Connector not included in scope of delivery ([see Accessories](#)).

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Technical specifications

Article No.		6SL5120-1UE28-5AC0	6SL5120-1UE31-3AC0	6SL5120-1UE32-0AC0
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling C type		
Article No.		6SL5120-1UE28-5AD0	6SL5120-1UE31-3AD0	6SL5120-1UE32-0AD0
Product designation		Single Motor Module in booksize format <u>internal</u> air cooling D type		
DC link voltage 495 ... 720 V DC				
Output current				
• Rated current I_N	A	85	132	200
• For S6 duty (40%) I_{S6}	A	110	150	230
• I_{max}				
- C type	A	141	210	282
- D type	A	170	264	400
Rated power ¹⁾				
• Based on IEC ²⁾	kW	45	75	110
• Based on NEC ³⁾	hp	60	100	150
Rated pulse frequency	kHz	4	4	4
DC link current I_d ²⁾	A	106	165	250
Current carrying capacity				
• DC link busbars	A	200	200	200
• 24 V DC busbars ³⁾	A	20	20	20
DC link capacitance	μF	1880	2820	3995
Current requirement At 24 V DC, max.	A	1.5	1.5	1.5
Power loss ⁴⁾ typ. ⁵⁾ /max.	kW	0.77/0.79	1.26/1.29	2.03/2.09
Cooling air requirement	m ³ /h (ft ³ /h)	290 (10241)	290 (10241)	340 (12007)
Motor connection U2, V2, W2		M8 screw studs (X1)	M8 screw studs (X1)	M8 screw studs (X1)
• Conductor cross-section, max.	mm ²	2.5 ... 95, 2 × 35	2.5 ... 120, 2 × 50	2.5 ... 120, 2 × 50
Shield support		See Accessories	See Accessories	See Accessories
PE connection		M6 screw	M8 screw	M8 screw
Motor brake connection		Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A	Plug-in connector (X11), 24 V DC, 2 A
Motor cable length, max.				
• Shielded	m (ft)	100 (328)	100 (328)	100 (328)
• Unshielded	m (ft)	150 (492)	150 (492)	150 (492)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	150 (5.91)	150 (5.91)	200 (7.87)
• Height	mm (in)	380 (14.96)	380 (14.96)	380 (14.96)
• Depth	mm (in)	270 (10.63)	270 (10.63)	270 (10.63)
Weight, approx.	kg (lb)	15 (33.1)	17.2 (37.9)	20 (44.1)

¹⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC.

²⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC according to IEC 60947-4-1:2018 Annex G Table G.1.

³⁾ Rated power of a standard asynchronous motor at 460 V 3 AC according to NEC Table 430.250.

⁴⁾ Rated DC link current for dimensioning an external DC connection.

⁵⁾ If, due to a number of Line Modules 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).

⁶⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁷⁾ At max. motor cable length 30 m (98.4 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Selection and ordering data

SINAMICS S220 Single Motor Module in booksize format

Rated output current A	Rated power (IEC) kW (hp)	C type Article No.	C type slim Article No.		D type Article No.	D type slim Article No.	
3	1.1 (1.5)	–	–		6SL5120-1UE13-0AD0	–	Available soon
5	2.2 (3)	–	–		6SL5120-1UE15-0AD0	–	Available soon
9	4 (5)	–	–		6SL5120-1UE21-0AD0	–	Available soon
18	7.5 (10)	6SL5120-1UE21-8AC0	–	Available soon	6SL5120-1UE21-8AD0	–	Available soon
24	11 (15)	6SL5120-1UE22-4AC0	–	Available soon	6SL5120-1UE22-4AD0	–	
30	15 (20)	6SL5120-1UE23-0AC0	–	Available soon	6SL5120-1UE23-0AD0	–	
		–	6SL5120-1UE23-0SC0		–	6SL5120-1UE23-0SD0	
45	22 (30)	6SL5120-1UE24-5AC0	–	Available soon	–	–	
60	30 (40)	6SL5120-1UE26-0AC0	–		–	–	
85	45 (60)	6SL5120-1UE28-5AC0	–		6SL5120-1UE28-5AD0	–	
132	75 (100)	6SL5120-1UE31-3AC0	–		6SL5120-1UE31-3AD0	–	
200	110 (150)	6SL5120-1UE32-0AC0	–		6SL5120-1UE32-0AD0	–	

Description	Article No.
Accessories	
Power connector (X1) with screw-type terminal At Motor Module end, with screw-type terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MA00-0AC0
Power connector (X1) with push-in connection with snap-in actuators At Motor Module end, with spring-loaded terminals 1.5 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MB00-0AC0
Shield connection plate For Motor Modules in booksize format with a width of 100 mm (3.94 in) (Motor Modules in booksize format C type 45 A/60 A) 150 mm (5.91 in) (Motor Modules in booksize format C/D type 85 A/132 A) 200 mm (7.87 in) (Motor Modules in booksize format C/D type 200 A)	6SL3162-1AD00-0AA0 6SL5166-1AF00-0AA0 6SL5166-1AH00-0AA0
Shield connection clamp For Motor Modules in booksize format C type with rated output current of 45 A/60 A - Diameter 3 ... 14 mm (0.12 ... 0.55 in) - Diameter 20 ... 35 mm (0.79 ... 1.38 in)	8WH9130-0MA00 8WH9130-0PA00

Description	Article No.
DC link rectifier adapter For direct infeed of DC link voltage - Screw-type terminals 0.5 ... 10 mm² For Motor Modules in booksize format with a width of 50 mm (1.97 in) and 100 mm (3.94 in)¹⁾ up to max. 30 A - Screw-type terminals 10 ... 35 mm² For Motor Modules in booksize format with a width of 100 mm (3.94 in)¹⁾; 45 A/60 A - Screw-type terminals 35 ... 95 mm² For Motor Modules in booksize format with a width of 150 mm (5.91 in) and 200 mm (7.87 in)	6SL3162-2BD00-0AA0 6SL3162-2BE00-0AA0 6SL3162-2BM00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 95 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	6SL3162-2AA00-0AA0
Reinforced DC link bridge 6 mm (0.24 in) For replacement of the DC link bridge in Single Motor Modules 3 A ... 24 A, 30 A slim Double Motor Modules 2 x 3 A ... 2 x 9 A	6SL3162-2BB00-0AA0

¹⁾ NOTICE: The DC link rectifier adapter must not be used for Motor Modules C type, 45 A and 60 A.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Single Motor Modules

Selection and ordering data

Description	Article No.
Accessories for re-ordering	
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Terminal Kit for Motor Modules in booksize format C/D types, 3 A to 30 A (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), shield connection clamp with pressure plate, dust protection blanking plugs, coding plug for X1) For Motor Modules with a width of • 50 mm (1.97 in), Single Motor Module (30 A slim) • 50 mm (1.97 in), Double Motor Module • 100 mm (3.94 in), Single Motor Module 30 A	6SL5166-8AB00-0AA0 6SL5166-8AB01-0AA0 6SL5166-8AD00-0AA0
Terminal Kit for Motor Modules 45 A to 200 A (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), dust protection blanking plugs) For Motor Modules with a width of • 100 mm (3.94 in), 45 A/60 A • 100 mm (3.94 in), 2 x 18 A • 150 mm (5.91 in), 85 A/132 A • 200 mm (7.87 in), 200 A	6SL5166-8AD01-0AA0 6SL5166-8AD02-0AA0 6SL5166-8AF00-0AA0 6SL5166-8AH00-0AA0
Shield connection clamp For Single Motor Modules in booksize format C/D types with rated output current of 3 A to 30 A	6SL3162-0AQ00-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, ID, IE, IL, IR, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SA, SE, SI, SK, TH, TR, TW	6SL5166-3BW00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0
Replacement fan For Motor Modules with a width of • 50 mm (1.97 in), C/D type (3 A ... 24 A, 30 A slim) • 100 mm (3.94 in), C/D type (30 A) • 100 mm (3.94 in), C type (45 A and 60 A) • 150 mm (5.91 in), C/D type (85 A and 132 A) • 200 mm (7.87 in), C/D type (200 A)	6SL3162-0AS00-0AA0 6SL5166-0AD00-0AA0 6SL3162-0AT00-0AA0 6SL5166-0AF00-0AA0 6SL5166-0AH00-0AA0

Overview


A Motor Module is a power unit (inverter). It generates a variable voltage with variable frequency from the DC link voltage that feeds the connected motor(s).

Double Motor Module in booksize format C/D types

Motor Modules in booksize format C/D types, 2 × 3 A to 2 × 18 A

Rated current	3 A	5 A	9 A	18 A	24 A	30 A	45 A	60 A	85 A	132 A	200 A
D types											
Single Motor Modules	3 A / 9 A 50 mm (1.97 in)	5 A / 15 A 50 mm (1.97 in)	9 A / 27 A 50 mm (1.97 in)	18 A / 54 A 50 mm (1.97 in)	24 A / 72 A 50 mm (1.97 in)	30 A / 90 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	85 A / 170 A 150 mm (5.90 in)	132 A / 264 A 150 mm (5.90 in)	200 A / 400 A 200 mm (87.9 in)
Double Motor Modules	2 × 3 A / 2 × 9 A 50 mm (1.97 in)	2 × 5 A / 2 × 15 A 50 mm (1.97 in)	2 × 9 A / 2 × 27 A 50 mm (1.97 in)	2 × 18 A / 2 × 54 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	—	—	—	—	—
C types											
Rated current / maximum current in A											
Single Motor Modules	18 A / 36 A 50 mm (1.97 in)	24 A / 48 A 50 mm (1.97 in)	30 A / 56 A 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	45 A / 90 A 100 mm (3.94 in)	60 A / 120 A 100 mm (3.94 in)	85 A / 141 A 150 mm (5.90 in)	132 A / 210 A 150 mm (5.90 in)	200 A / 282 A 200 mm (87.9 in)			
Double Motor Module	2 × 18 A / 2 × 54 A ¹⁾ 50 mm (1.97 in) ¹⁾ 100 mm (3.94 in)	—	—	—	—	—	—	—			

¹⁾ (slim)

G_PM21_EN_00713

Overview of Double Motor Module in booksize format C/D types

- C type: Optimized for continuous load with up to 200 % overload (continuous motion)
- D type: Optimized for highly dynamic, intermittent duty cycles with up to 300 % overload (discontinuous motion)

Devices in booksize format C/D types are optimized for multi-axis applications and are mounted next to one another. The connection for the common DC link is an integral feature. The device is internally air cooled.

The Motor Modules in booksize format C/D types are a further development of the booksize series and offer the following advantages:

- The amount of space required beneath the Motor Modules has been reduced thanks to improvements in the design.
- In the motor plug connector, the brake conductors and the PE connection are integrated directly in the plug connector.
- The motor connections on the Double Motor Module are located side by side, resulting in a significantly improved level of accessibility.
- The fan can be simply replaced without having to remove the Motor Module.
- The Double Motor Module 2 × 18 A is available with double and treble overload as well as in an extra slim variant with a width of 50 mm (1.97 in).

The signal cable shield can be connected to the Motor Module by means of a shield connection clamp, e.g. Weidmüller type KLBUE 3-8 SC.

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

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 busbars
- 4 DRIVE-CLiQ sockets
- 2 motor connections via connectors X1 and X2 (are not included in the scope of delivery)
- 2 Safe Stop inputs (1 input per axis)
- 2 safe motor brake controls
- 2 temperature sensor inputs for KTY84-130, Pt1000 or PTC
- 1 PE/protective conductor connection

The status of the Motor Modules is indicated via two multi-color LEDs.

The Motor Modules are supplied with a mounted shield connection plate. The associated shield connection clamp can be found in the Terminal Kit supplied.

Design

The scope of supply of the Motor Modules includes:

- DRIVE-CLiQ cable appropriate to the width of the Motor Module for connection to the adjacent Motor Module, length = width of Motor Module + 0.06 m (2.36 in)
- 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 supplied from the internal voltage levels for cooling the power unit
- 1 shield connection plate with shield connection clamp
- 1 set of warning labels in 36 languages

Integration

The Double Motor Module communicates via DRIVE-CLiQ with:

- SINUMERIK 828D
 - Numeric Control Extension NX10.3
 - Numeric Control Extension NX15.3

Technical specifications

Article No.	6SL5120-2UE...
Product designation	Double Motor Module in booksize format
DC link voltage (up to 2000 m (6562 ft) above sea level)	495 ... 720 V DC (line voltage 380 ... 480 V 3 AC)
Output frequency	0 ... 650 Hz ^{1) 2)}
Electronic power supply	24 V DC -15%/+20%
Type of cooling	Internal air cooling (power units with increased air cooling by built-in fan)
Permissible ambient and coolant temperature (air) during operation for line-side components, Line Modules and Motor Modules	-10 ... +40 °C (14 ... 104 °F) without derating, >40 ... 55 °C (104 ... 131 °F), with derating.
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 ... 4000 m (3281 ... 13124 ft) above sea level, with derating.
Declarations of Conformity	CE (Low-Voltage and EMC Directives)
Certificate of suitability	cULus
Safety Integrated	Safety Integrity Level 2 (SIL 2) according to IEC 61508, Performance Level d (PL d) and Category 3 according to EN ISO 13849-1

¹⁾ 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.

²⁾ The output frequency is currently limited to 550 Hz. The specified values apply to systems with license for high output frequency.

Technical specifications

Article No.		–	–	–	6SL5120-2UE21-8AC0 ^{*)}	6SL5120-2UE21-8SC0
Product designation		Double Motor Module in booksize format <u>internal</u> air cooling C type				
Article No.		6SL5120-2UE13-0AD0 ^{*)}	6SL5120-2UE15-0AD0 ^{*)}	6SL5120-2UE21-0AD0	6SL5120-2UE21-8AD0 ^{*)}	6SL5120-2UE21-8SD0
Product designation		Double Motor Module in booksize format <u>internal</u> air cooling D type				
DC link voltage 495 ... 720 V DC						
Output current						
• Rated current I_N	A	2 × 3	2 × 5	2 × 9	2 × 18	2 × 18
• For S6 duty (40%) I_{S6}						
- C type	A	–	–	–	2 × 24	2 × 24
- D type	A	2 × 4	2 × 6.7	2 × 12	2 × 24	2 × 24
• I_{max}						
- C type	A	–	–	–	2 × 36	2 × 54
- D type	A	2 × 9	2 × 15	2 × 27	2 × 54	2 × 54
Rated power ¹⁾						
• Based on IEC ²⁾	kW	2 × 1.1	2 × 2.2	2 × 4	2 × 7.5	2 × 7.5
• Based on NEC ³⁾	hp	2 × 1.5	2 × 3	2 × 5	2 × 10	2 × 10
DC link current I_d ⁴⁾	A	7.5	12.5	22.5	45	45
Current carrying capacity						
• DC link busbars	A	100	100	100	200	100 ⁵⁾
• 24 V DC busbars ⁶⁾	A	20	20	20	20	20
DC link capacitance	μF	235	235	235	705	705
Current requirement	A	1	1.1	1.1	0.95	1.3
At 24 V DC, max.						
Power loss ⁷⁾	kW	0.05/0.1	0.08/0.13	0.15/0.19	0.28/0.35	0.29
typ. ⁸⁾ /max.						
Cooling air requirement	m ³ /h (ft ³ /h)	22 (777)	25 (883)	27 (954)	62 (2190)	33 (1165)
Sound pressure level	dB	<60	<60	<60	<60	
L_{pA} (1 m)						
Motor connection		2 × plug connector (X1, X2) ⁹⁾ , 2 × (0.75 ... 6 mm ²)	2 × plug connector (X1, X2) ⁹⁾ , 2 × (0.75 ... 6 mm ²)	2 × plug connector (X1, X2) ⁹⁾ , 2 × (0.75 ... 6 mm ²)	2 × plug connector (X1, X2) ⁹⁾ , 2 × (0.75 ... 6 mm ²)	2 × plug connector (X1, X2) ⁹⁾ , 2 × (0.75 ... 6 mm ²)
U2, V2, W2						
PE connection		M5 screw	M5 screw	M5 screw	M5 screw	M5 screw
Motor brake connection		Integrated into the plug-in motor con- nector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor con- nector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor con- nector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor con- nector (X1, X2), 24 V DC, 2 A	Integrated into the plug-in motor con- nector (X1, X2), 24 V DC, 2 A
Motor cable length, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	70 (230)	70 (230)
• Unshielded	m (ft)	75 (246)	75 (246)	75 (246)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	100 (3.94)	50 (1.97)
• 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)	4.7 (10.4)	4.7 (10.4)	4.7 (10.4)	8.1 (17.9)	5.1 (11.2)

* Available soon

¹⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC.

²⁾ Rated power of a typical standard asynchronous motor at 400 V 3 AC according to IEC 60947-4-1:2018 Annex G Table G.1.

³⁾ Rated power of a standard asynchronous motor at 460 V 3 AC according to NEC Table 430.250.

⁴⁾ Rated DC link current for dimensioning an external DC connection.

⁵⁾ With reinforced DC link bridges, (Article No. 6SL3162-2BB00-0AA0) 200 A is possible (see [Accessories](#)).

⁶⁾ If, due to a number of Line Modules 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).

⁷⁾ Power loss of Motor Module at rated power including losses of 24 V DC electronics power supply.

⁸⁾ At max. motor cable length 30 m (98.4 ft), pulse frequency 4 kHz and DC link voltage 540 ... 600 V.

⁹⁾ Connector not included in scope of delivery (see [Accessories](#)).

SINAMICS S120/S220 drive system

SINAMICS S220 in booksize format

Motor Modules > Double Motor Modules

Selection and ordering data

SINAMICS S220

Double Motor Module in booksize format

Rated output current A	Rated power (IEC) kW (hp)	C type Article No.	C type slim Article No.		D type Article No.	D type slim Article No.	
2 × 3	2 × 1.1 (2 × 1.5)	–	–		6SL5120-2UE13-0AD0	–	Available soon
2 × 5	2 × 2.2 (2 × 3)	–	–		6SL5120-2UE15-0AD0	–	Available soon
2 × 9	2 × 4 (2 × 5)	–	–		6SL5120-2UE21-0AD0	–	
2 × 18	2 × 7.5 (2 × 10)	6SL5120-2UE21-8AC0		Available soon	6SL5120-2UE21-8AD0		Available soon
			6SL5120-2UE21-8SC0			6SL5120-2UE21-8SD0	

Description	Article No.
Accessories	
Power connector (X1/X2) with screw-type terminal At Motor Module end, with screw-type terminals 0.75 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MA00-0AC0
Power connector (X1/X2) with push-in connection with snap-in actuators At Motor Module end, with spring-loaded terminals 0.75 ... 6 mm ² For Motor Modules in booksize format C/D types with rated output current of 3 ... 30 A	6SL3162-2MB00-0AC0
DC link rectifier adapter For direct infeed of DC link voltage Screw-type terminals 0.5 ... 10 mm ² for Motor Modules in booksize format with a width of 50 mm (1.97 in) or 100 mm (3.94 in)	6SL3162-2BD00-0AA0
DC link adapter (2 units) For multi-tier configuration Screw-type terminals 35 ... 95 mm ² For all Line Modules and Motor Modules in booksize format	6SL3162-2BM01-0AA0
24 V terminal adapter For all Line Modules and Motor Modules in booksize format	6SL3162-2AA00-0AA0
Reinforced DC link bridge 6 mm (0.24 in) For replacement of the DC link bridge in Single Motor Modules 3 A ... 24 A Double Motor Modules 2 × 3 A ... 2 × 9 A	6SL3162-2BB00-0AA0

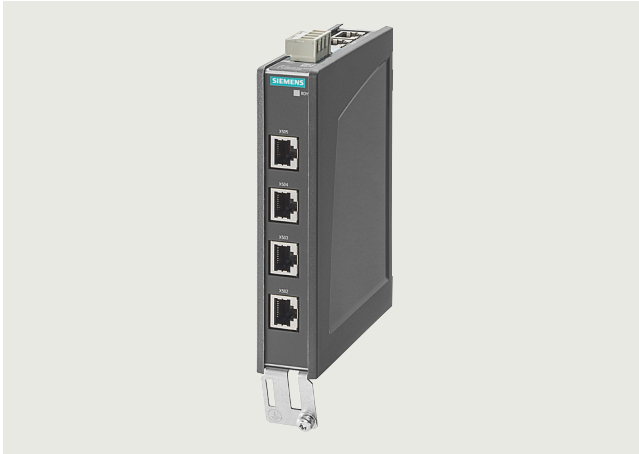
Description	Article No.
Accessories for re-ordering	
24 V jumper For connection of the 24 V busbars (for booksize format)	6SL3162-2AA01-0AA0
Terminal Kit (24 V jumper, plug-in terminals, DRIVE-CLiQ jumper (length = module width + 60 mm (2.36 in)), shield connection clamp with pressure plate, dust protection blanking plugs, coding plug for X1 and X2) For Motor Modules with a width of • 50 mm (1.97 in), Single Motor Module (30 A slim) • 50 mm (1.97 in), Double Motor Module • 100 mm (3.94 in), 30 A	6SL5166-8AB01-0AA0 6SL5166-8AB01-0AA0 6SL5166-8AD00-0AA0
Shield connection clamp For Double Motor Modules in booksize format C/D types	6SL3162-0AR00-0AA0
Warning labels in 36 languages This label set can be glued over the standard English or German labels to provide warnings in other languages. One set of labels is supplied with the devices. One sign in each of the following languages is provided in each set: BG, CN, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, ID, IE, IL, IR, IS, IT, JP, KR, LT, LV, MT, NL, NO, PL, PT, RO, RU, SA, SE, SI, SK, TH, TR, TW	6SL3166-3AB00-0AA0
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0
Replacement fan For Motor Modules with a width of • 50 mm (1.97 in), C/D type (3 A ... 24 A, 30 A slim) • 100 mm (3.94 in), C/D type (30 A)	6SL3162-0AS00-0AA0 6SL5166-0AD00-0AA0

SINAMICS S120/S220 drive system

Supplementary system components

DMC20 DRIVE-CLiQ Hub Module

Overview



DMC20 DRIVE-CLiQ Hub Module

The DMC20 DRIVE-CLiQ Hub Module is used to implement a star-shaped topology of a DRIVE-CLiQ line. Two DMC20 DRIVE-CLiQ Hub Modules can be connected in series (cascaded).

Design

The DMC20 DRIVE-CLiQ Hub Module in degree of protection IP20 is designed for mounting in control cabinets.

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.

The DMC20 DRIVE-CLiQ Hub Module can be snapped onto a TH 35 standard mounting rail according to EN 60715 (IEC 60715).

Selection and ordering data

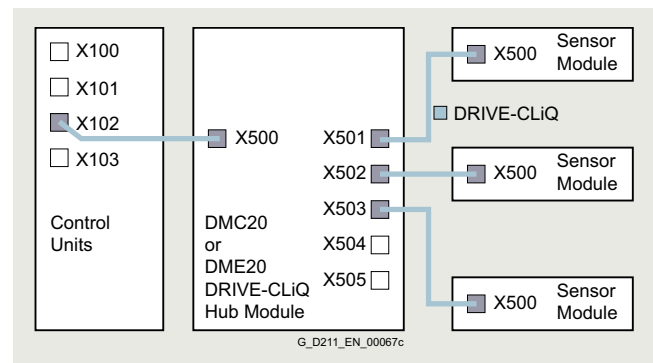
Description	Article No.
DMC20 DRIVE-CLiQ Hub Module Without DRIVE-CLiQ cable	6SL3055-0AA00-6AA1
Accessories for re-ordering	
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Technical specifications

Article No.	6SL3055-0AA00-6AA1
Product designation	DMC20 DRIVE-CLiQ Hub Module
Power 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	30 mm (1.18 in)
• Height	151 mm (5.94 in)
• Depth	110 mm (4.33 in)
Weight, approx.	0.36 kg (0.79 lb)
Certificate of suitability	cULus

Integration

Signals from more than one encoder can be collected with one DRIVE-CLiQ Hub Module and forwarded to the Control Unit through a single DRIVE-CLiQ cable.



With a DRIVE-CLiQ Hub Module, individual DRIVE-CLiQ nodes can be removed without interrupting the data exchange with the remaining devices in the DRIVE-CLiQ line.

SINAMICS S120/S220 drive system

Supplementary system components

DME20 DRIVE-CLiQ Hub Module

Overview



DME20 DRIVE-CLiQ Hub Module

The DME20 DRIVE-CLiQ Hub Module is used to implement a star-shaped topology of a DRIVE-CLiQ line. Two DME20 DRIVE-CLiQ Hub Modules can be connected in series (cascaded).

Design

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

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ devices
- 1 connection for the electronics power supply via the 24 V DC circular supply connector with conductor cross-section $4 \times 0.75 \text{ mm}^2$ (pins 1+2 internally bridged; pins 3+4 internally bridged)

The scope of supply of the DME20 DRIVE-CLiQ Hub Modules includes:

- 6 blanking plugs for sealing unused DRIVE-CLiQ sockets

Selection and ordering data

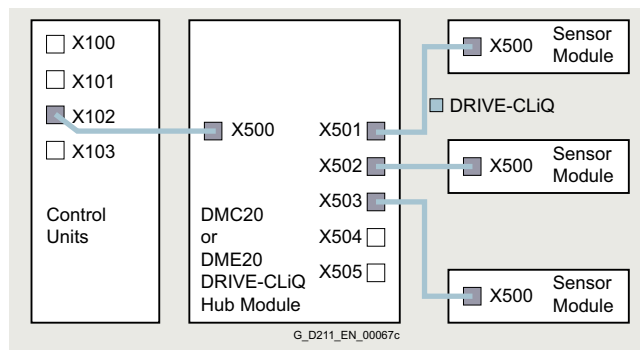
Description	Article No.
DME20 DRIVE-CLiQ Hub Module Without DRIVE-CLiQ cable; without electronics power supply cable and circular connector for 24 V DC	6SL3055-0AA00-6AB0
Accessories	
24 V DC power supply cable	Ordering and delivery Phoenix Contact www.phoenixcontact.de 1508365
• Shielded connector, 5-pole, can be assembled by the user • Unshielded connector, 4-pole, can be assembled by the user, Speed-con rapid interlock	1521601
Accessories for re-ordering	
SINAMICS dust-proof blanking plugs IP67 (6 units) For DRIVE-CLiQ port	6SL3066-4CA01-0AA0

Technical specifications

Article No.	6SL3055-0AA00-6AB0
Product designation	DME20 DRIVE-CLiQ Hub Module
Power requirement, max. at 24 V DC without DRIVE-CLiQ supply	0.15 A
• Conductor cross-section, max.	$4 \times 0.75 \text{ mm}^2$
Degree of protection	IP67
Dimensions	
• Width	99 mm (3.90 in)
• Height	149 mm (5.87 in)
• Depth	55.7 mm (2.19 in) (without connector)
Weight, approx.	0.8 kg (1.76 lb)
Certificate of suitability	cULus

Integration

Signals from more than one encoder can be collected with one DRIVE-CLiQ Hub Module and forwarded to the Control Unit through a single DRIVE-CLiQ cable.



With a DRIVE-CLiQ Hub Module, individual DRIVE-CLiQ nodes can be removed without interrupting the data exchange with the remaining devices in the DRIVE-CLiQ line.

The DME20 DRIVE-CLiQ Hub Module in degree of protection IP67 is suitable for installation outside control cabinets.

Overview



TM54F Terminal Module

The TM54F Terminal Module is a dual-processor I/O interface with four fail-safe digital outputs and ten fail-safe digital inputs for utilization of the Safety Integrated functions of the SINAMICS drive system via external actuators and sensors.

Every available safety function integrated in the drive can be controlled via the fail-safe digital inputs on the TM54F Terminal Module. In the event that the parameterized safety functions of several drives operated together on a Control Unit are to be executed together, then these drives can be grouped in the TM54F Terminal Module. The advantage of this approach is that only one fail-safe digital input needs to be connected for these drives.

The fail-safe digital inputs and outputs have two channels and are redundantly configured with an internal data cross-check using the two processors. A fail-safe digital output consists of one P-switching and one M-switching output as well as one digital input to read back the switching state. A fail-safe digital input consists of two digital inputs.

Safety sensors can be connected over two switchable 24 V sensor supplies and can be evaluated over the fail-safe digital inputs. The switchable 24 V sensor supply ensures that the fail-safe digital inputs can be dynamized to detect dormant errors (this dynamization is used to check the shutdown paths). An unswitchable 24 V sensor supply is additionally provided by the TM54F Terminal Module for connecting undynamizable safety sensors.

The TM54F Terminal Module must be directly connected to a Control Unit via a DRIVE-CLiQ cable. Only one TM54F Terminal Module can be assigned to each Control Unit. It is not permissible to make the TM54F connection via another DRIVE-CLiQ device, e.g. a Power Module, a Motor Module or a Line Module.

Design

The following are located on the TM54F Terminal Module:

- 4 fail-safe digital outputs
- 10 fail-safe digital inputs
- 4 LEDs, single color for indicating the status of the read back channel of the fail-safe digital outputs
- 4 LEDs, dual-color for indicating the status of the fail-safe digital outputs
- 20 LEDs, dual-color for indicating the status of the fail-safe digital inputs
- 3 LEDs, single color for indicating the status of the 24 V sensor supplies
- 2 DRIVE-CLiQ sockets
- 2 connections for 24 V sensor supply, switchable
- 1 connection for 24 V sensor supply, not switchable
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 connection for the 24 V power supply to digital outputs and sensors
- 1 PE/protective conductor connection

The status of the TM54F Terminal Module is indicated via a multi-color LED.

The TM54F Terminal Module can be snapped onto a TH 35 standard mounting rail in accordance with EN 60715 (IEC 60715).

The signal cable shield can be attached to the TM54F Terminal Module via a shield connection terminal, e.g. type SK8 supplied by Phoenix Contact or type KLBÜ CO 1 supplied by Weidmüller. The shield connection terminal must not be used as a strain relief mechanism.

Pins for connector coding are included in the TM54F Terminal Module scope of supply.

Integration

The TM54F Terminal Module can communicate via DRIVE-CLiQ with the following Control Units.

- SINUMERIK 828D
 - Numeric Control Extensions NX10.3
 - Numeric Control Extensions NX15.3

Selection and ordering data

Description	Article No.
TM54F Terminal Module	6SL3055-0AA00-3BA0
Without DRIVE-CLiQ cable	
Accessories for re-ordering	
Dust protection blanking plugs (50 units)	6SL3066-4CA00-0AA0
For DRIVE-CLiQ port	

SINAMICS S120/S220 drive system

Supplementary system components

TM54F Terminal Module

Technical specifications

Article No.	6SL3055-0AA00-3BA0
Product designation	TM54F Terminal Module
Current requirement (X524 at 24 V DC) without DRIVE-CLiQ supply	0.2 A
- Conductor cross-section, max. - Fuse protection, max.	2.5 mm ² 20 A
Max. current requirement ext. 24 V for supplying the digital outputs and 24 V sensor supply (X514 at 24 V DC)	4 A
- Conductor cross-section, max. - Fuse protection, max.	2.5 mm ² 20 A
I/O	
- Number of fail-safe digital inputs - Number of fail-safe digital outputs 24 V sensor supply	10 4 3, of which 2 can be temporarily shut down using an internal test routine for dynamizing fail-safe digital inputs, current carrying capacity 0.5 A each
- Cables and connections - Conductor cross-section, max.	Plug-in screw-type terminals 1.5 mm ²
Digital inputs in accordance with IEC 61131-2 Type 1, with galvanic isolation	
- Voltage - Low level (an open digital input is interpreted as "low") - High level - Current consumption at 24 V DC, typ. - Delay time of digital inputs, approx. ¹⁾ - L → H, typ. - H → L, typ. - Safe state	-3 ... +30 V -3 ... +5 V 15 ... 30 V >3.2 mA 30 μs 60 μs Low level (for inputs that can be inverted: without inversion)
Digital outputs (continuously short-circuit-proof)	
- Voltage - Load current per fail-safe digital output, max. ²⁾ - Delay times (resistive load) ¹⁾ - L → H, typ. - H → L, typ. - Safe state	24 V DC 0.5 A 300 μs 350 μs Output switched off
Scanning cycle t_{SI} for fail-safe digital inputs or fail-safe digital outputs	4 ... 25 ms (adjustable)
Power loss, max. At 24 V	4.5 W
PE connection	M4 screw
Dimensions	
- Width - Height - Depth	50 mm (1.97 in) 151 mm (5.94 in) 110 mm (4.33 in)
Weight, approx.	0.9 kg (1.98 lb)
Certificate of suitability	cULus
Safety Integrated	Acc. to IEC 61508 SIL 2 and ISO 13849-1 PL d and Category 3

¹⁾ The specified delay times refer to the hardware. The actual reaction time depends on the time slice in which the digital input/output is processed.

²⁾ The total current of all fail-safe digital outputs must not exceed 5.33 A..

SINAMICS S120/S220 drive system

Supplementary system components

Encoder system connection > SMC20 Sensor Module Cabinet-Mounted

Overview



SMC20 Sensor Module Cabinet-Mounted

The SMC20 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC20.

The following encoder signals can be evaluated:

- Incremental encoder sin/cos 1 V_{pp}
- Absolute encoder EnDat 2.1
- SSI encoder with incremental signals sin/cos 1 V_{pp} (firmware version 2.4 and later)

The motor temperature can also be sensed using a PTC thermistor KTY84-130, Pt1000 or PTC.

Design

The SMC20 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 1 encoder connection including motor temperature sensing (KTY84-130, Pt1000 or PTC) via SUB-D connector
- 1 DRIVE-CLiQ interface
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE/protective conductor connection

The status of the SMC20 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC20 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 standard mounting rail according to EN 60715 (IEC 60715).

The signal cable shield is connected via the encoder system connector and can also be connected to the SMC20 Sensor Module Cabinet-Mounted 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 as a strain relief mechanism.

Integration

SMC20 Sensor Modules Cabinet-Mounted communicate via DRIVE-CLiQ with selected devices.

Selection and ordering data

Description	Article No.
SMC20 Sensor Module Cabinet-Mounted	6SL3055-0AA00-5BA3
Without DRIVE-CLiQ cable	
Accessories for re-ordering	
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Technical specifications

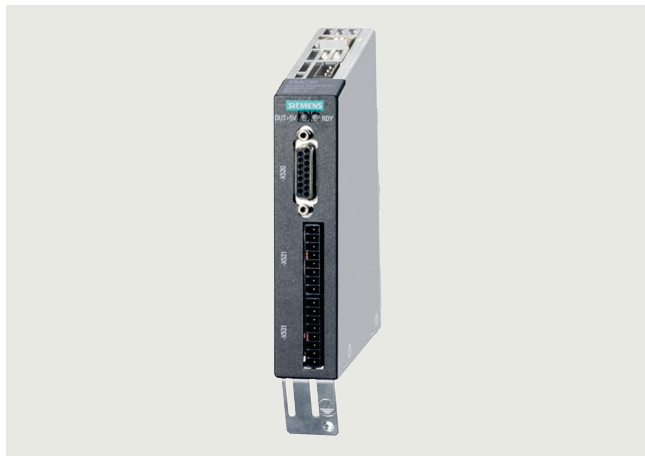
Article No.	6SL3055-0AA00-5BA3
Product designation	SMC20 Sensor Module Cabinet-Mounted
Power requirement, max. at 24 V DC, without taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Power loss, max.	10 W
Encoders which can be evaluated	• Incremental encoder sin/cos 1 V_{pp} • Absolute encoder EnDat 2.1 • SSI encoder 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 bits)
• SSI baud rate	100 ... 1000 kBaud
• Cable length to encoder, max.	100 m (328 ft)
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.45 kg (0.99 lb)
Certificate of suitability	cULus

SINAMICS S120/S220 drive system

Supplementary system components

Encoder system connection > SMC30 Sensor Module Cabinet-Mounted

Overview



SMC30 Sensor Module Cabinet-Mounted

The SMC30 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC30.

The following encoder signals can be evaluated:

- Incremental encoders TTL/HTL with/without open-circuit detection (open-circuit detection is only available with bipolar signals)
- SSI encoder with TTL/HTL incremental signals
- SSI encoder without incremental signals

The motor temperature can also be sensed using a PTC thermistor KTY84-130, Pt1000 or PTC.

Design

The SMC30 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 1 encoder connection including motor temperature sensing (KTY84-130, Pt1000 or PTC) either via SUB-D connector or via terminals
- 1 DRIVE-CLiQ interface
- 1 connection for the electronics power supply via the 24 V DC 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 standard mounting rail in according to EN 60715 (IEC 60715).

The maximum encoder cable length between SMC30 modules and encoders is 100 m. For HTL encoders, this length can be increased to 300 m if the A+/A- and B+/B- signals are evaluated and the power supply cable has a minimum cross-section of 0.5 mm².

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. The shield connection terminal must not be used as a strain relief mechanism.

Integration

SMC30 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Selection and ordering data

Description	Article No.
SMC30 Sensor Module Cabinet-Mounted Without DRIVE-CLiQ cable	6SL3055-0AA00-5CA2
Accessories for re-ordering	
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Technical specifications

Article No.	6SL3055-0AA00-5CA2
Product designation	SMC30 Sensor Module Cabinet-Mounted
Current requirement, max. at 24 V DC, without taking encoder into account	0.2 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Power loss, max.	10 W
Encoders which can be evaluated	• Incremental encoder TTL/HTL • SSI encoder with TTL/HTL incremental signals • SSI encoder without incremental signals
• Input current range TTL/HTL	4 ... 20 mA (typ. 10 mA)
• Encoder supply	24 V DC/0.35 A or 5 V DC/0.35 A
• Encoder frequency, max.	500 kHz
• SSI baud rate	100 ... 1000 kBaud
• Resolution absolute position SSI	30 bits
• Cable length, max.	
- TTL encoder	100 m (328 ft) (only bipolar signals permitted) ¹⁾
- HTL encoder	100 m (328 ft) for unipolar signals 300 m (984 ft) for bipolar signals ¹⁾
- SSI encoder	100 m (328 ft)
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.45 kg (0.99 lb)
Certificate of suitability	cULus

¹⁾ Signal cables twisted in pairs and shielded.

Overview



SMC40 Sensor Module Cabinet-Mounted

The SMC40 Sensor Module Cabinet-Mounted is required to evaluate the encoder signals of motors without a DRIVE-CLiQ interface. External encoders can also be connected via the SMC40.

The following encoder signals can be evaluated:

- Absolute encoder EnDat 2.2

Design

The SMC40 Sensor Module Cabinet-Mounted features the following connections and interfaces as standard:

- 2 encoder system interfaces
- 2 DRIVE-CLiQ interfaces
- 1 connection for the electronics power supply via the 24 V DC supply connector
- 1 PE (protective earth) connection

The status of the SMC40 Sensor Module Cabinet-Mounted is indicated via a multi-color LED.

The SMC40 Sensor Module Cabinet-Mounted can be snapped onto a TH 35 standard mounting rail in accordance with EN 60715 (IEC 60715).

The maximum encoder cable length between SMC40 modules and encoder systems is 100 m (328 ft). The specified supply voltage of the encoder must be observed. The maximum cable length for DRIVE-CLiQ cables is 30 m (98 ft).

The signal cable shield can be connected to the SMC40 Sensor Module Cabinet-Mounted via a shield connection clamp, e.g., Phoenix Contact type SK8 or Weidmüller type KLBÜ CO 1. The shield connection clamp must not be used as a strain relief mechanism.

Integration

SMC40 Sensor Modules Cabinet-Mounted communicate with a Control Unit via DRIVE-CLiQ.

Selection and ordering data

Description	Article No.
SMC40 Sensor Module Cabinet-Mounted	6SL3055-0AA00-5DA0
Without DRIVE-CLiQ cable	
Accessories for re-ordering	
Dust protection blanking plugs (50 units) For DRIVE-CLiQ port	6SL3066-4CA00-0AA0

Technical specifications

Article No.	6SL3055-0AA00-5DA0
Product designation	SMC40 Sensor Module Cabinet-Mounted
Current requirement, max. At 24 V DC, without taking encoder into account	0.1 A
• Conductor cross-section, max.	2.5 mm ²
• Fuse protection, max.	20 A
Power loss, max.	4 W
Encoders which can be evaluated	Absolute encoder EnDat 2.2
PE connection	M4 screw
Dimensions	
• Width	30 mm (1.18 in)
• Height	150 mm (5.91 in)
• Depth	111 mm (4.37 in)
Weight, approx.	0.45 kg (0.99 lb)
Certificate of suitability	cULus

SINAMICS S120/S220 drive system

Supplementary system components

Encoder system connection > SME125 Sensor Modules External

Overview



SME125 Sensor Module External

The 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.

Neither motor nor encoder data are saved in the SME125. The 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:

- 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 sensed using a PTC thermistor KTY84-130, Pt1000 or PTC.

Design

SME120/SME125 Sensor Modules External feature the following connections and interfaces as standard:

- 1 encoder connection via circular connector
- 1 temperature sensor connection via circular connector
- 1 Hall-effect sensor connection via circular connector (SME120 only)
- 1 DRIVE-CLiQ interface with integrated 24 V DC electronics power supply from the Control Unit or Motor Module
- 1 PE (protective earth) connection

Selection and ordering data

Description	Article No.
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 SME125 encoder system interface (connector kits, 17-pole)	6FX2003-0SA17

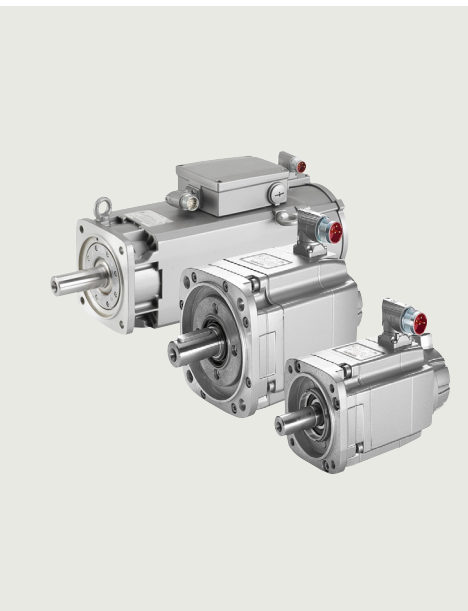
Technical specifications

Article No.	6SL3055-0AA00-5KA3
Product designation	SME125 Sensor Module External
Encoder	• Absolute encoder EnDat 2.1 with 5 V voltage supply • Absolute encoder SSI with incremental signals sin/cos 1 V_{pp} with 5-V voltage supply
Signal subdivision (interpolation)	≤16384 × (14 bits)
Max. encoder frequency that can be evaluated	≤500 kHz
SSI/EnDat 2.1 baud rate	100 kHz
Measuring system interface	17-pin M23 circular connector
Temperature sensor input	6-pin M17 circular connector
Output	IP67 DRIVE-CLiQ connector
Current requirement, max. at 24 V DC, without taking encoder into account	0.16 A
• Current carrying capacity of the encoder supply, for measuring system (at 5 V DC)	0.35 A
• Conductor cross-section • Protection	Acc. to connector contacts Via DRIVE-CLiQ power supply source
Power loss, max.	4.5 W
PE connection	M4 screw/1.8 Nm
Cable length, max.	
• To measuring system ²⁾/ temperature sensor • To automatic speed control	3 m (9.84 ft) 100 m (328 ft)
Degree of protection	IP67
Dimensions	
• Width • Height • Depth	117.6 mm (4.63 in) 43.1 mm (1.70 in) 127 mm (5.00 in)
Weight, approx.	0.7 kg (1.54 lb)
Certificate of suitability	cULus

¹⁾ Only SSI encoders with 5 V supply voltage

²⁾ The maximum cable length at the encoder system interface depends on the current drawn by the encoder system and the cross-section of the supply conductors in the cable, however, a maximum of 30 m (98.4 ft).

SIMOTICS motors



5/2	Feed motors for SINAMICS S120 Combi/SINAMICS S120
5/2	<u>SIMOTICS S-1FT2 Compact synchronous motors</u> – SH 30/40/48/63/80/100 – Natural cooling
5/8	<u>SIMOTICS S-1FK2 Compact/High Inertia synchronous motors</u> – SH 30/40/48/63/80/100 – Natural cooling
5/12	<u>SIMOTICS S-1FK7 Compact/High Inertia synchronous motors</u> – SH 48/63/80/100 – Natural cooling
5/16	Spindle motors for SINAMICS S120 Combi/SINAMICS S120
5/16	<u>SIMOTICS M-1PH3 asynchronous motors</u>
5/18	– SH 100/132 – Forced ventilation
5/18	– SH 132 – Forced ventilation – Star-delta circuit
5/20	<u>SIMOTICS M-1PH8 asynchronous motors</u>
5/22	– SH 80 – Forced ventilation
5/24	– SH 100 – Forced ventilation
5/26	– SH 100 – Forced ventilation – Star-delta circuit
5/28	– SH 132 – Forced ventilation
5/30	Premium Performance – SH 80 – Forced ventilation

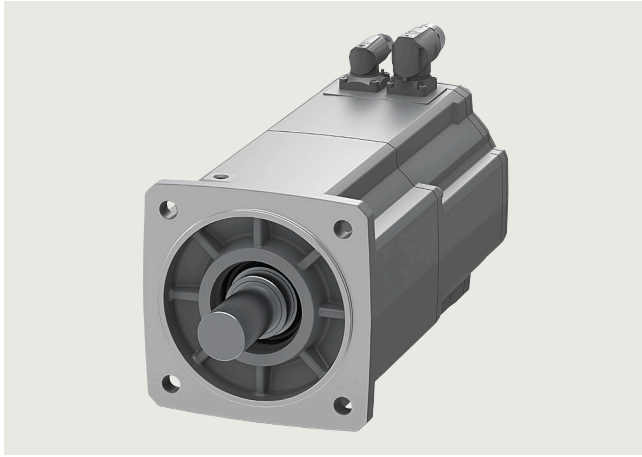
In addition, the Siemens Product
Configurator can be used on the internet at
the following address:
www.siemens.com/spc

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FT2 Compact synchronous motors – Natural cooling

Overview



SIMOTICS S-1FT2 feed motors

The SIMOTICS S-1FT2 servomotors are compact permanent-magnet synchronous motors for a wide range of uses in industrial environments. They are characterized by high power density, degree of protection and overload capability.

The SIMOTICS S-1FT2 servomotors significantly extend the core range of SIMOTICS S-1FK2 motors and allow a broader application spectrum to be covered. They offer various rated speeds, various encoder resolutions and protection classes, as well as a large number of options.

The motors are designed for operation without external cooling and the heat is dissipated through the motor surface.

The SIMOTICS S-1FT2 feed motors are designed to work with the SINAMICS S120/S220¹⁾ drive system.

Benefits

SIMOTICS S-1FT2 Compact motors

- Precise, stable control with medium to high masses to be moved with medium moment of inertia
- High torque even at high speeds, thanks to the special field weakening concept
- Various encoder resolutions, depending on machine accuracy
- High machine precision thanks to high-precision shaft and flange mounting
- Fast acceleration thanks to triple electrical overload capability
- Low torque ripple
- High static torque
- Maintenance-free absolute encoder without battery
- Robust signal connector
- Various degrees of protection for matching to both machine conditions and ambient conditions
- Very compact design

Application

- Machine tools (e.g. auxiliary axes, feed drives)
- Robots and handling systems
- Packaging, plastics and textile machines
- Wood, glass, ceramics and stone working machines

Function

- Compact synchronous servomotors
- Torque M_0 : 0.64 Nm to 50 Nm
- Shaft heights: 30 to 100
- Rated speeds: 1500 r/min to 6000 r/min
- Electronic rating plate in motor encoder
- Naturally-cooled type of construction without fan
- Plug connection for power cable
- DRIVE-CLiQ interface for signal cable
- Various single-turn and multi-turn absolute encoders
- Degree of protection IP64/IP65/IP67

Configuration

The Configuration Manual for SIMOTICS S-1FT2 for SINAMICS S120 is available at:

support.industry.siemens.com/cs/ww/en/view/109794387

The compatibility list for SINAMICS S120/S220 Booksize Modules can be found at:

support.industry.siemens.com/cs/ww/en/view/109806050

The SINAMICS S220 Booksize power units along with the Motor Modules are available at:

support.industry.siemens.com/cs/ww/en/view/109803552

Characteristic curves

Characteristics for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ [SIMOTICS S-1FT2 in the SPC](#)

Dimensional drawings

Dimensional drawings for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ [SIMOTICS S-1FT2 in the SPC](#)

More information

[Environmental Product Declaration \(EPD\)](#)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product.

You can find more information on the internet at:

support.industry.siemens.com/cs/ww/en/ps/28193/cert?ci=5690

¹⁾ SINAMICS S220 Motor Modules booksize format on request.

Technical specifications

Article No.	1FT2...
Product brand name	SIMOTICS
Product type designation	S-1FT2 Compact
Product designation	Feed motor
Motor type	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling
Insulation of the stator winding according to EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a winding overtemperature rise of $\Delta T = 100 \text{ K}$ at an ambient temperature of 40 °C (104 °F)
Type of construction according to EN 60034-7 (IEC 60034-7)	IM B5 (IM V1, IM V3)
Degree of protection according to EN 60034-5 (IEC 60034-5)	IP64, IP65 and IP67
Shaft end on the drive end according to DIN 748-3 (IEC 60072-1)	Plain shaft/ shaft with feather key (half-key balancing)
Shaft and flange accuracy according to DIN 42955 (IEC 60072-1) ¹⁾	Tolerance N in each case for radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end
Vibration severity according to EN 60034-14 (IEC 60034-14)	Grade A is maintained up to rated speed
Sound pressure level L_{pA} (1 m) according to EN ISO 1680, maximum tolerance + 3 dB (A)	
• 1FT2.04	55 dB
• 1FT2.05/1FT2.06	65 dB
• 1FT2.08/1FT2.10	70 dB
Connection	Plug for power and signal, rotatable
Paint finish	Anthracite, similar to RAL 7016
2nd rating plate	Enclosed separately
Holding brake	Optionally installed (24 V DC)
Certificate of suitability	cURus, CE

Built-in encoder systems with DRIVE-CLiQ interface**Single-turn absolute encoders**

AS22DQC encoder	22-bit single-turn absolute encoder
AS26DQC encoder	26-bit single-turn absolute encoder

Multi-turn absolute encoders

AM22DQC encoder	22-bit multi-turn absolute encoder + 12-bit multi-turn (traversing range 4096 revolutions)
AM26DQC encoder	26-bit multi-turn absolute encoder + 12-bit multi-turn (traversing range 4096 revolutions)

¹⁾ Radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end.

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FT2 Compact synchronous motors – Natural cooling

Selection and ordering data

Static torque	Rated speed	Shaft height	Rated power	SIMOTICS S-1FT2 synchronous motors Natural cooling	Moment of inertia Rotor		Weight, approx.	
M_0 at $\Delta T = 100\text{ K}$	n_N	SH	P_N at $\Delta T = 100\text{ K}$		Without brake	With brake	Without brake	With brake
Nm (lb _f -ft)	r/min		kW (hp)		J	J	m	m
				Article No.	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	kg (lb)	kg (lb)
Shaft height SH 30								
0.64 (0.47)	6000	30	0.26 (0.35)	1FT2203-2AK ■■■ - ■■■ B0	0.2 (0.2)	0.22 (0.19)	1.16 (2.56)	1.53 (3.37)
1.27 (0.94)	6000	30	0.43 (0.58)	1FT2203-4AK ■■■ - ■■■ B0	0.35 (0.31)	0.37 (0.33)	1.49 (3.29)	1.97 (4.34)
Shaft height SH 40								
2.4 (1.8)	3000	40	0.8 (1.1)	1FT2204-5AF ■■■ - ■■■ B0	1.23 (1.09)	1.31 (1.16)	2.9 (6.4)	3.8 (8.4)
2.4 (1.8)	6000	40	0.6 (0.8)	1FT2204-5AK ■■■ - ■■■ B0	1.23 (1.09)	1.31 (1.16)	2.9 (6.4)	3.8 (8.4)
3.2 (2.4)	3000	40	1.0 (1.3)	1FT2204-6AF ■■■ - ■■■ B0	1.61 (1.43)	1.69 (1.50)	3.5 (7.7)	4.4 (9.7)
Shaft height SH 48								
3.6 (2.7)	2000	48	0.69 (0.93)	1FT2205-2AC ■■■ - ■■■ B0	3.15 (2.79)	4.05 (3.58)	3.75 (8.27)	4.75 (10.47)
3.6 (2.7)	3000	48	0.9 (1.2)	1FT2205-2AF ■■■ - ■■■ B0	3.15 (2.79)	4.05 (3.58)	3.8 (8.4)	4.8 (10.6)
3.6 (2.7)	4500	48	1.06 (1.42)	1FT2205-2AH ■■■ - ■■■ B0	3.15 (2.79)	4.05 (3.58)	3.75 (8.27)	4.75 (10.47)
6.0 (4.4)	3000	48	1.5 (2.0)	1FT2205-4AF ■■■ - ■■■ B0	5.1 (4.5)	6.0 (5.3)	5.2 (11.5)	6.2 (13.7)
Shaft height SH 63								
6.0 (4.4)	2000	63	1.15 (1.54)	1FT2206-2AC ■■■ - ■■■ B0	7.8 (6.9)	9.4 (8.3)	6.3 (13.9)	7.9 (17.4)
6.5 (4.8)	3000	63	1.7 (2.3)	1FT2206-2AF ■■■ - ■■■ B0	7.8 (6.9)	9.4 (8.3)	6.3 (13.9)	7.9 (17.4)
6.5 (4.8)	4500	63	1.8 (2.4)	1FT2206-2AH ■■■ - ■■■ B0	7.8 (6.9)	9.4 (8.3)	6.3 (13.9)	7.9 (17.4)
9 (6.64)	1500	63	1.30 (1.74)	1FT2206-3AB ■■■ - ■■■ B0	11.5 (10.2)	13.1 (11.6)	6.3 (13.9)	7.9 (17.4)
9 (6.64)	3000	63	2.35 (3.15)	1FT2206-3AF ■■■ - ■■■ B0	11.5 (10.2)	13.1 (11.6)	7.6 (16.8)	9.2 (20.3)
12 (8.85)	2000	63	2.2 (3.0)	1FT2206-4AC ■■■ - ■■■ B0	15.1 (13.4)	16.8 (14.9)	8.9 (19.6)	10.6 (23.4)
12 (8.85)	3000	63	2.9 (3.9)	1FT2206-4AF ■■■ - ■■■ B0	15.1 (13.4)	16.8 (14.9)	8.9 (19.6)	10.6 (23.4)
12 (8.85)	4500	63	2.2 (3.0)	1FT2206-4AH ■■■ - ■■■ B0	15.1 (13.4)	16.8 (14.9)	8.9 (19.6)	10.6 (23.4)
Holding brake								
Without brake				0				
With brake				1				
Degree of protection								
IP64 (without shaft seal)				0				
IP65 (with shaft seal)				1				
IP67 (with shaft seal)				2				
Shaft extension/feather key								
Plain shaft				0				
Shaft with feather key				1				
Only SH 40: Plain shaft, alternative dimensions, only IP64				2				
Encoder system for motors with DRIVE-CLiQ interface								
26-bit single-turn absolute encoder (AS26DQC encoder)					B			
26-bit absolute encoder + 12 bit multi-turn (AM26DQC encoder)					C			
22-bit single-turn absolute encoder (AS22DQC encoder)					S			
22-bit absolute encoder + 12 bit multi-turn (AM22DQC encoder)					M			

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FT2 Compact synchronous motors – Natural cooling

Motor type (repeated)	Efficiency ¹⁾	Stall current	SINAMICS S120 Combi Power Module	SINAMICS S120 Motor Module booksize format	Power cable with complete shield	
	η	I_0 at M_0 at $\Delta T = 100\text{ K}$	Rated output current	Rated output current	Motor connection and brake connection via power connector	
	%	A	I_N	I_N	Power connector	Cable cross-section ²⁾
			A	A	Size	mm ²
1FT2203-2AK...	82.1	1.05	9	3	M17	4 × 1.5
1FT2203-4AK...	85.0	2.05	9	5	M17	4 × 1.5
1FT2204-5AF...	90.3	2.3	9	3	M17	4 × 1.5
1FT2204-5AK...	90.5	4.4	9	5	M17	4 × 1.5
1FT2204-6AF...	91.4	3.0	9	3	M17	4 × 1.5
1FT2205-2AC...	88.1	1.84	9	3	M17	4 × 1.5
1FT2205-2AF...	90.3	2.9	9	3	M17	4 × 1.5
1FT2205-2AH...	90.2	3.8	9	3	M17	4 × 1.5
1FT2205-4AF...	90.5	4.7	9	5	M17	4 × 1.5
1FT2206-2AC...	88.3	2.8	9	3	M23	4 × 1.5
1FT2206-2AF...	90.2	5.0	9	5	M23	4 × 1.5
1FT2206-2AH...	91.7	6.5	9	9	M23	4 × 1.5
1FT2206-3AB...	91.3	3.15	9	3	M23	4 × 1.5
1FT2206-3AF...	92.3	5.4	9	9	M23	4 × 1.5
1FT2206-4AC...	91.4	4.5	9	5	M23	4 × 1.5
1FT2206-4AF...	92.4	7.9	9	9	M23	4 × 1.5
1FT2206-4AH...	94.1	12.0	12	18	M23	4 × 1.5

For more components,
see SINAMICS S120
drive system

For more information about cables,
see MOTION-CONNECT connec-
tion systems

¹⁾ Optimum efficiency in continuous duty.

²⁾ The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, under continuous operating conditions at an ambient air temperature of 40 °C (104 °F).

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FT2 Compact synchronous motors – Natural cooling

Selection and ordering data

Static torque M_0 at $\Delta T = 100\text{ K}$ Nm (lb _f -ft)	Rated speed n_N r/min	Shaft height SH	Rated power P_N at $\Delta T = 100\text{ K}$ kW (hp)	SIMOTICS S-1FT2 synchronous motors Natural cooling Article No.	Moment of inertia Rotor		Weight, approx.		
					Without brake	With brake	Without brake	With brake	
					J	J	m	m	
					10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	kg (lb)	kg (lb)	
Shaft height SH 80									
12.5 (9.2)	3000	80	2.85 (3.82)	1FT2208-2AF ■■ - ■■ B0	22.5 (19.9)	25.8 (22.8)	11.1 (24.4)	13.1 (28.8)	
18 (13.3)	1500	80	2.5 (3.4)	1FT2208-3AB ■■ - ■■ B0	29.6 (26.2)	32.6 (28.9)	12.6 (27.8)	14.6 (32.2)	
18 (13.3)	2000	80	3.1 (4.2)	1FT2208-3AC ■■ - ■■ B0	30.0 (26.6)	33.0 (29.2)	12.6 (27.8)	14.6 (32.2)	
18 (13.3)	3000	80	3.5 (4.7)	1FT2208-3AF ■■ - ■■ B0	30.0 (26.6)	33.0 (29.2)	12.6 (27.8)	14.6 (32.2)	
22 (16.2)	1500	80	2.9 (3.9)	1FT2208-4AB ■■ - ■■ B0	38.8 (34.3)	44.4 (39.3)	14.6 (32.2)	17.3 (38.1)	
22 (16.2)	2000	80	3.6 (4.8)	1FT2208-4AC ■■ - ■■ B0	39.0 (34.5)	44.0 (38.9)	14.6 (32.2)	17.3 (38.1)	
22 (16.2)	3000	80	3.7 (5.0)	1FT2208-4AF ■■ - ■■ B0	39.0 (34.5)	44.0 (38.9)	14.6 (32.2)	17.3 (38.1)	
27 (19.9)	1500	80	3.45 (4.63)	1FT2208-5AB ■■ - ■■ B0	48.1 (42.6)	53.6 (47.4)	16.6 (36.6)	19.3 (42.6)	
27 (19.9)	2000	80	4.0 (5.4)	1FT2208-5AC ■■ - ■■ B0	48.0 (42.5)	54.0 (47.8)	16.6 (36.6)	19.3 (42.6)	
Shaft height SH 100									
22 (16.2)	2000	100	3.85 (5.16)	1FT2210-2AC ■■ - ■■ B0	61.7 (54.6)	67.7 (59.9)	15.6 (34.4)	18.6 (41.0)	
22 (16.2)	3000	100	5.1 (6.8)	1FT2210-2AF ■■ - ■■ B0	61.7 (54.6)	67.7 (59.9)	15.6 (34.4)	18.6 (41.0)	
30 (22.1)	1500	100	4.5 (6.0)	1FT2210-3AB ■■ - ■■ B0	89.0 (78.8)	95.0 (84.1)	22.0 (48.5)	25.0 (55.1)	
30 (22.1)	2000	100	5.5 (7.4)	1FT2210-3AC ■■ - ■■ B0	89.0 (78.8)	95.0 (84.1)	22.0 (48.5)	25.0 (55.1)	
30 (22.1)	3000	100	5.8 (7.8)	1FT2210-3AF ■■ - ■■ B0	89.0 (78.8)	95.0 (84.1)	22.0 (48.5)	25.0 (55.1)	
40 (29.5)	1500	100	5.4 (7.2)	1FT2210-4AB ■■ - ■■ B0	117.0 (103.6)	133.0 (117.7)	27.0 (59.5)	31.0 (68.4)	
40 (29.5)	2000	100	6.4 (8.6)	1FT2210-4AC ■■ - ■■ B0	117.0 (103.6)	133.0 (117.7)	27.0 (59.5)	31.0 (68.4)	
40 (29.5)	3000	100	5.7 (7.6)	1FT2210-4AF ■■ - ■■ B0	117.0 (103.6)	133.0 (117.7)	27.0 (59.5)	31.0 (68.4)	
50 (36.9)	1500	100	6.1 (8.2)	1FT2210-5AB ■■ - ■■ B0	145.0 (128.3)	161.0 (142.5)	32.0 (70.6)	36.0 (79.4)	
50 (36.9)	2000	100	7.1 (9.5)	1FT2210-5AC ■■ - ■■ B0	145.0 (128.3)	161.0 (142.5)	32.0 (70.6)	36.0 (79.4)	
Holding brake									
Without brake					0				
With brake					1				
Degree of protection									
IP64 (without shaft seal)					0				
IP65 (with shaft seal)					1				
IP67 (with shaft seal)					2				
Shaft extension/feather key									
Plain shaft					0				
Shaft with feather key					1				
Only SH 40: Plain shaft, alternative dimensions, only IP64					2				
Encoder system for motors with DRIVE-CLiQ interface									
26-bit single-turn absolute encoder (AS26DQC encoder)					B				
26-bit absolute encoder + 12 bit multi-turn (AM26DQC encoder)					C				
22-bit single-turn absolute encoder (AS22DQC encoder)					S				
22-bit absolute encoder + 12 bit multi-turn (AM22DQC encoder)					M				

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FT2 Compact synchronous motors – Natural cooling

Motor type (repeated)	Efficiency ¹⁾	Stall current	SINAMICS S120 Combi Power Module	SINAMICS S120 Motor Module booksize format	Power cable with complete shield	
	η	I_0 at M_0 at $\Delta T = 100\text{ K}$	Rated output current	Rated output current	Motor connection and brake connection via power connector	
	%	A	I_N	I_N	Power connector	Cable cross-section ²⁾
			A	A	Size	mm ²
1FT2208-2AF...	91.6	8.3	9	9	M23	4 × 1.5
1FT2208-3AB...	92.6	6.2	9	9	M23	4 × 1.5
1FT2208-3AC...	92.2	8.4	9	9	M23	4 × 1.5
1FT2208-3AF...	93.5	11.9	12	18	M23	4 × 1.5
1FT2208-4AB...	93.9	7.1	9	9	M23	4 × 1.5
1FT2208-4AC...	93.0	11.7	12	18	M23	4 × 1.5
1FT2208-4AF...	94.7	15.0	–	18	M23	4 × 1.5
1FT2208-5AB...	93.2	8.6	9	9	M23	4 × 1.5
1FT2208-5AC...	93.0	14.6	–	18	M23	4 × 1.5
1FT2210-2AC...	93.8	9.3	9	9	M23	4 × 1.5
1FT2210-2AF...	93.4	12.9	12	18	M40	4 × 2.5
1FT2210-3AB...	93.5	8.5	9	9	M23	4 × 1.5
1FT2210-3AC...	93.6	15.0	–	18	M23	4 × 1.5
1FT2210-3AF...	94.9	19.8	–	24	M23	4 × 2.5
1FT2210-4AB...	93.8	11.8	12	18	M23	4 × 1.5
1FT2210-4AC...	93.9	15.0	–	18	M23	4 × 1.5
1FT2210-4AF...	95.1	23.0	–	24	M23	4 × 2.5
1FT2210-5AB...	95.3	15.0	–	18	M23	4 × 2.5
1FT2210-5AC...	94.7	23.0	–	24	M40	4 × 4

For more components,
see SINAMICS S120
drive system

For more information about cables,
see MOTION-CONNECT connec-
tion systems

¹⁾ Optimum efficiency in continuous duty.

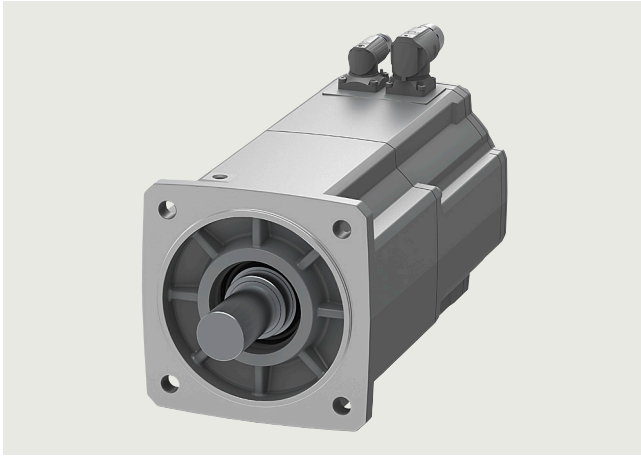
²⁾ The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, under continuous operating conditions at an ambient air temperature of 40 °C (104 °F).

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FK2 Compact/High Inertia synchronous motors – Natural cooling

Overview



SIMOTICS S-1FK2 feed motors

The SIMOTICS S-1FK2 motors are compact permanent-magnet synchronous motors. The motors are designed for operation without external cooling and the heat is dissipated through the motor surface.

The SIMOTICS S-1FK2 motors have a high power density, degree of protection and overload capability.

The SIMOTICS S-1FK2 feed motors are designed to work with the SINAMICS S120/S220¹⁾ drive system.

Benefits

- Maximum machine dynamics thanks to optimum relation between torque and motor moment of inertia
- Very high torque even at high speeds as a result of the special field weakening concept
- Excellent machine precision thanks to high resolution of motor encoder and high-precision shaft and flange mounting
- Precise, rugged control characteristics for medium to high masses to be moved
- Very fast acceleration thanks to triple electrical overload capability
- Low torque ripple
- High static torque
- Maintenance-free absolute encoders without battery
- Rugged signal connectors
- Compact design

Application

- Machine tools (e.g. feed drives, auxiliary axes)
- Robots
- Handling systems

Function

- Compact synchronous servomotors
- Torque M_0 : 0.64 Nm to 50 Nm
- Shaft heights: 30 to 100
- Rated speed: 1500 r/min to 6000 r/min
- Electronic rating plate in motor encoder
- Naturally cooled type of construction without fan
- Plug connection for power cable
- DRIVE-CLiQ interface for signal cable
- IP64/IP65 degree of protection

Configuration

The Configuration Manual for SIMOTICS S-1FK2 for SINAMICS S120 is available at:

support.industry.siemens.com/cs/ww/en/view/109769757

The compatibility list for SINAMICS S120/S220 Booksize Modules can be found at:

support.industry.siemens.com/cs/ww/en/view/109806050

The SINAMICS S220 Booksize power units along with the Motor Modules are available at:

support.industry.siemens.com/cs/ww/en/view/109803552

Characteristic curves

Characteristics for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ SIMOTICS S-1FK2 in the SPC

Dimensional drawings

Dimensional drawings for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ SIMOTICS S-1FK2 in the SPC

More information

[Environmental Product Declaration \(EPD\)](#)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product.

You can find more information on the internet at:

support.industry.siemens.com/cs/ww/en/ps/24677/cert?ci=5690

¹⁾ SINAMICS S220 Motor Modules booksize format on request.

SIMOTICS S-1FK2 Compact/High Inertia synchronous motors – Natural cooling**Technical specifications**

Article No.	1FK2...
Product brand name	SIMOTICS
Product type designation	S-1FK2 Compact/High Inertia
Product designation	Feed motor
Motor type	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling
Insulation of the stator winding according to EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a winding temperature rise of $\Delta T = 100$ K at an ambient temperature of 40 °C (104 °F)
Type of construction according to EN 60034-7 (IEC 60034-7)	IM B5 (IM V1, IM V3)
Degree of protection according to EN 60034-5 (IEC 60034-5)	IP64 and IP65
Shaft end on the drive end according to DIN 748-3 (IEC 60072-1)	Plain shaft/ optional shaft with feather key (half-key balancing)
Shaft and flange accuracy according to DIN 42955 (IEC 60072-1) ¹⁾	Tolerance N in each case for radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end
Vibration severity according to EN 60034-14 (IEC 60034-14)	Grade A is maintained up to rated speed
Sound pressure level L_{pA} (1 m) according to EN ISO 1680, maximum tolerance + 3 dB (A)	
• 1FK2203/1FK2204	55 dB
• 1FK2.05/1FK2.06	65 dB
• 1FK2.08/1FK2210	70 dB
Connection	Plug for power and signal, rotatable
Paint finish	Anthracite, similar to RAL 7016
2nd rating plate	Enclosed separately
Holding brake	Optionally installed (24 V DC)
Certificate of suitability	cURus, CE

Built-in encoder systems with DRIVE-CLiQ interface**Single-turn absolute encoder**

AS22DQC encoder	22-bit single-turn absolute encoder
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Multi-turn absolute encoder

AM22DQC encoder	22-bit multi-turn absolute encoder + 12-bit multi-turn (traversing range 4096 revolutions)
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¹⁾ Radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end.

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FK2 Compact/High Inertia synchronous motors – Natural cooling

Selection and ordering data

Static torque M_0 at $\Delta T = 100\text{ K}$ Nm (lb _f -ft)	Rated speed n_N r/min	Shaft height SH	Rated power P_N at $\Delta T = 100\text{ K}$ kW (hp)	SIMOTICS S-1FK2 synchronous motors Natural cooling Article No.	Moment of inertia of rotor		Weight, approx.		
					Without brake	With brake	Without brake	With brake	
					J	J	m	m	
10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	kg (lb)	kg (lb)						
1FK2 Compact									
0.64 (0.47)	6000	30	0.26 (0.35)	1FK2203-2AK ■■■ - ■■■ B0	0.2 (0.2)	0.22 (0.19)	1.16 (2.56)	1.53 (3.37)	
1.27 (0.94)	6000	30	0.43 (0.58)	1FK2203-4AK ■■■ - ■■■ B0	0.35 (0.31)	0.37 (0.33)	1.49 (3.29)	1.97 (4.34)	
2.4 (1.8)	3000	40	0.75 (1.01)	1FK2204-5AF ■■■ - ■■■ B0	1.23 (1.09)	1.31 (1.16)	2.9 (6.4)	3.75 (8.27)	
3.2 (2.4)	3000	40	1.0 (1.3)	1FK2204-6AF ■■■ - ■■■ B0	1.61 (1.43)	1.69 (1.50)	3.5 (7.7)	4.35 (9.59)	
3.6 (2.7)	3000	48	0.94 (1.26)	1FK2205-2AF ■■■ - ■■■ B0	3.15 (2.79)	4.05 (3.58)	3.75 (8.27)	4.75 (10.47)	
6.0 (4.4)	3000	48	1.45 (1.94)	1FK2205-4AF ■■■ - ■■■ B0	5.1 (4.5)	6.0 (5.3)	5.2 (11.5)	6.2 (13.7)	
6.5 (4.8)	3000	63	1.71 (2.29)	1FK2206-2AF ■■■ - ■■■ B0	7.8 (6.9)	9.4 (8.3)	6.3 (13.9)	7.9 (17.4)	
12 (8.85)	3000	63	2.85 (3.82)	1FK2206-4AF ■■■ - ■■■ B0	15.1 (13.4)	16.8 (14.9)	8.9 (19.6)	10.6 (23.4)	
18 (13.3)	2000	80	3.05 (4.09)	1FK2208-3AC ■■■ - ■■■ B0	29.6 (26.2)	33.0 (29.2)	12.6 (27.8)	14.6 (32.2)	
22 (16.2)	2000	80	3.55 (4.76)	1FK2208-4AC ■■■ - ■■■ B0	38.8 (34.3)	44.4 (39.3)	14.6 (32.2)	17.3 (38.1)	
27 (19.9)	2000	80	4.0 (5.4)	1FK2208-5AC ■■■ - ■■■ B0	48.1 (42.6)	53.6 (47.4)	16.6 (36.6)	19.3 (42.6)	
30 (22.1)	1500	100	4.5 (6.0)	1FK2210-3AB ■■■ - ■■■ B0	88.8 (78.6)	94.8 (83.9)	22.0 (48.5)	25.0 (55.1)	
40 (29.5)	1500	100	5.4 (7.2)	1FK2210-4AB ■■■ - ■■■ B0	117.0 (103.6)	133.0 (117.7)	27.0 (59.5)	31.0 (68.4)	
30 (22.1)	2000	100	5.5 (7.4)	1FK2210-3AC ■■■ - ■■■ B0	88.8 (78.6)	94.8 (83.9)	22.0 (48.5)	25.0 (55.1)	
40 (29.5)	2000	100	6.4 (8.6)	1FK2210-4AC ■■■ - ■■■ B0	117.0 (103.6)	133.0 (117.7)	27.0 (59.5)	31.0 (68.4)	
50 (36.9)	2000	100	7.1 (9.5)	1FK2210-5AC ■■■ - ■■■ B0	145.0 (128.3)	161.0 (142.5)	32.0 (70.6)	36.0 (79.4)	
1FK2 High Inertia									
6 (4.43)	2000	63	1.15 (1.54)	1FK2306-2AC ■■■ - ■■■ B0	12.3 (10.9)	13.4 (11.9)	7.6 (16.8)	9.0 (19.8)	
12 (8.85)	2000	63	2.2 (3.0)	1FK2306-4AC ■■■ - ■■■ B0	29.8 (26.4)	30.8 (27.3)	11.4 (25.1)	12.8 (28.2)	
18 (13.3)	1500	80	2.51 (3.37)	1FK2308-3AB ■■■ - ■■■ B0	60.1 (53.2)	62.8 (55.6)	16.2 (35.7)	18.0 (39.7)	
22 (16.2)	1500	80	2.92 (3.92)	1FK2308-4AB ■■■ - ■■■ B0	69.1 (61.2)	74.4 (65.9)	18.5 (40.8)	20.5 (45.2)	
Holding brake					0	1			
Without brake					0	1			
With brake					1				
Degree of protection									
IP64 (without shaft seal)					0	1			
IP65 (with shaft seal)					1				
Shaft end/feather key									
Plain shaft					0	1			
Shaft with feather key					1				
Encoder system for motors with DRIVE-CLiQ interface									
22-bit single-turn absolute encoder (AS22DQC encoder)					S				
22-bit absolute encoder + 12-bit multi-turn (AM22DQC encoder)					M				

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS S-1FK2 Compact/High Inertia synchronous motors – Natural cooling

Motor type (repeated)	Efficiency ¹⁾	Stall current	SINAMICS S120 Combi Power Module	SINAMICS S120 Motor Module booksize format	Power cable with complete shield	
	η	I_0 at M_0 at $\Delta T = 100$ K	Rated output current	Rated output current	Motor connection and brake connection via power connector	
	%	A	I_N	I_N	Power connector	Cable cross-section ²⁾
			A	A	Size	mm ²
1FK2203-2AK...	82.1	1.05	9	3	M17	4 × 1.5
1FK2203-4AK...	85.0	2.05	9	5	M17	4 × 1.5
1FK2204-5AF...	90.3	2.25	9	3	M17	4 × 1.5
1FK2204-6AF...	90.5	3.0	9	3	M17	4 × 1.5
1FK2205-2AF...	90.3	2.9	9	3	M17	4 × 1.5
1FK2205-4AF...	90.5	4.7	9	5	M17	4 × 1.5
1FK2206-2AF...	90.2	5.0	9	5	M23	4 × 1.5
1FK2206-4AF...	92.4	7.9	9	9	M23	4 × 1.5
1FK2208-3AC...	92.9	8.4	9	9	M23	4 × 1.5
1FK2208-4AC...	93.0	11.7	12	18	M23	4 × 1.5
1FK2208-5AC...	93.0	14.6	–	18	M23	4 × 1.5
1FK2210-3AB...	93.5	8.5	9	9	M23	4 × 1.5
1FK2210-4AB...	93.8	11.8	12	18	M23	4 × 1.5
1FK2210-3AC...	93.6	15.0	–	18	M23	4 × 1.5
1FK2210-4AC...	93.9	15.0	–	18	M23	4 × 1.5
1FK2210-5AC...	94.7	22.5	–	24	M40	4 × 2.5
1FK2306-2AC...	90.5	2.8	9	3	M23	4 × 1.5
1FK2306-4AC...	91.4	4.5	9	5	M23	4 × 1.5
1FK2308-3AB...	92.6	6.2	9	9	M23	4 × 1.5
1FK2308-4AB...	93.9	7.1	9	9	M23	4 × 1.5

For more components,
see SINAMICS S120
drive system

For more information about cables,
see MOTION-CONNECT connec-
tion systems

¹⁾ Optimum efficiency in continuous duty.

²⁾ The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, under continuous operating conditions at an ambient air temperature of 40 °C (104 °F).

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

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

Overview



SIMOTICS S-1FK7 feed motors in SH 63/SH 48 with DQI encoder

SIMOTICS S-1FK7 motors are compact permanent-magnet synchronous motors. SIMOTICS S-1FK7 motors can be combined with the SINAMICS S120 drive system to create a powerful system with high functionality. The motors are designed for operation without external cooling and the heat is dissipated through the motor surface. SIMOTICS S-1FK7 motors have a high overload capability.

The SIMOTICS S-1FK7 feed motors are designed to work with the SINAMICS S120/S220¹⁾ drive system.

Benefits

- Maximum machine dynamics thanks to optimum relation between torque and motor moment of inertia
- Very high torque even at high speeds as a result of the special field weakening concept
- Excellent machine precision thanks to high resolution of motor encoder and high-precision shaft and flange mounting
- Very fast acceleration thanks to triple electrical overload capability
- High degree of ruggedness because encoder is mechanically decoupled from the motor shaft
- Maintenance-free absolute encoders without battery
- High energy efficiency

SIMOTICS S-1FK7 Compact motors

- Space-saving installation due to extremely high power density
- For universal applications
- Wide range of motors

SIMOTICS S-1FK7 High Inertia motors

- Robust closed-loop control properties for high or variable load moment of inertia
- Minimal optimization and commissioning overhead for the compensation of disturbances

Application

- Machine tools (e.g. feed drives, auxiliary axes)
- Robots
- Handling systems

Function

- Compact synchronous servomotors
- Torque M_0 : 3 Nm to 48 Nm
- Shaft heights: 48 to 100
- Rated speed: 2000 r/min to 6000 r/min
- Easily replaceable encoders with 20-bit resolution
- Electronic rating plate in motor encoder
- Naturally cooled type of construction without fan
- Plug connection for power cable
- DRIVE-CLiQ interface for signal cable
- IP65 degree of protection

Configuration

The Configuration Manual for SIMOTICS S-1FK7 for SINAMICS S120 is available at:

support.industry.siemens.com/cs/ww/en/view/55379345

The compatibility list for SINAMICS S120/S220 Booksize Modules can be found at:

support.industry.siemens.com/cs/ww/en/view/109806050

The SINAMICS S220 Booksize power units along with the Motor Modules are available at:

support.industry.siemens.com/cs/ww/en/view/109803552

Characteristic curves

Characteristics for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ **SIMOTICS S-1FK7 in the SPC**

Dimensional drawings

Dimensional drawings for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ **SIMOTICS S-1FK7 in the SPC**

More information

[Environmental Product Declaration \(EPD\)](#)

Data sheets on the Environmental Product Declaration (EPD) are available in PDF format for this product.

The EPD PDF provides brief and concise information about the ecological properties of a product.

You can find more information on the internet at:

support.industry.siemens.com/cs/ww/en/ps/13349/cert?ci=5690

¹⁾ SINAMICS S220 Motor Modules booksize format on request.

Technical specifications

Article No.	1FK7...
Product brand name	SIMOTICS
Product type designation	S-1FK7 Compact/High Inertia
Product designation	Feed motor
Motor type	Permanent-magnet synchronous motor
Magnet material	Rare-earth magnet material
Cooling	Natural cooling
Temperature monitoring	Temperature sensor in the stator winding
Insulation of the stator winding according to EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a winding temperature rise of $\Delta T = 100$ K at an ambient temperature of 40 °C (104 °F)
Type of construction according to EN 60034-7 (IEC 60034-7)	IM B5 (IM V1, IM V3)
Degree of protection according to EN 60034-5 (IEC 60034-5)	IP65
Shaft end on the drive end according to DIN 748-3 (IEC 60072-1)	Plain shaft/ feather key and keyway (half-key balancing)
Shaft and flange accuracy according to DIN 42955 (IEC 60072-1) ¹⁾	Tolerance N
Vibration severity according to EN 60034-14 (IEC 60034-14)	Grade A is maintained up to rated speed
Sound pressure level L_{pA} (1 m) according to EN ISO 1680, maximum tolerance + 3 dB (A)	
• 1FK704	55 dB
• 1FK706	65 dB
• 1FK708/1FK710	70 dB
Connection	Connectors for signals and power, can be rotated
Paint finish	Anthracite, similar to RAL 7016
2nd rating plate	Enclosed separately
Holding brake	With/without
Certificate of suitability	cURus

Options

Order code	Description
K23	Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite, similar to RAL 7016

-Z must be added to the Article No. to order a motor with options.

¹⁾ Radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end.

SIMOTICS motors

Feed motors for SINAMICS S120 Combi/SINAMICS S120

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

Selection and ordering data

Static torque	Rated speed	Shaft height	Rated power	SIMOTICS S-1FK7 synchronous motors Natural cooling	Moment of inertia of rotor		Weight, approx.	
M_0 at $\Delta T = 100\text{ K}$	n_N	SH	P_N at $\Delta T = 100\text{ K}$		Without brake	With brake	Without brake	With brake
Nm (lb _f -ft)	r/min		kW (hp)		J	J	m	m
				Article No.	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	10^{-4} kgm^2 ($10^{-3}\text{ lb}_f\text{-in-s}^2$)	kg (lb)	kg (lb)
1FK7 Compact								
6 (4.43)	3000	63	1.5 (2.0)	1FK7060-2AF71-1 ■ ■ ■ 1	7.7 (6.8)	8.7 (7.7)	7.1 (15.7)	8.5 (18.7)
8 (5.90)	3000	80	2.1 (2.8)	1FK7080-2AF71-1 ■ ■ ■ 1	14.2 (12.6)	17.5 (15.5)	10.3 (22.7)	13.3 (29.3)
8.5 (6.3)	3000	63	1.9 (2.5)	1FK7062-2AF71-1 ■ ■ ■ 1	11.2 (9.9)	12.2 (10.8)	9.1 (20.1)	10.5 (23.2)
11 (8.11)	2000	63	1.9 (2.5)	1FK7063-2AC71-1 ■ ■ ■ 1	14.7 (13.0)	15.7 (13.9)	11.1 (24.5)	12.5 (27.6)
	3000	63	2.3 (3.1)	1FK7063-2AF71-1 ■ ■ ■ 1	14.7 (13.0)	15.7 (13.9)	11.1 (24.5)	12.5 (27.6)
12 (8.85)	2000	80	2.1 (2.8)	1FK7081-2AC71-1 ■ ■ ■ 1	20 (17.7)	23.5 (20.8)	12.9 (28.4)	15.9 (35.1)
	3000	80	2.7 (3.6)	1FK7081-2AF71-1 ■ ■ ■ 1	20 (17.7)	23.5 (20.8)	12.9 (28.4)	15.9 (35.1)
16 (11.8)	2000	80	2.6 (3.5)	1FK7083-2AC71-1 ■ ■ ■ 1	26 (23.0)	29.5 (26.1)	15.6 (34.4)	18.6 (41.0)
	3000	80	3.3 (4.4)	1FK7083-2AF71-1 ■ ■ ■ 1	26 (23.0)	29.5 (26.1)	15.6 (34.4)	18.6 (41.0)
18 (13.3)	2000	100	3.0 (4.0)	1FK7100-2AC71-1 ■ ■ ■ 1	54 (47.8)	62 (54.9)	17.6 (38.8)	21 (46.3)
	3000	100	3.8 (5.1)	1FK7100-2AF71-1 ■ ■ ■ 1	54 (47.8)	62 (54.9)	17.6 (38.8)	21 (46.3)
20 (14.8)	2000	80	3.1 (4.2)	1FK7084-2AC71-1 ■ ■ ■ 1	32.5 (28.8)	35.5 (31.4)	18.3 (40.4)	21.3 (47.0)
	3000	80	3.1 (4.2)	1FK7084-2AF71-1 ■ ■ ■ 1	32.5 (28.8)	35.5 (31.4)	18.3 (40.4)	21.3 (47.0)
27 (19.9)	2000	100	4.3 (5.8)	1FK7101-2AC71-1 ■ ■ ■ 1	79 (69.9)	87 (77.0)	23.0 (50.7)	27.5 (60.6)
36 (26.6)	2000	100	5.2 (7.0)	1FK7103-2AC71-1 ■ ■ ■ 1	104 (92.1)	112 (99.1)	28.5 (62.8)	33.0 (72.8)
48 (35.4)	2000	100	7.7 (10.3)	1FK7105-2AC71-1 ■ ■ ■ 1	154 (136)	162 (143)	39.0 (86.0)	43.5 (95.9)
1FK7 High Inertia								
3 (2.21)	6000	48	0.9 (1.2)	1FK7042-3BK71-1 ■ ■ ■ 1	5.1 (4.5)	5.4 (4.8)	5.1 (11.2)	5.8 (12.8)
6 (4.43)	3000	63	1.5 (2.0)	1FK7060-3BF71-1 ■ ■ ■ 1	12.5 (11.1)	13.5 (11.9)	7.9 (17.4)	9.3 (20.5)
8.5 (6.3)	3000	63	1.9 (2.5)	1FK7062-3BF71-1 ■ ■ ■ 1	23.5 (20.8)	24.5 (21.7)	10.7 (23.6)	12.1 (26.7)
12 (8.85)	3000	80	2.7 (3.6)	1FK7081-3BF71-1 ■ ■ ■ 1	49 (43.4)	52 (46.0)	15.2 (33.5)	18.2 (40.1)
18 (13.3)	2000	100	3.0 (4.0)	1FK7100-3BC71-1 ■ ■ ■ 1	87 (77.0)	95 (84.1)	19.4 (42.8)	22.8 (50.3)
20 (14.8)	2000	80	3.1 (4.2)	1FK7084-3BC71-1 ■ ■ ■ 1	99 (87.6)	102 (90.3)	23.0 (50.7)	26.0 (57.3)
	3000	80	3.1 (4.2)	1FK7084-3BF71-1 ■ ■ ■ 1	99 (87.6)	102 (90.3)	23.0 (50.7)	26.0 (57.3)
27 (19.9)	2000	100	4.3 (5.8)	1FK7101-3BC71-1 ■ ■ ■ 1	127 (112)	136 (120)	25.7 (56.7)	30.2 (66.6)
	3000	100	4.9 (6.6)	1FK7101-3BF71-1 ■ ■ ■ 1	127 (112)	136 (120)	25.7 (56.7)	30.2 (66.6)
36 (26.6)	2000	100	5.2 (7.0)	1FK7103-3BC71-1 ■ ■ ■ 1	168 (149)	176 (156)	32.1 (70.8)	36.6 (80.7)
	3000	100	4.4 (5.9)	1FK7103-3BF71-1 ■ ■ ■ 1	168 (149)	176 (156)	32.1 (70.8)	36.6 (80.7)
48 (35.4)	2000	100	7.7 (10.3)	1FK7105-3BC71-1 ■ ■ ■ 1	249 (220)	258 (228)	44.4 (97.9)	48.9 (107.8)

Encoder system for motors with DRIVE-CLiQ interface

20-bit single-turn absolute encoder (AS20DQI encoder)
20-bit absolute encoder + 12-bit multi-turn (AM20DQI encoder)

Shaft end	Shaft and flange accuracy	Holding brake
Feather key and keyway	Tolerance N	Without
Feather key and keyway	Tolerance N	With
Plain shaft	Tolerance N	Without
Plain shaft	Tolerance N	With

Q
RA
B
G
H

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

Motor type (repeated)	Efficiency ¹⁾	Stall current	SINAMICS S120 Combi Power Module	SINAMICS S120 Motor Module booksize format	Power cable with complete shield	
	η	I_0 at M_0 at $\Delta T = 100$ K	Rated output current	Rated output current	Motor connection and brake connection via power connector	
	%	A	I_N	I_N	Power connector	Cable cross-section ²⁾
			A	A	Size	mm ²
1FK7060-2AF71-...	90	4.45	9	5	M23	4 × 1.5
1FK7080-2AF71-...	92	4.9	9	5	M23	4 × 1.5
1FK7062-2AF71-...	91	5.3	9	5	M23	4 × 1.5
1FK7063-2AC71-...	91	5.3	9	5	M23	4 × 1.5
1FK7063-2AF71-...	91	8.0	9	9	M23	4 × 1.5
1FK7081-2AC71-...	93	5.0	9	5	M23	4 × 1.5
1FK7081-2AF71-...	93	8.7	9	9	M23	4 × 1.5
1FK7083-2AC71-...	93	7.5	9	9	M23	4 × 1.5
1FK7083-2AF71-...	93	10.1	12	18	M23	4 × 1.5
1FK7100-2AC71-...	92	8.4	9	9	M23	4 × 1.5
1FK7100-2AF71-...	92	11.1	12	18	M23	4 × 1.5
1FK7084-2AC71-...	93	8.5	9	9	M23	4 × 1.5
1FK7084-2AF71-...	93	12.1	12	18	M23	4 × 1.5
1FK7101-2AC71-...	93	12.3	12	18	M40	4 × 1.5
1FK7103-2AC71-...	93	14.4	–	18	M40	4 × 1.5
1FK7105-2AC71-...	93	20.0	–	18	M40	4 × 2.5
1FK7042-3BK71-...	89	4.4	9	5	M23	4 × 1.5
1FK7060-3BF71-...	90	4.45	9	5	M23	4 × 1.5
1FK7062-3BF71-...	91	5.3	9	5	M23	4 × 1.5
1FK7081-3BF71-...	93	8.7	9	9	M23	4 × 1.5
1FK7100-3BC71-...	92	8.4	9	9	M23	4 × 1.5
1FK7084-3BC71-...	93	8.5	9	9	M23	4 × 1.5
1FK7084-3BF71-...	93	12.1	12	18	M23	4 × 1.5
1FK7101-3BC71-...	93	12.3	12	18	M40	4 × 1.5
1FK7101-3BF71-...	93	18.8	–	18	M40	4 × 2.5
1FK7103-3BC71-...	93	14.4	–	18	M40	4 × 1.5
1FK7103-3BF71-...	93	26.0	–	30	M40	4 × 4
1FK7105-3BC71-...	93	20.0	–	30	M40	4 × 2.5

For more components,
see SINAMICS S120
drive system

For more information about cables,
see MOTION-CONNECT connec-
tion systems

¹⁾ Optimum efficiency in continuous duty.

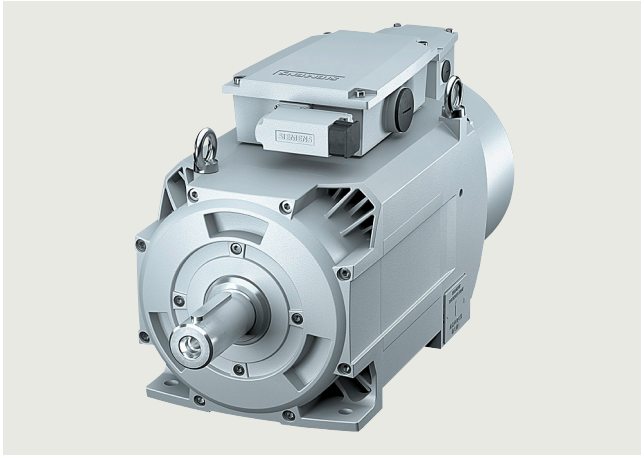
²⁾ The current carrying capacity of the power cables complies with EN 60204-1 for installation type C, under continuous operating conditions at an ambient air temperature of 40 °C (104 °F).

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH3 asynchronous motors – Forced ventilation

Overview



SIMOTICS M-1PH3 spindle motor

SIMOTICS M-1PH3 motors are compact squirrel-cage asynchronous motors with degree of protection IP55. Depending on the control requirements, appropriate encoder systems are available for the motors for sensing the motor speed and indirect position.

The SIMOTICS M-1PH3 spindle motors are adapted to the SINAMICS S120/S220¹⁾ drive system.

Benefits

- Wide speed setting ranges
- Outstanding performance characteristics
 - Maximum speeds up to 12000 r/min
 - High dynamic response (short acceleration rates)
- Simple and flexible connection system
- Long-lasting motor bearings for high radial forces with belt drives
- Commissioning with electronic rating plate and DRIVE-CLiQ interface

Application

- Main spindles for standard milling and turning machines
- Driven tools for standard turning machines

Function

- Compact asynchronous spindle motors
- Spindle power: 3.7 kW to 15 kW
- Shaft heights: 100 to 132
- Maximum speed: 12000 r/min
- Electronic rating plate in motor encoder
- Integrated terminal box for power cable
- DRIVE-CLiQ interface for signal cable
- IP55 degree of protection
- Vibration severity grade S/SR
- High rotational accuracy
- Optimized bearing design for high cantilever forces

Configuration

The Configuration Manual for SIMOTICS M-1PH3 for SINAMICS S120 is available at:

support.industry.siemens.com/cs/ww/en/view/109763196

The compatibility list for SINAMICS S120/S220 Booksize Modules can be found at:

support.industry.siemens.com/cs/ww/en/view/109806050

The SINAMICS S220 Booksize power units along with the Motor Modules are available at:

support.industry.siemens.com/cs/ww/en/view/109803552

Characteristic curves

Characteristics for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ SIMOTICS M-1PH3 in the SPC

Dimensional drawings

Dimensional drawings for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

[Access to the Siemens Product Configurator](#)

The Siemens Product Configurator can be accessed without having to register or log in:

www.siemens.com/spc

→ SIMOTICS M-1PH3 in the SPC

More information

More information is available on the internet at:

support.industry.siemens.com/cs/ww/en/ps/25213

¹⁾ SINAMICS S220 Motor Modules booksize format on request.

Technical specifications

Article No.	1PH3...
Product brand name	SIMOTICS
Product type designation	M-1PH3
Product designation	Spindle motor
Motor type	Asynchronous motor
Cooling	Forced ventilation
Ambient temperature, permissible	-15 ... +40 °C (-5 ... +104 °F)
Temperature monitoring	Pt1000 temperature sensor in the stator winding
Insulation of the stator winding according to EN 60034-1 (IEC 60034-1)	For an ambient temperature of up to 40 °C (104 °F)
• 1PH310/1PH313	Temperature class 180 (H)
Motor fan ratings	
• 1PH310/1PH313	380 V 3AC ± 10%, 50 Hz 480 V 3AC ± 10%, 60 Hz
Encoder system, built-in	DRIVE-CLiQ interface
• 1PH310/1PH313 for speeds up to 12000 r/min	22-bit incremental encoder (resolution 4194304, encoder-internal 2048 S/R) (IC22DQ encoder)
Sound pressure level L_{pA} (1 m) according to EN ISO 1680 Tolerance + 3 dB	Rated pulse frequency 4 kHz, operation without load and speed below maximum speed
• 1PH310/1PH313	73 dB
Connection	
• 1PH310/1PH313	Terminal box top/cable entry from right or left/ signal connection DE
• Fan	
- 1PH310/1PH313	Power connector, terminals in the terminal box
• Encoder system	Connector for signals (without mating connector) or DRIVE-CLiQ
Vibration severity according to EN 60034-14 (IEC 60034-14)	<u>Grade S:</u> • Grade S is maintained from 2000 r/min up to maximum speed <u>Grade SR:</u> • Grade SR is maintained from 4500 r/min up to maximum speed
Shaft and flange accuracy according to DIN 42955 (IEC 60072-1) ¹⁾	Tolerance R
Degree of protection according to EN 60034-5 (IEC 60034-5)	IP55
Rating plate	1 unit attached to motor
Paint finish	Anthracyte, similar to RAL 7016
Certificate of suitability	cURus, EAC, CE, UKCA

¹⁾ Radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH3 asynchronous motors – Forced ventilation

Selection and ordering data

Rated speed	Speed, max.	Rated power S1 duty	Rated torque	SIMOTICS M-1PH3 asynchronous motor Forced ventilation DE → NDE Terminal box top	Efficiency	Moment of inertia	Weight, approx.
n_N r/min	$n_{\max 1}$ r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)
Shaft height SH 100 – Line voltage 400 V 3 AC							
1000	6000	3.7 (5.0)	35 (25.8)	1PH3103-1ID0 ■ - ■ GA0	75.5	0.0112 (0.0991)	39 (86.0)
	6000	5.5 (7.4)	53 (39.1)	1PH3105-1ID0 ■ - ■ GA0	77.8	0.0150 (0.1328)	48 (106)
1500	12000	3.7 (5.0)	24 (17.7)	1PH3101-1IF0 ■ - ■ A0	81.3	0.0090 (0.0797)	32 (70.6)
	12000	5.5 (7.4)	35 (25.8)	1PH3103-1IF0 ■ - ■ A0	81.8	0.0112 (0.0991)	39 (86.0)
	8000/12000	9 (12.1)	57 (42.0)	1PH3107-1IDF0 ■ - ■ A0	83.9	0.0180 (0.1593)	53 (117)
2000	12000	7.5 (10.1)	36 (26.6)	1PH3105-1IG0 ■ - ■ A0	86.5	0.0150 (0.1328)	48 (106)
	12000	11 (14.8)	53 (39.1)	1PH3107-1IG0 ■ - ■ A0	86.9	0.0180 (0.1593)	53 (117)
Shaft height SH 132 – Line voltage 400 V 3 AC							
1000	6000	11 (14.8)	105 (77.4)	1PH3133-1DD0 ■ - ■ GA0	83.6	0.0740 (0.6550)	90 (198)
	8000	12 (16.1)	115 (84.8)	1PH3135-1DD0 ■ - ■ A0	85.0	0.0940 (0.8320)	106 (234)
	8000	15 (20.1)	143 (105)	1PH3136-1DD0 ■ - ■ GA0	84.1	0.0940 (0.8320)	106 (234)
1200	8000	7.5 (10.1)	60 (44.3)	1PH3131-1DE0 ■ - ■ GA0	85.0	0.0547 (0.4841)	73 (161)
	8000	9 (12.1)	72 (53.1)	1PH3132-1DE0 ■ - ■ GA0	84.4	0.0547 (0.4841)	73 (161)
1500	10000	11 (14.8)	70 (51.6)	1PH3131-1DF0 ■ - ■ A0	87.1	0.0547 (0.4841)	73 (161)
2000	10000	15 (20.1)	72 (53.1)	1PH3133-1DG0 ■ - ■ A0	90.3	0.0740 (0.6550)	90 (198)
Shaft height SH 132 – Line voltage 400 V 3 AC – Star-delta circuit							
1000/2000	8000	15 (20.1)	143/72 (105/53.1)	1PH3136-1DS0 ■ - ■ GA0	84.1/91.0	0.0940 (0.8320)	106 (234)

Encoder system for motors with DRIVE-CLiQ interface

Without encoder

22-bit incremental encoder

Type of construction

IM B3 (IM V5)

IM B5 (IM V1)

IM B5 (IM V1) 1PH8 flange compatible, only for SH 132

Shaft end DE

Plain shaft

Feather key

Bearing version

Standard

Performance

Performance

Balancing

-

Half-key

Vibration severity in accordance with Siemens¹⁾/EN 60034-14

S

S

SR

A

D

0

2

4

0

2

G

L

K

Option

Order code	Description
P81	Special transport package

-Z must be added to the Article No. to order a motor with options.

¹⁾ For definition of the vibration severity according to Siemens, see the 1PH3 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH3 asynchronous motors – Forced ventilation

Motor type (repeated)	Rated current for S1 duty I_N A	SINAMICS S120 Combi								
		Rated output current for S1 duty I_N A	3-axis Power Modules			4-axis Power Modules				
			Frame type:			Frame type:				
			B11	B12	B13	B14	B01	B02	B17	B16
			Article No. 6SL3111-			Article No. 6SL3111-				
			3VE21-6FC1	3VE21-6EC1	3VE22-0HC1	4VE21-6FC1	4VE21-6EC1	4VE21-6ED1	4VE21-6ED2	4VE22-0HC1
1PH3103-1.D...	12.9	18	✓	○	○/●	✓	○/●	○/●	○/●	○/●
1PH3105-1.D...	17.8	18	✓	○	○	✓	○	○	○	○
1PH3101-1.F...	12.0	18	✓	○	○/●	✓	○/●	○/●	○/●	○/●
1PH3103-1.F...	16.9	18	✓	○	○	✓	○	○	○	○
1PH3107-1.DF...	24.0	24	–	✓	○	–	✓	✓	✓	○
1PH3105-1.G...	16.5	18	✓	○	○	✓	○	○	○	○
1PH3107-1.G...	29.0	30	–	–	✓	–	–	–	–	✓
1PH3133-1.DD...	29.4	30	–	–	✓	–	–	–	–	✓
1PH3135-1.DD...	30.0	30	–	–	✓	–	–	–	–	✓
1PH3136-1.DD...	42.8	30	–	–	○ ¹⁾	–	–	–	–	○ ¹⁾
1PH3131-1.DE...	21.7	24	–	✓	○	–	✓	✓	✓	○
1PH3132-1.DE...	24.0	24	–	✓	○	–	✓	✓	✓	○
1PH3131-1.DF...	24.0	24	–	✓	○	–	✓	✓	✓	○
1PH3133-1.DG...	30.0	30	–	–	✓	–	–	–	–	✓
1PH3136-1.DS...	31.0/31.9	30	–	–	✓	–	–	–	–	✓

- ✓ Perfectly suited as main spindle
- Suitable as main spindle
- Perfectly suited as driven tool
- Not suitable

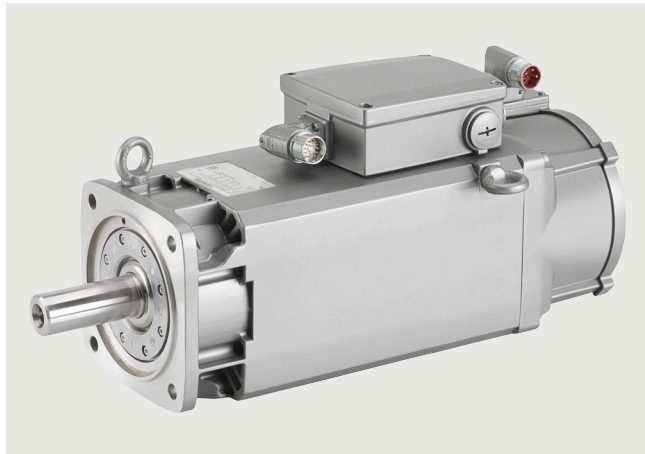
¹⁾ Operation on SINAMICS S120 booksize format 45 A Motor Module recommended. Operation on SINAMICS S120 Combi only possible with derating.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – Forced ventilation

Overview



SIMOTICS M-1PH808 spindle motor with forced ventilation

SIMOTICS M-1PH8 motors are compact squirrel-cage asynchronous motors with degree of protection IP55. Depending on the control requirements, appropriate encoder systems are available for the motors for sensing the motor speed and indirect position. The SIMOTICS M-1PH8 spindle motors are adapted to the SINAMICS S120/S220¹⁾ drive system.

Benefits

- Maximum power over an extremely wide speed range as a result of intelligent winding design and optimized field-weakening and heat dissipation concept
- Very fast spindle acceleration rates and maximum cutting forces thanks to special lamination structure and high overload factor
- Long-lasting motor bearings for high radial forces with belt drives
- High degree of protection, including motor fan
- Commissioning with electronic rating plate and DRIVE-CLiQ interface

Application

- Main spindles for standard milling and turning machines
- Driven tools for standard turning machines

Technical specifications

Terminal box assignment, max. connectable conductor cross-sections

1PH8 motor Forced ventilation	Terminal box	Cable entry		Outer cable diameter, max. ²⁾	Number of main terminals	Cross-section per terminal, max.	Rated current, max. ³⁾
	Type	Power	External signals				
1PH808	gk803	1 × M25 × 1.5	1 × Ø 22 mm (0.87 in) ⁴⁾	20 (0.79)	Phases: 3 × M5 Grounding: 2 × M5	1 × 10	50
1PH810	gk813	1 × M32 × 1.5	1 × Ø 22 mm (0.87 in) ⁴⁾	24.2 (0.95)	Phases: 3 × M5 Grounding: 2 × M5	1 × 16	66
1PH810 Star/ Delta	gk826	1 × M32 × 1.5	1 × Ø 22 mm (0.87 in) ⁴⁾	24.2 (0.95)	Phases: 6 × M5 Grounding: 2 × M5	1 × 10	50
1PH813	gk833	1 × M40 × 1.5	1 × Ø 22 mm (0.87 in) ⁴⁾	32 (1.26)	Phases: 3 × M6 Grounding: 2 × M6	1 × 35	104

¹⁾ SINAMICS S220 Motor Modules booksize format on request

²⁾ Dependent on the design of the metric cable gland.

Function

- Compact asynchronous spindle motors
- Spindle power: 2.8 kW to 12 kW
- Shaft heights: 80 to 132
- Maximum speed: 24000 r/min
- Electronic rating plate in motor encoder
- Integrated, easily replaceable fan
- Integrated terminal box for power cable
- DRIVE-CLiQ interface for signal cable
- IP55 degree of protection (including fan)
- Vibration severity grade S/A and Special/B
- High rotational accuracy
- Optimized bearing design for high cantilever forces

Configuration

The Configuration Manual for SIMOTICS M-1PH8 for SINAMICS S120 is available at:
support.industry.siemens.com/cs/ww/en/view/109744012

The compatibility list for SINAMICS S120/S220 Booksized Modules can be found at:
support.industry.siemens.com/cs/ww/en/view/109806050

The SINAMICS S220 Booksized power units along with the Motor Modules are available at:
support.industry.siemens.com/cs/ww/en/view/109803552

Characteristic curves

Characteristics for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

Access to the Siemens Product Configurator
 The Siemens Product Configurator can be accessed without having to register or log in:
www.siemens.com/spc
 →SIMOTICS S-1PH8 in the SPC

Dimensional drawings

Dimensional drawings for the SIMOTICS motors are available via selectors through to the exact article number with the Siemens Product Configurator.

Access to the Siemens Product Configurator
 The Siemens Product Configurator can be accessed without having to register or log in:
www.siemens.com/spc
 →SIMOTICS S-1PH8 in the SPC

Technical specifications

Article No.	1PH8...
Product brand name	SIMOTICS
Product type designation	M-1PH8
Product designation	Spindle motor
Motor type	Asynchronous motor
Cooling	Forced ventilation
Ambient temperature, permissible	-15 ... +40 °C (5 ... +104 °F)
Temperature monitoring	Temperature sensor in the stator winding
Insulation of the stator winding according to EN 60034-1 (IEC 60034-1)	For an ambient temperature of up to 40 °C (104 °F)
• 1PH808/1PH810/1PH813	Temperature class 180 (H)
Motor fan ratings	
• 1PH808	230 V 1 AC ± 10%, 50 Hz 265 V 1 AC ± 10%, 60 Hz
• 1PH810/1PH813	400 V 3 AC ± 10 %, 50 Hz 480 V 3 AC ± 10%, 60 Hz
Encoder system, built-in	DRIVE-CLiQ interface
• 1PH8...-1D... for speeds up to 12000 r/min	22-bit incremental encoder (resolution 4194304, encoder-internal 2048 S/R) + commutation position 11 bit (IC22DQ encoder)
• 1PH8...-1U... for speeds up to 15000 r/min	20-bit incremental encoder (resolution 1048576, encoder-internal 512 S/R) without commutation position (IN20DQ encoder)
• 1PH8...-1S... for speeds up to 24000 r/min	19-bit incremental encoder (resolution 524288, encoder-internal 256 S/R) without commutation position (IN19DQ encoder)
Sound pressure level L_{pA} (1 m) according to EN ISO 1680 Tolerance + 3 dB	Rated pulse frequency 4 kHz and speed range up to 5000 r/min
• 1PH808/1PH810/1PH813	70 dB
Connection	
• 1PH808/1PH810/1PH813	Terminal box top/cable entry from right/signal connection DE
• Fan	
- 1PH808	Power connector
- 1PH810/1PH813	Terminals in terminal box
• Encoder system	Connector for signals (without mating connector) or DRIVE-CLiQ
Vibration severity	In accordance with Siemens/EN 60034-14 (IEC 60034-14)
Shaft and flange accuracy ¹⁾	In accordance with Siemens/DIN 42955 (IEC 60072-1)
Degree of protection according to EN 60034-5 (IEC 60034-5)	
• 1PH808/1PH810/1PH813	IP55
• Fan	IP55
Rating plate	1 unit attached to motor 1 unit supplied loose in terminal box
Paint finish	Anthracite RAL 7016
Certificate of suitability	cURus

Options

Order code	Description
K23	Special paint finish for "Worldwide" climate group: Primer and paint finish: Anthracite, similar to RAL 7016

-Z must be added to the Article No. to order a motor with options.

¹⁾ Radial eccentricity of the shaft end, concentricity of the centering ring, and axial eccentricity of the mounting flange to the axis of the shaft end.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

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

Selection and ordering data

Rated speed	Continuous speed, max.	Rated power S1 duty	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor Forced ventilation DE → NDE IP55 degree of protection Terminal box top	Efficiency	Moment of inertia	Weight, approx.
n_N r/min	n_{max1} r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	M_0 Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)
Shaft height SH 80 – Line voltage 400 V 3 AC								
1500	10000	2.8 (3.75)	18 (13.3)	21 (15.5)	1PH8083-1DF0 ■ - ■ HA1	80.9	0.0064 (0.057)	32 (70.6)
	12000	2.8 (3.75)	18 (13.3)	21 (15.5)	1PH8083-1DF0 ■ - ■ DA1-Z L37	80.9	0.0064 (0.057)	32 (70.6)
	12000	2.8 (3.75)	18 (13.3)	21 (15.5)	1PH8083-1DF0 ■ - ■ LA1	80.9	0.0064 (0.057)	32 (70.6)
2000	10000	3.7 (4.96)	18 (13.3)	21 (15.5)	1PH8083-1DG0 ■ - ■ HA1	83.2	0.0064 (0.057)	32 (70.6)
	12000	3.7 (4.96)	18 (13.3)	21 (15.5)	1PH8083-1DG0 ■ - ■ DA1-Z L37	83.2	0.0064 (0.057)	32 (70.6)
	15000	3.7 (4.96)	18 (13.3)	21 (15.5)	1PH8083-1UG0 ■ - ■ LA1	83.2	0.0064 (0.057)	32 (70.6)
	17000	3.7 (4.96)	18 (13.3)	21 (15.5)	1PH8083-1SG0 ■ - ■ MA1	83.2	0.0064 (0.057)	32 (70.6)
3000	10000	4.1 (5.50)	13 (9.59)	21 (15.5)	1PH8083-1DM0 ■ - ■ HA1	86.9	0.0064 (0.057)	32 (70.6)
	12000	4.1 (5.50)	13 (9.59)	21 (15.5)	1PH8083-1DM0 ■ - ■ DA1-Z L37	86.9	0.0064 (0.057)	32 (70.6)
	15000	4.1 (5.50)	13 (9.59)	21 (15.5)	1PH8083-1UM0 ■ - ■ LA1	86.9	0.0064 (0.057)	32 (70.6)
	20000	4.1 (5.50)	13 (9.59)	21 (15.5)	1PH8083-1SM0 ■ - ■ MA1	86.9	0.0064 (0.057)	32 (70.6)
4500	10000	4.8 (6.44)	10 (7.38)	19 (14.0)	1PH8083-1DN0 ■ - ■ HA1	86.4	0.0064 (0.057)	32 (70.6)
	12000	4.8 (6.44)	10 (7.38)	19 (14.0)	1PH8083-1DN0 ■ - ■ DA1-Z L37	86.4	0.0064 (0.057)	32 (70.6)
	15000	4.8 (6.44)	10 (7.38)	19 (14.0)	1PH8083-1UN0 ■ - ■ LA1	86.4	0.0064 (0.057)	32 (70.6)
	20000	4.8 (6.44)	10 (7.38)	19 (14.0)	1PH8083-1SN0 ■ - ■ MA1	86.4	0.0064 (0.057)	32 (70.6)
1500	10000	3.7 (4.96)	24 (17.7)	27 (19.9)	1PH8087-1DF0 ■ - ■ HA1	81.7	0.0089 (0.079)	39 (86.0)
	12000	3.7 (4.96)	24 (17.7)	27 (19.9)	1PH8087-1DF0 ■ - ■ DA1-Z L37	81.7	0.0089 (0.079)	39 (86.0)
	14000	3.7 (4.96)	24 (17.7)	27 (19.9)	1PH8087-1UF0 ■ - ■ LA1	81.7	0.0089 (0.079)	39 (86.0)
2000	10000	4.9 (6.57)	23 (17.0)	27 (19.9)	1PH8087-1DG0 ■ - ■ HA1	85.3	0.0089 (0.079)	39 (86.0)
	12000	4.9 (6.57)	23 (17.0)	27 (19.9)	1PH8087-1DG0 ■ - ■ DA1-Z L37	85.3	0.0089 (0.079)	39 (86.0)
	15000	4.9 (6.57)	23 (17.0)	27 (19.9)	1PH8087-1UG0 ■ - ■ LA1	85.3	0.0089 (0.079)	39 (86.0)
	18000	4.9 (6.57)	23 (17.0)	27 (19.9)	1PH8087-1SG0 ■ - ■ MA1	85.3	0.0089 (0.079)	39 (86.0)
3000	10000	4.8 (6.44)	15 (11.1)	27 (19.9)	1PH8087-1DM0 ■ - ■ HA1	87.1	0.0089 (0.079)	39 (86.0)
	12000	4.8 (6.44)	15 (11.1)	27 (19.9)	1PH8087-1DM0 ■ - ■ DA1-Z L37	87.1	0.0089 (0.079)	39 (86.0)
	15000	4.8 (6.44)	15 (11.1)	27 (19.9)	1PH8087-1UM0 ■ - ■ LA1	87.1	0.0089 (0.079)	39 (86.0)
	20000	4.8 (6.44)	15 (11.1)	27 (19.9)	1PH8087-1SM0 ■ - ■ MA1	87.1	0.0089 (0.079)	39 (86.0)
4500	10000	5.8 (7.78)	12 (8.85)	25 (18.4)	1PH8087-1DN0 ■ - ■ HA1	86.8	0.0089 (0.079)	39 (86.0)
	12000	5.8 (7.78)	12 (8.85)	25 (18.4)	1PH8087-1DN0 ■ - ■ DA1-Z L37	86.8	0.0089 (0.079)	39 (86.0)
	15000	5.8 (7.78)	12 (8.85)	25 (18.4)	1PH8087-1UN0 ■ - ■ LA1	86.8	0.0089 (0.079)	39 (86.0)
	20000	5.8 (7.78)	12 (8.85)	25 (18.4)	1PH8087-1SN0 ■ - ■ MA1	86.8	0.0089 (0.079)	39 (86.0)
Type of construction					L37 Increased continuous speed, max. from 10000 to 12000 r/min			
IM B3 (IM V5, IM V6) IM B5 (IM V1, IM V3)								
Shaft end DE		Balancing		Bearing version		Vibration severity in accordance with Siemens¹⁾/ EN 60034-14	Shaft and flange accuracy	
Plain shaft		–		0 D Standard with fixed bearing		SR/A	R	
Feather key		Full-key		1 H Standard		S/A	R	
Feather key		Half-key		2 L Performance		SPECIAL/B	SPECIAL	
				M High Performance		SPECIAL/B	SPECIAL	

¹⁾ For definition of the vibration severity according to Siemens, see the 1PH8 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

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

Motor type (repeated)	Rated current for S1 duty	Stall current	SINAMICS S120 Combi								
			Rated output current for S1 duty	3-axis Power Modules			4-axis Power Modules				
				Frame type:			Frame type:				
				B11	B12	B13	B14	B01	B02	B17	B16
	I_N A	I_0 A	I_N A	Article No. 6SL3111-			Article No. 6SL3111-				
				3VE21- 6FC1	3VE21- 6EC1	3VE22- 0HC1	4VE21- 6FC1	4VE21- 6EC1	4VE21- 6ED1	4VE21- 6ED2	4VE22- 0HC1
1PH8083-1.F...	7.5	8	9	O	O/●	O/●	O/●	O/●	O/●	O/●	O/●
	7.5	8	9	O	O/●	O/●	O/●	O/●	O/●	O/●	O/●
	7.5	8	9	O	O/●	O/●	O/●	O/●	O/●	O/●	O/●
1PH8083-1.G...	11.6	12	12	O	O	O	O	O/●	O/●	O/●	O/●
	11.6	12	12	O	O	O	O	O/●	O/●	O/●	O/●
	11.6	12	12	O	O	O	O	O/●	O/●	O/●	O/●
	11.6	12	12	O	O	O	O	O/●	O/●	O/●	O/●
1PH8083-1.M...	13.6	17	18	O	O	O	O	O	O	O	O/● ²⁾
	13.6	17	18	O	O	O	O	O	O	O	O/● ²⁾
	13.6	17	18	O	O	O	O	O	O	O	O/● ²⁾
	13.6	17	18	O	O	O	O	O	O	O	O/● ²⁾
1PH8083-1.N...	17	23	18	✓	O	O	✓	O	O	O	O
	17	23	18	✓	O	O	✓	O	O	O	O
	17	23	18	✓	O	O	✓	O	O	O	O
	17	23	18	✓	O	O	✓	O	O	O	O
1PH8087-1.F...	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
1PH8087-1.G...	14.1	15	18	O	O	O	O	O	O	O	O
	14.1	15	18	O	O	O	O	O	O	O	O
	14.1	15	18	O	O	O	O	O	O	O	O
	14.1	15	18	O	O	O	O	O	O	O	O
1PH8087-1.M...	17.3	23	18	✓	O	O	✓	O	O	O	O
	17.3	23	18	✓	O	O	✓	O	O	O	O
	17.3	23	18	✓	O	O	✓	O	O	O	O
	17.3	23	18	✓	O	O	✓	O	O	O	O
1PH8087-1.N...	19.5	28	30	✓ ²⁾	O	O	✓ ²⁾	O	O	O	O
	19.5	28	30	✓ ²⁾	O	O	✓ ²⁾	O	O	O	O
	19.5	28	30	✓ ²⁾	O	O	✓ ²⁾	O	O	O	O
	19.5	28	30	✓ ²⁾	O	O	✓ ²⁾	O	O	O	O

- ✓ Perfectly suited as main spindle
 O Suitable as main spindle
 ● Perfectly suited as driven tool
 – Not suitable

2) With derating

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 100 – Forced ventilation**Selection and ordering data**

Rated speed	Continuous speed, max.	Rated power S1 duty	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor Forced ventilation DE → NDE IP55 degree of protection Terminal box top	Efficiency	Moment of inertia	Weight, approx.
n_N r/min	n_{max1} r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	M_0 Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)
Shaft height SH 100 – Line voltage 400 V 3 AC								
1500	9000	3.7 (5.0)	24 (17.7)	29 (21.4)	1PH8101-1DF0 ■ - ■ HA1	83.5	0.0138 (0.122)	42 (92.6)
	10000	3.7 (5.0)	24 (17.7)	29 (21.4)	1PH8101-1DF0 ■ - ■ DA1-Z L37	83.5	0.0138 (0.122)	42 (92.6)
	12000	3.7 (5.0)	24 (17.7)	29 (21.4)	1PH8101-1DF0 ■ - ■ LA1	83.5	0.0138 (0.122)	42 (92.6)
1000	9000	3.7 (5.0)	35 (25.8)	38 (28.0)	1PH8103-1DD0 ■ - ■ HA1	81.4	0.0172 (0.152)	51 (112)
	10000	3.7 (5.0)	35 (25.8)	38 (28.0)	1PH8103-1DD0 ■ - ■ DA1-Z L37	81.4	0.0172 (0.152)	51 (112)
	12000	3.7 (5.0)	35 (25.8)	38 (28.0)	1PH8103-1DD0 ■ - ■ LA1	81.4	0.0172 (0.152)	51 (112)
1500	9000	5.5 (7.4)	35 (25.8)	38 (28.0)	1PH8103-1DF0 ■ - ■ HA1	85.2	0.0172 (0.152)	51 (112)
	10000	5.5 (7.4)	35 (25.8)	38 (28.0)	1PH8103-1DF0 ■ - ■ DA1-Z L37	85.2	0.0172 (0.152)	51 (112)
	12000	5.5 (7.4)	35 (25.8)	38 (28.0)	1PH8103-1DF0 ■ - ■ LA1	85.2	0.0172 (0.152)	51 (112)
2000	9000	7 (9.39)	33 (24.3)	38 (28.0)	1PH8103-1DG0 ■ - ■ HA1	87.7	0.0172 (0.152)	51 (112)
	10000	7 (9.39)	33 (24.3)	38 (28.0)	1PH8103-1DG0 ■ - ■ DA1-Z L37	87.7	0.0172 (0.152)	51 (112)
	12000	7 (9.39)	33 (24.3)	38 (28.0)	1PH8103-1DG0 ■ - ■ LA1	87.7	0.0172 (0.152)	51 (112)
3000	9000	8.4 (11.3)	27 (19.9)	38 (28.0)	1PH8103-1DM0 ■ - ■ HA1	90.0	0.0172 (0.152)	51 (112)
	10000	8.4 (11.3)	27 (19.9)	38 (28.0)	1PH8103-1DM0 ■ - ■ DA1-Z L37	90.0	0.0172 (0.152)	51 (112)
	12000	8.4 (11.3)	27 (19.9)	38 (28.0)	1PH8103-1DM0 ■ - ■ LA1	90.0	0.0172 (0.152)	51 (112)
1500	9000	7 (9.39)	45 (33.2)	52 (38.4)	1PH8105-1DF0 ■ - ■ HA1	86.7	0.0252 (0.223)	65 (143)
	10000	7 (9.39)	45 (33.2)	52 (38.4)	1PH8105-1DF0 ■ - ■ DA1-Z L37	86.7	0.0252 (0.223)	65 (143)
	12000	7 (9.39)	45 (33.2)	52 (38.4)	1PH8105-1DF0 ■ - ■ LA1	86.7	0.0252 (0.223)	65 (143)
1000	9000	6.3 (8.4)	60 (44.3)	63 (46.5)	1PH8107-1DD0 ■ - ■ HA1	83.4	0.0289 (0.256)	73 (161)
	10000	6.3 (8.4)	60 (44.3)	63 (46.5)	1PH8107-1DD0 ■ - ■ DA1-Z L37	83.4	0.0289 (0.256)	73 (161)
	12000	6.3 (8.4)	60 (44.3)	63 (46.5)	1PH8107-1DD0 ■ - ■ LA1	83.4	0.0289 (0.256)	73 (161)
1500	9000	9 (12.1)	57 (42.0)	63 (46.5)	1PH8107-1DF0 ■ - ■ HA1	86.9	0.0289 (0.256)	73 (161)
	10000	9 (12.1)	57 (42.0)	63 (46.5)	1PH8107-1DF0 ■ - ■ DA1-Z L37	86.9	0.0289 (0.256)	73 (161)
	12000	9 (12.1)	57 (42.0)	63 (46.5)	1PH8107-1DF0 ■ - ■ LA1	86.9	0.0289 (0.256)	73 (161)
2000	9000	10.5 (14.1)	50 (36.9)	63 (46.5)	1PH8107-1DG0 ■ - ■ HA1	89.7	0.0289 (0.256)	73 (161)
	10000	10.5 (14.1)	50 (36.9)	63 (46.5)	1PH8107-1DG0 ■ - ■ DA1-Z L37	89.7	0.0289 (0.256)	73 (161)
	12000	10.5 (14.1)	50 (36.9)	63 (46.5)	1PH8107-1DG0 ■ - ■ LA1	89.7	0.0289 (0.256)	73 (161)
Type of construction					L37 Increased continuous speed, max. from 9000 to 10000 r/min			
IM B3 (IM V5, IM V6) IM B5 (IM V1, IM V3)								
Shaft end DE		Balancing		Bearing version		Vibration severity in accordance with Siemens¹⁾/ EN 60034-14	Shaft and flange accuracy	
Plain shaft		–		0 D Standard with fixed bearing		SR/A	R	
Feather key		Full-key		1 H Standard		S/A	R	
Feather key		Half-key		2 L Performance		SPECIAL/B	SPECIAL	
				M High Performance		SPECIAL/B	SPECIAL	

¹⁾ For definition of the vibration severity according to Siemens, see the 1PH8 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 100 – Forced ventilation

Motor type (repeated)	Rated current for S1 duty	Stall current	SINAMICS S120 Combi								
			Rated output current for S1 duty	3-axis Power Modules			4-axis Power Modules				
				Frame type:			Frame type:				
				B11	B12	B13	B14	B01	B02	B17	B16
				Article No. 6SL3111-			Article No. 6SL3111-				
	I_N A	I_0 A	I_N A	3VE21- 6FC1	3VE21- 6EC1	3VE22- 0HC1	4VE21- 6FC1	4VE21- 6EC1	4VE21- 6ED1/	4VE21- 6ED2	4VE22- 0HC1
1PH8101-1.F...	12.5	14	12	O	O	O	O	O	O	O	O/●
	12.5	14	12	O	O	O	O	O	O	O	O/●
	12.5	14	12	O	O	O	O	O	O	O	O/●
1PH8103-1.D...	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
	10	11	12	O	O/● ²⁾	O/● ²⁾	O/● ²⁾	O/●	O/●	O/●	O/●
1PH8103-1.F...	13.5	14	18	O	O	O	O	O	O	O	O/● ²⁾
	13.5	14	18	O	O	O	O	O	O	O	O/● ²⁾
	13.5	14	18	O	O	O	O	O	O	O	O/● ²⁾
1PH8103-1.G...	17.5	19	18	✓	O	O	✓	O	O	O	O
	17.5	19	18	✓	O	O	✓	O	O	O	O
	17.5	19	18	✓	O	O	✓	O	O	O	O
1PH8103-1.M...	25.7	31	30	–	✓ ²⁾	O	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	O
	25.7	31	30	–	✓ ²⁾	O	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	O
	25.7	31	30	–	✓ ²⁾	O	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	O
1PH8105-1.F...	17.5	20	18	✓	O	O	✓	O	O	O	O
	17.5	20	18	✓	O	O	✓	O	O	O	O
	17.5	20	18	✓	O	O	✓	O	O	O	O
1PH8107-1.D...	17.5	25	18	✓	O	O	✓	O	O	O	O
	17.5	25	18	✓	O	O	✓	O	O	O	O
	17.5	25	18	✓	O	O	✓	O	O	O	O
1PH8107-1.F...	23.5	25	24	–	✓	O	–	✓	✓	✓	O
	23.5	25	24	–	✓	O	–	✓	✓	✓	O
	23.5	25	24	–	✓	O	–	✓	✓	✓	O
1PH8107-1.G...	26	29	30	–	✓ ²⁾	✓	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓
	26	29	30	–	✓ ²⁾	✓	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓
	26	29	30	–	✓ ²⁾	✓	–	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓

- ✓ Perfectly suited as main spindle
- O Suitable as main spindle
- Perfectly suited as driven tool
- Not suitable

²⁾ With derating

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 100 – Forced ventilation – Star-delta circuit

Selection and ordering data

Rated speed	Continuous speed, max.	Rated power S1 duty	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor Forced ventilation DE → NDE IP55 degree of protection Terminal box top	Efficiency	Moment of inertia	Weight, approx.
n_N r/min	n_{max1} r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	M_0 Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)
Shaft height SH 100 – Line voltage 400 V 3 AC – Star-delta circuit								
1500/4000	9000	3.7/3.7 (5.0/5.0)	24/9 (17.7/6.64)	29/19 (21.4/14.0)	1PH8101-1DS0 ■ - ■ HA1	83.0/89.0	0.0138 (0.1221)	42 (92.6)
	10000	3.7/3.7 (5.0/5.0)	24/9 (17.7/6.64)	29/19 (21.4/14.0)	1PH8101-1DS0 ■ - ■ DA1-Z L37	83.0/89.0	0.0138 (0.1221)	42 (92.6)
	12000	3.7/3.7 (5.0/5.0)	24/9 (17.7/6.64)	29/19 (21.4/14.0)	1PH8101-1DS0 ■ - ■ LA1	83.0/89.0	0.0138 (0.1221)	42 (92.6)
	18000	3.7/3.7 (5.0/5.0)	24/9 (17.7/6.64)	29/19 (21.4/14.0)	1PH8101-1SS0 ■ - ■ MA1	83.0/89.0	0.0138 (0.1221)	42 (92.6)
1500/4000	9000	7.5/7.5 (10.1/10.1)	48/18 (35.4/13.3)	55/36 (40.6/26.6)	1PH8105-1DS0 ■ - ■ HA1	86.4/90.7	0.0252 (0.2230)	65 (143)
	10000	7.5/7.5 (10.1/10.1)	48/18 (35.4/13.3)	55/36 (40.6/26.6)	1PH8105-1DS0 ■ - ■ DA1-Z L37	86.4/90.7	0.0252 (0.2230)	65 (143)
	12000	7.5/7.5 (10.1/10.1)	48/18 (35.4/13.3)	55/36 (40.6/26.6)	1PH8105-1DS0 ■ - ■ LA1	86.4/90.7	0.0252 (0.2230)	65 (143)
	18000	7.5/7.5 (10.1/10.1)	48/18 (35.4/13.3)	55/36 (40.6/26.6)	1PH8105-1SS0 ■ - ■ MA1	86.4/90.7	0.0252 (0.2230)	65 (143)
1500/4000	9000	8.5/8.5 (11.4/11.4)	54/20 (39.8/14.8)	63/42 (46.5/31.0)	1PH8107-1DS0 ■ - ■ HA1	86.1/89.8	0.0289 (0.2558)	73 (161)
	10000	8.5/8.5 (11.4/11.4)	54/20 (39.8/14.8)	63/42 (46.5/31.0)	1PH8107-1DS0 ■ - ■ DA1-Z L37	86.1/89.8	0.0289 (0.2558)	73 (161)
	12000	8.5/8.5 (11.4/11.4)	54/20 (39.8/14.8)	63/42 (46.5/31.0)	1PH8107-1DS0 ■ - ■ LA1	86.1/89.8	0.0289 (0.2558)	73 (161)
	18000	8.5/8.5 (11.4/11.4)	54/20 (39.8/14.8)	63/42 (46.5/31.0)	1PH8107-1SS0 ■ - ■ MA1	86.1/89.8	0.0289 (0.2558)	73 (161)
Type of construction					L37 Increased continuous speed, max. from 9000 to 10000 r/min			
IM B3 (IM V5, IM V6) IM B5 (IM V1, IM V3)								
Shaft end DE		Balancing		Bearing version		Vibration severity in accordance with Siemens¹⁾/ EN 60034-14	Shaft and flange accuracy	
Plain shaft		–		0 D Standard with fixed bearing		SR/A	R	
Feather key		Full-key		1 H Standard		S/A	R	
Feather key		Half-key		2 L Performance		SPECIAL/B	SPECIAL	
				M High Performance		SPECIAL/B	SPECIAL	

¹⁾ For definition of the vibration severity according to Siemens, see the 1PH8 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 100 – Forced ventilation – Star-delta circuit

Motor type (repeated)	Rated current for S1 duty	Stall current	SINAMICS S120 Combi								
			Rated output current for S1 duty	3-axis Power Modules			4-axis Power Modules				
				Frame type:			Frame type:				
				B11	B12	B13	B14	B01	B02	B17	B16
	I_N A	I_0 A	I_N A	Article No. 6SL3111-			Article No. 6SL3111-				
				3VE21- 6FC1	3VE21- 6EC1	3VE22- 0HC1	4VE21- 6FC1	4VE21- 6EC1	4VE21- 6ED1	4VE21- 6ED2	4VE22- 0HC1
1PH8101-1.S...	13.2/13.5	15/20	18	O	O	O	O	O	O	O	O
	13.2/13.5	15/20	18	O	O	O	O	O	O	O	O
	13.2/13.5	15/20	18	O	O	O	O	O	O	O	O
	13.2/13.5	15/20	18	O	O	O	O	O	O	O	O
1PH8105-1.S...	23/24	25/35	24	–	O	O	–	O	O	O	O
	23/24	25/35	24	–	O	O	–	O	O	O	O
	23/24	25/35	24	–	O	O	–	O	O	O	O
	23/24	25/35	24	–	O	O	–	O	O	O	O
1PH8107-1.S...	27/28	30/40	30	–	–	O	–	–	–	–	O
	27/28	30/40	30	–	–	O	–	–	–	–	O
	27/28	30/40	30	–	–	O	–	–	–	–	O
	27/28	30/40	30	–	–	O	–	–	–	–	O

- ✓ Perfectly suited as main spindle
- O Suitable as main spindle
- Perfectly suited as driven tool
- Not suitable

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 132 – Forced ventilation**Selection and ordering data**

Rated speed	Continuous speed, max.	Rated power S1 duty	Rated torque	Static torque	SIMOTICS M-1PH8 asynchronous motor Forced ventilation DE → NDE IP55 degree of protection Terminal box top	Efficiency	Moment of inertia	Weight, approx.
n_N r/min	n_{max1} r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	M_0 Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)
Shaft height SH 132 – Line voltage 400 V 3 AC								
1500	8000	11 (14.8)	70 (51.6)	96 (70.8)	1PH8131-1DF0 ■ - ■ HA1	89.9	0.059 (0.522)	89 (196)
	10000	11 (14.8)	70 (51.6)	96 (70.8)	1PH8131-1DF0 ■ - ■ LA1	89.9	0.059 (0.522)	89 (196)
1000	8000	12 (16.1)	115 (84.8)	128 (94.4)	1PH8133-1DD0 ■ - ■ HA1	87.1	0.076 (0.673)	106 (234)
	10000	12 (16.1)	115 (84.8)	128 (94.4)	1PH8133-1DD0 ■ - ■ LA1	87.1	0.076 (0.673)	106 (234)
Type of construction								
IM B3 (IM V5, IM V6)								
IM B5 (IM V1, IM V3)								
Shaft end DE		Balancing				Bearing version	Vibration severity in accordance with Siemens¹⁾/ EN 60034-14	Shaft and flange accuracy
Plain shaft		–				0 H Standard	S/A	R
Feather key		Full-key				1 L Performance	SPECIAL/B	SPECIAL
Feather key		Half-key				2 M High Performance	SPECIAL/B	SPECIAL

¹⁾ For definition of the vibration severity according to Siemens, see the 1PH8 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 asynchronous motors – SH 132 – Forced ventilation

Motor type (repeated)	Rated current for S1 duty	Stall current	SINAMICS S120 Combi								
			Rated output current for S1 duty	3-axis Power Modules			4-axis Power Modules				
				Frame type:			Frame type:				
				B11	B12	B13	B14	B01	B02	B17	B16
				Article No. 6SL3111-			Article No. 6SL3111-				
I_N A	I_0 A	I_N A	3VE21- 6FC1	3VE21- 6EC1	3VE22- 0HC1	4VE21- 6FC1	4VE21- 6EC1	4VE21- 6ED1	4VE21- 6ED2	4VE22- 0HC1	
1PH8131-1.F...	24	30	24	–	✓	○	–	✓	✓	✓	○
	24	30	24	–	✓	○	–	✓	✓	✓	○
1PH8133-1.D...	30	32	30	–	–	✓	–	–	–	–	✓
	30	32	30	–	–	✓	–	–	–	–	✓

- ✓ Perfectly suited as main spindle
- Suitable as main spindle
- Perfectly suited as driven tool
- Not suitable

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 Premium Performance asynchronous motors – SH 80 – Forced ventilation

Selection and ordering data

Rated speed	Maximum speed	Rated power S1 duty	Rated torque	SIMOTICS M-1PH8 Premium Performance asynchronous motor Forced ventilation DE → NDE IP55 degree of protection Terminal box top	Efficiency	Moment of inertia	Weight, approx. Motor with solid shaft
n_N r/min	n_{max} r/min	P_N kW (hp)	M_N Nm (lb _f -ft)	Article No.	η %	J kgm ² (lb _f -in-s ²)	m kg (lb)

Shaft height SH 80 – Line voltage 400 V 3 AC

9000	24000	2.8 (3.8)	3.0 (2.2)	1PH8081-1SU0 2- NA1-Z Q12+Q52	88.5	0.0045 (0.040)	24 (52.9)
	24000	2.8 (3.8)	3.0 (2.2)	1PH8081-1SW0 2- NA1-Z Q12+Q52	84.3	0.0045 (0.040)	24 (52.9)
	24000	3.5 (4.7)	3.7 (2.7)	1PH8081-1SV0 2- NA1-Z Q12+Q52	95.0	0.0045 (0.040)	24 (52.9)
5200	24000	4.5 (6.0)	8.3 (6.1)	1PH8083-1SW0 2- NA1-Z Q12+Q52	86.6	0.0064 (0.057)	29.5 (65.0)
12000	24000	4.5 (6.0)	3.6 (2.7)	1PH8083-1SV0 2- NA1-Z Q12+Q52	93.9	0.0064 (0.057)	29.5 (65.0)
	24000	6.5 (8.7)	5.2 (3.8)	1PH8087-1SV0 2- NA1-Z Q12+Q52	94.7	0.0089 (0.079)	37 (81.6)

Type of construction

IM B5 (IM V1, IM V3) **2**

Shaft end DE

Solid shaft **0**
Hollow shaft Order code **Y64** required.
Prepared for bearing-free rotating feed-throughs¹⁾ **3**

Bearing version **Vibration severity in accordance with Siemens²⁾ EN 60034-14** **Shaft and flange accuracy**

Premium Performance SPECIAL/B SPECIAL **N**

Q52 DE flange with additional 4 × M8 thread for one adapter plate for alignment of motor shaft with spindle shaft

Q12 M5 sealing air connection on terminal box¹⁾

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¹⁾ For further details on interfaces and sealing air conditioning, see the 1PH8 Configuration Manual.

²⁾ For definition of the vibration severity according to Siemens, see the 1PH8 Configuration Manual.

SIMOTICS motors

Spindle motors for SINAMICS S120 Combi/SINAMICS S120

SIMOTICS M-1PH8 Premium Performance asynchronous motors – SH 80 – Forced ventilation

Motor type (repeated)	Rated current for S1 duty I_N A	SINAMICS S120 Combi								
		Pulse frequency kHz	3-axis Power Modules			4-axis Power Modules				
			Frame type:			Frame type:				
			B11	B12	B13	B14	B01	B02	B17	B16
			Article No. 6SL3111-			Article No. 6SL3111-				
			3VE21- 6FC1	3VE21- 6EC1	3VE22- 0HC1	4VE21- 6FC1	4VE21- 6EC1	4VE21- 6ED1	4VE21- 6ED2	4VE22- 0HC1
1PH8081-1SU02-....	12.5	4	–	–	–	–	✓	✓	✓	✓
1PH8081-1SW02-....	12.5	8	–	–	–	–	–	–	–	–
1PH8081-1SV02-....	15.5	8	–	–	–	–	–	–	–	–
1PH8083-1SW02-....	15.5	8	–	–	–	–	–	–	–	–
1PH8083-1SV02-....	15.5	8	–	–	–	–	–	–	–	–
1PH8087-1SV02-....	19.0	8	–	–	–	–	–	–	–	–

- ✓ Perfectly suited as main spindle
- Suitable as main spindle
- Perfectly suited as driven tool
- Not suitable

SIMOTICS motors

Notes

Motion Control Encoder measuring systems



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Built-on optoelectronic rotary encoders

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Introduction

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Incremental encoders

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Incremental encoder with sin/cos 1 V_{pp}

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Incremental encoder with RS422 (TTL)

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MOTION-CONNECT

DRIVE-CLiQ signal cables

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Introduction

Overview

Motion control encoder	Interface	Built-on encoder usable for Safety Integrated ¹⁾	Resolution	Accuracy	Cable length	Degree of protection at housing (at shaft input)
			S/R = signals/revolution	arcsec	m (ft)	
Incremental encoders						
	sin/cos 1 V _{pp}	No	1000 ... 2500 S/R	± 18 mech. × 3600/ PPR count z	150 (492)	IP67 (IP64)
	RS422 (TTL)	No	500 ... 5000 S/R	± 18 mech. × 3600/ PPR count z	100 (328)	IP67 (IP64)
	HTL	No	100 ... 2500 S/R	± 18 mech. × 3600/ PPR count z	300 (984)	IP67 (IP64)
Absolute encoders						
	DRIVE-CLiQ	Yes	Single-turn 24 bit Multi-turn 36 bit (2 ²⁴ steps × 4096 revolutions)	± 20	100 (328)	IP67 (IP64)
	SSI	No	Single-turn 13 bit (8192 steps) Multi-turn 25 bit (8192 steps × 4096 revolutions)	± 60	100 (328)	IP67 (IP64)
	EnDat 2.1	Yes	Single-turn 13 bit (8192 steps) Multi-turn 25 bit (8192 steps × 4096 revolutions)	± 60 (incremental track)	150 (492)	IP67 (IP64)
	PROFIBUS DP-V2	No	Single-turn 13 bit (8192 steps) Multi-turn 27 bit (8192 steps × 16384 revolutions)	± 79	100 (328)	IP67 (IP64)
	PROFINET IO with RT/IRT	No	Single-turn 13 bit/16 bit (8192/65536 steps) Multi-turn 27 bit/30 bit (8192/65536 steps × 16384 revolutions)	± 79	100 (328)	IP67 (IP64)
Accessories for measuring systems						
Couplings Clamps Signal connectors as mating connectors MOTION-CONNECT DRIVE-CLiQ signal cables						

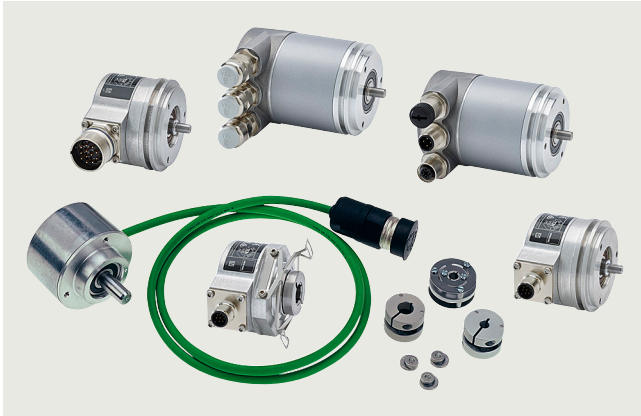
¹⁾ If you require information about the usability of motion control encoder measuring systems for Safety Integrated, please contact your local Siemens office.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Introduction

Overview



Incremental and absolute encoders with mounting accessories

Motion control encoders are optoelectronic built-on encoders that detect the traversing distances, angles of rotation, speeds or positions of machine axes. Motion control encoders are direct measuring systems that are built-on to shafts, axes or motors. They can be used in conjunction with numerical and programmable logic controllers, drives and position displays. Motion control encoders are system-tested, certified components that have been harmonized for use with the following systems:

- SINUMERIK CNCs
- SIMOTION Motion Control Systems
- SIMATIC programmable logic controllers
- SINAMICS drive systems

Application

Motion control encoders are used with machine tools and production machines as additional external measuring systems. They are available as incremental or absolute encoders.

Incremental encoders

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. Movements of the machine while the power is off are not recorded.

Incremental encoders are suitable for use in simple machine concepts with mostly small dimensions.

Absolute encoders

Absolute encoders, on the other hand, also record movements while the power is off and return the actual position after power on. Travel to a reference point is not necessary.

Absolute encoders are suitable for complex machines or machines with large dimensions.

Design

All motion control encoders are available in Synchro flange and clamp flange versions. The absolute encoders are also available with a hollow shaft and torque arm.

The motion control encoders are driven via a plug-in coupling or spring disk coupling. Alternatively, pulleys can also be used.

The motor control 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 supply the voltage directly at the measuring circuit connector. With SINAMICS, the measuring systems are provided with power via the Sensor Modules.

For motion control encoders with cables, the cable length including the connector is 1 m (3.28 ft).

The following bending radii must be observed for the cable to the built-on encoder:

- One-time bending: ≥ 20 mm (0.79 in)
- Continuous bending: ≥ 75 mm (2.95 in)

More information

Power supply

Absolute encoders with EnDat, SSI or DRIVE-CLiQ and incremental encoders with sin/cos 1 V_{pp}, HTL or TTL fulfill the requirements of IEC 61010-1 if power is supplied from a secondary circuit with limited energy (Low Voltage, Limited Energy) acc. to IEC 61010-1^{3rd Ed.}, Section 9.4 or from a Class 2 secondary circuit in accordance with UL 1310.

The corresponding sections of DIN EN 61010-1, EN 61010-1, UL 61010-1 and CAN/CSA-C22.2 No. 61010-1 can be used instead of IEC 61010-1^{3rd Ed.}, Section 9.4.

Absolute encoders with PROFIBUS DP and PROFINET IO fulfill the requirements of UL 508 and CAN/CSA-C22.2 No. 14 if power is supplied from a Class 2 secondary circuit as per National Electrical Code/Canadian Electrical Code.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Incremental encoders

Function



Incremental encoder with sin/cos 1 V_{pp} and clamp flange incl. cable with connector as well as incremental encoder with RS422/HTL and Synchro flange

Incremental encoders detect relative movement and deliver a defined number of electrical pulses per revolution, which represent the measurement of the traveled distance or angle.

Incremental encoders operate on the principle of optoelectronic scanning of dividing discs with the transmitted light principle. The light source is a light emitting diode (LED). The light-dark modulation generated as the encoder shaft rotates is picked up by photoelectronic elements. With an appropriate arrangement of the line pattern on the dividing disk connected to the shaft and the fixed aperture, the photoelectronic elements provide two trace signals A and B at 90° to one another, as well as a reference signal R.

The encoder electronics amplify these signals and convert them to different output levels.

Signal levels

The following signal levels are available for the incremental encoders:

Signal level	Benefits
Analog signals sin/cos with level 1 V _{pp}	The analog signal allows the digitization of the trace signals. In order to obtain a fine resolution, the signals are interpolated in the higher-level controller.
RS422 differential signals (TTL)	The resolution can be quadrupled by means of edge evaluation.
HTL (High Voltage Transistor Logic)	Built-on encoders with an HTL interface are designed for applications with digital inputs with a 24 V level. The resolution can be quadrupled by means of edge evaluation.

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Technical specifications

Article No.		6FX2001-3....	6FX2001-2....	6FX2001-4...0
Product name		Motion control encoder	Motion control encoder	Motion control encoder
Product designation		Incremental encoder with sin/cos 1 V _{pp}	Incremental encoder with RS422 (TTL)	Incremental encoder with HTL
Operating voltage DC V _p on encoder	V	5 ± 10 %	5 ± 10 % or 10 ... 30	10 ... 30
No-load current consumption, maximum	mA	150	150	150
Connection		Axial/radial flange outlet M23 or cable with connector M23	Axial/radial flange outlet M23 or cable with connector M23	Axial/radial flange outlet M23 or cable with connector M23
Limit frequency, typical	kHz	≥ 180 (- 3 dB) ≥ 450 (- 6 dB)	–	–
Scanning frequency, maximum	kHz	–	300	300
Resolution, maximum	S/R	2500	5000	2500
Signal level		Sinusoidal 1 V _{pp}	RS422 (TTL)	V _H ≥ 21 V with I _H = 20 mA at 24 V V _L ≤ 2.8 V with I _L = 20 mA at 24 V
Outputs protected against short-circuit to 0 V		Yes Briefly	Yes	Yes Briefly
Switching time (10 ... 90 % rise/fall time t _r /t _f) (for 1 m (3.28 ft) cable and recommended input circuit)	ns	–	≤ 50	≤ 200
Phase angle, signal A to B	Degrees	90 ± 10	90	90
Edge spacing				
• At 300 kHz	μs	–	≥ 0.45	≥ 0.45
Cable length to downstream electronics, maximum ¹⁾	m (ft)	150 (492)	100 (328) without fault signal 50 (164) with fault signal	300 (984)
Accuracy	arcsec	± 18 mech. × 3600/PPR count z	± 18 mech. × 3600/PPR count z	± 18 mech. × 3600/PPR count z
LED failure monitoring		–	High-resistance driver	High-resistance driver
Maximum mechanical speed	r/min	12000	12000	12000

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.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Incremental encoders

Technical specifications

Article No. Product name Product designation		6FX2001-3.... Motion control encoder Incremental encoder with sin/cos 1 V _{pp}	6FX2001-2.... Motion control encoder Incremental encoder with RS422 (TTL)	6FX2001-4...0 Motion control encoder Incremental encoder with HTL
Starting torque at 20 °C (68 °F)	Nm (lb _f -ft)	≤ 0.01 (0.01)	≤ 0.01 (0.01)	≤ 0.01 (0.01)
Shaft loading capacity				
• $n \leq 6000$ r/min				
- Axial	N (lb _f)	40 (8.99)	40 (8.99)	40 (8.99)
- Radial at shaft end	N (lb _f)	60 (13.5)	60 (13.5)	60 (13.5)
• $n > 6000$ r/min				
- Axial	N (lb _f)	10 (2.25)	10 (2.25)	10 (2.25)
- Radial at shaft end	N (lb _f)	20 (4.50)	20 (4.50)	20 (4.50)
Shaft diameter				
• Synchro flange	mm (in)	6 (0.24)	6 (0.24)	6 (0.24)
• Clamp flange	mm (in)	10 (0.39)	10 (0.39)	10 (0.39)
Shaft length				
• Synchro flange	mm (in)	10 (0.39)	10 (0.39)	10 (0.39)
• Clamp flange	mm (in)	20 (0.79)	20 (0.79)	20 (0.79)
Angular acceleration, maximum	rad/s ²	10 ⁵	10 ⁵	10 ⁵
Moment of inertia of rotor	kgm ² (lb _f -in-s ²)	≤ 2.9 × 10 ⁻⁶ (2.57 × 10 ⁻⁵)	≤ 2.9 × 10 ⁻⁶ (2.57 × 10 ⁻⁵)	≤ 2.9 × 10 ⁻⁶ (2.57 × 10 ⁻⁵)
Vibration (55 ... 2000 Hz) according to EN 60068-2-6	m/s ² (ft/s ²)	≤ 300 (984)	≤ 300 (984)	≤ 300 (984)
Shock according to EN 60068-2-27				
• 6 ms	m/s ² (ft/s ²)	≤ 2000 (6562)	≤ 2000 (6562)	≤ 2000 (6562)
Degree of protection				
• At housing		IP67	IP67	IP67
• At shaft input		IP64	IP64	IP64
Ambient temperature during Operation				
• Flange outlet or fixed cable				
- At V _p = 5 V ± 10 %	°C (°F)	-40 ... +100 (-40 ... +212)	-40 ... +100 (-40 ... +212)	-40 ... +100 (-40 ... +212)
- At V _p = 10 ... 30 V	°C (°F)	–	-40 ... +70 (-40 ... +158)	–
• Flexible cable				
- At V _p = 5 V ± 10 %	°C (°F)	-10 ... +100 (+14 ... +212)	-10 ... +100 (+14 ... +212)	-10 ... +100 (+14 ... +212)
- At V _p = 10 ... 30 V	°C (°F)	–	-10 ... +70 (+14 ... +158)	–
Net weight	kg (lb)	0.3 (0.66)	0.3 (0.66)	0.3 (0.66)
EMC		EMC Directive 2014/30/EC and regulations of EMC directives (applicable basic standards)		
Certificate of suitability		CE, CSA, UL	CE, CSA, UL	CE, CSA, UL

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Incremental encoders

Selection and ordering data

Description	Article No.
Incremental encoder with sin/cos 1 V_{pp}	
<u>5 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-3G
- Radial flange outlet	6FX2001-3E
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-3C
<u>Resolution</u>	
1000 S/R	B 0 0
1024 S/R	B 0 2
2500 S/R	C 5 0
Incremental encoder with RS422 (TTL)	
<u>5 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-2G
- Radial flange outlet	6FX2001-2E
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-2C
• Clamp flange and connection via	
- Axial flange outlet	6FX2001-2R
- Radial flange outlet	6FX2001-2P
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-2M
<u>10 ... 30 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-2H
- Radial flange outlet	6FX2001-2F
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-2D
• Clamp flange and connection via	
- Axial flange outlet	6FX2001-2S
- Radial flange outlet	6FX2001-2Q
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-2N
<u>Resolution</u>	
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	Article No.
Incremental encoder with HTL	
<u>10 ... 30 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-4H
- Radial flange outlet	6FX2001-4F
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-4D
• Clamp flange and connection via	
- Axial flange outlet	6FX2001-4S
- Radial flange outlet	6FX2001-4Q
- Cable 1 m (3.28 ft) with connector ¹⁾	6FX2001-4N
<u>Resolution</u>	
100 S/R	A 1
500 S/R	A 5
1000 S/R	B 0
2500 S/R	C 5

¹⁾ Universal integrated cable outlet for axial and radial outlet direction.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Function



Absolute encoders with SSI/EnDat and PROFIBUS DP (top), and DRIVE-CLiQ and PROFINET IO (bottom)

Absolute encoders output an absolute angular position between 0° and 360° . They operate 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). This prevents any scanning errors from occurring. After switching on the machine, the position value is transferred immediately to the controller, travel to a reference point is not necessary.

All absolute encoders are available in single-turn and multi-turn versions.

Single-turn encoders

Single-turn encoders divide one rotation (360 degrees 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.

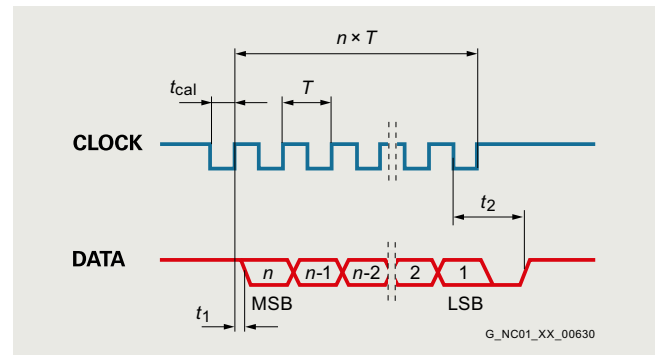
Multi-turn encoders

Multi-turn encoders 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 an additional $2^{12} = 4096$ revolutions can be coded.

Interfaces

The following interfaces are supported by the absolute encoders:

Interface	Benefits
DRIVE-CLiQ	• Very high data transfer rates possible • Advantages in time-critical applications • Simple and quick automatic configuration using electronic rating plates • Fast and easy diagnostics with a single tool • One interface for connecting drives as well as indirect and direct measurement systems to the CNC.
SSI	• Advantages in time-critical applications
EnDat 2.1	• High data transfer rate, bidirectional • Advantages in time-critical applications • Incremental encoder sin/cos $1 V_{pp}$ • Connection via SINAMICS Sensor Modules SMC/SME
PROFIBUS DP-V2	• Parameterizable built-on encoder • Reduced wiring overhead in plants with a large number of encoders • Isochronous operation and direct data exchange
PROFINET IO	• Parameterizable built-on encoder • Reduced wiring overhead in plants with a large number of encoders • Supports conformity class C (IRT communication), B, A (RT communication) • IRT (isochronous mode) • 2 ports • Media redundancy with MRPD, MRP



Data transfer for absolute encoders with SSI interface

n = data word length (13 bits for single-turn and 25 bits for multi-turn)
 T = 1 ... 10 μs
 t_{cal} = $\leq 5 \mu s$
 t_1 = $\leq 0.4 \mu s$ (without cable)
 t_2 = 17 ... 20 μs

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Technical specifications

Article No. Product name Product designation		6FX2001-5.D...-1AA0 Motion control encoder Absolute encoder with DRIVE-CLiQ	6FX2001-5.S.. Motion control encoder Absolute encoder with SSI	6FX2001-5.E.. Motion control encoder Absolute encoder with EnDat 2.1
Operating voltage DC V_p on encoder	V	24 - 15 % + 20 %	4.75 ... 30	3.6 ... 14
Current consumption, approx.				
• Single-turn	mA	37	90	90
• Multi-turn	mA	43	120	120
Connection		Radial flange outlet M12	Axial/radial flange outlet M23	Axial/radial flange outlet M23
Interface		DRIVE-CLiQ	SSI	EnDat 2.1
Clock input		–	Differential cable receiver acc. to EIA standard RS 485	Differential cable receiver acc. to EIA standard RS 485
Data output		DRIVE-CLiQ	Differential cable driver acc. to EIA standard RS 485	Differential cable driver acc. to EIA standard RS 485
Short-circuit strength		Yes	Yes	Yes
Transfer rate	Mbps	100	–	–
Transfer rate	kHz	–	100 ... 1000	100 ... 2000
Maximum speed				
• Electrical	r/min	14000	–	–
- With ± 1 LSB accuracy	r/min	–	5000	5000
- With ± 12 LSB accuracy	r/min	12000	–	–
- With ± 100 LSB accuracy	r/min	–	12000	12000
• Mechanical				
- Single-turn	r/min	15000	15000	15000
- Multi-turn	r/min	12000	12000	12000
Cable length to downstream electronics, maximum ¹⁾				
• Up to 300 kHz cycle	m (ft)	100 (328)	–	–
• Up to 1 MHz cycle	m (ft)	–	100 (328)	150 (492)
• Up to 1 MHz cycle	m (ft)	–	50 (164)	50 (164)
• Up to 2 MHz cycle	m (ft)	–	–	10 (32.8)
Resolution				
• Single-turn	bit	24	13 (8192 steps)	13 (8192 steps)
• Multi-turn	bit	36 (2^{24} steps $\times$ 4096 revolutions)	25 (8192 steps $\times$ 4096 revolutions)	25 (8192 steps $\times$ 4096 revolutions)
Frame				
• Single-turn	bit	–	13 without parity	According to EnDat specification
• Multi-turn	bit	–	25 without parity	According to EnDat specification
Incremental track		S/R	–	512, 1 V_{pp}
Code type				
• Transfer		DRIVE-CLiQ	Gray, fir tree format	Dual
Parameterization capability				
• Preset		–	Set to zero	–
• Counting direction		–	Yes	–
Accuracy		arcsec	± 20	± 60 (incremental track)
Starting torque at 20 °C (68 °F)		Nm (lb _f -ft)	≤ 0.01 (0.01)	≤ 0.01 (0.01)

S/R = signals/revolution

¹⁾ Observe the max. permissible cable length of the connected module.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Technical specifications

Article No.		6FX2001-5.D...-1AA0	6FX2001-5.S...	6FX2001-5.E...
Product name		Motion control encoder	Motion control encoder	Motion control encoder
Product designation		Absolute encoder with DRIVE-CLiQ	Absolute encoder with SSI	Absolute encoder with EnDat 2.1
Solid shaft loading capacity				
• $n \leq 6000$ r/min				
- Axial	N (lb _f)	40 (8.99)	40 (8.99)	40 (8.99)
- Radial at shaft end	N (lb _f)	60 (13.5)	60 (13.5)	60 (13.5)
• $n > 6000$ r/min				
- Axial	N (lb _f)	10 (2.25)	10 (2.25)	10 (2.25)
- Radial at shaft end	N (lb _f)	20 (4.50)	20 (4.50)	20 (4.50)
Shaft diameter				
• Synchro flange	mm (in)	6 (0.24) with flat face	6 (0.24)	6 (0.24)
• Clamp flange	mm (in)	10 (0.39) with flat face	10 (0.39)	10 (0.39)
• Torque arm Hollow shaft	mm (in)	10 (0.39) or 12 (0.47)	–	–
Shaft length				
• Synchro flange	mm (in)	10 (0.39)	10 (0.39)	10 (0.39)
• Clamp flange	mm (in)	20 (0.79)	20 (0.79)	20 (0.79)
Angular acceleration, maximum	rad/s ²	10 ⁵	10 ⁵	10 ⁵
Moment of inertia of rotor				
• Solid shaft	kgm ² (lb _f -in-s ²)	2.9×10^{-6} (2.57×10^{-5})	2.9×10^{-6} (2.57×10^{-5})	2.9×10^{-6} (2.57×10^{-5})
• Hollow shaft	kgm ² (lb _f -in-s ²)	4.6×10^{-6} (4.07×10^{-5})	–	–
Vibration (55 ... 2000 Hz) according to EN 60068-2-6				
• Solid shaft	m/s ² (ft/s ²)	≤ 300 (984)	≤ 300 (984)	≤ 300 (984)
• Hollow shaft	m/s ² (ft/s ²)	≤ 150 (492)	–	–
Shock according to EN 60068-2-27				
• 6 ms				
- Solid shaft	m/s ² (ft/s ²)	≤ 2000 (6562)	≤ 2000 (6562)	≤ 2000 (6562)
- Hollow shaft	m/s ² (ft/s ²)	≤ 1000 (3281)	–	–
Degree of protection				
• At housing		IP67	IP67	IP67
• At shaft input		IP64	IP64	IP64
Ambient temperature during				
• Operation	°C (°F)	-30 ... +100 (-22 ... +212)	-40 ... +100 (-40 ... +212)	-40 ... +100 (-40 ... +212)
Net weight				
• Single-turn	kg (lb)	0.35 (0.77)	0.35 (0.77)	0.35 (0.77)
• Multi-turn	kg (lb)	0.35 (0.77)	0.35 (0.77)	0.35 (0.77)
EMC				
EMC Directive 2014/30/EC and regulations of EMC directives (applicable basic standards)				
Certificate of suitability				
CE, CSA, UL				

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Technical specifications

Article No.		6FX2001-5.P..	6FX2001-5.N..
Product name		Motion control encoder	Motion control encoder
Product designation		Absolute encoder with PROFIBUS DP	Absolute encoder with PROFINET IO
Operating voltage DC V_p on encoder	V	10 ... 30	10 ... 30
Power consumption, max.	W	2.5	3
Connection		Terminal block with address selector switch and bus terminating resistor in removable cover with radial cable glands (3 units)	2 × M12 connectors, D-coded, 4-pole for PROFINET ports 1 × M12 connector, A-coded, 4-pole for operating voltage
• Cable diameter	mm (in)	6.5 ... 9 (0.26 ... 0.35) Removal of cover possible without interrupting bus	–
Interface		PROFIBUS DP-V2	PROFINET IO with RT/IRT
Clock input		Differential cable receiver acc. to EIA standard RS 485	2 ports IRT
Data output		Differential cable driver acc. to EIA standard RS 485	2 ports IRT
Short-circuit strength		Yes	Yes
Transfer rate	Mbps	12	100
LED for diagnostics		Green/red	Green/red/yellow/orange
Maximum speed			
• Electrical			
- With ± 1 LSB accuracy	r/min	5000	5000
• Mechanical			
- Single-turn	r/min	12000	12000
- Multi-turn	r/min	6000	6000
Cable length to downstream electronics, maximum ¹⁾			
• Up to 93.75 Kbps	m (ft)	1200 (3937)	–
• Up to 1.5 Mbps	m (ft)	200 (656)	–
• Up to 12 Mbps	m (ft)	100 (328)	100 (328)
Number of nodes		99	–
Resolution			
• Single-turn	bit	13 (8192 steps)	13 with V 4.1, 16 with V 4.2 (8192/65536 steps)
• Multi-turn	bit	27 (8192 steps × 16384 revolutions)	27 with V 4.1, 30 with V 4.2 (8192/65536 steps × 16384 revolutions)
Frame		According to PNO encoder profile V 4.1 Class 1, Class 2, Class 3, Class 4 Standard frame 81	According to PNO encoder profile V 4.1 and V 4.2 Class 1, Class 2, Class 3, Class 4 Standard frames 81/82/83/84/86/87/88/89 Siemens frame 860/862
Code type			
• Sampling		Gray	Gray
• Transfer		Binary, PROFIBUS	Binary, PROFINET
Bus load, approx.			
• At 12 Mbps per encoder	μs	20	–
Cycle time	ms	1	0.25 ... 100
Parameterization capability			
• Resolution per revolution		1 ... 8192	1 ... 8192/65536
• Total resolution		1 ... 134217728	1 ... 134217728/1073741824
• Preset		Yes	Yes
• Counting direction		Yes	Yes
• Velocity signal		Yes	Yes
• Limit switches		Yes, 2 units	No
• Isochronous mode		Yes	Yes
• Direct data exchange		Yes	No

¹⁾ Observe the max. permissible cable length of the connected module.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Technical specifications

Article No.		6FX2001-5.P..	6FX2001-5.N..
Product name		Motion control encoder	Motion control encoder
Product designation		Absolute encoder with PROFIBUS DP	Absolute encoder with PROFINET IO
Online parameterization		Yes	Yes
PNO certificate		Yes	Yes
Supported profiles		PNO encoder profile V 4.1	PNO encoder profile V 4.1 and V 4.2
Accuracy	arcsec	± 79 (± 1 LSB with 8192 steps)	± 79 (± 1 LSB with 8192 steps) (± 2 LSB with 65536 steps)
Friction torque at 20 °C (68 °F)	Nm (lb _F -ft)	≤ 0.03 (0.02)	≤ 0.03 (0.02)
Starting torque at 20 °C (68 °F)	Nm (lb _F -ft)	≤ 0.03 (0.02)	≤ 0.03 (0.02)
Shaft loading capacity			
• $n \leq 6000$ r/min			
- Axial	N (lb _F)	40 (8.99)	40 (8.99)
- Radial at shaft end	N (lb _F)	110 (24.7)	110 (24.7)
• $n > 6000$ r/min			
- Axial	N (lb _F)	10 (2.25)	10 (2.25)
- Radial at shaft end	N (lb _F)	20 (4.50)	20 (4.50)
Shaft diameter			
• Synchro flange	mm (in)	6 (0.24)	6 (0.24)
• Clamp flange	mm (in)	10 (0.39)	10 (0.39)
Torque arm	mm (in)	15 (0.59)	15 (0.59)
Hollow shaft ¹⁾			
Shaft length			
• Synchro flange	mm (in)	10 (0.39)	10 (0.39)
• Clamp flange	mm (in)	20 (0.79)	20 (0.79)
Angular acceleration, maximum	rad/s ²	10 ⁵	10 ⁵
Moment of inertia of rotor			
• Solid shaft	kgm ² (lb _F -in-s ²)	1.90 × 10 ⁻⁶ (1.68 × 10 ⁻⁵)	1.90 × 10 ⁻⁶ (1.68 × 10 ⁻⁵)
• Hollow shaft	kgm ² (lb _F -in-s ²)	2.80 × 10 ⁻⁶ (2.47 × 10 ⁻⁵)	2.80 × 10 ⁻⁶ (2.47 × 10 ⁻⁵)
Vibration (55 ... 2000 Hz) according to EN 60068-2-6	m/s ² (ft/s ²)	≤ 100 (328)	≤ 100 (328)
Shock according to EN 60068-2-27			
• 6 ms	m/s ² (ft/s ²)	≤ 1000 (3281)	≤ 1000 (3281)
Degree of protection			
• At housing		IP67	IP67
• At shaft input		IP64	IP64
Ambient temperature during			
• Operation	°C (°F)	-40 ... +85 (-40 ... +185)	-40 ... +85 (-40 ... +185)
Net weight			
• Single-turn	kg (lb)	0.4 (0.88)	0.4 (0.88)
• Multi-turn	kg (lb)	0.5 (1.1)	0.5 (1.1)
EMC		EMC Directive 2014/30/EC and regulations of EMC directives (applicable basic standards)	
Certificate of suitability		CE, CSA, UL	CE, CSA, UL

¹⁾ Hollow shaft diameter 12 mm, 10 mm or 8 mm (0.47 in, 0.39 in or 0.31 in) possible using supplied reduction sleeves.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Absolute encoders

Selection and ordering data

Description	Article No.
Absolute encoders with DRIVE-CLiQ	
<u>24 V DC supply voltage</u>	
• Radial connection	
- Synchro flange Solid shaft	6FX2001-5FD ■ ■ ■ -1AA0
- Clamp flange Solid shaft	6FX2001-5QD ■ ■ ■ -1AA0
- Torque arm Hollow shaft diameter 10 mm (0.39 in)	6FX2001-5VD ■ ■ ■ -1AA0
- Torque arm Hollow shaft diameter 12 mm (0.47 in)	6FX2001-5WD ■ ■ ■ -1AA0
<u>Resolution</u>	
• Single-turn 24 bit	1 3
• Multi-turn 36 bit	2 5
Absolute encoders with SSI	
<u>4.75 ... 30 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-5HS ■ ■ ■
- Radial flange outlet	6FX2001-5FS ■ ■ ■
• Clamp flange and connection via	
- Axial flange outlet	6FX2001-5SS ■ ■ ■
- Radial flange outlet	6FX2001-5QS ■ ■ ■
<u>Resolution</u>	
• Single-turn 8192 steps/revolution (13 bit)	1 2
• Multi-turn 8192 steps/revolution, 4096 revolutions (25 bit)	2 4
Absolute encoders with EnDat 2.1	
<u>3.6 ... 14 V DC supply voltage</u>	
• Synchro flange and connection via	
- Axial flange outlet	6FX2001-5HE ■ ■ ■
- Radial flange outlet	6FX2001-5FE ■ ■ ■
• Clamp flange and connection via	
- Axial flange outlet	6FX2001-5SE ■ ■ ■
- Radial flange outlet	6FX2001-5QE ■ ■ ■
<u>Resolution</u>	
• Single-turn 8192 steps/revolution (13 bit)	1 3
• Multi-turn 8192 steps/revolution, 4096 revolutions (25 bit)	2 5

Description	Article No.
Absolute encoders with PROFIBUS DP	
<u>10 ... 30 V DC supply voltage</u>	
• Radial connection	
- Synchro flange Solid shaft	6FX2001-5FP ■ ■ ■
- Clamp flange Solid shaft	6FX2001-5QP ■ ■ ■
- Torque arm Hollow shaft diameter 15 mm (0.59 in) ¹⁾	6FX2001-5WP ■ ■ ■
<u>Resolution</u>	
• Single-turn 8192 steps/revolution (13 bit)	1 2
• Multi-turn 8192 steps/revolution, 16384 revolutions (27 bit)	2 4
Absolute encoders with PROFINET IO	
<u>10 ... 30 V DC supply voltage</u>	
• Radial connection	
- Synchro flange Solid shaft	6FX2001-5FN ■ ■ ■
- Clamp flange Solid shaft	6FX2001-5QN ■ ■ ■
- Torque arm Hollow shaft diameter 15 mm (0.59 in) ¹⁾	6FX2001-5WN ■ ■ ■
<u>Resolution</u>	
• Single-turn 8192 steps/revolution (13 bit) 65536 steps/revolution (16 bit)	1 3
• Multi-turn 8192 steps/revolution, 16384 revolutions (27 bit) 65536 steps/revolution, 16384 revolutions (30 bit)	2 5

More information

Since the DRIVE-CLiQ interface has been disclosed, it is possible to use absolute encoders with integrated DRIVE-CLiQ interface from a range of different manufacturers.

You can find additional information on the internet at:

<https://support.industry.siemens.com/cs/document/65402168>

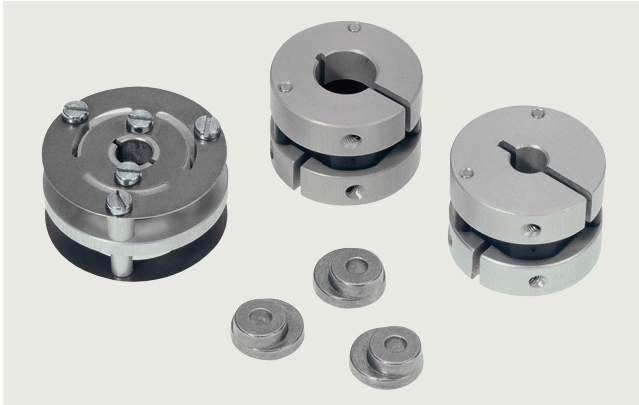
¹⁾ Hollow shaft diameter 12 mm, 10 mm or 8 mm (0.47 in, 0.39 in or 0.31 in) possible using supplied reduction sleeves.

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Accessories

Overview



Couplings and clamps

Couplings

The motion control encoders are driven via a plug-in coupling or spring disk coupling. Alternatively, pulleys can also be used.

Clamps

Motion control encoders with Synchro flange can be axially mounted on the machine with screws or secured with 3 clamps.

Signal connectors as mating connectors

A signal connector is available as a mating connector for motion control encoders with flange outlet or with cable and connector.

The mating connector with 12 contacts is suitable for all incremental encoders.

The mating connector with 17 contacts is suitable for absolute encoders with EnDat.

Signal connector

A signal connector is available as a replacement for motion control encoders with cable and connector.

MOTION-CONNECT DRIVE-CLiQ signal cables

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with M12 plug are available as basic cables and extensions for connecting motion control encoders with DRIVE-CLiQ interface.

For further information about the signal cables, refer to "MOTION-CONNECT connection systems".

Technical specifications

Article No. Product designation		6FX2001-7KF06 Spring disk coupling	6FX2001-7KF10 Spring disk coupling	6FX2001-7KS06 Plug-in coupling	6FX2001-7KS10 Plug-in coupling
Diameter					
• 1st shaft diameter	mm (in)	6 (0.24)	6 (0.24)	6 (0.24)	10 (0.39)
• 2nd shaft diameter	mm (in)	5 (0.20)	6 (0.24)	6 (0.24)	10 (0.39)
Transferable torque, maximum	Nm (lb _F -ft)	0.8 (0.59)	0.8 (0.59)	0.7 (0.52)	0.7 (0.52)
Maximum mechanical speed	r/min	12000	12000	12000	12000
Center offset of shafts, maximum	mm (in)	0.4 (0.02)	0.4 (0.02)	0.5 (0.02)	0.5 (0.02)
Axial displacement	mm (in)	0.4 (0.02)	0.4 (0.02)	0.5 (0.02)	0.5 (0.02)
Angular displacement of shafts, maximum	°	3	3	1	1
Rigidity					
• Radial	Nm/rad (lb _F -ft/rad)	150 (111)	150 (111)	31 (22.9)	31 (22.9)
• Axial	N/mm (lb _F /mm)	6 (1.35)	6 (1.35)	10 (2.25)	10 (2.25)
Moment of inertia	kgcm ² (lb _F -in-s ²)	0.019 (1.68 × 10 ⁻⁵)	0.019 (1.68 × 10 ⁻⁵)	0.02 (1.77 × 10 ⁻⁵)	0.02 (1.77 × 10 ⁻⁵)
Ambient temperature during					
• Operation	°C (°F)	-40 ... +150 (-40 ... +302)	-40 ... +150 (-40 ... +302)	-40 ... +80 (-40 ... +176)	-40 ... +80 (-40 ... +176)
Outer diameter	mm (in)	30 (1.18)	30 (1.18)	25 (0.98)	25 (0.98)
Length	mm (in)	18.3 (0.72)	18.3 (0.72)	19 (0.75)	19 (0.75)
Net weight	g (oz)	16 (0.56)	16 (0.56)	20 (0.7)	20 (0.7)
Article No. Product designation		6FX2001-7KP01 Clamp			
Outer diameter					
• 1st clamp diameter	mm (in)	9 (0.35)			
• 2nd clamp diameter	mm (in)	12 (0.47)			
Clamp hole diameter	mm (in)	3.2 (0.13)			
Height	mm (in)	5.5 (0.22)			
Net weight	g (oz)	3 (0.1)			

Motion Control Encoder measuring systems

Built-on optoelectronic rotary encoders

Accessories

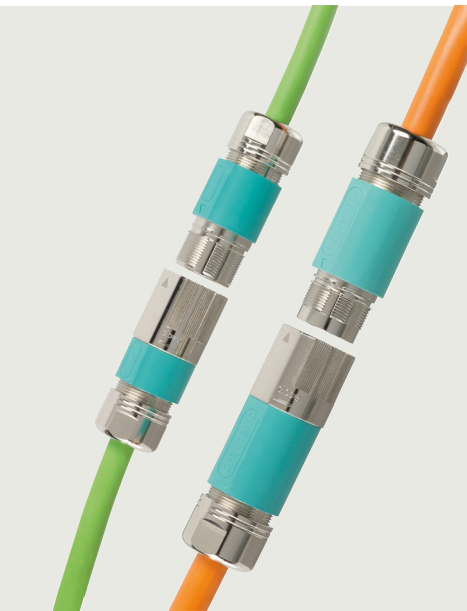
Selection and ordering data

Description	Article No.
Spring disk coupling For shaft diameter: • 6 mm/6 mm (0.24 in/0.24 in) • 6 mm/5 mm (0.24 in/0.20 in)	6FX2001-7KF10 6FX2001-7KF06
Plug-in coupling For shaft diameter: • 6 mm/6 mm (0.24 in/0.24 in) • 10 mm/10 mm (0.39 in/0.39 in)	6FX2001-7KS06 6FX2001-7KS10
Clamp (1 unit) For built-on encoder with Synchro flange (3 units are required.)	6FX2001-7KP01
Signal connector with cap nut (1 unit) Mating connector for incremental encoder with sin/cos 1 V _{pp} , RS422 (TTL) and HTL and absolute encoder with SSI 12-pole, insulator each with 12 socket contacts 0.08 ... 0.22 mm ² and 0.20 ... 0.56 mm ² , 2 x cable clamping 6.5 ... 10 mm (0.26 ... 0.39 in) and 10.1 ... 13 mm (0.40 ... 0.51 in)	6FX2003-0SU12
Signal connector with cap nut (1 unit) Mating connector for absolute encoder with EnDat 17-pole, insulator with 17 socket contacts 0.20 ... 0.56 mm ² , 2 x cable clamping 6.5 ... 10 mm (0.26 ... 0.39 in) and 10.1 ... 13 mm (0.40 ... 0.51 in)	6FX2003-0SU17
Signal connector with external thread for encoders with cable (1 unit) Replacement connector for incremental encoders with sin/cos 1 V _{pp} , RS422 (TTL) and HTL 12-pole, insulator with 12 pin contacts 0.20 ... 0.56 mm ² , 2 x cable clamping 6.5 ... 10 mm (0.26 ... 0.39 in) and 10.1 ... 13 mm (0.40 ... 0.51 in)	6FX2003-0SA12

Description	Article No.
Power connecting cable Pre-assembled cable for power supply of the absolute encoders with PROFINET IO with M12 plug connector and M12 plug socket, A-coded, 4-pole • Length 2 m (6.56 ft) • Length 3 m (9.84 ft) • Length 5 m (16.4 ft) • Length 10 m (32.8 ft) • Length 15 m (49.2 ft)	6XV1801-5DH20 6XV1801-5DH30 6XV1801-5DH50 6XV1801-5DN10 6XV1801-5DN15
IE connecting cable Pre-assembled signal cable for absolute encoders PROFINET IO with M12 plug connector and RJ45, D-coded, 4-pole • Length 2 m (6.56 ft) • Length 3 m (9.84 ft) • Length 5 m (16.4 ft) • Length 10 m (32.8 ft) • Length 15 m (49.2 ft)	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15
IE FC RJ45 Plug 145 (1 unit) 2 x 2 RJ45 connector with rugged metal enclosure and FC connection technology, 145° cable outlet	6GK1901-1BB30-0AA0
IE FC M12 Plug PRO (1 unit) M12 connector with metal enclosure and FC connection technology, axial cable outlet, D-coded	6GK1901-0DB20-6AA0
IE POWER M12 CABLE CONNECTOR PRO (3 units) Connection socket for connecting SCALANCE W-700/X208pro for 24 V DC supply voltage, 4-pole, A-coded, including assembly instructions	6GK1907-0DC10-6AA3
IE FC TP Trailing Cable 2 x 2 (PROFINET Type C) 4-wire, shielded, PROFINET-compliant, TP installation cable for use in cable carriers, sold by the meter Max. length 2000 m (6562 ft) Minimum order 20 m (65.6 ft)	6XV1840-3AH10
MOTION-CONNECT DRIVE-CLiQ signal cable ¹⁾ For encoder systems with DRIVE-CLiQ and M12 connection	6FX.002-2DC3.-1..0

¹⁾ For complete Article No. and length code, refer to "MOTION-CONNECT connection systems".

MOTION-CONNECT connection systems



7/2	Introduction
7/2	General information
7/4	Connection overviews
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7/6	SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules
7/7	SINAMICS S120 Combi Power Modules
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7/16	Signal cables
	<u>DRIVE-CLiQ signal cables</u>
7/18	without 24 V DC cores
7/19	MOTION-CONNECT with 24 V DC cores
7/20	MOTION-CONNECT with 24 V DC cores with M12 connection
7/21	MOTION-CONNECT with 24 V DC cores with M17 connection
	<u>Signal cables for motors</u>
7/22	with SPEED-CONNECT connector
7/23	with full-thread connector
7/24	Length code
7/25	Accessories for signal cables
7/25	DRIVE-CLiQ cabinet bushing (RJ45)
7/25	DRIVE-CLiQ cabinet bushing (M12)
7/26	DRIVE-CLiQ coupler

MOTION-CONNECT connection systems

Introduction

General information

Overview

MOTION-CONNECT cables are suitable for use with many different types of machine tools and production machinery.

The following variants of MOTION-CONNECT cable are available as fully-assembled power and signal cables or sold by the meter:

- **MOTION-CONNECT 500**
 - Cost-effective solution for predominantly fixed installation
 - Suitable for low mechanical loading
 - Tested for travel distances of up to 5 m
- **MOTION-CONNECT 800PLUS**
 - Meets requirements for use in cable carriers
 - Suitable for high mechanical loading
 - Oil resistance
 - Tested for travel distances of up to 50 m

Benefits

Pre-assembled MOTION-CONNECT cables provide high quality and perfect, system-tested functionality.

SPEED-CONNECT

Connectors with SPEED-CONNECT quick-release locks enable fast, stable and reliable connections. Less than a quarter revolution of the union nut of the connector already provides reliable locking and therefore a reliable connection, completely without tools.

The cables with SPEED-CONNECT connectors supplement the established range of MOTION-CONNECT cables with full-thread connectors.

Application

MOTION-CONNECT cables are intended for use in machines. They are not suitable for building technology applications or outdoor installation.

MOTION-CONNECT cables are tested in a cable carrier with horizontal travel distance and are also designed for cable carrier installation. They are not self-supporting.

The pre-assembled cables can be ordered in length units of 10 cm and can be extended, if necessary.

When cable lengths (basic cables and extensions) are determined for the systems and applications described in this catalog, the technically permissible maximum cable lengths (e.g. 25 m) specified in the catalog must be observed. Malfunctions can occur if longer cables are used.

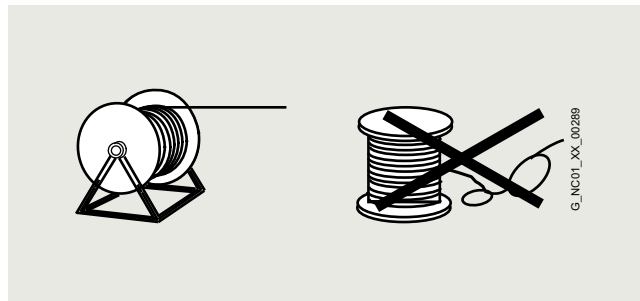
Siemens assumes no liability for correct transmission of signals or power in this case.

Compatibility between SPEED-CONNECT and full-thread connectors:

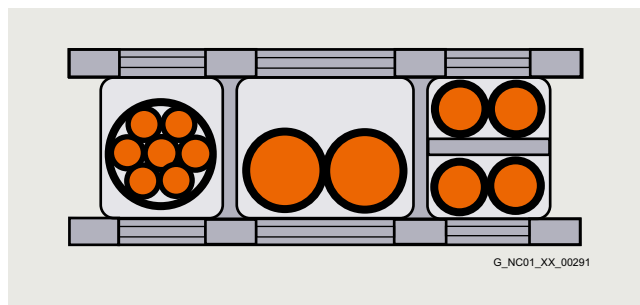
Connector on motor with external thread	Connector with cap nut on cable	Compatibility
SPEED-CONNECT	SPEED-CONNECT	✓
SPEED-CONNECT ¹⁾	Full thread	✓
Full thread	Full thread	✓
Full thread	SPEED-CONNECT	–

¹⁾ In case of shocks and vibrations, an additional O-ring is recommended to prevent the connection from loosening.

Function



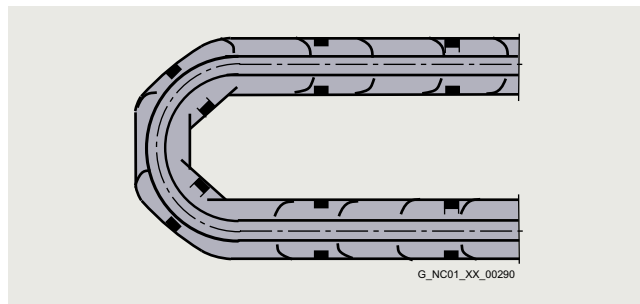
The cables must be removed from the drum without twisting, i.e. the cables must be unwound and must never be lifted over the drum flange in loops.



To maximize the service life of the cable carrier and cables, cables in the carrier made from different materials must be separated by spacers in the cable carrier. The spacers must be filled evenly to ensure that the position of the cables does not change during operation. The cables should be distributed as symmetrically as possible according to their weights and dimensions. Cables with very different outer diameters should also be separated by spacers.

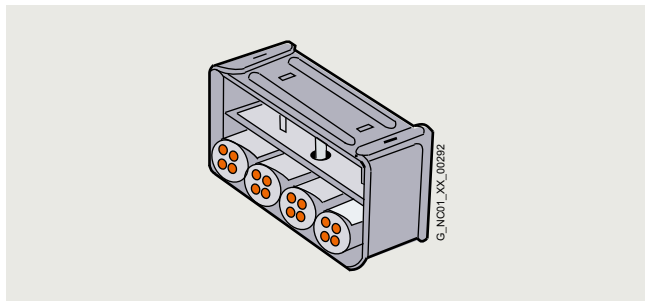
When inserting pre-assembled cables into the cable carrier, do not pull at the connector, as this may damage the strain relief or cable clamping.

The cables must not be fixed in the cable carrier. They must be freely movable.



The cables must be able to be moved without application of force in particular in the bending radii of the carrier. The specified minimum bending radii must be adhered to.

The cable fixings must be attached at both ends at an appropriate distance away from the end points of the moving parts in a dead zone.

Function


MOTION-CONNECT cables are tested in a cable carrier. The cables are attached at one end by means of strain relief to the moving ends of the cable carrier. Strain relief is applied over a wide area of the cable jacket surface without crimping the cable.

Cables must be installed in accordance with the instructions supplied by the cable carrier manufacturer.

Notes:

If, for example, pre-assembled cables are installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied (power and signal cables¹⁾). 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
	Bare wire ends
	Cable not included in the scope of delivery. Cable must be supplied by the customer.

More information
Current carrying capacity for power and signal cables

The current carrying capacity of PVC/PUR-insulated copper cables is specified for installation type C under continuous operating conditions in the table with reference to an ambient air temperature of 40 °C. For other ambient temperatures, the values must be corrected by the derating factors from the table.

Current-carrying capacity of cables with copper cores according to EN 60204-1

rms 50/60 Hz AC or DC in amps for installation type C

Multi-core cables, vertically or horizontally on walls/open, without protection tubes and installation ducts/with contact

Cross-section mm ²	Current A
----------------------------------	--------------

Electronics (one control circuit pair)

0.20	4.4
0.50	7.5
0.75	9.5

Power (one symmetrically loaded AC cable)

0.75	9.8
1.00	11.7
1.50	15.2
2.50	21
4	28
6	36

Derating factors for power and signal cables

Ambient air temperature °C (°F)	Derating factor accord. 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

For a detailed description as well as characteristic curves for MOTION-CONNECT cables, please refer to Catalog NC 62 and the Industry Mall.

¹⁾ Not applicable to DRIVE-CLiQ signal cables.

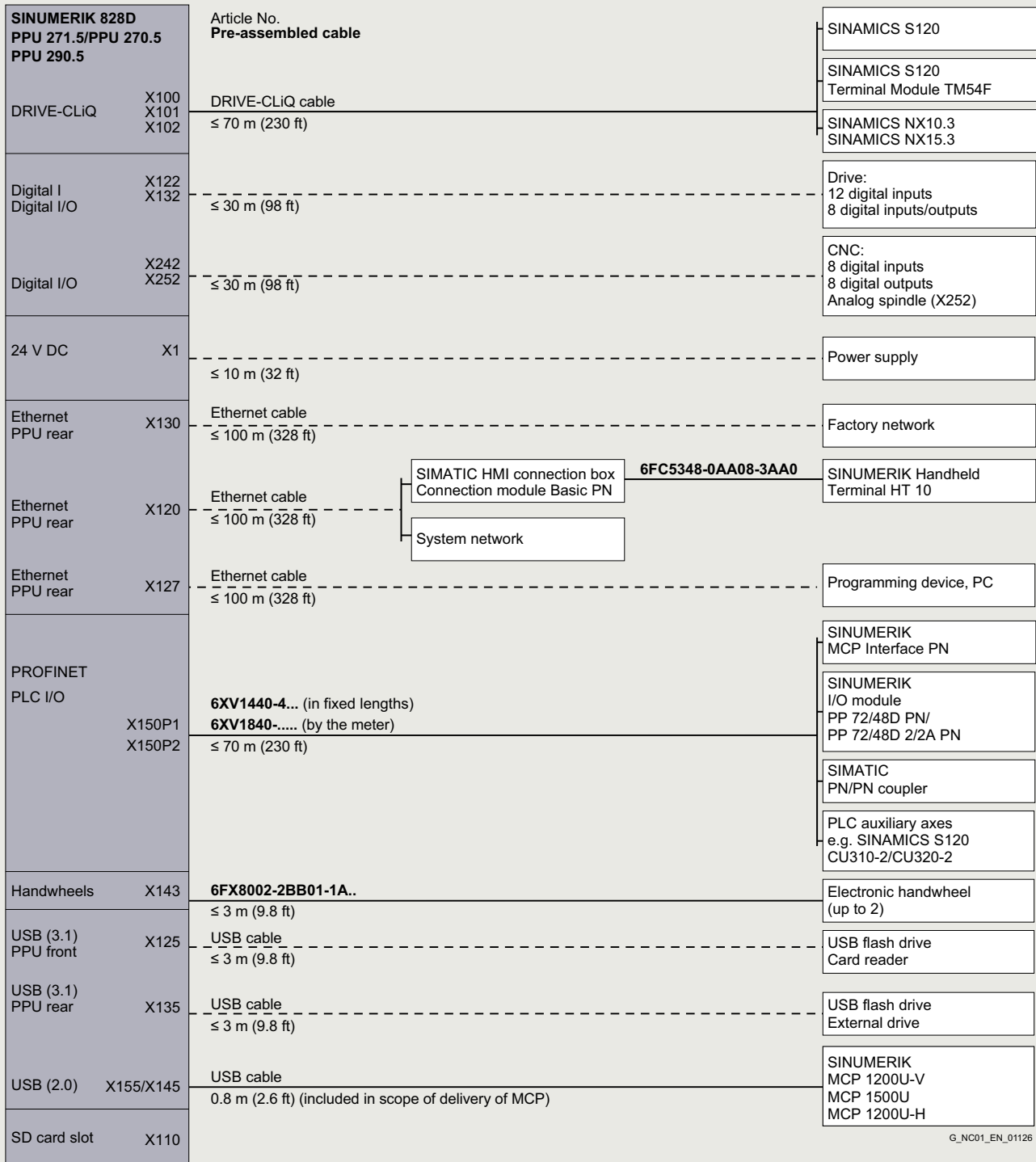
MOTION-CONNECT connection systems

Connection overviews

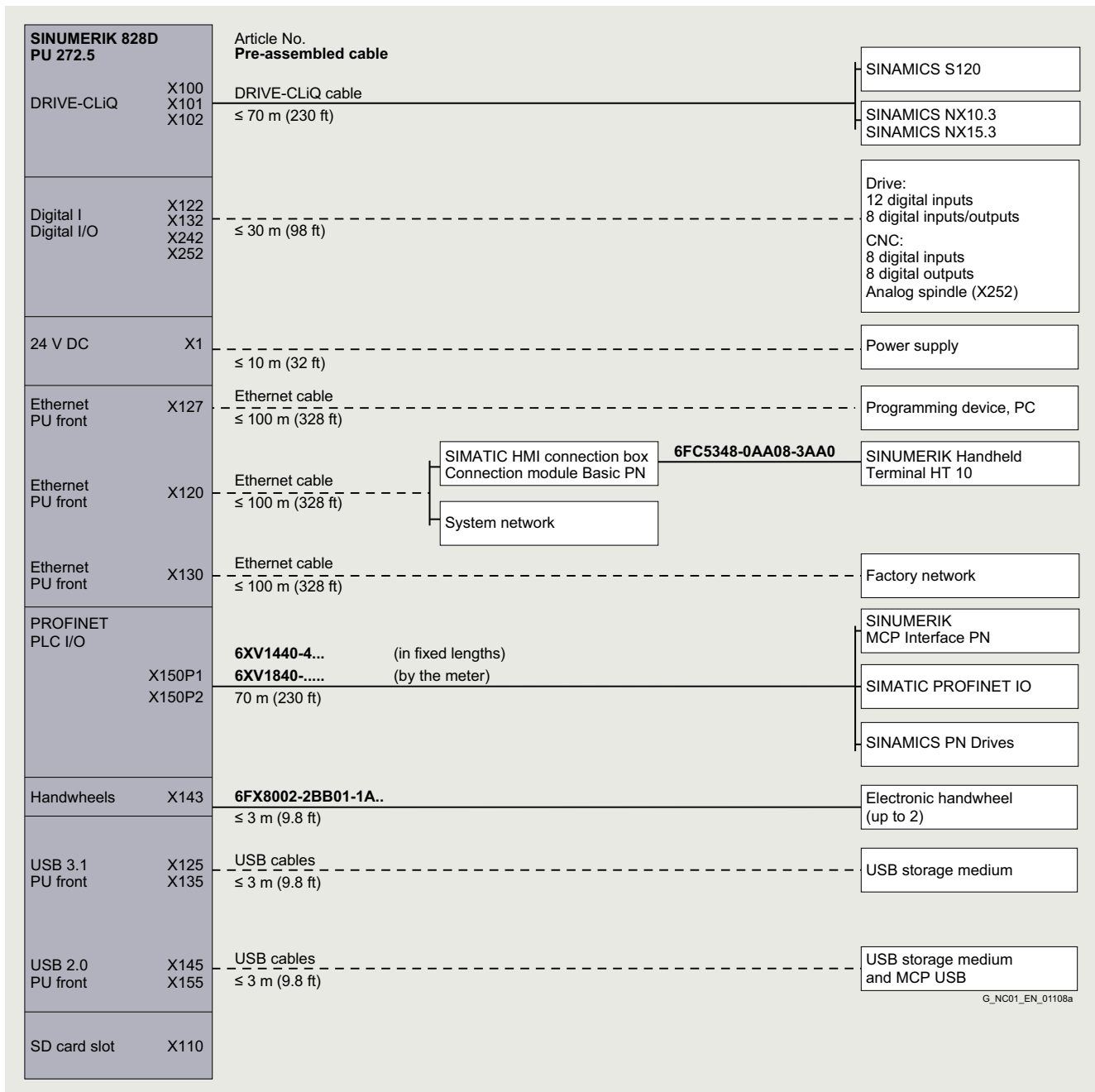
SINUMERIK 828D PPU 27x.5/PPU 290.5

Integration

Connection overview of SINUMERIK 828D PPU 27x.5/PPU 290.5



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Integration**Connection overview of SINUMERIK 828D PU 272.5**

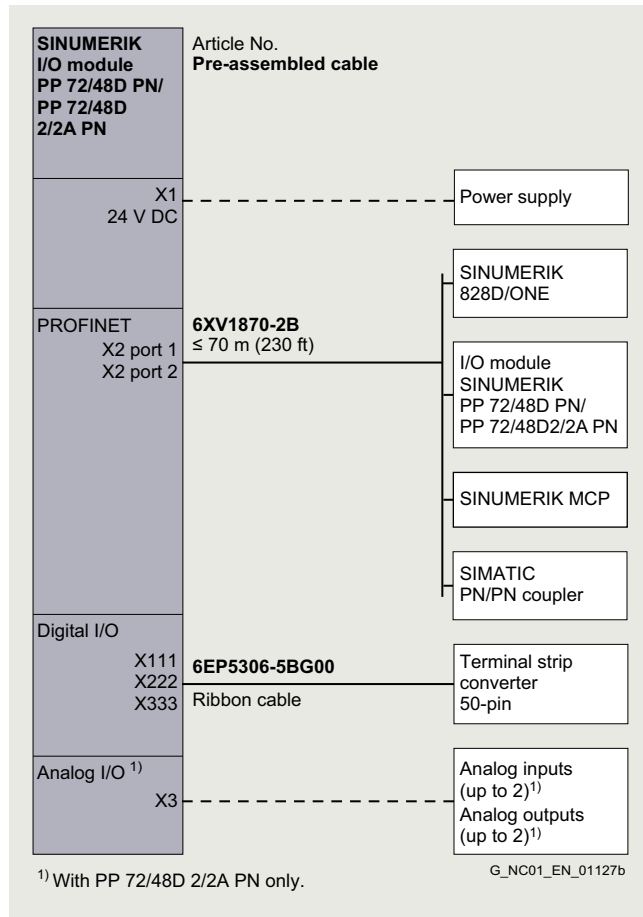
MOTION-CONNECT connection systems

Connection overviews

SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules

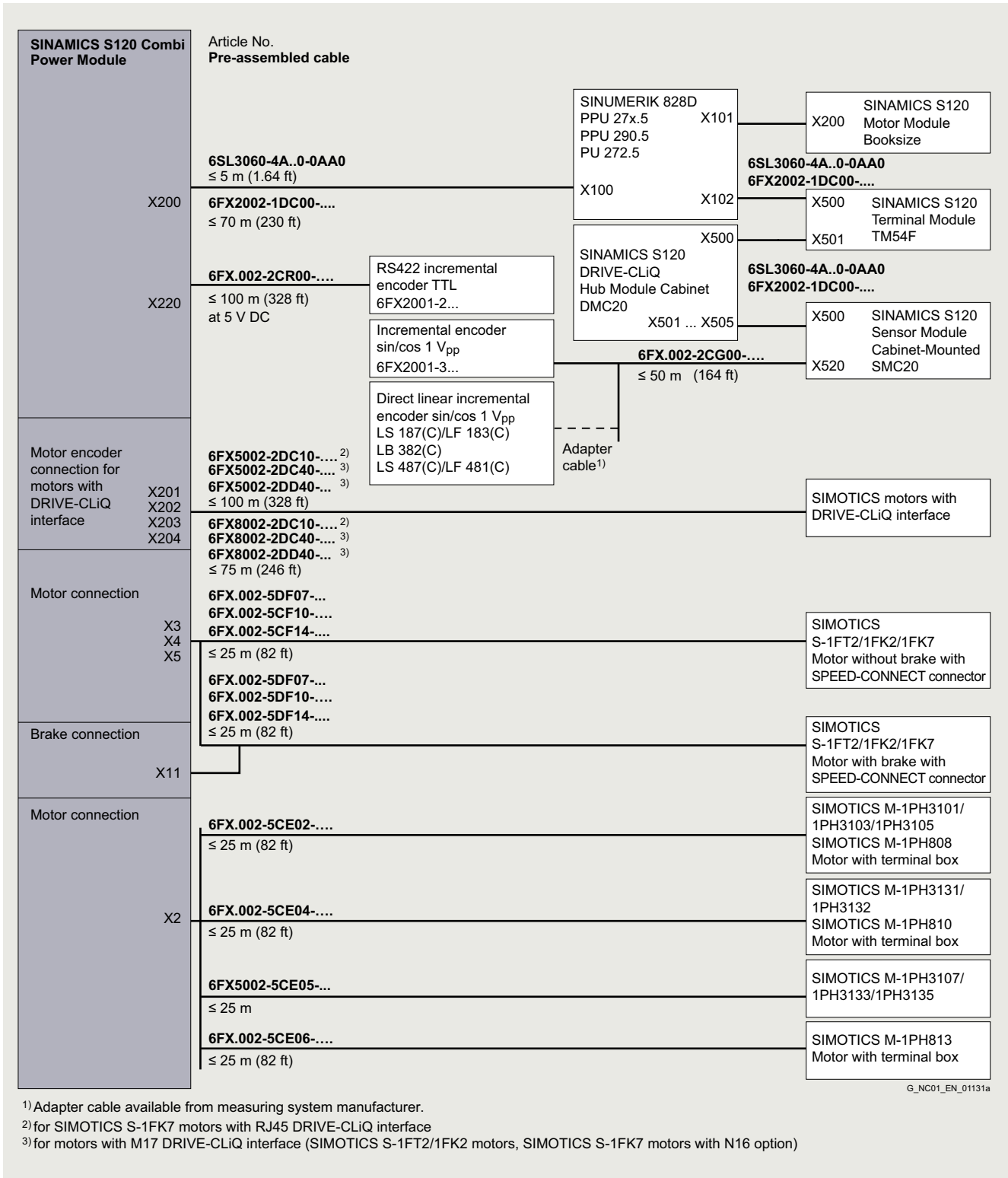
Integration

Connection overview of SINUMERIK PP 72/48D PN and PP 72/48D 2/2A PN I/O modules



SINAMICS S120 Combi Power Modules connected to SINUMERIK 828D PPU 27x.5/PPU 290.5
Integration

Connection overview of SINAMICS S120 Combi Power Modules connected to SINUMERIK 828D PPU 27x.5/PPU 290.5/PU 272.5



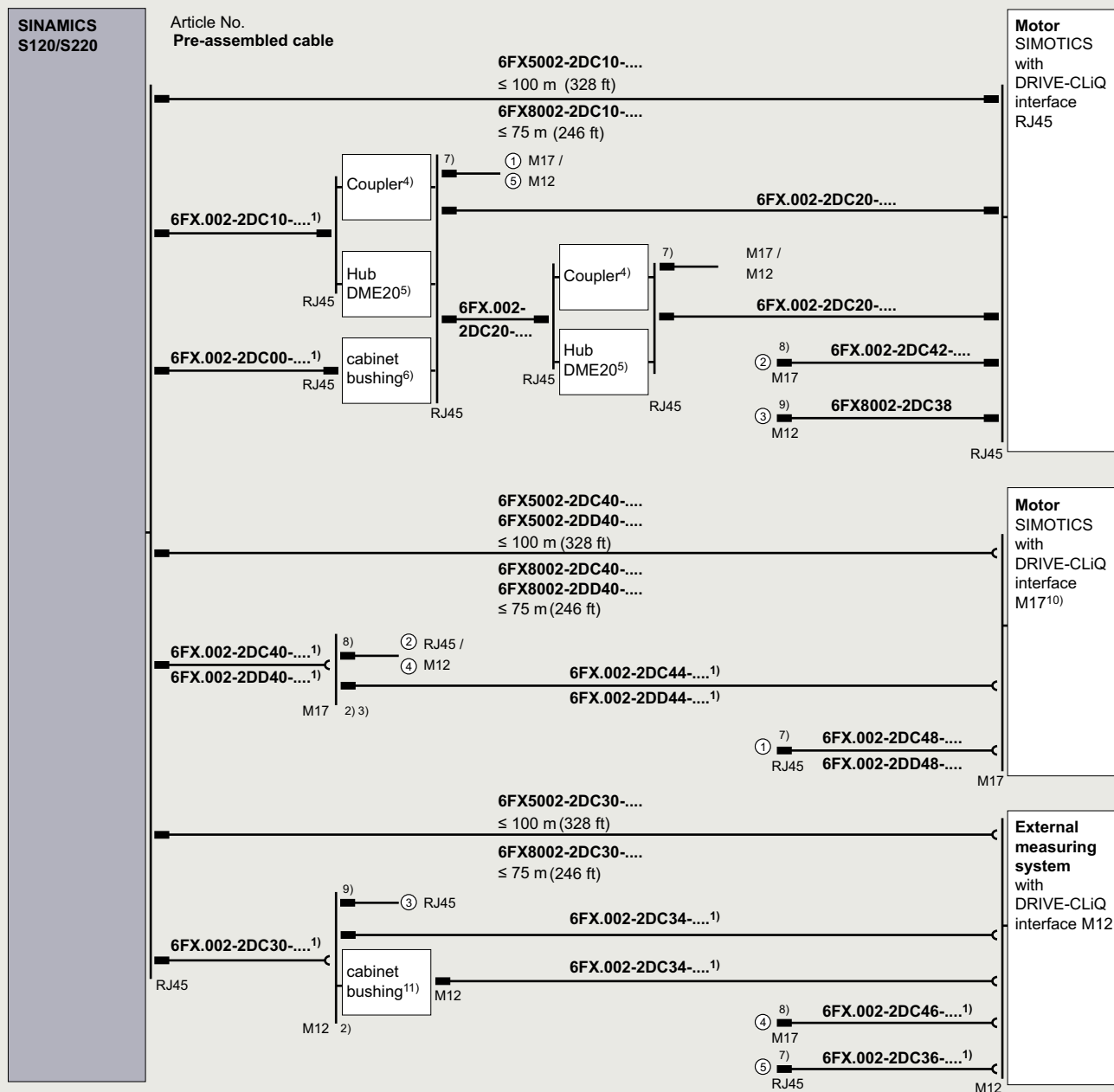
MOTION-CONNECT connection systems

Connection overviews

SIMOTICS motors with DRIVE-CLiQ interface RJ45 or M17 and ext. measuring systems with M12 connection

Integration

Connection overview of SINAMICS S120/S220 for SIMOTICS motors with RJ45 or M17 connection and external measuring systems with M12 connection



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¹⁾ Total permissible cable length ≤ 100 m (328 ft) (6FX5...) or ≤ 75 m (246 ft) (6FX8...).

²⁾ Max. 3 M12 disconnection points (max. 2, if more than 1 cable in the line is < 6 m) or 4 M17 disconnection points permissible without derating.

³⁾ Optional mounting flange (6FX2003-7HX00).

⁴⁾ Optional DRIVE-CLiQ RJ45/IP67 coupler (6SL3066-2DA00-0AB0), max. 3 couplers permissible with derating (5 m (16 ft) per coupler).

⁵⁾ Optional DME20 DRIVE-CLiQ Hub Module RJ45/IP67 (6SL3055-0AA00-6AB0), max. 2 DME20 Hub Modules possible.

⁶⁾ Optional DRIVE-CLiQ RJ45/IP67, RJ45/IP20 cabinet bushing (6SL3066-2DA00-0AA0).

⁷⁾ Disconnection point with RJ45 connection

⁸⁾ Disconnection point with M17 connection

⁹⁾ Disconnection point with M12 connection

¹⁰⁾ For SIMOTICS S-1FT2, S-1FK2, S-1FT7...-K... or 1FT7...-L... and S-1FK7 with N16 option.

¹¹⁾ Optional DRIVE-CLiQ M12/IP67 cabinet bushing (6FX2003-0DT67).

Integration
Connection overview of SINAMICS S120/S220 Motor Modules in booksize format

The DRIVE-CLiQ signal cables of type 6SL3060-4A...0-0AA0 required for the standard configuration are part of the scope of supply of the Motor Modules. In this case, the modules must be mounted directly adjacent to one another in a row.

SINAMICS S120/S220 Motor Module Booksize format	Article No. Pre-assembled cable	X200- X203 ¹⁾	6SL3060-4A..0-0AA0 ≤ 5 m (1.64 ft) 6FX2002-1DC00-.... ≤ 70 m (230 ft)	X200- SINAMICS S120/S220
				X202 Smart Line Module
				X200- SINAMICS S120
				X202 Active Line Module
				X200- SINAMICS S120
				X202 Basic Line Module
				X200- SINAMICS S120/S220
				X203 ¹⁾ Motor Module
				X100 SINUMERIK 828D
				SINAMICS NX10.3/NX15.3
X200- X203 ¹⁾	6SL3060-4A..0-0AA0 ≤ 5 m (1.64 ft) 6FX2002-1DC00-.... ≤ 70 m (230 ft)	X200- X203 ¹⁾	Further SINAMICS S120/S220 Motor Modules	
Motor encoder connection via SMC for motors <u>without</u> DRIVE-CLiQ interface	X200- X203 ¹⁾	6SL3060-4A..0-0AA0 ≤ 5 m (1.64 ft) 6FX2002-1DC00-.... ≤ 70 m (230 ft)	X500 SINAMICS SMC20	
			X500 SINAMICS SMC30	
			X500 SINAMICS SMC40	
Motor encoder connection for motors <u>with</u> DRIVE-CLiQ interface	X200- X203 ¹⁾	6FX5002-2DC10-.... ²⁾ 6FX5002-2DC40-.... ³⁾ 6FX5002-2DD40-.... ³⁾ ≤ 100 m (328 ft) 6FX8002-2DC10-.... ²⁾ 6FX8002-2DC40-.... ³⁾ 6FX8002-2DC40-.... ³⁾ ≤ 75 m (246 ft)	Motor encoder in SIMOTICS motors with DRIVE-CLiQ interface	
Motor connection	Pre-assembled power cables, see power cables for motors (max. cable length, see technical specifications of Motor Modules)	SIMOTICS motors		

G_NC01_EN_01128

¹⁾ For Single Motor Module: X200-X202
For Double Motor Module: X200-X203

²⁾ for SIMOTICS S-1FK7 motors with RJ45 DRIVE-CLiQ interface

³⁾ for motors with M17 DRIVE-CLiQ interface (SIMOTICS S-1FT2/1FK2 motors, SIMOTICS S-1FK7 motors with N16 option)

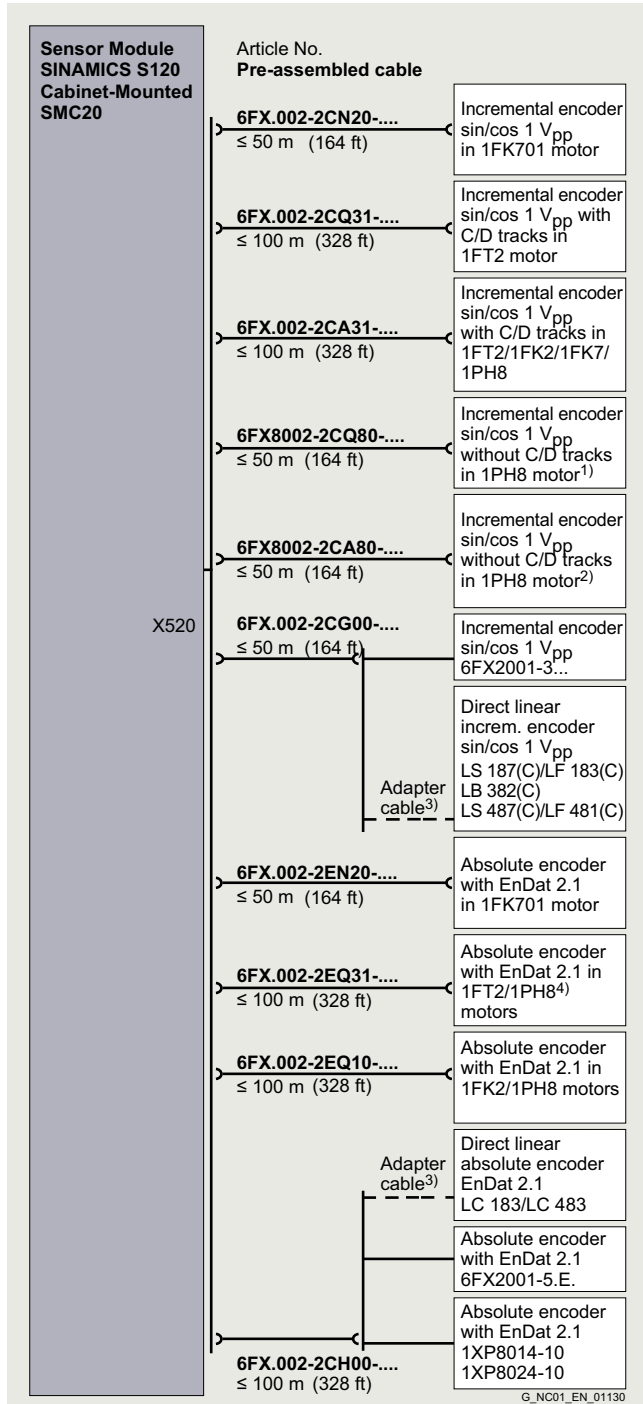
MOTION-CONNECT connection systems

Connection overviews

SINAMICS S120 Sensor Modules Cabinet-Mounted SMC20/SMC30/SMC40

Integration

Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC20



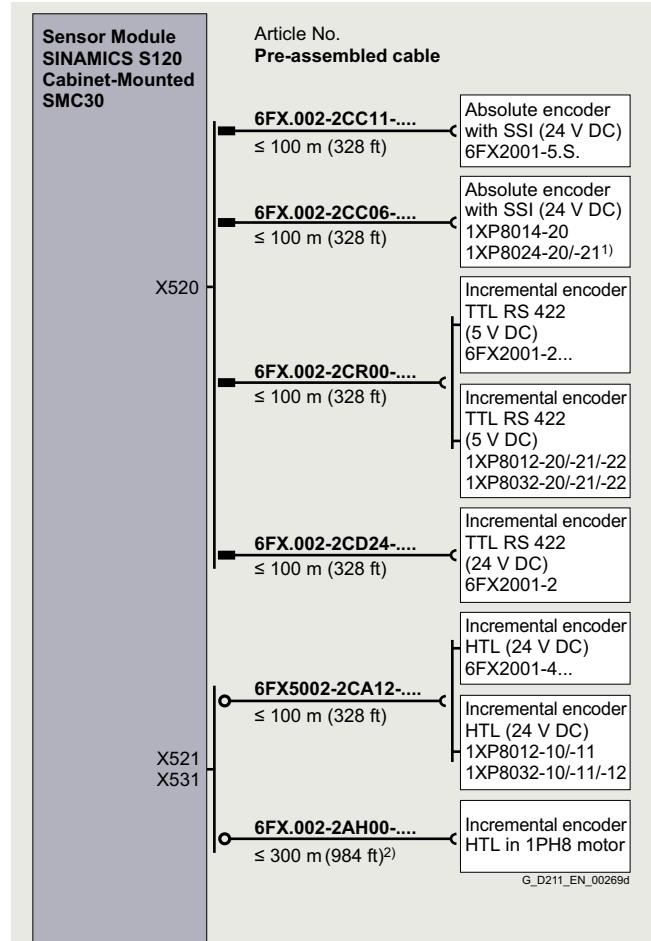
1) Possible for 1PH808/1PH810/1PH813/1PH816 motors for encoders with 512 S/R and 256 S/R (for SPEED-CONNECT).

2) Possible for 1PH8 motors for encoders with 512 S/R and 256 S/R (for full thread).

3) Adapter cable available from measuring system manufacturer.

4) Possible for 1PH808/1PH810/1PH813/1PH816 motors.

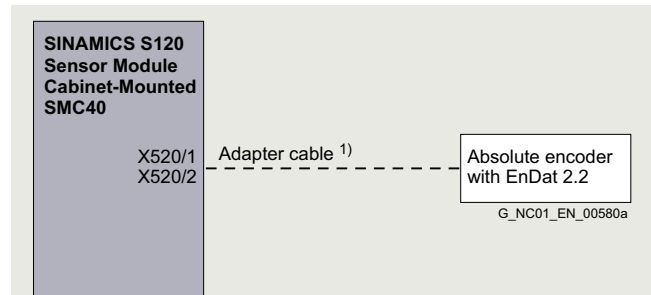
Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC30



¹⁾For position control only.

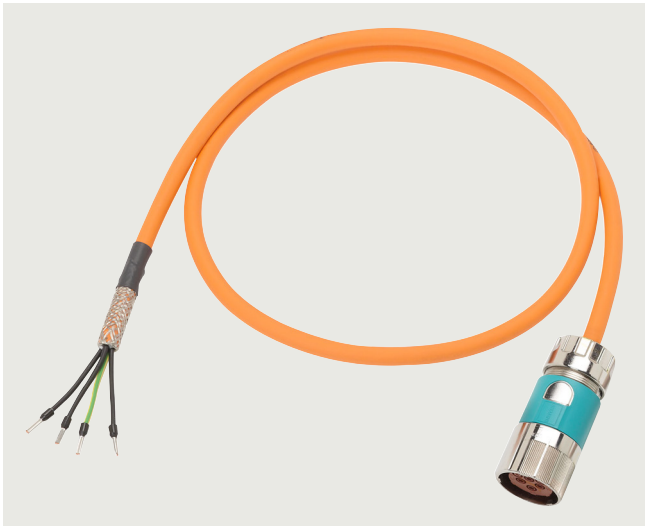
²⁾Applies to HTL encoders with bipolar signal evaluation or for evaluation of difference signals A*, A and B*, B; for HTL encoders with unipolar signal evaluation the permissible cable length is reduced to 100 m (328 ft).

Connection overview of SINAMICS S120 Sensor Module Cabinet-Mounted SMC40



¹⁾ Adapter cable available from encoder manufacturer.

Overview



Power cable for connecting a SIMOTICS S-1FK7 motor with SPEED-CONNECT connector to a SINAMICS S120 Combi Power Module

The synchronous and asynchronous motors are connected to the Motor Modules or Power Modules by means of MOTION-CONNECT power cables.

The pre-assembled MOTION-CONNECT power cables are of high quality and offer safety with problem-free functioning.

If pre-assembled power cables are to be installed in a cable carrier in such a way that the connector would inhibit assembly, pre-assembled cables without assembled connector can also be supplied. In this case, the contacts of the cables are crimped and the connector is supplied separately. After installing the cables, the customer assembles the connector.

The 6FX.002-5....-.... power cables are available with crimped contacts and with the connector supplied separately as an option (not applicable to power cables with bare wire ends or cable lugs).

Power cables with separately supplied **module-end** connector:
In this case, the 6th position of the Article No. must be changed from **0** to **1**: 6FX.0**1**2-5....-.... (not for power cables for SINAMICS S120 Power Modules).

Power cables without **module-end** connector:
In this case, the 6th position of the Article No. must be changed from **0** to **2**: 6FX.0**2**2-5....-....
The connector can be ordered separately.

Power cables with separately supplied **motor-end** connector:
In this case, the 6th position of the Article No. must be changed from **0** to **4**: 6FX.0**4**2-5....-.... (not for power cables with bare wire ends on the motor end and for power cables for SINAMICS S120 Combi Power Modules).

Type of delivery	Cross-section	Length
Pre-assembled power cables		
• Variable length, in exact decimeter lengths	1.5 mm ² to 6 mm ²	0.1 m to 299 m (0.33 ft to 981 ft)
Power cables sold by the meter		
• Fixed lengths	1.5 mm ² and 2.5 mm ²	50 m, 100 m, 200 m, 500 m (164 ft, 328 ft, 656 ft, 1641 ft)
• Variable length, in exact meter lengths	4 mm ² and 6 mm ²	1 m to 500 m (3.28 ft to 1641 ft)

Starting with 30 kg or 100 m (66.2 lb or 328 ft) or more, the cables are supplied on cable drums; below 30 kg or 100 m, reels are used instead of drums. This applies to both pre-assembled power cables and cables sold by the meter.

MOTION-CONNECT connection systems

Power cables

Technical specifications

Article No.	6FX500.-.....-.....	6FX800.-.....-.....
Product name	MOTION-CONNECT 500	MOTION-CONNECT 800PLUS
Product designation	Power cable	Power cable
Certificate of suitability		
• CE	Yes	Yes
• RoHS conformity	Yes	Yes
• cURus or UR/CSA ¹⁾	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90
Rated voltage U_0/U		
• Power conductors	600 V/1000 V	600 V/1000 V
• Signal conductors	24 V (EN) 1000 V (UL/CSA)	24 V (EN) 1000 V (UL/CSA)
Test voltage, rms		
• Power conductors	4 kV	4 kV
• Signal conductors	2 kV	2 kV
Operating temperature on the surface		
• Fixed installation	-20 ... +80 °C (-4 ... +176 °F)	-50 ... +80 °C (-58 ... +176 °F)
• Flexible installation	0 ... 60 °C (32 ... 140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Tensile stress, max.		
• Fixed installation	50 N/mm ² (7252 lb/in ²)	50 N/mm ² (7252 lb/in ²)
• Flexible installation	20 N/mm ² (2901 lb/in ²)	20 N/mm ² (2901 lb/in ²)
Smallest bending radius		
• Fixed installation	$5 \times D_{\max}$	$4 \times D_{\max}$
• Flexible installation	See Selection and ordering data	See Selection and ordering data
Torsional stress	Absolute 30°/m	Absolute 30°/m
Bending	100000	10 million
Traversing velocity	30 m/min (98.4 ft/min)	Up to 300 m/min (984 ft/min)
Acceleration	2 m/s ² (6.56 ft/s ²)	Up to 50 m/s ² (164 ft/s ²)
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen-free/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-404:2012 (mineral oil only)	EN 60811-404:2012
Outer jacket	PVC 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

Degree of protection of the pre-assembled power cables and their extensions when closed and connected: IP67.

¹⁾ The UR-CSA File No. is printed on the cable jacket.

MOTION-CONNECT connection systems

Power cables

Power cables for SIMOTICS S-1FT2/1FK2/1FK7 motors with SPEED-CONNECT connector

Selection and ordering data

Power cables for SIMOTICS S-1FT2/S-1FK2 and S-1FK7 motors with SPEED-CONNECT connector

Connection method, Power/Motor Module end	Number of cores × cross-section mm ²	Connector size, motor end	Pre-assembled cable with SPEED-CONNECT connector	Cable sold by the meter ¹⁾	D _{max}		Weight (cable sold by the meter)		Smallest bending radius ²⁾	
			Article No.	Article No.	6FX5 mm (in)	6FX8 mm (in)	6FX5 kg/m (lb/ft)	6FX8 kg/m (lb/ft)	6FX5 mm (in)	6FX8 mm (in)
Motors <u>without holding brake</u> on SINAMICS S120 <u>Combi Power Modules</u>										
Bare wire ends	4 × 1.5	1 (M23)	6FX■002-5CF10-....	6FX■008-1BB11-....	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1.5 (M40)	6FX■002-5CF14-....							
Motors <u>with holding brake</u> on SINAMICS S120 <u>Combi Power Modules</u>										
Bare wire ends	4 × 1.5+2 × 1.5	0.5 (M17)	6FX■002-5DF07-....	6FX5008-1BA11-...	10.8 (0.43)	–	0.22 (0.15)	–	195 (7.68)	–
		1 (M23)	6FX■002-5DF10-....	6FX■008-1BA11-....	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.23 (0.15)	195 (7.68)	90 (3.54)
		1.5 (M40)	6FX■002-5DF14-....							
Motors <u>without holding brake</u> on SINAMICS S120 <u>Motor Modules C/D types in booksize format</u>										
Connector ³⁾	4 × 1.5	0.5 (M17)	6FX■002-5CN27-....	6FX■008-1BB11-....	8.4 (0.33)	9.5 (0.37)	0.12 (0.08)	0.15 (0.10)	155 (6.10)	75 (2.95)
		1 (M23)	6FX■002-5CN06-....							
		1.5 (M40)	6FX■002-5CN26-....							
	4 × 2.5	1 (M23)	6FX■002-5CN16-....	6FX■008-1BB21-....	10.0 (0.39)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
		1.5 (M40)	6FX■002-5CN36-....							
	4 × 4	1.5 (M40)	6FX■002-5CN46-....	6FX■008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.27 (0.18)	210 (8.27)	100 (3.94)
Motors <u>with holding brake</u> on SINAMICS S120 <u>Motor Modules C/D types in booksize format</u>										
Connector ³⁾	4 × 1.5+2 × 1.5	0.5 (M17)	6FX■002-5DN27-....	6FX■008-1BA11-....	10.8 (0.43)	12.0 (0.47)	0.22 (0.15)	0.23 (0.15)	195 (7.68)	90 (3.54)
		1 (M23)	6FX■002-5DN06-....							
		1.5 (M40)	6FX■002-5DN26-....							
	4 × 2.5+2 × 1.5	1 (M23)	6FX■002-5DN16-....	6FX■008-1BA21-....	12.4 (0.49)	13.8 (0.54)	0.25 (0.17)	0.30 (0.20)	225 (8.86)	105 (4.13)
		1.5 (M40)	6FX■002-5DN36-....							
	4 × 4+2 × 1.5	1.5 (M40)	6FX■002-5DN46-....	6FX■008-1BA31-....	14.0 (0.55)	15.2 (0.60)	0.35 (0.24)	0.38 (0.26)	255 (10.04)	115 (4.53)
MOTION-CONNECT 500			5		5					
MOTION-CONNECT 800PLUS			8		8					
Length code			....		....					

¹⁾ Note type of delivery.

²⁾ Valid for installation in a cable carrier.

³⁾ For Motor Modules in booksize format C/D types, 3 A to 30 A.

MOTION-CONNECT connection systems

Power cables

Power cables for SIMOTICS M-1PH8 motors with terminal box

Selection and ordering data

Power cables for SIMOTICS M-1PH8 motors with terminal box

Motor	Thread	Number of cores × cross-section	Connection method Power/Motor Module end	Pre-assembled cable	Cable sold by the meter ¹⁾	$D_{\max}$	Weight (cable sold by the meter)		Smallest bending radius ²⁾		
Type		mm ²		Article No.	Article No.	6FX5 mm (in)	6FX8 mm (in)	6FX5 kg/m (lb/ft)	6FX8 kg/m (lb/ft)	6FX5 mm (in)	6FX8 mm (in)
SIMOTICS M-1PH8 motors with terminal box on SINAMICS S120 Combi Power Modules											
M-1PH808	M25	4 × 2.5	Bare wire ends ³⁾	6FX■002-5CE02-....	6FX■008-1BB21-....	11.0 (0.43)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
M-1PH810	M32	4 × 4	Bare wire ends ³⁾	6FX■002-5CE04-....	6FX■008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.31 (0.21)	210 (8.27)	100 (3.94)
M-1PH813	M40	4 × 6	Bare wire ends ³⁾	6FX■002-5CE06-....	6FX■008-1BB41-....	20.0 (0.79)	15.1 (0.59)	0.37 (0.25)	0.42 (0.28)	245 (9.65)	120 (4.72)
SIMOTICS M-1PH8 motors with terminal box on SINAMICS S120 Motor Modules C/D types in booksize format											
M-1PH808	M25	4 × 2.5	Connector ⁴⁾	6FX8002-5CP17-....	6FX8008-1BB21-....	–	11.0 (0.43)	–	0.20 (0.13)	–	90 (3.54)
M-1PH810	M32	4 × 2.5	Connector ⁴⁾	6FX8002-5CP16-....	6FX8008-1BB21-....	–	11.0 (0.43)	–	0.20 (0.13)	–	90 (3.54)
MOTION-CONNECT 500				5			5				
MOTION-CONNECT 800PLUS				8			8				
Length code				....							

¹⁾ Note type of delivery.

²⁾ Valid for installation in a cable carrier.

³⁾ Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs and 4 M6 cable lugs are also included in the scope of supply of the cables.

⁴⁾ For Motor Modules in booksize format C/D types, 3 A to 30 A.

MOTION-CONNECT connection systems

Power cables

Power cables for SIMOTICS M-1PH3 motors with terminal box

Selection and ordering data

Power cables for SIMOTICS M-1PH3 motors with terminal box

Motor	Thread	Number of cores × cross-section	Connection method Power/Motor Module end	Pre-assembled cable	Cable sold by the meter ¹⁾	$D_{\max}$	Weight (cable sold by the meter)		Smallest bending radius ²⁾		
Type		mm ²		Article No.	Article No.	mm (in)	mm (in)	kg/m (lb/ft)	kg/m (lb/ft)	mm (in)	mm (in)
SIMOTICS M-1PH3 motors with terminal box on SINAMICS S120 <u>Combi Power Modules</u>											
M-1PH3101 M-1PH3103 M-1PH3105	M25	4 × 2.5	Bare wire ends ³⁾	6FX0002-5CE02-....	6FX0008-1BB21-....	11.0 (0.43)	11.0 (0.43)	0.21 (0.14)	0.20 (0.13)	180 (7.09)	90 (3.54)
M-1PH3131 M-1PH3132	M32	4 × 4	Bare wire ends ³⁾	6FX0002-5CE04-....	6FX0008-1BB31-....	11.4 (0.45)	12.3 (0.48)	0.27 (0.18)	0.31 (0.21)	210 (8.27)	100 (3.94)
M-1PH3107 M-1PH3133 M-1PH3135	M32	4 × 6	Bare wire ends ³⁾	6FX5002-5CE05-....	6FX5008-1BB41-....	20.0 (0.79)	15.1 (0.59)	0.37 (0.25)	0.42 (0.28)	245 (9.65)	120 (4.72)
SIMOTICS M-1PH3 motors with terminal box on SINAMICS S120 <u>Motor Modules C/D types in booksize format</u>											
M-1PH3101 M-1PH3103 M-1PH3105	M25	4 × 2.5	Connector ⁴⁾	6FX8002-5CP17-....	6FX8008-1BB21-....	–	11.0 (0.43)	–	0.20 (0.13)	–	90 (3.54)
M-1PH3131 M-1PH3132	M32	4 × 4	Connector ⁴⁾	6FX8002-5CP26-....	6FX8008-1BB31-....	–	12.3 (0.48)	–	0.27 (0.18)	–	100 (3.94)
M-1PH3107 M-1PH3133 M-1PH3135 M-1PH3136	M32	4 × 10	Connector ⁴⁾	6FX8002-5CP46-....	6FX8008-1BB51-....	–	18.2 (0.72)	–	0.62 (0.42)	–	140 (5.51)
			Bare wire ends ⁵⁾	6FX8002-5CR41-....							
MOTION-CONNECT 500				5						5	
MOTION-CONNECT 800PLUS				8						8	
Length code				....						....	

¹⁾ Note type of delivery.

²⁾ Valid for installation in a cable carrier.

³⁾ Length of core ends: 300 mm (11.81 in). 4 M8 cable lugs and 4 M6 cable lugs are also included in the scope of supply of the cables.

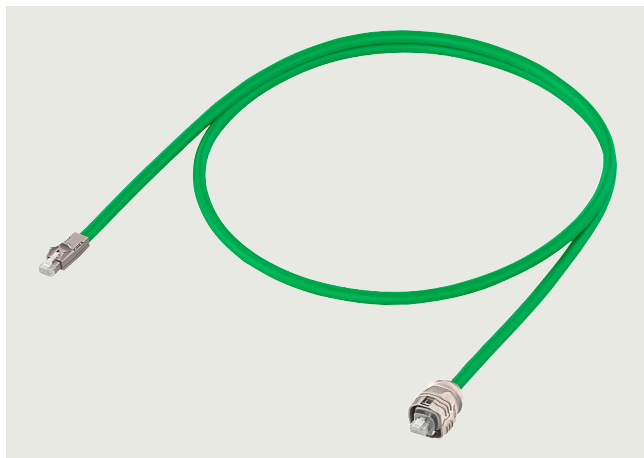
⁴⁾ For Motor Modules in booksize format C/D types, 3 A to 30 A.

⁵⁾ For Motor Modules in booksize format C type, 45 A. Length of core ends: 300 mm (11.81 in). 5 M8 cable lugs and 5 M6 cable lugs are also included in the scope of supply of the cables.

MOTION-CONNECT connection systems

Signal cables

Overview



MOTION-CONNECT DRIVE-CLiQ signal cable with IP20/IP67 connector
Signal cables are pre-assembled and are sold by the meter for the connection of a variety of components.

The following different types of cable are available:

- DRIVE-CLiQ signal cables
- MOTION-CONNECT DRIVE-CLiQ signal cables
- MOTION-CONNECT pre-assembled signal cables

Application

DRIVE-CLiQ signal cables

DRIVE-CLiQ signal cables are used to connect components with DRIVE-CLiQ connections which have a separate or external 24 V DC power supply.

MOTION-CONNECT DRIVE-CLiQ signal cables

MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores are used whenever components with DRIVE-CLiQ connections must meet high requirements such as mechanical stress and oil resistance, e.g. where a connection is made outside the cabinet between Power Modules/Motor Modules and SIMOTICS S-1FK7/ SIMOTICS M-1PH8 motors with DRIVE-CLiQ interface.

MOTION-CONNECT pre-assembled signal cables

MOTION-CONNECT pre-assembled signal cables are used whenever motor encoders on motors without DRIVE-CLiQ interface are connected to Sensor Modules.

Type of delivery for pre-assembled signal cables

Pre-assembled signal cables are available in units of 10 cm (3.94 in).

Starting with 30 kg or 100 m (66.2 lb or 328 ft) or more, the cables are supplied on cable drums; below 30 kg or 100 m, reels are used instead of drums.

Technical specifications

Article No.	6FX2002-1DC00-....	6FX5...-DC...-....	6FX8...-DC...-....
Product name	DRIVE-CLiQ signal cable	MOTION-CONNECT 500 DRIVE-CLiQ signal cable	MOTION-CONNECT 800PLUS DRIVE-CLiQ signal cable
Certificate of suitability	• CE • RoHS conformity • cURus or UR/CSA¹⁾	• CE • RoHS conformity • cURus or UR/CSA¹⁾	• CE • RoHS conformity • cURus or UR/CSA¹⁾
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 • Flexible installation	• Fixed installation • Flexible installation	• Fixed installation • Flexible installation
Tensile stress, max.	45 N/mm ² (6526 lb/in ²)	80 N/mm ² (11603 lb/in ²)	50 N/mm ² (7252 lb/in ²)
Smallest bending radius	50 mm (1.97 in)	35 mm (1.38 in)	35 mm (1.38 in)
Torsional stress	–	Absolute 30°/m	Absolute 30°/m
Bending	–	100000	10 million
Traversing velocity	–	30 m/min (98.4 ft/min)	300 m/min (984 ft/min)
Acceleration	–	2 m/s ² (6.56 ft/s ²)	Up to 50 m/s ² (164 ft/s ²)
Insulation material, incl. jacket	CFC/silicone-free	CFC/silicone-free	CFC/halogen-free/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-404:2012	EN 60811-404:2012 (mineral oil only)	EN 60811-404:2012
Outer jacket	PVC	PVC	PUR, HD22.10 S2 (VDE 0282, Part 10)
Flame-retardant	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3	EN 60332-1-1 to 1-3

Degree of protection of the pre-assembled signal cables and their extensions when closed and connected: IP67.

¹⁾ The UR-CSA File No. is printed on the cable jacket.

MOTION-CONNECT connection systems

Signal cables

Technical specifications

Article No.	6FX500.-.....-.....	6FX800.-.....-.....
Product name	MOTION-CONNECT 500	MOTION-CONNECT 800PLUS
Product designation	Signal cable	Signal cable
Certificate of suitability		
• CE	Yes	Yes
• RoHS conformity	Yes	Yes
• cURus or UR/CSA ¹⁾	UL758-CSA-C22.2-N.210.2-M90	UL758-CSA-C22.2-N.210.2-M90
Rated voltage according to EN 50395	30 V	30 V
Test voltage, rms	500 V	500 V
Operating temperature on the surface		
• Fixed installation	-20 ... +80 °C (-4 ... +176 °F)	-50 ... +80 °C (-58 ... +176 °F)
• Flexible installation	0 ... 60 °C (32 ... 140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Tensile stress, max.		
• Fixed installation	50 N/mm ² (7252 lb/in ²)	50 N/mm ² (7252 lb/in ²)
• Flexible installation	20 N/mm ² (2901 lb/in ²)	20 N/mm ² (2901 lb/in ²)
Smallest bending radius		
• Fixed installation	60 mm (2.36 in)	4 × D _{max}
• Flexible installation	100 mm (3.94 in)	70 mm (2.76 in)
Torsional stress	Absolute 30°/m	Absolute 30°/m
Bending	2 million	10 million
Traversing velocity	180 m/min (591 ft/min)	Up to 300 m/min (984 ft/min)
Acceleration	5 m/s ² (16.4 ft/s ²)	Up to 50 m/s ² (164 ft/s ²)
Insulation material, incl. jacket	CFC/silicone-free	CFC/halogen-free/silicone-free IEC 60754-1/DIN VDE 0472-815
Oil resistance	EN 60811-404:2012 (mineral oil only)	EN 60811-404:2012
Outer jacket	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

Degree of protection of the pre-assembled signal cables and their extensions when closed and connected: IP67.

¹⁾ The UR-CSA File No. is printed on the cable jacket.

MOTION-CONNECT connection systems
Signal cables

Pre-assembled DRIVE-CLiQ signal cables without 24 V DC cores

Selection and ordering data

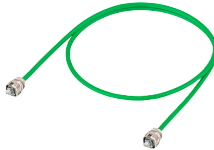
Pre-assembled DRIVE-CLiQ signal cables without 24 V DC cores

Type	Length	$D_{\max}$	Connector module end motor end	Degree of protection module end motor end	DRIVE-CLiQ signal cable <u>without</u> 24 V DC cores
	m (ft)	mm (in)			Article No.
Fixed lengths 	0.11 (0.36)		RJ45	IP20	6SL3060-4AB00-0AA0
	0.16 (0.52)				6SL3060-4AD00-0AA0
	0.21 (0.69)				6SL3060-4AF00-0AA0
	0.26 (0.85)				6SL3060-4AH00-0AA0
	0.31 (1.02)				6SL3060-4AK00-0AA0
	0.36 (1.18)				6SL3060-4AM00-0AA0
	0.41 (1.35)				6SL3060-4AP00-0AA0
	0.60 (1.97)				6SL3060-4AU00-0AA0
	0.95 (3.12)				6SL3060-4AA10-0AA0
	1.20 (3.94)				6SL3060-4AW00-0AA0
	1.45 (4.76)				6SL3060-4AF10-0AA0
	2.10 (6.89)				6SL3060-4AB20-0AA0
	2.40 (7.87)				6SL3060-4AE20-0AA0
	2.80 (9.19)				6SL3060-4AJ20-0AA0
	5.00 (16.41)				6SL3060-4AA50-0AA0
To the decimeter 	max. 70 (230)	7.0 (0.28)	RJ45	IP20	6FX2002-1DC00-....
Length code					....

MOTION-CONNECT connection systems

Signal cables

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores**Selection and ordering data****Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables for SINAMICS S120 and motors with 24 V DC cores**

Type	Application	Length, max.	$D_{\max}$	Connector module end motor end	Degree of protection module end motor end	MOTION-CONNECT DRIVE-CLiQ signal cable <u>with 24 V DC cores</u> Article No.
		m (ft)	mm (in)			
	To the decimeter					
	For components with DRIVE-CLiQ interface in the control cabinet. For example, for making the connection between SINAMICS S120 Motor Modules or Power Modules and the DRIVE-CLiQ cabinet bushing.	100 (328)	7.1 (0.28)	RJ45	IP20	6FX5002-2DC00-....
		75 (246)	7.1 (0.28)	RJ45	IP20	6FX8002-2DC00-....
	To the decimeter					
	For built-in or built-on encoder systems with DRIVE-CLiQ interface. For example, for making the connection between SIMOTICS motors and SINAMICS S120 Motor Modules or Power Modules.	100 (328)	7.1 (0.28)	RJ45	IP20/IP67	6FX8002-2DC10-....
		75 (246)	7.1 (0.28)	RJ45	IP20/IP67	6FX5002-2DC10-....
	To the decimeter					
	For built-in or built-on encoder systems with DRIVE-CLiQ interface. For example, for making the connection between SIMOTICS S-1FK7/ SIMOTICS M-1PH8/and SINAMICS S120 via DRIVE-CLiQ cabinet bushings, couplers or DME20, or 2 couplers or DME20.	100 (328)	7.1 (0.28)	RJ45	IP67/IP67	6FX5002-2DC20-....
		75 (246)	7.1 (0.28)	RJ45	IP67/IP67	6FX8002-2DC20-....
MOTION-CONNECT 500						5
MOTION-CONNECT 800PLUS						8
Length code						....

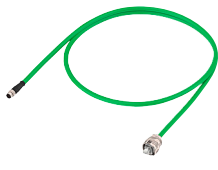
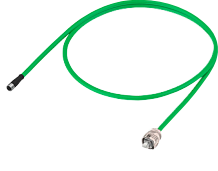
MOTION-CONNECT connection systems

Signal cables

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores

Selection and ordering data

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores for SINAMICS S120 and direct measuring systems with M12 connection or SIMOTICS motors with M12 connection at the disconnection point

Version	SIMOTICS motor/ encoder Usage	Length, max.	D_{max}	Module-end connector/ degree of protection	Encoder/ motor-end connector/ degree of protection	Basic cable	Extension
		m (ft)	mm (in)			Article No.	Article No.
Basic cable between encoder and SINAMICS S120 Motor Module or Power Module							
To the meter ¹⁾	Absolute encoders with DRIVE-CLiQ interface and M12 connection	100 (328)	7.1 (0.28)	RJ45/IP20	M12/IP67 ²⁾	6FX5002-2DC30-....	6FX5002-2DC34-....
	Non-Siemens direct measuring systems with DRIVE-CLiQ interface and M12 connection	75 (246)	7.1 (0.28)	RJ45/IP20	M12/IP67 ²⁾	6FX8002-2DC30-....	6FX8002-2DC34-....
							
Extension for all cables with M12 connection							
To the meter ¹⁾		30 (98.4)	7.1 (0.28)	M12/IP67 ²⁾	M12/IP67 ²⁾	6FX5002-2DC34-....	6FX5002-2DC34-....
		30 (98.4)	7.1 (0.28)	M12/IP67 ²⁾	M12/IP67 ²⁾	6FX8002-2DC34-....	6FX8002-2DC34-....
							
Adapter cable between SIMOTICS motor with DRIVE-CLiQ RJ45 interface and disconnection point with M12 connection							
To the meter ¹⁾	S-1FK7 M-1PH8	30 (98.4)	7.1 (0.28)	M12/IP67 ²⁾	RJ45/IP67 ³⁾	6FX8002-2DC38-....	6FX8002-2DC34-....
							
Adapter cable between encoder with DRIVE-CLiQ M12 interface and disconnection point with M17 connection							
To the meter ¹⁾		100 (328)	7.1 (0.28)	M17/IP67 ²⁾	M12/IP67 ²⁾	6FX5002-2DC46-....	6FX5002-2DC34-....
		75 (246)	7.1 (0.28)	M17/IP67 ²⁾	M12/IP67 ²⁾	6FX8002-2DC46-....	6FX8002-2DC34-....
							
Adapter cable between encoder with DRIVE-CLiQ M12 interface and disconnection point with RJ45/IP67 connection							
To the meter ¹⁾	DRIVE-CLiQ cou- pler, DME20, cabinet bushing with RJ45 connection	100 (328)	7.1 (0.28)	RJ45/IP67 ³⁾	M12/IP67 ²⁾	6FX5002-2DC36-....	6FX5002-2DC34-....
		75 (246)	7.1 (0.28)	RJ45/IP67 ³⁾	M12/IP67 ²⁾	6FX8002-2DC36-....	6FX8002-2DC34-....
							
MOTION-CONNECT 500						5	5
MOTION-CONNECT 800PLUS						8	8
Length code						....	....

The combinations of signal cable extensions shown are only provided by way of example.
The maximum length of a DRIVE-CLiQ line (basic cable plus ex-
tensions and/or adapter cable) must be observed.

¹⁾ To the meter up to 20 m (65.6 ft), beyond that in steps of 5 m (16.4 ft) up to the maximum length.

²⁾ Max. 3 M12 disconnection points or 4 M17 disconnection points permissible without reduction in maximum total length. With a combination of M17 and M12, a maximum number of 3 disconnection points is possible without shortening the maximum length.

³⁾ DRIVE-CLiQ coupler 6SL3066-2DA00-0AB0 required at disconnection point or between 2 cables with RJ45 connection. The total maximum length is reduced by 5 m (16.4 ft) for each coupler.

MOTION-CONNECT connection systems

Signal cables

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores

Selection and ordering data

Pre-assembled MOTION-CONNECT DRIVE-CLiQ signal cables with 24 V DC cores for SINAMICS S120 and SIMOTICS S-1FT2/S-1FK2 and S-1FK7 motors with M17 connection or direct measuring systems with M17 connection at the disconnection point

Version	SIMOTICS motor/ encoder Usage	Length, max.	$D_{\max}$	Module-end connector/ degree of protection	Motor-end connector/ degree of protection	Basic cable	Extension
		m (ft)	mm (in)			Article No.	Article No.
To the decimeter	S-1FT2/-1FK2/-1FK7 ¹⁾	100 (328)	7.1 (0.28)	RJ45/IP20	M17/IP67 ²⁾	6FX5002-2D-40-....	6FX5002-2D-44-....
	S-1FT2/-1FK2/-1FK7 ¹⁾	75 (246)	7.1 (0.28)	RJ45/IP20	M17/IP67 ²⁾	6FX8002-2D-40-....	6FX8002-2D-44-....

Extension for all cables with M17 connection

To the decimeter	S-1FT2/-1FK2/-1FK7 ¹⁾	100 (328)	7.1 (0.28)	M17/IP67 ²⁾	M17/IP67 ²⁾	6FX5002-2D-44-....	6FX5002-2D-44-....
	S-1FT2/-1FK2/-1FK7 ¹⁾	75 (246)	7.1 (0.28)	M17/IP67 ²⁾	M17/IP67 ²⁾	6FX8002-2D-44-....	6FX8002-2D-44-....

Adapter cable between SIMOTICS motor with DRIVE-CLiQ RJ45 interface and disconnection point with M17 connection

To the decimeter	S-1FT2/-1FK2/-1FK7 ¹⁾	100 (328)	7.1 (0.28)	M17/IP67 ²⁾	RJ45/IP67 ³⁾	6FX5002-2DC42-....	6FX5002-2D-44-....
	S-1FT2/-1FK2/-1FK7 ¹⁾	75 (246)	7.1 (0.28)	M17/IP67 ²⁾	RJ45/IP67 ³⁾	6FX8002-2DC42-....	6FX8002-2D-44-....

Adapter cable between encoder with DRIVE-CLiQ M12 interface and disconnection point with M17 connection

To the meter up to 20 m (65.6 ft), beyond that in steps of 5 m (16.4 ft)		100 (328)	7.1 (0.28)	M17/IP67 ²⁾	M12/IP67 ²⁾	6FX5002-2DC46-....	6FX5002-2D-44-....
		75 (246)	7.1 (0.28)	M17/IP67 ²⁾	M12/IP67 ²⁾	6FX8002-2DC46-....	6FX8002-2D-44-....

Adapter cable between SIMOTICS motor with DRIVE-CLiQ M17 interface and disconnection point with RJ45/IP67 connection

To the decimeter	S-1FT2/-1FK2/-1FK7 ¹⁾	100 (328)	7.1 (0.28)	RJ45/IP67 ³⁾	M17/IP67 ²⁾	6FX5002-2D-48-....	6FX5002-2D-44-....
	S-1FT2/-1FK2/-1FK7 ¹⁾ (e.g. for DRIVE-CLiQ coupler, DME20, cabi- net bushing with RJ45 connection)	75 (246)	7.1 (0.28)	RJ45/IP67 ³⁾	M17/IP67 ²⁾	6FX8002-2D-48-....	6FX8002-2D-44-....

MOTION-CONNECT 500

MOTION-CONNECT 800PLUS

Connector, type: **SPEED-CONNECT**Connector, type: **Full thread**

Length code

5				5			
8				8			
C				C			
D				D			
....							

The combinations of signal cable extensions shown are only provided by way of example.

The maximum length of a DRIVE-CLiQ line (basic cable plus extensions and/or adapter cable) must be observed.

¹⁾ For SIMOTICS S-1FK7 with option N16.

²⁾ Max. 3 M12 disconnection points or 4 M17 disconnection points permissible without reduction in maximum total length. With a combination of M17 and M12, a maximum number of 3 disconnection points is possible without shortening the maximum length.

³⁾ DRIVE-CLiQ coupler 6SL3066-2DA00-0AB0 required at disconnection point or between 2 cables with RJ45 connection. The total maximum length is reduced by 5 m (16.4 ft) for each coupler.

MOTION-CONNECT connection systems

Signal cables

Pre-assembled signal cables for motors with SPEED-CONNECT connector

Selection and ordering data

Pre-assembled MOTION-CONNECT signal cables for motors with **SPEED-CONNECT** connector

Encoder system	Motor	Connection via	Length, max.	$D_{\max}$	Degree of protection Connector ¹⁾	Basic cable	Extension
	SIMOTICS	SINAMICS	m (ft)	mm (in)		Article No.	Article No.
Absolute encoder with EnDat 2.1	S-1FK7/ M-1PH8 ²⁾	SMC20	100 (328)	9.8 (0.39)	IP20/IP67	6FX002-2EQ31-....	6FX002-2EQ34-....
Incremental encoder sin/cos 1 V_{pp} 2048 S/R, with C and D tracks	S-1FK7/ M-1PH8 ²⁾	SMC20	100 (328)	9.8 (0.39)	IP20/IP67	6FX002-2CQ31-....	6FX002-2CQ34-....
Incremental encoder sin/cos 1 V_{pp} 256 and 512 S/R, without C and D tracks	M-1PH8 ²⁾	SMC20	50 (164)	9.2 (0.36)	IP20/IP67	6FX802-2CQ80-....	6FX002-2CQ34-....
MOTION-CONNECT 500						5	5
MOTION-CONNECT 800PLUS						8	8
Signal cable							
Pre-assembled						0	
Connector at module end supplied separately						1	
Connector at motor end supplied separately						4	
Length code						....	....

¹⁾ The specified degree of protection refers to the basic cable.

²⁾ For SIMOTICS M-1PH808/-1PH810/-1PH813/-1PH816 motors

Pre-assembled signal cables for direct or external measuring systems with full-thread connector

Selection and ordering data

Encoder system	Connection via	Length, max.	$D_{\max}$	Degree of protection Connector ¹⁾	Basic cable	Extension
	SINAMICS	m (ft)	mm (in)		Article No.	Article No.
Absolute encoder with EnDat 2.1	SMC20	100 (328)	9.8 (0.39)	IP20/IP67	6FX0002-2EQ10-....	6FX0002-2EQ14-....
Absolute encoder with EnDat 2.1	SMC20	100 (328)	9.2 (0.36)	IP20/IP67	6FX0002-2CH00-....	6FX0002-2AD04-....
• 6FX2001-5.E.. • 1XP8014-10/1XP8024-10	SMC20	100 (328)	9.2 (0.36)	IP20/IP67	6FX0002-2CH00-....	6FX0002-2AD04-....
Absolute encoder with SSI 24 V DC	SMC30	100 (328)	9.3 (0.37)	IP20/IP67	6FX0002-2CC11-....	6FX0002-2CB54-....
• 6FX2001-5.S.. Clock-pulse rate 100 ... 250 kHz • 1XP8014-20/1XP8024-20/-21	SMC30	100 (328)	9.3 (0.37)	IP20/IP67	6FX0002-2CC06-....	—
Incremental encoder sin/cos 1 V _{pp} 2048 S/R, with C and D tracks	SMC20	100 (328)	9.8 (0.39)	IP20/IP67	6FX0002-2CA31-....	6FX0002-2CA34-....
Incremental encoder sin/cos 1 V _{pp} 256 and 512 S/R, without C and D tracks	SMC20	50 (164)	9.2 (0.36)	IP20/IP67	6FX8002-2CA80-....	6FX0002-2CA34-....
Incremental encoder sin/cos 1 V _{pp} without C and D tracks 6FX2001-3	SMC20	50 (164)	9.3 (0.37)	IP20/IP67	6FX0002-2CG00-....	6FX0002-2CB54-....
Incremental encoder HTL	SMC30	300 (984) ²⁾	9.3 (0.37)	—/IP67	6FX0002-2AH00-.... 6FX0002-2AH00-....	6FX0002-2AH04-....
	SMC30	300 (984) ²⁾	9.3 (0.37)	IP20/IP67	6FX0002-2AH11-....	6FX0002-2AH04-....
Incremental encoder HTL 24 V DC 6FX2001-4	SMC30	100 (328)	9.3 (0.37)	—/IP67	6FX5002-2CA12-....	6FX0002-2CB54-....
Incremental encoder TTL RS422 6FX2001-2	SMC30	100 (328)	9.3 (0.37)	IP20/IP67	6FX0002-2CR00-....	6FX0002-2CB54-....
• 5 V DC • 24 V DC	SMC30	100 (328)	9.3 (0.37)	IP20/IP67	6FX0002-2CD24-....	6FX0002-2CB54-....
MOTION-CONNECT 500					5	5
MOTION-CONNECT 800PLUS					8	8
Signal cable						
Pre-assembled					0	
Connector at module end supplied separately					1	
Connector at motor end supplied separately					4	
Length code					....	....

The combinations of signal cable extensions shown are only provided by way of example.

The maximum specified cable length (basic cable and extensions) must not be exceeded.
The permissible total maximum length is reduced by 2 m (6.56 ft) for each interruption point.

¹⁾ The specified degree of protection refers to the basic cable.

²⁾ Applicable to HTL encoders with bipolar signal evaluation or for evaluation of the difference signals A*, A and B*, B; for HTL encoders with unipolar signal evaluation, the permissible cable length is reduced to 100 m (328 ft).

MOTION-CONNECT connection systems

Length code

Overview

Length Article No. supplement

Length code for pre-assembled cables

Length	Article No.	supplement
6FX.....-.....-		
0 m	1	
100 m (328 ft)	2	
200 m (656 ft)	3	
0 m	A	
10 m (32.8 ft)	B	
20 m (65.6 ft)	C	
30 m (98.4 ft)	D	
40 m (131 ft)	E	
50 m (164 ft)	F	
60 m (197 ft)	G	
70 m (230 ft)	H	
80 m (262 ft)	J	
90 m (295 ft)	K	
0 m	A	
1 m (3.28 ft)	B	
2 m (6.56 ft)	C	
3 m (9.84 ft)	D	
4 m (13.1 ft)	E	
5 m (16.4 ft)	F	
6 m (19.7 ft)	G	
7 m (23.0 ft)	H	
8 m (26.2 ft)	J	
9 m (29.5 ft)	K	
0 m	0	
0.1 m (3.94 in)	1	
0.2 m (7.87 in)	2	
0.3 m (11.81 in)	3	
0.4 m (15.75 in)	4	
0.5 m (19.69 in)	5	
0.6 m (23.62 in)	6	
0.7 m (27.56 in)	7	
0.8 m (31.5 in)	8	
Examples:		
1.0 m (3.28 ft)	1	A B 0
2.2 m (7.22 ft)	1	A C 2
8.0 m (26.3 ft)	1	A J 0
299.0 m (981 ft)	3	K K 0

Note:

Pre-assembled cables with a length of 0 m (...-1AA0) can **not** be ordered!

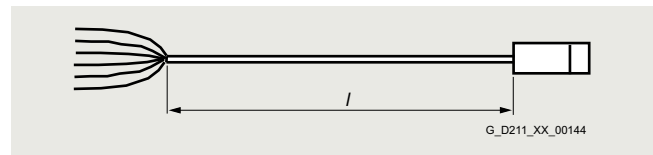
Length Article No. supplement

Length code for cables sold by the meter¹⁾

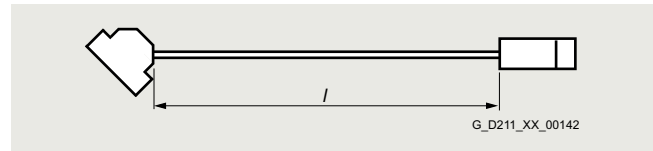
Length	Article No.	supplement
6FX.008-.....-		
50 m (164 ft)	1	F
100 m (328 ft)	2	A
200 m (656 ft)	3	A
500 m (1641 ft)	6	A

More information

Definition of lengths for pre-assembled cables



Cable with bare wire ends and pre-assembled connector



Cable with pre-assembled connectors at both ends

Tolerances:

- Cable lengths up to 10 m (32.8 ft): $\pm 2\%$
- Cable lengths of 10 m (32.8 ft) and longer: $\pm 1\%$

¹⁾ Note type of delivery. Power cables with a core cross-section as of $4 \times 4 \text{ mm}^2$ or $4 \times 4 \text{ mm}^2$ with brake cores can be delivered at exact length in meters. Length code as for pre-assembled cables.

MOTION-CONNECT connection systems

Accessories for signal cables

DRIVE-CLiQ cabinet bushing (RJ45)/DRIVE-CLiQ cabinet bushing (M12)**Overview**

DRIVE-CLiQ cabinet bushing for signal cables (RJ45)

The DRIVE-CLiQ cabinet bushing (RJ45) provides the high IP67 degree of protection for the appropriate MOTION-CONNECT DRIVE-CLiQ signal cables routed through openings in control cabinets. The DRIVE-CLiQ cabinet bushing has IP54 degree of protection on the outside and IP20 on the inside of the control cabinet.

Overview

DRIVE-CLiQ cabinet bushing for signal cables (M12)

The DRIVE-CLiQ cabinet bushing (M12) provides the high IP67 degree of protection for the appropriate MOTION-CONNECT DRIVE-CLiQ signal cables routed through openings in control cabinets. The DRIVE-CLiQ cabinet bushing (M12) has IP67 degree of protection at both ends and is designed as a socket with internal thread on the outside of the cabinet and as pins with an external thread on the inside of the cabinet.

Note:

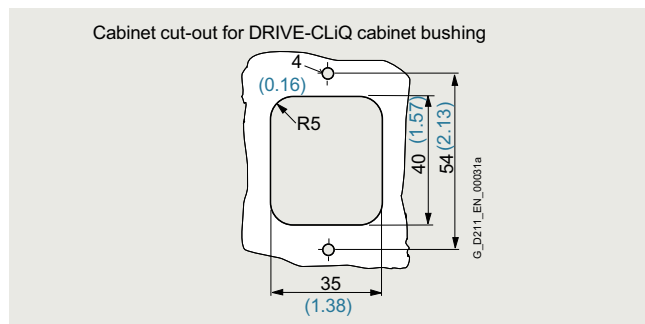
The IP67 degree of protection is only achieved with the DRIVE-CLiQ signal cables connected.

Selection and ordering data

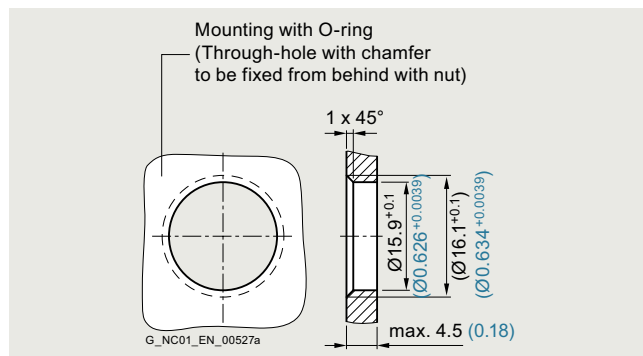
Description	Article No.
DRIVE-CLiQ cabinet bushing For MOTION-CONNECT DRIVE-CLiQ signal cables (RJ45)	6SL3066-2DA00-0AA0

Selection and ordering data

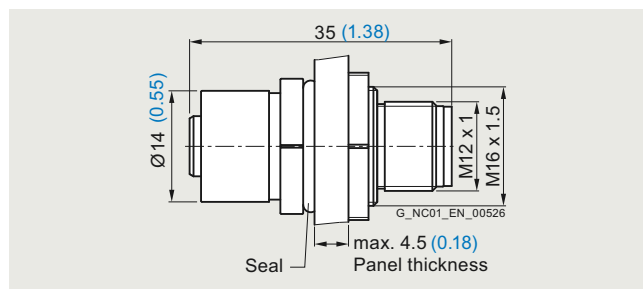
Description	Article No.
DRIVE-CLiQ cabinet bushing For MOTION-CONNECT DRIVE-CLiQ signal cables (M12)	6FX2003-0DT67

Dimensional drawings

Dimensions in mm (in)

Dimensional drawings

Dimensions in mm (in)



Cutout in cabinet for DRIVE-CLiQ cabinet bushing

MOTION-CONNECT connection systems
Accessories for signal cables

DRIVE-CLiQ coupler

Overview



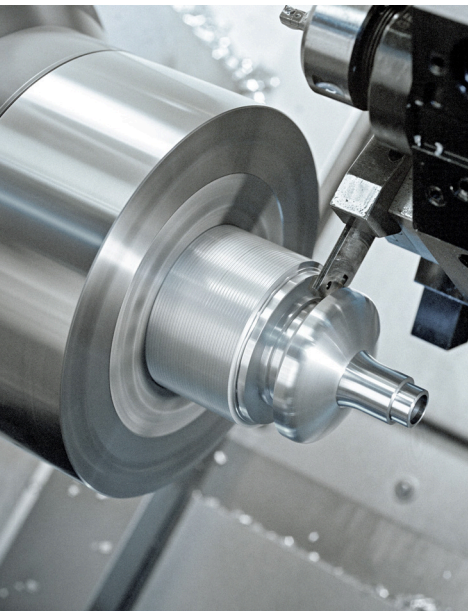
DRIVE-CLiQ coupler for signal cables

The DRIVE-CLiQ coupler makes it possible to join two MOTION-CONNECT DRIVE-CLiQ signal cables with IP67 degree of protection.

Selection and ordering data

Description	Article No.
DRIVE-CLiQ coupler For MOTION-CONNECT DRIVE-CLiQ signal cables	6SL3066-2DA00-0AB0

Services and training



8/2 8/2	Services OSS Plus - Online Service and Support Plus
8/3	Documentation
8/4 8/4 8/6	Training SITRAIN SinuTrain for SINUMERIK Operate
8/8 8/8	Siemens Automation Cooperates with Education (SCE) Teaching made easy - Comprehensive support on the way to Industry 4.0
8/11 8/11 8/13 8/14	Engineering software Analyze MyMachine /SINUMERIK Tuning Center SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool) Siemens Product Configurator
8/15 8/15	Applications Application examples

Glossary SINUMERIK 828
mall.industry.siemens.com/mall/en/ww/Catalog/Products/10355434

Services and training

Services

OSS Plus - Online Service and Support Plus

Overview



OSS Plus - Online Service and Support Plus

For the SINUMERIK 828D and the associated components¹⁾ from Siemens DI, you will receive a free OSS Plus service contract for a period of 24 months.

After machine registration by OEM or dealer, within 24 months after delivery of the control package, OSS Plus can be used.

After end-user registration, within 24 months after delivery of the control package, OSS Plus can be used by the end user for another 24 months.

Machine registration can be done by registering in MyRegistration using QR code.
myregistration.siemens.com

Online Service and Support Plus services include:

- Online service support
- Provision of service engineers
- On-site diagnostics
- Fault correction on site
- Proof of fault correction

The fault correction is carried out through online service support, by repairing and/or replacing faulty components.

Benefits

- Your benefit: The OSS Plus contract period is full 24 months after the notification of the final acceptance (2nd commissioning) at the end user.
- You can contractually extend the period for OSS Plus by an additional 6, 12, 24 or 36 months.
- This contractual extension must be completed during an active OSS Plus.

Selection and ordering data

Description	Article No.
Extension of OSS Plus service	6FC8520-0RX00 - AA2
For SINUMERIK 828D and the associated components from Siemens on machine tools	
• Contract extension by 6 months	0
• Contract extension by 12 months	1
• Contract extension by 24 months	2
• Contract extension by 36 months	3
OSS Plus post-registration	6FC8520-0RX00-7AA2
OSS Plus re-entry	6FC8520-0RX00-8AA2

More information

More information about the conditions and the scope of the OSS Plus service contract can be found at:

www.siemens.com/automation/ossplus

More information about online registration is available at:

myregistration.siemens.com

The QR code in SINUMERIK Operate takes you directly to the myRegistration homepage. The hardware identification number is automatically transferred to the registration procedure.

¹⁾ Not applicable to complete motor spindles.

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 SINUMERIK CNCs and the SINAMICS S120/S220 drive systems. This documentation includes operating manual, programming manual and configuration manual up to the commissioning manual.

The documents are available in hardcopy form or as a PDF file for downloading from the internet.

More information is available on the internet at:

www.siemens.com/sinumerikdocumentation

support.industry.siemens.com/cs/de/en/view/108464614

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SINUMERIK documentation**

Provision of documentation
for further processing
Valid for use on a control
Supply of a license

License conditions see:

www.siemens.com/docu-licence

**Technical documentation on
SINUMERIK 828D**

support.industry.siemens.com/cs/document/109766724

**Technical documentation on
SINAMICS**

support.industry.siemens.com/cs/ww/en/view/109807358

**Technical documentation on
SIMOTICS motors**

support.industry.siemens.com/cs/ww/en/view/109813641

**Documentation Motion Control
Encoder measuring systems**

support.industry.siemens.com/cs/ww/en/ps/13204/man

Additional search term:
Motion Control Encoder

Individual adaptation of information

Whether for turning, milling, grinding or nibbling - machine manufacturers and machine operators can assemble their individual operating instructions on the internet for specific topics such as programming, commissioning, etc.

Machine manufacturers and end customers are not only able to assemble their own customized technical documents for a specific product or system on the internet, they can also generate complete libraries with individually configured contents. The content that matches your topic can be found from the full range of 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. User-generated collections can be saved in the commonly used RTF, PDF or XML formats.

More information is available on the internet at:

www.siemens.com/mdm

Services and training

Training

SITRAIN

Introduction

Learn the way you like it – with SITRAIN

SITRAIN imparts a wide range of technical knowledge for all industries and applications. Our offering is oriented toward the needs of learners and the demands of innovative companies. Get pleasure out of learning - thanks to innovative learning methods, personal support, and knowledge that will help you in your work and further development. For successful, flexible, and continuous learning.

Education and training directly from the manufacturer

SITRAIN provides you with training from the industrial product and solution portfolio from Siemens and benefits from 30 years of expertise in technical training. Take a look at the many options for expanding your knowledge with SITRAIN and find the course that meets your needs! The following training and further education units are available to you for your individual knowledge building:



Industrial Automation Systems SIMATIC

Training available for:
SIMATIC S7-1500, TIA Portal,
SIMATIC S7-300/400,
SIMATIC S7-1200



Drive Technology

Training available for:
SINAMICS S120 and
SINAMICS G120 low-voltage
converters,
SINAMICS G130 / G150 /
G180 / S150



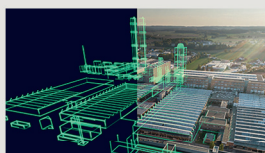
SINUMERIK CNC automation system

Training available for:
SINUMERIK 840D, SINUMERIK
840D sl and SINUMERIK ONE



Process Control Systems

Training available for:
SIMATIC PCS 7,
SIMATIC PCS neo



Digital Enterprise

Training available for:
Openness, SIMIT, OPC UA,
Industrial Edge,
Virtual commissioning



Industrial Communications

Training available for:
PROFINET, SCALANCE,
RUGGEDCOM, Industrial Ethernet,
Fieldbus communication,
Industrial Security,
Remote
communication



Identification and Locating

Training available for:
RFID, RTLS-Systems



Operator Control and Monitoring Systems

Training available for:
SIMATIC WinCC Unified in TIA
Portal, SIMATIC WinCC in TIA
Portal, SIMATIC WinCC V7x



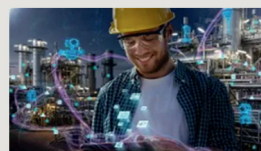
Motion Control System SIMOTION

Training available for:
SIMOTION (Programming,
Commissioning, Diagnostics,
Service)



Smart Infrastructure

Training available for:
SIRIUS, SENTRON, SIVACON,
ALPHA, SIMOCODE,
Circuit breakers



Process Analytics & Instrumentation

Training is available for process
analytics and instrumentation,
explosion protection, process
gas chromatographs



Additional training offer

SIMOVE with Automated
Guided Vehicles (AGV),
SIPLUS CMS, Guidelines and
standards for control cabinets

Introduction***Different learning formats and methods for maximum learning success***

With our SITRAIN training formats, you learn in the way that best suits your preferences and routine. You decide whether you would rather take online training or face-to-face training. It is up to you whether you would like to study on demand or at fixed times.

With a personal learning consultant, in the team, or on your own – you can explore all the possibilities.

Discover our three learning formats:

**Learning Event**

SITRAIN Learning Events are the perfect choice when you want to achieve a defined learning goal in the shortest possible time. You learn in a protected learning environment outside of the daily work routine under the guidance of a learning consultant - virtually, in the training center, or at your company.

**Learning Membership
SITRAIN Access**

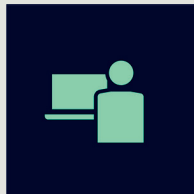
With SITRAIN access, you enter a world of extensive and constantly expanding self-study units on our digital learning platform for industry. With SITRAIN access, you can implement a modern learning culture in your team or company with independent and continuous learning.

**Learning Journey**

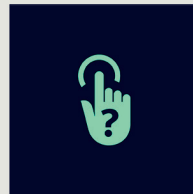
The Learning Journey is the perfect combination of units taken live and self-study units for sustainable learning success. The modular approach enables simple integration into your daily work. This also includes one-year membership for using the SITRAIN access digital learning platform.

**Live**

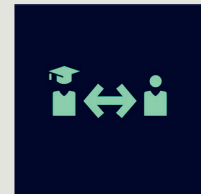
Learn together with others, simultaneously and guided by a learning consultant. Online, in the SITRAIN training center or at your company.

**Self-reliant**

Expand your knowledge self-determined with industry learning and work on your learning units at your own pace and according to your own schedule.

**On demand**

Get the knowledge you need, exactly when you need it. Be it to answer a current question or to work on a special topic.

**Individual**

Talk directly with the learning consultant, clarify detailed questions and get personal coaching for transferring the learned topics to your own application.

**Training cases catalog**

<https://www.siemens.com/sitrain-catalog-training-cases>

www.siemens.com/sitrain

Find
your local
offer here



Services and training

Training

SinuTrain for SINUMERIK Operate

Overview



SinuTrain for SINUMERIK Operate is a PC-based CNC programming software package, based on the original CNC kernel.

SinuTrain for SINUMERIK Operate enables completely identical operator control and CNC programming as on SINUMERIK CNCs that are equipped with the graphical user interface SINUMERIK Operate.

Application

SinuTrain for SINUMERIK Operate can be used for the following applications:

In the work preparation

- Higher machine availability through work preparation on the CNC programming station and security through offline verification of the programs
- Operation and programming are identical 1:1 to that on the machine, so no new operating or programming knowledge is required.
- Enhanced productivity thanks to integrated program and tool management as on a real CNC, integration into the company network, and external data storage media, e.g. USB stick

In training

- Simple learning and professional training through preconfigured machines, and no additional hardware costs
- Learning as on the CNC, with additional tutorials and programming guides
- Perfectly tailored training packages¹⁾ directly from: <http://www.siemens.com/sce>

At the machine manufacturer

- Adaptation of SinuTrain to the specific machine
- The real machine and the machine-manufacturer-specific SinuTrain delivered together to the end users
- Another sales argument thanks to the CNC programming station supplied

For the presentation

- Present always and everywhere
- Live demonstration of (new) SINUMERIK functions instead of slides

Function

The SinuTrain offline programming station brings SINUMERIK Operate to the PC to create realistic conditions, including animated machine control panels. This facilitates the easy transition of know-how from a training situation into a practical environment. This powerful tool enables practice-oriented offline programming on the PC based on the DIN 66025 programming language, the ShopMill and ShopTurn options, type SINUMERIK 828D and 840D sl commands, and the direct transfer of CNC programs to the CNC. Using SINUMERIK Operate and the original SINUMERIK CNC kernel, all operating and programming operations can be used and CNC programs executed.

Integration

SinuTrain for SINUMERIK Operate Version 4.95 Ed2 is based on SINUMERIK 840D sl CNC software with software version 04.95.03.02.003, and can be used for:

- SINUMERIK 840D sl
- SINUMERIK 828D (see Compatibility)

Requirements:

Hardware:

- PC with 2 GHz processor
- RAM: 4 GB of free memory space
- Hard disk:
 - 1.2 GB of free memory space for the minimum installation in English
 - 3.3 GB of free memory space for the complete installation in all languages
- DVD drive for installation from DVD-ROM
- USB interface
- Keyboard, mouse

Software:

- Operating system
 - Microsoft Windows 10 (64-bit - Mobile and Mobile Enterprise are not supported)
 - Restricted compatibility for Microsoft Windows 11 Home/Pro/Pro Education/Pro for Workstations/Enterprise/Education (64-bit)
- Adobe Acrobat Reader

¹⁾ For schools and universities only, not for in-house vocational training departments.

Selection and ordering data

Description	Article No.	Product ID
SinuTrain for SINUMERIK Operate		
Version 4.95 SINUMERIK 840D sl/ SINUMERIK 828D with CNC software 4.95		
• Single-user license	6FC5870-4YC48-0YA0	MCS5410
• Multi-user/ classroom license (18)	6FC5870-8YC48-0YA0	MCS5420
• Basic version	6FC5870-0YC48-0YA0	– *)
Machine adaptation for SinuTrain for SINUMERIK Operate		
• Machine adaptation by Siemens ¹⁾	6FC5088-4AA22-4AB1	– *)
• Importing the start-up archive (option)	6FC5870-0CC48-0YA0	MCS5500
Training packages²⁾		
• Trainer package 6 × single-user licenses 40 × student licenses	6FC5870-1TC48-0YA0	MCS5440
• Trainer package XL 1 × classroom license (18) 40 × student licenses	6FC5870-2TC48-0YA0	MCS5450
• 300-h student license	6FC5870-1YC48-0YA0	MCS5430
• Student package 20 × 300-h student licenses	6FC5870-1SC48-0YA0	MCS5460

More information

The basic version of SinuTrain for SINUMERIK Operate is available for download on the internet.

You can find additional information on the internet at:

www.siemens.com/sinutrain-downloads

* Marketing and sales via Siemens regional company

¹⁾ Services for machine adaptation:
You provide a complete file for CNC series commissioning archive by email. You will then receive a file for importing into SinuTrain by email.
For more information, please contact your local Siemens sales office or Regional Company.

²⁾ For schools and universities only, not for in-house vocational training departments, at: <https://www.siemens.com/sce>

Services and training

Siemens Automation Cooperates with Education (SCE)

Teaching made easy - Comprehensive support on the way to Industry 4.0

Knowledge & technology – the keystones to success in digitalization



Digitalization is quickly and radically changing our world. What does this mean for education?

In the world of Industry 4.0, companies can expect a host of new opportunities and challenges. New systems are verified on the spot through simulations. Automated mass production processes can make every product on the conveyor belt a unique product.



New products are now market-ready much faster. Siemens is shaping this transformation as a technology leader in the field of automation and process lifecycle management (PLM).

These new digitalization processes are changing the know-how requirements for employees. Many educational institutions are facing the challenge of conveying Industry 4.0 know-how as part of their teaching and training. The Siemens Automation Cooperates with Education (SCE) program is supporting educators on the way to Industry 4.0.

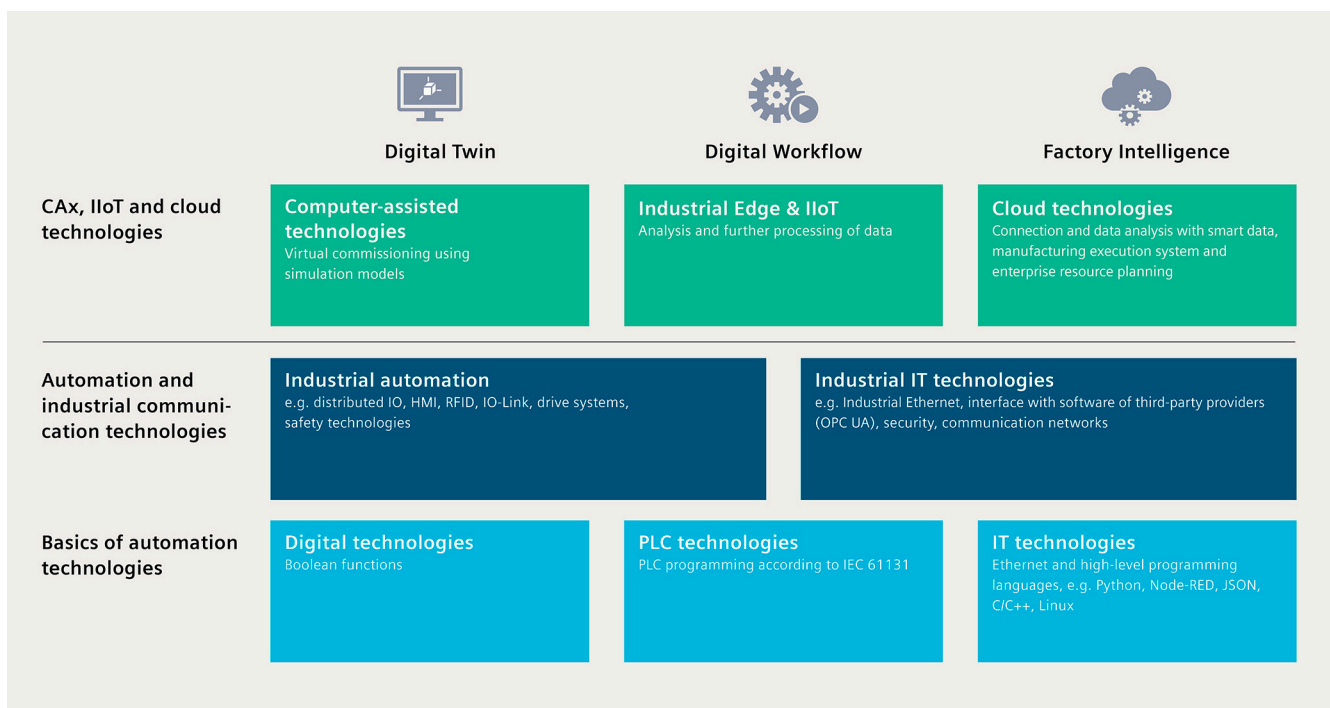
The SCE digitalization concept for educators

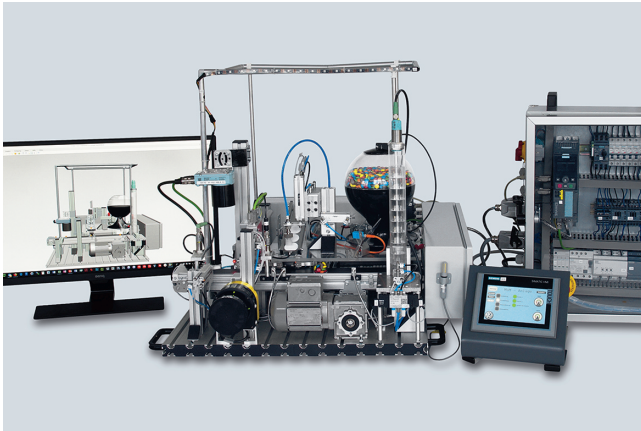
The SCE digitalization concept presented here shows how digitalization can be implemented in educational institutions – from vocational schools to universities.

Digitalization (or Industry 4.0) know-how is now introduced through computer aided technology, Industrial Edge and IIoT as well as Cloud technologies. It is founded on the basics of automation, such as digital technologies, PLC and information technologies, and on advanced automation and industrial communication technologies.

The level of digitalization knowledge can be weighted, depending on the vocational field or branch of study – e.g. mechanical engineering, automation engineering or computer science.

8



The SCE digitalization concept for educators (continued)

As part of their project work, students at Vocational School 2 in Wolfsburg, Germany, have implemented the three levels of the SCE Industry 4.0 concept. A virtual twin created with the Siemens NX Mechatronics Designer (MCD) CAD software was used for the design and virtual commissioning. This enables fast and efficient assembly of the real automation system, e.g. with SIMATIC S7-1500/ET 200SP/RFID, for use in classes. Production data, such as the number of bottles filled, production date and system parameters, are uploaded to a cloud using SIMATIC IOT2000.

siemens.com/sce/iot2000

siemens.com/nx

The SCE offers**Learning and training documents**

More than 100 didactically prepared learning and training documents are available through SCE and incorporate the digitalization concept. They are designed for use in classes, but can also be customized or used for individual study. These documents are available for free download, most of them in 7 languages.

siemens.com/sce/documents

Educator courses

Excellent teaching content is needed to introduce students to digitalization. For this purpose, SCE holds educator courses in certain regions. Based on our learning and training documents and through practical exercises, educators acquire the latest Industry 4.0 know-how.

siemens.com/sce/courses

**Trainer packages**

The 90 SCE trainer packages help educators teaching and implementing the SCE digitalization concept. Trainer packages comprise specially compiled, genuine Siemens hardware and software products. The trainer packages are based on the learning and training documents and are offered to schools, colleges and universities at special terms.

siemens.com/sce/tp

Support for your projects / textbooks

We support you on selected projects with advice and assistance from SCE contact partners.

As a special service, we support textbook authors. We maintain a list of textbooks on the SCE website.

siemens.com/sce/contact

siemens.com/sce/books

Services and training

Siemens Automation Cooperates with Education (SCE)

Teaching made easy - Comprehensive support on the way to Industry 4.0

Partnerships for proliferation of Industry 4.0 in education



Partnership with WorldSkills

As a technology powerhouse, we support vocational training of students around the world. Since 2010, we have partnered with WorldSkills as a Global Industry Partner in order to amplify this cause.

WorldSkills is an international organization whose mission is to raise the profile and recognition of skilled people, and show how important vocational skills are in achieving economic growth and personal success. Every two years, WorldSkills hosts the world championships of skills.

Siemens provides the competitors with automation products, such as SIMATIC S7-1500 and LOGO!, for the disciplines: industrial control, electrical installations, Polymechanics/Automation and manufacturing technology.

Additionally, we support selected continental and regional competitions.

siemens.com/worldskills

Partnerships with educators

We provide support to educators and educational organizations in the form of one-on-one advice through SCE contact partners and Siemens experts as well as long-term cooperation.

siemens.com/sce/contact

Partnerships with producers of learning systems

For practical training in classrooms and labs, numerous producers of learning systems offer a wide range of complete didactic solutions based on SCE trainer packages.

siemens.com/sce/learningsystems



Information portal



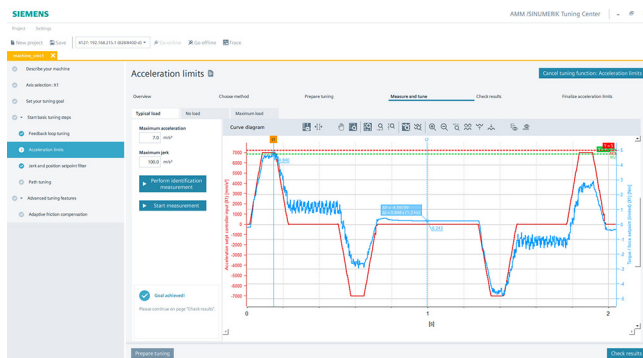
To facilitate your teaching assignment and/or for selfstudy, we offer educators and students a comprehensive SCE information portal. At this portal you have quick access to all SCE offers, e.g. learning and training documents including projects, Getting Started information, videos, manuals, trial software and newsletters.

siemens.com/sce

**Global
Industry
Partner**

worldskills

Overview



Analyze MyMachine /SINUMERIK Tuning Center (AMM /STC) helps you to set up your machine by identifying optimum parameters for the axes. AMM /STC guides you through the optimization process, helping you to carry out optimization so you can find the optimum settings. With AMM /STC, you can optimize your machine quickly and effectively.

Analyze MyMachine /SINUMERIK Tuning Center supports the optimization of machines with the following profile:

- One channel in SINUMERIK is supported.
- One data set is optimized (servo data set 1 and the active drive data set).
- Only metric units are supported, imperial units (such as inch) are not supported.
- The focus is on path axes. Spindles can be optimized using the control loop tuning. In axis mode, acceleration tuning and jerk tuning are supported. The focus is not on the auxiliary axes, such as tool changers and handling axes; these are not supported.

Benefits

- Standard optimization can be performed without expert knowledge
- The operator is guided through the tool step by step during an optimization.
- The tool provides recommendations for the necessary optimization functions.
- The tool presents effective combinations and their dependencies
- Machine data entry is not required
- Simple optimization and testing of complex functions prior to purchase
- Visible SINUMERIK functions for increased productivity and precision
- The tool contains many years of mechatronic knowledge.

Design

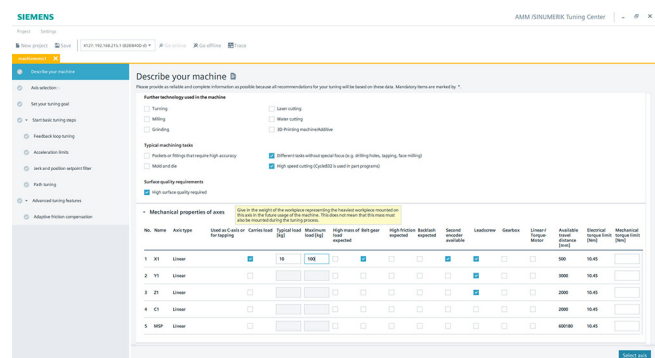
The user interface of the Analyze MyMachine (AMM) /SINUMERIK Tuning Center (STC) is divided into the following main sections:

Describe your machine

On the "Describe your machine" page, you can enter data for the machine that you would like to optimize. Some parameters, such as software limit switches and torque limit values, are automatically read when the application is connected to the machine.

AMM /STC provides you with recommendations and settings based on the characteristics of your machine, as well as the planned applications and processes. The more detailed the information you provide, the better the system will support you.

Machine data can also be entered in offline mode before a connection to the machine is established.



Axis selection

On the "Axis selection" page, you can select the axis that needs to be optimized. Only one axis can be processed per optimization step. Optimize each axis separately.

All basic optimization steps – with the exception of Path tuning – relate to the selected axis. After you select an axis, it is displayed in the navigation tree.

Set your tuning goal

On the "Set your tuning goal" page, you can define the tuning goals for the selected axis.

Use the sliders to define the following parameters:

- Tuning focus: Refers to path relevant goals
- Position overshoot tolerance: Axis-specific tuning goal

Function

- Path adjustment of axes
- Optimization of
 - Drive controllers of axes and spindles
 - Acceleration limits of axes and spindles
 - Jerk limitation of axes and spindles
- Adaptive friction compensation

Services and training
Engineering software

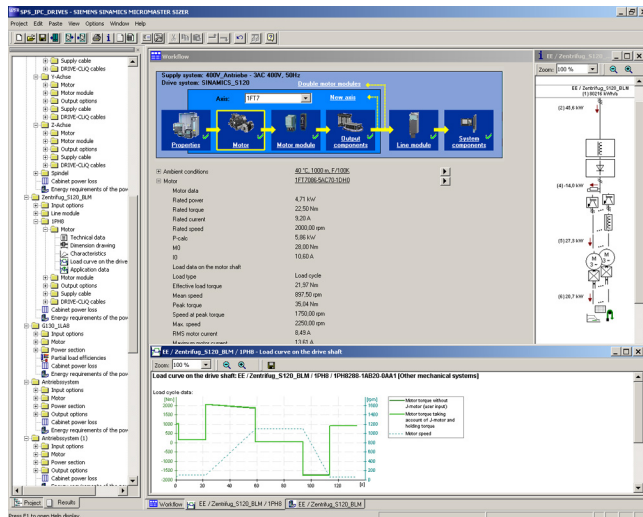
Analyze MyMachine /SINUMERIK Tuning Center

Selection and ordering data

Description	Article No.	Product ID
Analyze MyMachine /SINUMERIK Tuning Center Software for path and axis optimization of machine tools with SINUMERIK 828D / SINUMERIK 840D sl / SINUMERIK ONE, including Diagnostic Trace Languages: Chinese Simplified, Chinese Traditional, English, German, French, Italian, Korean, Portuguese, Spanish		MCS2157

More information

You can find more information at:
support.industry.siemens.com/cs/ww/en/view/109976152
support.industry.siemens.com/cs/ww/en/view/109822967

SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool)**Overview**

The following drives and controls can be engineered in a user-friendly way using the SIZER for Siemens Drives engineering tool:

- SIMOTICS motors, including servo geared motors
- SINAMICS low-voltage drive systems
- Motor starters
- SINUMERIK CNC¹⁾
- SIMOTION Motion Control controller
- SIMATIC controller

It provides support when selecting the technologies involved in the hardware and firmware components required for a drive task. SIZER for Siemens Drives covers the full range of operations required to configure a complete drive system, from basic single drives to demanding multi-axis applications.

SIZER for Siemens Drives supports all of the engineering steps in one workflow:

- Configuring the power supply
- Designing the motor and gearbox, including calculation of mechanical transmission elements
- Configuring the drive components
- Compiling the required accessories
- Selecting the line-side and motor-side power options, e.g. cables, filters, and reactors

When SIZER for Siemens Drives was being designed, particular importance was placed on a high degree of usability and a universal, function-based approach to the drive application. The extensive user guidance makes it easy to use the tool. Status information keeps you continually informed about the progress of the configuration process.

The drive configuration is saved in a project. In the project, the components and functions used are displayed in a hierarchical tree structure.

The project view permits the configuration of drive systems and the copying/inserting/modifying of drives already configured.

The configuration process produces the following results:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to SAP)
- Technical specifications of the system
- Characteristic curves
- Comments on line harmonic distortions
- Mounting arrangement of drive and control components and dimensional drawings of motors
- Energy requirements of the configured application

These results are displayed in a results tree and can be reused for documentation purposes.

Support is provided by the technological online help menu:

- Detailed technical specifications
- Information about the drive systems and their components
- Decision-making criteria for the selection of components
- Online help in English, French, German, Italian, Chinese and Japanese

System requirements

- PG or PC, with Pentium III min. 800 MHz (recommended > 1 GHz)
- 512 MB RAM (1 GB RAM recommended)
- At least 2 GB of free hard disk space
- An additional 100 MB of free hard disk space on Microsoft Windows system drive
- Screen resolution 1024 × 768 pixels
- Operating system:
 - Microsoft Windows 7 (32/64-bit) Professional, Enterprise, Ultimate, Home
 - Microsoft Windows 8.1 (32/64-bit) Professional, Enterprise, Ultimate, Home
 - Microsoft Windows 365
 - Microsoft Windows 10 (64-bit) Professional, Enterprise
- Microsoft Office 2003/2007/2010/2013/2016/365
- Microsoft Internet Explorer V8.0
- Microsoft .NET Framework 2.0
- OpenGL 2.1

More informationDrive dimensioning in the TIA Selection Tool

Application-specific requirements can be determined using drive technology dimensioning in the TIA Selection Tool. This can include motors, gearboxes and converters. The tool supports the configuration and dimensioning of control functions with an open and closed control loop. The technical documentation with features of the technical drive system, as well as a product list for ordering via SiePortal can also be compiled.

You can find more information on the SIZER for Siemens Drives engineering tool at

support.industry.siemens.com/cs/ww/en/ps/13434/dl

It is recommended to switch to the TIA Selection Tool (Desktop) with integrated configuration for drive systems.

You can find more information about the TIA Selection Tool at: www.siemens.com/tia-selection-tool

¹⁾ SINUMERIK 828D PU 272.5/PPU 2xx.5 can be engineered using TIA Selection Tool.

Services and training

Engineering software

Siemens Product Configurator

Overview

The Siemens Product Configurator helps you to configure the optimum drive technology products for a number of applications. The product portfolio comprises the full drive technology range of gearbox, motor, converter and connection system as well as corresponding controller with suitable software license. The intuitive user interface in conjunction with product-specific preliminary selectors makes it simple, fast and efficient to configure products. The result is a bill of materials with extensive documentation consisting of technical data sheets, motor characteristic curves, 2D dimensional drawings / 3D CAD models, EPLAN macros and much more. You can order the products directly by transferring the bill of materials to the shopping cart of SiePortal.



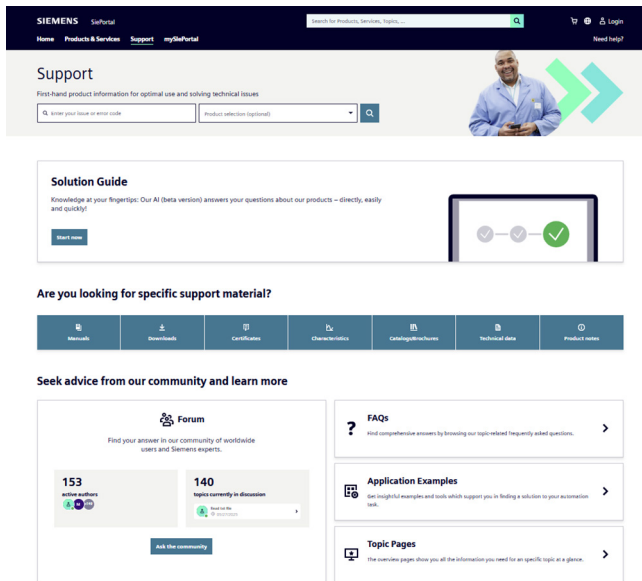
Siemens Product Configurator at a glance

- Quick and easy configuration of drive products and associated components – gearboxes, motors, converters, controllers, connection systems
- Extensive documentation for all products and components, such as
 - Data sheets in up to 12 languages
 - Motor characteristic curves
 - 2D dimensional drawings / 3D CAD models in different formats
 - Terminal box drawing and terminal connection diagram
 - Certificates
 - EPLAN macros
- Ability to order products directly through SiePortal

Access to the Siemens Product Configurator

The Siemens Product Configurator can be accessed without the need for registration or logging in:
www.siemens.com/spc

Overview



Application examples

Descriptions of real, functioning and sector-neutral solutions, comprising a solution path, performance/power data, configuring instructions and the tested program code.

Benefits

The application examples show you solutions for typical automation tasks as example. You can use this as a suggestion or basis for your own solutions.

More information

You can find application examples on the internet at:

sieportal.siemens.com/en-ww/support

or

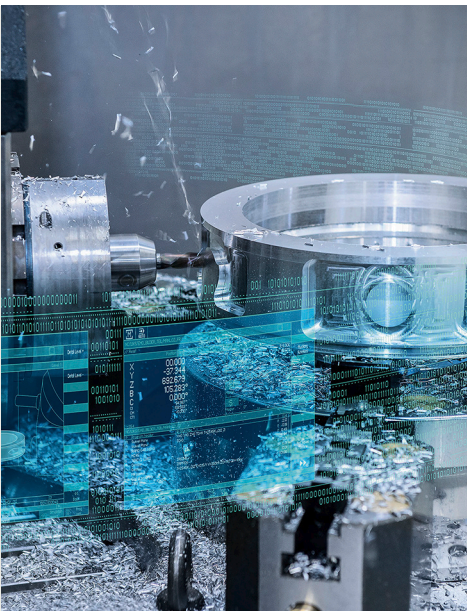
sieportal.siemens.com/su/bluQQ

Or please contact your Siemens representative.

Services and training

Notes

Product Partner SINUMERIK Systems



9/2	Hofmann Mess- und Auswuchttechnik GmbH & Co. KG AB 9000 ring balancing system
9/3	ARTIS – CTM-tool and process monitoring system
9/4	ARTIS – Genior Modular tool and process monitoring system
9/5	MARPOSS S.p.A. – Laser Tool Setter
9/6	MCU GmbH & Co. KG – Toolinspect II
9/7	VibroCut – oscillate
9/8	VibroCut – ultrasonic
9/9	Innomotics GmbH – 2SP1 motor spindles
9/10	Nordmann GmbH & Co. KG – Tool monitoring system SEM-MODUL-e2

Under the name Product Partner SINUMERIK Systems, leading companies present acknowledged know-how in specific fields. Their products and solutions, that they develop, produce and sell themselves, are a useful complement to our comprehensive portfolio.

Our partner network also makes a crucial contribution toward you benefiting from maximally complete, high quality and efficient solutions, enabling you to sustainably improve your competitiveness.

This partnership allows intensive cooperation, and ensures a high degree of compatibility and reliability in productive use with SINUMERIK CNCs.

The systems supplied by our partners are in many cases available for earlier SINUMERIK software versions and can be installed retrospectively. For further information, please contact the partner directly. You can find additional information on the internet at:

www.siemens.com/product-partner

Disclaimer

Product Partners are external companies outside of Siemens and its affiliated companies. Information and descriptions of products from Product Partners are non-binding, and are the responsibility of the Product Partners. These products are manufactured independently by the relevant Product Partner on its own responsibility, and are distributed and delivered under its general terms and conditions of business and delivery. Unless compulsory by law, Siemens assumes no liability or warranty for these products or for the connection with these products of the Product Partners.

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Product Partner SINUMERIK Systems

Hofmann Mess- und Auswucht GmbH & Co. KG - AB 9000 ring balancing system

Overview



AB 9000 ring balancing system

The AB 9000 ring balancing system is based on a brilliantly simple concept. The vibrations generated on rotating systems due to imbalance are actively and quickly eliminated as the system rotates. Two balancing rotors are permanently mounted on the tool spindle via thin ring bearings. A fast, intelligent controller uses sensors to detect the imbalance in the spindle, calculates and adjusts the position of the two balancing rotors electromagnetically until they are ideally positioned to compensate the imbalance.

Benefits

- Automatic (active) balancing of all kinds of rotors
- Balancing during operation without machine shutdown
- Implementation of test imbalance for the purpose of system identification
- Generation of unbalance for acceptance tests

Function

- Automatic (active) balancing of rotors (e.g. grinding wheels, grinding spindles, turning chucks, fans) in one or two planes with imbalance monitoring
- Active balancing during operation without machine shutdown
- Ring-shaped balancing unit for efficient, space-saving integration into the rotor
- Very fast balancing even at high rotational speeds by electromagnetic actuator and adaptive balancing process
- Non-contact, wear-free transmission of actuator energy between stator and balancing ring
- Pre-balancing software for manual correction of basic unbalance - AB 9000 then only balances the new operational unbalances.
- Balancing unit can be neutralized, e.g. for pre-balancing.
- Indication of remaining balancing capacity
- PC operating software

More information

Hofmann Mess- und Auswuchttechnik GmbH & Co. KG

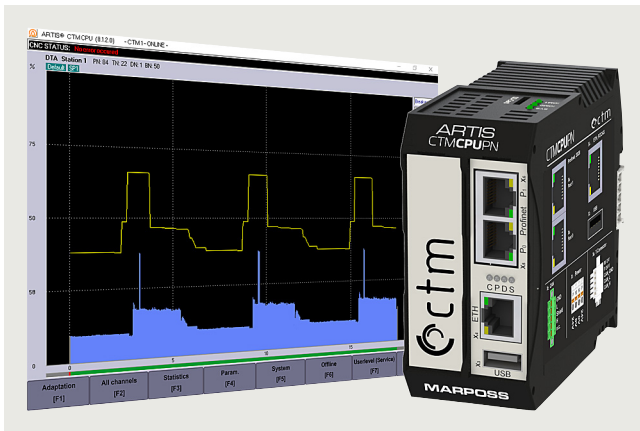
Werner-von-Siemens-Straße 21
64319 PFUNGSTADT
GERMANY

Tel.: +49 6157 949-0

Email: info@hofmann-global.com

Internet: www.hofmann-global.com

Overview



CTM-tool and process monitoring system

The CTM-system protects machining processes by means of precise **in-process monitoring**. It detects tool breakages, missing tools and tool wear. CTM can be easily integrated into the control via an Ethernet interface and a fieldbus connection. The module offers various data acquisition options, either digitally directly from the Siemens control or via various transmitters.

Benefits

- Comprehensive machine, cutting process and tool protection
- Reduced costs per item by elimination of rejects
- Shorter processing time thanks to Adaptive Control
- Optimization of processes
- Process documentation for quality assurance

Function

- Data are collected either digitally or via external sensors, e.g. for force, torque, expansion, vibration
- Comparison of the current process against a learned setpoint curve, visual representation of deviations
- Flexible adaptation even to complex processes
- Specification of values for breakage limits, display and documentation of alarms
- Visualization on the CNC operator panel or on an external screen
- Integrated in the machine tool control system
- Adaptive feedrate control (AC)
- Various monitoring strategies, for example, specifically for long-term machining operations, hobbing processes or miniature tools through coolant flow monitoring
- Flexible interface concept with solutions for PROFIBUS, PROFINET, Ethernet and a connection via digital inputs and outputs
- All limit values are automatically adjusted and taught in so that they are precisely tailored to the application

More information

MARPOSS GmbH (ARTIS)

Mercedesstraße 10
71384 WEINSTADT
GERMANY

Tel.: +49 7151 2054-0

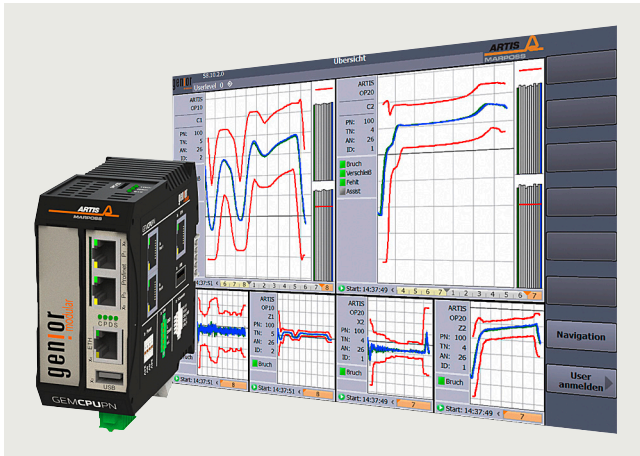
Email: marposs4siemens@marposs.com

Internet: www.marposs.com

Product Partner SINUMERIK Systems

ARTIS - Genior Modular tool and process monitoring system

Overview



Genior Modular – fully automatic tool and process monitoring system

Genior Modular is a fully automatic machine and process monitoring system for machining processes and is predominantly deployed in medium and large-scale production runs. The Genior Modular system detects tool breakage, tool wear and missing tools. In most cases, the alarm limits are set and adjusted automatically. They can, however, also be adjusted manually in case of need. The Genior Modular system comprises evaluation electronic circuitry and offers various methods of data capture, appropriate measuring transducers and visualization software.

Benefits

- Comprehensive machine, cutting process and tool protection
- The Multiview visualization (up to 16 processes simultaneously) provides the possibility to optimize the processes
- Reduced costs per item by elimination of rejects
- Automatic monitoring with only few operator interventions
- Easy to install, can be scaled modularly

Function

- Data collection/acquisition in digital form or via external sensors, e.g. for force, torque, vibration
- Breakage limits are set automatically and refined automatically within 10 processes
- Manual adaptations possible in Expert Mode
- Modern visualization of current machining operations and stored machining steps
- Visualization on the CNC operator panel or on an external screen
- Adaptive feedrate control (option)
- Trend reports, data export, machine status, collision detection and network integration for visualization

More information

MARPOSS GmbH (ARTIS)

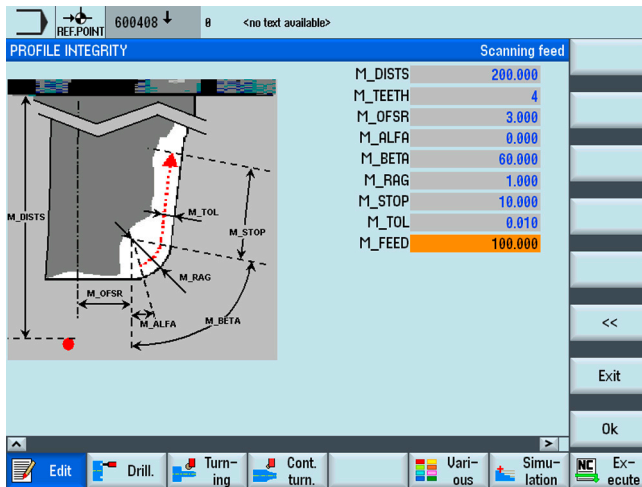
Mercedesstraße 10
71384 WEINSTADT
GERMANY

Tel.: +49 7151 2054-0

Email: marposs4siemens@marposs.com

Internet: www.marposs.com

Overview



Laser Tool Setter – Automatic non-contact tool setting, part probing, machine and tool monitoring on machine tools

MARPOSS provides measuring cycles for part probing and tool setting which work in synergy with MARPOSS Probing Systems. The specific user interface makes programming easy.

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 machining conditions, can be performed by MARPOSS Probing and Monitoring Systems.

Benefits

- Fast, automatic and precise workpiece setup
- Tool presetting in machine condition to compensate axes thermal drift
- Tool and process verification to keep high production quality
- Part inspection on machine to avoid repositioning

Function

Tool measurements with Mida laser:

- Length and diameter of the tool
- Axial breakage
- Cutters integrity
- Cutters radius
- Compensation of the thermal drift of the machine axes

Part measurements with Mida spindle probes:

- Part positioning
- Measuring of drilled holes, pins, pockets and shoulders
- Single surface measurement
- Measuring the internal and external cross-arm

Machine and tool monitoring with MMS:

- Performance (tool breakage and wear)
- Force (cutting force optimization)
- Vibrations (machine condition and tool unbalancing)
- Temperature (overheating of bearings)
- Displacement (spindle growth)

More information

MARPOSS GmbH

Mercedesstraße 10
71384 WEINSTADT
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Internet: www.marposs.com

Product Partner SINUMERIK Systems

MCU GmbH & Co. KG - Toolinspect II

Overview



Toolinspect II - Tool and process monitoring

The Toolinspect II module communicates with the SINUMERIK CNC via PROFINET or PROFIBUS DP. Visualization on the operator panel of the CNC is implemented with the module via a TCP/IP interface.

Benefits

- Easy operation using 3 function keys
- Tool damage detected immediately (real time system)
- Machine cycle time is not increased
- Automatic adaptation to any type of machining without intervention by the machine operator
- Rugged flash memory

Function

- Control-integrated tool, process and machine analysis
- 19 languages available online and selectable at any time
- Adaptive control for roughing operations to reduce machining times (option)
- Automatic system and data backup on 4 GB SD card
- Read out of torque and path actual data
- Monitoring of up to 6 channels (6 simultaneous machining operations)
- Monitoring after tool change
- Integrated process analysis and process reports in PDF/Excel files (option)
- Process analysis with evaluation capability for technologists and export function of the actual values and display of the data in Excel
- Evaluation of MDE production data and up to 250 faults (option)
- Link to SINUMERIK Integrate

More information

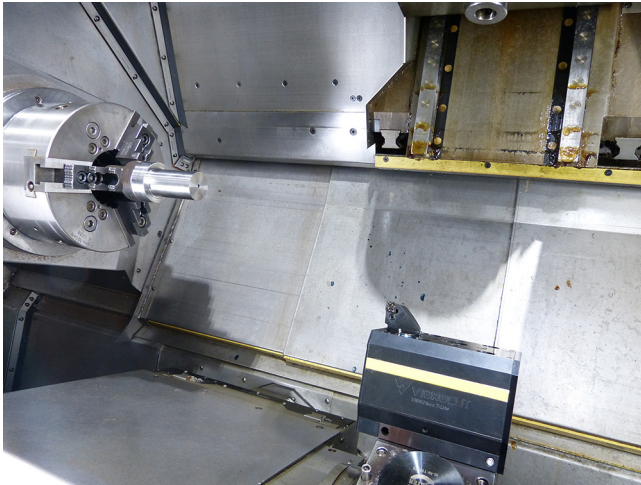
MCU GmbH & Co. KG
Sales Office

Staubenthaler Straße 18
42369 WUPPERTAL
GERMANY

Tel.: +49 8383 92233-18
Fax: +49 8383 92233-19

Email: sales@mcu-gmbh.de

Internet: www.mcu-gmbh.de/en

Overview**VibroCut - oscillate**

VibroCut oscillate is a tool holder which causes the tool to oscillate in a defined manner. It generates controlled vibrations to optimize the cutting process. By introducing precise oscillations, it ensures consistent chip breaking and improves machining efficiency.

Benefits

- Reliable and robust chip breaking of every material
- Reduced costs per item by elimination of rejects
- Reliable process enables automatization
- Prevention of operator accidents, such as cutting injuries from chipping
- Reduction of process time by avoiding actual machine down-times
- Optimization of processes

Function

- Installation similar to driven tool on the turret of turning machines
- Frequency of oscillation is generated by the velocity of the driven turret
- Rigid bearings
- Manual adjustment of the amplitude
- Integrated programming in the machine tool control system

More information**VibroCut GmbH**

Annaberger Str. 240
09125 CHEMNITZ
GERMANY

Tel.: +49 371 335 660151 2054-0

Email: info@vibrocut.de

Internet: www.vibrocut.de/en

Product Partner SINUMERIK Systems

VibroCut - ultrasonic

Overview



VibroCut - ultrasonic

VibroCut ultrasonic is an ultrasonic assistance that shifts existing process boundaries in drilling, deep hole drilling, and grinding. By minimizing friction, both tool wear and chip removal are improved.

The minimized friction reduces both tool wear and improves chip removal.

The reduction of process forces enables higher productivity, process safety and quality.

Function

- Generation of ultrasound in the rotating tool holder
- High-performance and integrated sensor for reliable ultrasonic performance
- Ultrasonic equipment and control cabinet
- HMI for ultrasonic visualization, process control and calibration
- Machine interface for the control

More information

VibroCut GmbH

Annaberger Str. 240
09125 CHEMNITZ
GERMANY

Tel.: +49 371 335 660151 2054-0

Email: info@vibrocut.de

Internet: www.vibrocut.de/en

Benefits

- **Shifting process limits**
Ultrasound improves the machinability and enables the machining of materials that are difficult to cut
- **Increased productivity**
Reduced process forces enable higher cutting parameters, shorter machining times and an increased cutting rate
- **Improved process security**
Lower tool load, less surface cutting edge formation and optimized chip removal reduce the risk of tool failure
- **Reduced tool wear**
The reduced friction leads to a reduction in wear progression on the cutting tool.
- **Highest quality thanks to innovation**
Less burr formation and better bore quality, especially with regard to straightness during deep hole drilling

In our innovative systems, ultrasound is controlled in a defined manner using an integrated sensor. This ensures that identical conditions always prevail on the tool. This unique feature ensures a consistently high and reproducible quality that is currently unparalleled.

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 for rough cutting and precise fine machining applications.

The 2SP1 motor spindle contains all the classical elements of a motor spindle, such as a tool interface, tool clamping and release mechanism, spindle bearings suitable for absorbing the machining forces, water-cooled drive motor, spindle casing for fixing and sensors for indexing and monitoring tool changeover.

The motor spindles are available in 2 diameters of 200 mm (7.87 in) (2SP120) and 250 mm (9.84 in) (2SP125) and are offered with a range of different torques and speeds 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 is developed and manufactured from our product partner Innomotics GmbH – Business Unit Spindle Technology.

Benefits

The 2SP1 motor spindles offer the following important user benefits over conventional belt-driven solutions:

- Compact spindle solution and everything integrated in the spindle box
- Fewer components and easy installation
- Economical standard solution
- Optional digital sensor signal interface (DRIVE-CLiQ) simplifies commissioning, reduces hardware requirements in the control cabinet, and enables spindle monitoring
- 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

More information

For information about other motor spindles for turning, grinding, milling and drilling, please contact:

Innomotics GmbH - Business Unit Spindle Technology
 Birkenfelder Weg 14
 96126 MAROLDSWEISACH
 GERMANY

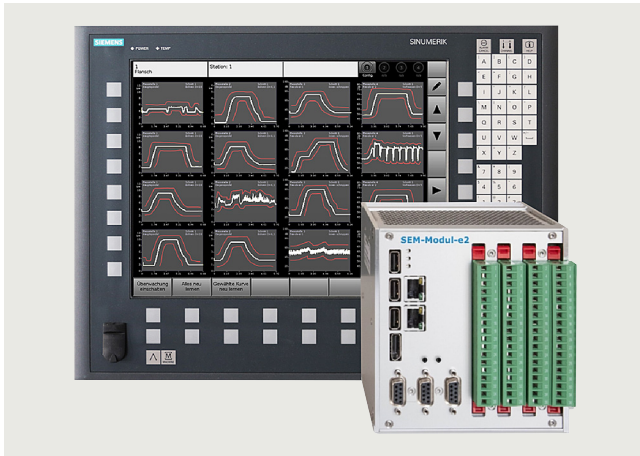
Tel.: +49 9532 9229-0
 Fax: +49 9532 9229-133

info-weiss@innomotics.com

Product Partner SINUMERIK Systems

Nordmann GmbH & Co. KG - Tool monitoring system SEM-MODUL-e2

Overview



Tool monitoring system SEM-MODUL-e2

Monitoring of active power, acoustic emission, torque, current, force, hydraulic pressure, distance, or workpiece dimensions using various monitoring strategies, such as static and dynamic evaluation and envelope curve limits.

Benefits

- Control/monitoring through internal drive data via PROFIBUS and PROFINET
- Visualization and operation integrated in SINUMERIK NCUs
- Alternatively, visualization and operation via an external display with touchscreen or a PC on the network
- Checking for break and wear, even for the smallest tools, using additional sensors if required
- Upgrade with acoustic sensors for monitoring of workpiece dimensions

Function

- Communication with up to 3 SINUMERIK NCUs via PROFIBUS and PROFINET
- Simultaneous analysis of internal drive data and analog sensor measurement values
- Display of up to 36 different measurement curves simultaneously
- Parallel and time-independent monitoring of all measuring points
- Operator input integrated in the control and via touch screen
- Integrated user management

More information

Nordmann GmbH & Co. KG

Kalscheurener Straße 8
50354 HÜRTH
GERMANY

Tel.: +49 2233 96 88-0

Email: info@nordmann.eu

Internet: www.nordmann.eu



10/2	Certificates of suitability (approvals)
10/4	Partners
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10/5	Software licenses
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Appendix

Certificates of suitability (approvals)

Overview

Many of the products in this catalog fulfill requirements, e.g. for UL, CSA or FM and are labeled with the corresponding approval designation.

All of the certificates of suitability, 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 used for their intended purpose.

In other cases, the vendor of these products is responsible for arranging for the issue of new certificates.

Test code	Tested by	Device series/ Component	Test standard	Product category/ File-No.
UL: Underwriters Laboratories Independent public testing body in North America				
     	UL according to UL standard	SINUMERIK	Standard UL 508, CSA C22.2 No. 142	NRAQ/7.E164110 NRAQ/7.E217227
		SIMOTION	Standard UL 508, CSA C22.2 No. 142	NRAQ/7.E164110
	UL according to CSA standard	SINAMICS	Standard UL 508, 508C, 61800-5-1 CSA C22.2 No. 142, 274	NRAQ/7.E164110, NMMS/2/7/8.E192450, NMMS/2/7/8.E203250, NMMS/7.E214113, NMMS/7.E253831
	UL according to UL and CSA standards			NMMS/2/7/8.E121068 NMMS/7.E355661 NMMS/7.E323473
	UL according to UL standard	SIMODRIVE	Standard UL 508C, CSA C22.2 No. 274	NMMS/2/7/8.E192450 NMMS/7.E214113
	UL according to CSA standard	SIMOTICS	Standard UL 1004-1, 1004-6, 1004-8, CSA C22.2 No. 100	PRGY2/8.E227215 PRHZ2/8.E93429 PRHJ2/8.E342747 PRGY2/8.E253922 PRHZ2/8.E342746
	UL according to UL and CSA standards			
		Line/motor reactors	Standard UL 508, 506, 5085-1, 5085-2, 1561, CSA C22.2 No. 14, 47, 66.1-06, 66.2-06	XQNX2/8.E257859 NMTR2/8.E219022 NMMS2/8.E333628 XPTQ2/8.E257852 XPTQ2/8.E103521 NMMS2/8.E224872 XPTQ2/8.E354316 XPTQ2/8.E198309 XQNX2/8.E475972
		Line filters, dv/dt filters, sine-wave filters	UL 1283, CSA C22.2 No. 8	FOKY2/8.E70122
		Resistors	UL 508, 508C, CSA C22.2 No. 14, 274	NMTR2/8.E224314 NMMS2/8.E192450 NMTR2/8.E221095 NMTR2/8.E226619
TUV: TÜV Rheinland of North America Inc. Independent public testing body in North America, Nationally Recognized Testing Laboratory (NRTL)				
TÜV: TÜV SÜD Product Service Independent public testing body in Germany, Nationally Recognized Testing Laboratory (NRTL) for North America				
	TUV according to UL and CSA standards	SINAMICS	NRTL listing according to standard UL 508C	U7V 12 06 20078 013 U7 11 04 20078 009 U7 11 04 20078 010 U7 11 04 20078 011
		SIMOTION	NRTL listing according to standard UL 508	U7V 13 03 20078 01
		SIMODRIVE	NRTL listing according to standard UL 508C, CSA C22.2. No. 14	CU 72090702
		Motion Control Encoder	NRTL listing according to UL 61010-1 CSA C22.2 No. 61010-1	U8V 10 06 20196 024

Certificates of suitability (approvals)

Overview

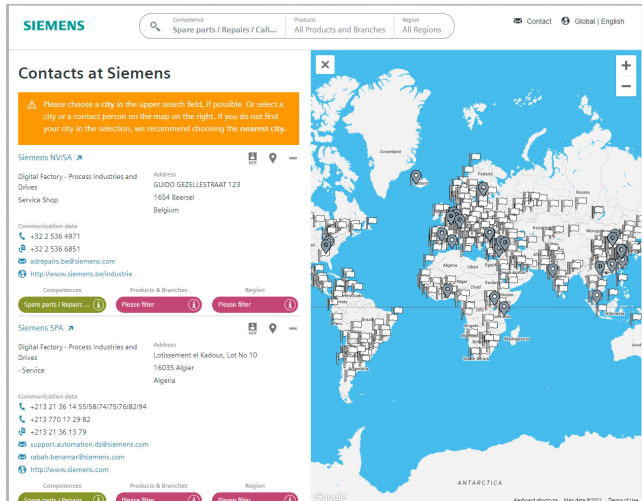
Test code	Tested by	Device series/ Component	Test standard	Product category/ File-No.
CSA: Canadian Standards Association Independent public testing body in Canada				
	CSA according to CSA standard	SINUMERIK	Standard CSA C22.2 No. 142	2252-01 : LR 102527
FMRC: Factory Mutual Research Corporation Independent public testing body in North America				
	FM according to FM standard	SINUMERIK	Standard FMRC 3600, FMRC 3611, FMRC 3810, ANSI/ISA S82.02.1	–
EAC: Independent public testing body within the Eurasian Conformity Area				
	EAC in accordance with the EAC Directive	SINAMICS SINUMERIK SIMOTION	Standard IEC 61800-5-1/-2, IEC 61800-3	–
RCM: Australian Communications and Media Authority Independent public testing body in Australia				
	RCM according to EMC standard	SINAMICS SINUMERIK SIMOTION	Standard IEC AS 61800-3, EN 61800-3	–
KC: National Radio Research Agency Independent public testing body in South Korea				
	KC according to EMC standard	SINAMICS SINUMERIK SIMOTION	Standard KN 11	–
BIA Federal Institute for Occupational Safety				
–	Functional safety	SINAMICS SINUMERIK SIMOTION	Standard EN 61800-5-2	–
TÜV SÜD Rail				
–	Functional safety	SINAMICS SINUMERIK SIMOTION	Standard EN 61800-5-2	–

More information about certificates can be found online at:
<https://support.industry.siemens.com/cs/ww/en/ps/cert>

Appendix

Partners

Partners at Siemens



At your service locally, around the globe for consulting, sales, training, service, support, spare parts on the entire portfolio of Digital Industries.

Your partner can be found in our Personal Contacts Database at:
www.siemens.com/automation-contact

You start by selecting

- the required competence,
- products and branches,
- a country and a city

or by a

- location search or free text search.

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 supply can be found in the readme file supplied with the relevant product(s).

License types

Siemens Digital Industries and Smart Infrastructure offers various types of software license:

- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software per license.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

Rental floating license

The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Demo license

The demo license support the "sporadic use" of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required.

One license is required per installation of the software.

Demo floating license

The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Certificate of License (CoL)

The CoL is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated.

The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

Appendix

Notes on software

Software licenses

Overview

ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Digital Industries and Smart Infrastructure supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Software Update Service (SUS)

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

Overview

The "General License Conditions for Software Products for Automation and Drives" are applicable for supplies and deliveries of DI software products.

Legal notes during setup for new software products

All software products feature a uniform reference to the license conditions. The license conditions are enclosed either with the documentation or in the software pack. When software is downloaded from the Internet, the license contract is displayed before the ordering procedure and must be accepted by the user before downloading can continue.

Notice:

This software is protected by German and/or US copyright laws and the regulations of international agreements. Unauthorized reproduction or sale of this software or parts of it is a criminal offense. This will lead to criminal and civil prosecution, and may result in significant fines and/or claims for damages. Prior to installing and using the software, please read the applicable license conditions for this software. You will find these in the documentation or packaging.

If you have received this software on a CD-ROM that is marked Trial version, or accompanying software that is licensed for your use, the software is only permitted to be used for test and validation purposes in accordance with the accompanying conditions for the trial license. To this end, it is necessary for programs, software libraries, etc. are installed on your computer. We therefore urgently recommend that installation is performed on a single-user computer or on a computer that is not used in the production process or for storing important data, since it cannot be completely excluded that existing files will be modified or overwritten. We accept no liability whatsoever for damage and/or data losses that result from this installation or the non-observance of this warning. Every other type of use of this software is only permitted if you are in possession of a valid license from Siemens is obtained.

If you are not in possession of a valid license that can be proven by presenting an appropriate Certificate of License/software product certificate, please abort installation immediately and contact a Siemens office without delay to avoid claims for damages.

Software update services

Order

To order the software update service, an article number must be specified. The software update service can be ordered when the software products are ordered or at a later date. Subsequent orders require that the ordering party is in possession at least of a single license.

Note:

It is recommended that the software update service is ordered as early as possible. If a new software version of a software product is released for delivery by Siemens, only those customers will receive it automatically who are entered in the appropriate delivery list at Siemens at this time. Previous software versions, or the current software version are not supplied when the software update service is ordered. The software update service requires that the software product is up-to-date at the time of completion of the contract for the software update service.

Delivery

When a software update service is ordered, you will be sent the contractual conditions of this service and the price is due for payment. At the same time, you will be included in a delivery list for the software product to be updated. If Siemens releases a new software version for the corresponding software product for general sale (function version or product version), it will be delivered automatically to the goods recipient specified in the delivery address within the contract period.

Appendix

Conversion tables

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./s)	2.645×10^{-6}	1.972×10^{-3}
(lb-in) (r/min)	1.587×10^{-5}	1.183×10^{-2}
(lb-ft) (deg./s)	3.173×10^{-5}	2.366×10^{-2}
(lb-ft) (r/min)	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	r/min	rad/s	degrees/s
r/min	1	0.105	6.0
rad/s	9.55	1	57.30
degrees/s	0.167	1.745×10^{-2}	1

Conversion tables

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 $\frac{5}{9}$		multiply by $\frac{9}{5}$ 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 Gauges¹⁾

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.

Appendix

Metal surcharges

Explanation of the raw material/metal surcharges ¹⁾

Surcharge calculation

To compensate for variations in the price of the raw materials silver, copper, aluminum, lead, gold, dysprosium²⁾ and/or neodym²⁾, surcharges are calculated on a daily basis using the so-called metal factor. These apply to products containing these raw materials and are calculated per raw material. These surcharges are added to the price of a product if the basic official price (BOP) of the raw material in question is exceeded.

Surcharges are calculated in accordance with the following criteria:

Basic official price (BOP) of the raw material

- BOP of the workday prior to receipt of the order or prior to release order (Daily Price) for:
 - Silver (processed)³⁾
 - Gold (processed)³⁾
 - Aluminum per 100 kg (LME-notation/10, converted from USD to EUR using LME-FX-Rate [MTLE] + 1.2%)⁴⁾
 - Copper per 100 kg (LME-notation/10, converted from USD to EUR using LME-FX-Rate [MTLE] + 1.2%) + 1%⁴⁾
 - Lead (constant 199.50 EUR per 100 kg)
- If BOP is suspended, the last one is used.

Metal factor of the products

Certain products are displayed with a metal factor. The metal factor determines the official price (for those raw materials concerned) as of which the metal surcharges are applied and the calculation method used (weight or percentage method). An exact explanation is given below.

Structure of the metal factor

Metal factor consists of several digits; the first digit indicates whether the percentage 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 raw material. If no surcharge is added for a raw material, a "-" is used.

1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG)
3rd digit	for copper (CU)
4th digit	for aluminum (AL)
5th digit	for lead (PB)
6th digit	for gold (AU)
7th digit	for dysprosium (Dy) ²⁾
8th digit	for neodym (Nd) ²⁾

Weight method

The weight method uses the BOP, the daily price and the raw material weight. In order to calculate the surcharge, the BOP must be subtracted from the daily price. The difference is then multiplied by the raw material weight.

The BOP can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. The raw material weight can be found in the respective product descriptions.

Percentage method

Use of the percentage method is indicated by the letters A-Z at the respective digit of the metal factor.

The surcharge is increased - dependent on the deviation of the daily price compared with the BOP - using the percentage method in "steps" and consequently offers surcharges that remain constant within the framework of this "step range". A higher percentage rate is charged for each new step. The respective percentage level can be found in the table below.

Metal factor examples

L E A - - - -	Basis for % surcharge: List price Silver Basis 150 €, Step 50 €, 0.5 % Copper Basis 150 €, Step 50 €, 0.1 % No surcharge for aluminum No surcharge for lead No surcharge for gold No surcharge for dysprosium No surcharge for neodym
N - A 6 - - -	Basis for % surcharge: Customer net price No surcharge for silver Copper Basis 150 €, Step 50 €, 0.1 % Aluminum acc. to weight, basic offic. price 225 € No surcharge for lead No surcharge for gold No surcharge for dysprosium No surcharge for neodym
- - 3 - - - -	No basis necessary No surcharge for silver Copper acc. to weight, basic official price 150 € No surcharge for aluminum No surcharge for lead No surcharge for gold No surcharge for dysprosium No surcharge for neodym

¹⁾ Refer to the separate explanation on the next page regarding the raw materials dysprosium and neodym (= rare earths).

²⁾ For a different method of calculation, refer to the separate explanation for these raw materials on the next page.

³⁾ Source: Umicore, Hanau (<https://pmm.umicore.com/en>).

⁴⁾ Source: The London Metal Exchange – an HKEX Company (<https://www.lme.com/>).

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Explanation of the raw material/metal surcharges for dysprosium and neodym (rare earths)

Surcharge calculation

To compensate for variations in the price of the raw materials silver¹⁾, copper¹⁾, aluminum¹⁾, lead¹⁾, gold¹⁾, dysprosium and/or neodym, surcharges are calculated on a daily basis using the so-called metal factor. This applies to products containing at least one of these raw materials. The surcharge for dysprosium and neodym is calculated as a supplement to the price of a product if the basic official price (BOP) of the raw material in question is exceeded.

The surcharge is calculated in accordance with the following criteria:

- Basic official price (BOP) of the raw material²⁾
Three-month basic average price (see below) in the period before the quarter in which the order was received or the release order took place (average official price) for
 - Dysprosium (Dy metal, 99 %min. FOB China; USD/kg)
 - Neodym (Nd metal, 99 %min. FOB China; USD/kg)
- Metal factor of the products
Certain products are displayed with a metal factor. The metal factor indicates (for those raw materials concerned) the BOP as of which the surcharges for dysprosium and neodym are calculated using the weight method. An exact explanation of the metal factor is given below.

Three-month average price

The prices of rare earths vary according to the foreign currency, and there is no freely accessible stock exchange listing. This makes it more difficult for all parties involved to monitor changes in price. In order to avoid continuous adjustment of the surcharges, but to still ensure fair, transparent pricing, an average price is calculated over a three-month period using the average monthly foreign exchange rate from USD to EUR (source: European Central Bank). Since not all facts are immediately available at the start of each month, a one-month buffer is allowed before the new average price applies.

Examples of calculation of the average official price:

Period for calculation of the average price:	Period during which the order/release order is effected and the average price applies:
Sep 2012 - Nov 2012	Q1 in 2013 (Jan - Mar)
Dec 2012 - Feb 2013	Q2 in 2013 (Apr - Jun)
Mar 2013 - May 2013	Q3 in 2013 (Jul - Sep)
Jun 2013 - Aug 2013	Q4 in 2013 (Oct - Dec)

Structure of the metal factor

The metal factor consists of several digits; the first digit is not relevant to the calculation of dysprosium and neodym.

The remaining digits indicate the method of calculation used for the respective raw material. If no surcharge is added for a raw material, a "-" is used.

1st digit	List or customer net price using the percentage method
2nd digit	for silver (AG) ¹⁾
3rd digit	for copper (CU) ¹⁾
4th digit	for aluminum (AL) ¹⁾
5th digit	for lead (PB) ¹⁾
6th digit	for gold (AU) ¹⁾
7th digit	for dysprosium (Dy)
8th digit	for neodym (Nd)

Weight method

The weight method uses the basic official price, the average price and the raw material weight. In order to calculate the surcharge, the BOP must be subtracted from the average price. The difference is then multiplied by the raw material weight.

The basic official price can be found in the table below using the number (1 to 9) of the respective digit of the metal factor. Your Sales contact can inform you of the raw material weight.

Metal factor examples

-----71	No basis necessary
↑	No surcharge for silver
↑	No surcharge for copper
↑	No surcharge for aluminum
↑	No surcharge for lead
↑	No surcharge for gold
↑	Dysprosium acc. to weight, basic official price 300 €
↑	Neodym acc. to weight, basic official price 50 €

¹⁾ For a different method of calculation, refer to the separate explanation for these raw materials on the previous page.

²⁾ Source: Asian Metal Ltd (www.asianmetal.com)

Appendix

Metal surcharges

Values of the metal factor

Percentage method	Basic official price in €	Step range in €	% surcharge 1st step	% surcharge 2nd step	% surcharge 3rd step	% surcharge 4th step	% sur-charge per addi-tional step
			Price in €	Price in €	Price in €	Price in €	
			150.01 - 200.00	200.01 - 250.00	250.01 - 300.00	300.01 - 350.00	
A	150	50	0.1	0.2	0.3	0.4	0.1
B	150	50	0.2	0.4	0.6	0.8	0.2
C	150	50	0.3	0.6	0.9	1.2	0.3
D	150	50	0.4	0.8	1.2	1.6	0.4
E	150	50	0.5	1.0	1.5	2.0	0.5
F	150	50	0.6	1.2	1.8	2.4	0.6
G	150	50	1.0	2.0	3.0	4.0	1.0
H	150	50	1.2	2.4	3.6	4.8	1.2
I	150	50	1.6	3.2	4.8	6.4	1.6
J	150	50	1.8	3.6	5.4	7.2	1.8
			175.01 - 225.00	225.01 - 275.00	275.01 - 325.00	325.01 - 375.00	
O	175	50	0.1	0.2	0.3	0.4	0.1
P	175	50	0.2	0.4	0.6	0.8	0.2
R	175	50	0.5	1.0	1.5	2.0	0.5
			225.01 - 275.00	275.01 - 325.00	325.01 - 375.00	375.01 - 425.00	
S	225	50	0.2	0.4	0.6	0.8	0.2
U	225	50	1.0	2.0	3.0	4.0	1.0
V	225	50	1.0	1.5	2.0	3.0	1.0
W	225	50	1.2	2.5	3.5	4.5	1.0
			150.01 - 175.00	175.01 - 200.00	200.01 - 225.00	225.01 - 250.00	
Y	150	25	0.3	0.6	0.9	1.2	0.3
			400.01 - 425.00	425.01 - 450.00	450.01 - 475.00	475.01 - 500.00	
Z	400	25	0.1	0.2	0.3	0.4	0.1
Price basis (1st digit)							
L	Calculation based on the list price						
N	Calculation based on the customer net price (discounted list price)						
Weight method	Basic official price in €						
1	50	Calculation based on raw material weight					
2	100						
3	150						
4	175						
5	200						
6	225						
7	300						
8	400						
9	555						
Miscella-neous							
-	No metal surcharge						

Conditions of sale and delivery

1. General Provisions

By using this catalog you can purchase hard- and software products as well as services (together hereinafter referred to as "products") described therein from Siemens Aktiengesellschaft subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Note, for products purchased from any Siemens entity having a registered office outside of Germany, the respective terms and conditions of sale and delivery of the respective Siemens entity apply exclusively. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in European Union

For customers with a seat or registered office in European Union, the following terms and conditions apply subordinate to T&C:

- for products, which include specific terms and conditions in the text of the product description, these specific terms and conditions shall apply and subordinate thereto,,
- for stand-alone software products and software products forming a part of a product or project, the "General Conditions for Software Products for Infrastructure & Industry Business (German law)"¹⁾ and/or
- for consulting services the "Allgemeine Geschäftsbedingungen für Beratungsleistungen für Infrastructure & Industry Geschäft (Deutsches Recht)"¹⁾ (available only in German) and/or
- for other services, the „Supplementary Terms and Conditions for Services for Infrastructure & Industry Business (German Law) ("BL")"¹⁾ and/or
- for other products the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾.

In case such products should contain Open Source Software, the conditions of which shall prevail over the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾, the Product will be given a note as to which special conditions apply to this open source software. This shall apply mutatis mutandis for notices referring to other third-party software components.

1.2 For customers with a seat or registered office outside European Union

For customers with a seat or registered office outside European Union, the following terms and conditions apply subordinate to T&C:

- for products, which include specific terms and conditions in the description text, these specific terms and conditions shall apply and subordinate thereto,
- for consulting services the "Standard Terms and Conditions for Consulting Services for Infrastructure & Industry Business (Swiss Law)"¹⁾ and/or
- for other services the "International Terms & Conditions for Services"¹⁾ supplemented by "Software Licensing Conditions"¹⁾ and/or
- for other products the "International Terms & Conditions for Products"¹⁾ supplemented by "Software Licensing Conditions"¹⁾

1.3 For customers with master or framework agreement

To the extent products offered are covered by an existing master or framework agreement, the terms and conditions of that agreement shall apply instead of T&C.

2. Prices

The prices are in € (Euro) ex point of delivery, exclusive of packaging.

The sales tax (value added tax) is not included in the prices. It shall be charged separately at the respective rate according to the applicable statutory legal regulations.

Prices are subject to change without prior notice. We will charge the prices valid at the time of delivery.

To compensate for variations in the price of raw materials (e.g. silver, copper, aluminum, lead, gold, dysprosium and neodym), surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials.

A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation. The metal factor, provided it is relevant, can be found in the respective product description.

You will find a detailed explanation of the metal factor on the page headed "Metal surcharges".

3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the individual pages of this catalog – especially with regard to data, dimensions and weights given – these are subject to change without prior notice.

¹⁾ The text of the Terms and Conditions of Siemens AG can be downloaded at https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

Appendix

Conditions of sale and delivery

4. Export Control and Sanctions Compliance

4.1 General

Customer shall comply with all applicable sanctions, embargoes and (re-)export control laws and regulations, and, in any event, with those of the European Union, the United States of America and any locally applicable jurisdiction (collectively "Export Regulations").

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Prior to any transaction by customer concerning products (including hardware, documentation and technology) delivered by Siemens, or products (including maintenance and technical support) performed by Siemens with a third party, customer shall check and certify by appropriate measures that

- (i) the customer's use, transfer, or distribution of such products, the brokering of contracts or the provision of other economic resources in connection with products will not be in violation of any Export Regulations, also taking into account any prohibitions to circumvent these (e.g., by undue diversion)
- (ii) the products are not intended or provided for prohibited or unauthorized non-civilian purposes (e.g. armaments, nuclear technology, weapons, or any other usage in the field of defense and military);
- (iii) customer has screened all direct and indirect parties involved in the receipt, use, transfer, or distribution of the products against all applicable restricted party lists of the Export Regulations concerning trading with entities, persons and organizations listed therein and
- (iv) products within the scope of items-related restrictions, as specified in the respective annexes to the Export Regulations, will not, unless permitted by the Export Regulations, be
 - (a) exported, directly or indirectly (e.g., via Eurasian Economic Union (EAEU) countries), to Russia or Belarus, or
 - (b) resold to any third party business partner that does not take a prior commitment not to export such products to Russia or Belarus.

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 - (ii) grant access to, transfer, (re-)export (including any "deemed (re-)exports"), or otherwise make available the products to any entity, person, or organization identified on a restricted party list of the Export Regulations;
 - (iii) use the products for any purpose prohibited by the Export Regulations (e.g. use in connection with armaments, nuclear technology or weapons);
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 - (v) facilitate any of the afore mentioned activities by any user.
- Customer shall provide all users with all information necessary to ensure compliance with the Export Regulations.

4.4 Semiconductor Development

Customer will not, without advance written authorization from Siemens, use offerings for the development or production of integrated circuits at any semiconductor fabrication facility located in China meeting the criteria specified in the U.S. Export Administration Regulations, 15 C.F.R. 744.23.

4.5 Information

Upon request by Siemens, customer shall promptly provide Siemens with all information pertaining to users, the intended use and the location of use or the final destination (in the case of hardware, documentation and technology) of the products. Customer will notify Siemens prior to customer disclosing any information to Siemens that is defense-related or requires controlled or special data handling pursuant to applicable government regulations, and will use the disclosure tools and methods specified by Siemens.

4.6 Reservation

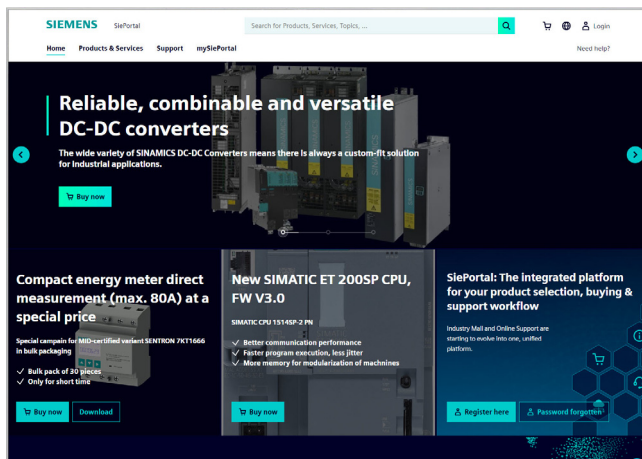
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5. Miscellaneous

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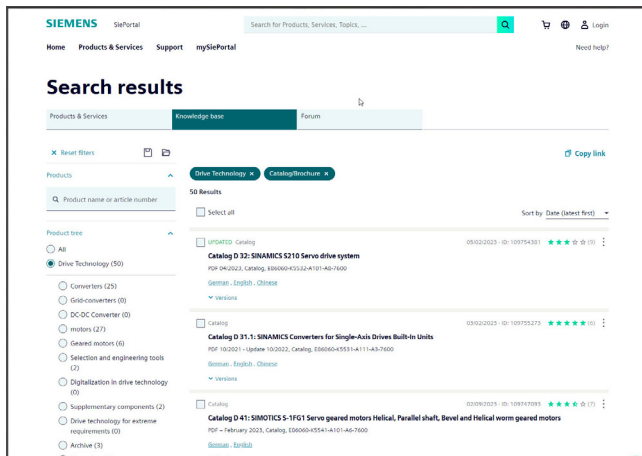
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Published by
Siemens AG

Digital Industries
Motion Control
Postfach 31 80
91050 Erlangen, Germany

For the U.S. published by
Siemens Industry Inc.

390 Kent Avenue
Elk Grove Village, IL 60007
United States

PDF (Article No. E86060-K4482-A101-B2-7600)
V1.MKKATA.MTS.120
KG 0925 316 En
Produced in Germany
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