

SIEMENS



Motion Control Drives

SINAMICS Converters for Single-Axis Drives Distributed Converters

Catalog
D 31.2

Edition
October
2021

[siemens.com/drives](https://www.siemens.com/drives)

Related catalogs

<p>Motion Control Drives D 31.1 SINAMICS Converters for Single-Axis Drives Built-In Units</p> <p>E86060-K5531-A111-A2-7600</p>		<p>Industrial Controls IC 10 SIRIUS</p> <p>PDF (E86060-K1010-A101-B3-7600)</p>	
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<p>Motion Control Drives D 21.4 SINAMICS S120 and SIMOTICS</p> <p>E86060-K5521-A141-A1-7600</p>		<p>Industry Mall Information and Ordering Platform on the Internet:</p> <p>www.siemens.com/industrymall</p>	
<p>SIMOTICS S-1FG1 D 41 Servo geared motors Helical, Parallel shaft, Bevel and Helical worm geared motors</p> <p>PDF (E86060-K5541-A101-A5-7600)</p>			
<p>SIMOTICS GP, SD, XP, DP D 81.1 Low-Voltage Motors Type series 1FP1, 1LE1, 1LE5, 1MB1, 1MB5, 1PC1 Frame sizes 63 to 450 Power range 0.09 to 1000 kW PDF (E86060-K5581-A111-B5-7600)</p>			
<p>SIMOGEAR D 50.1 Geared Motors Helical, parallel shaft, bevel, helical worm and worm geared motors</p> <p>E86060-K5250-A111-A8-7600</p>			



SIEMENS



SINAMICS Converters
for Single-Axis Drives
Distributed Converters

Catalog D 31.2 · October 2021

Dear customer,

We are pleased to present you the new edition of the Catalog D 31.2 - October 2021. The catalog provides a comprehensive overview of SINAMICS converters for single-axis drives – **distributed converters** – comprising the product families SINAMICS G115D, SINAMICS G120D and SIMATIC ET 200pro FC-2.

The catalog has been revised and supplemented. The Catalog News D 31.2 N · March 2021, which provided a comprehensive overview of the new distributed drive system SINAMICS G115D, have been entered in the new catalog. The SINAMICS G115D distributed drive system has been developed for the conveyor technology sector with a focus on the Intralogistics and Airport industries as well as simple horizontal applications in Automotive and Food & Beverage.

The products listed in this catalog are also included in the Industry Mall. Please contact your local Siemens office for additional information.

Up-to-date information about SINAMICS is available on the internet at:
www.siemens.com/sinamics

You can access our Industry Mall on the internet at
www.siemens.com/industrymall

Your personal contact will be glad to receive your suggestions and recommendations for improvement.

You can find your representative in our Personal Contact database at:
www.siemens.com/automation-contact

We hope that you will often enjoy using Catalog D 31.2 · October 2021 as a selection and ordering reference document and wish you every success with our products and solutions.

With kind regards,



Frank Golüke
Vice President
General Motion Control
Siemens AG, Digital Industries, Motion Control

SINAMICS Converters for Single-Axis Drives

Distributed Converters

Motion Control Drives



Catalog D 31.2 · October 2021

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Catalog D 31.2 · 2018

Catalog News D 31.2 N · March 2021

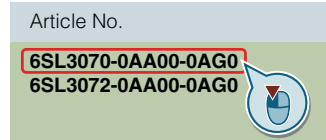
Refer to the Industry Mall for current updates of this catalog:

www.siemens.com/industrymall

Please contact your local Siemens branch.

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



Or directly on the internet, e.g.

www.siemens.com/product?6SL3070-0AA00-0AG0



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

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Digital Enterprise

The building blocks that ensure everything works together perfectly in the digital enterprise

Digitalization is already changing all areas of life and existing business models. It is placing greater pressure on industry while at the same time creating new business opportunities. Today, thanks to scalable solutions from Siemens, companies can already become a digital enterprise and ensure their competitiveness.



Industry faces tremendous challenges



Reduce time-to-market

Today manufacturers have to bring products to market at an ever-increasing pace despite the growing complexity of these products. In the past, a major manufacturer would push aside a small one, but now it is a fast manufacturer that overtakes a slow one.



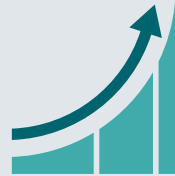
Boost flexibility

Consumers want customized products, but at a price they would pay for a mass-produced item. That only works if production is more flexible than ever before.



Improve quality

To ensure a high level of quality while meeting legal requirements, companies have to establish closed quality loops and enable the traceability of products.



Boost efficiency

Today the product itself needs to be sustainable and environmentally friendly, while energy efficiency in production has become a competitive advantage.



Increase security

Increasing networking escalates the threat to production facilities of cyberattacks. Today more than ever, companies need suitable security measures.



The digital enterprise has already become a reality

To fully benefit from all the advantages of digitalization, companies first have to achieve complete consistency of their data. Fully digitally integrated business processes, including those of suppliers, can help to create a digital representation of the entire value chain. This requires

- the integration of industrial software and automation,
- expansion of the communication networks,
- security in automation,
- and the use of business-specific industrial services.

MindSphere

The cloud-based open IoT operating system from Siemens

With MindSphere, Siemens offers a cost-effective and scalable cloud platform as a service (PaaS) for the development of applications. The platform, designed as an open operating system for the Internet of Things, makes it possible to improve the efficiency of plants by collecting and analyzing large volumes of production data.

Totally Integrated Automation (TIA) Where digitalization becomes reality

Totally Integrated Automation (TIA) ensures the seamless transition from the virtual to the real world. It already encompasses all the necessary conditions for transforming the benefits of digitalization into true added value. The data that will form the digital twin for actual production is generated from a common base.

Digital Plant

Learn more about the digital enterprise for the process industry
www.siemens.com/digitalplant

Digital Enterprise Suite

Learn more about the digital enterprise for the discrete industry
www.siemens.com/digital-enterprise-suite



TIA Selection Tool – quick, easy, smart configuration

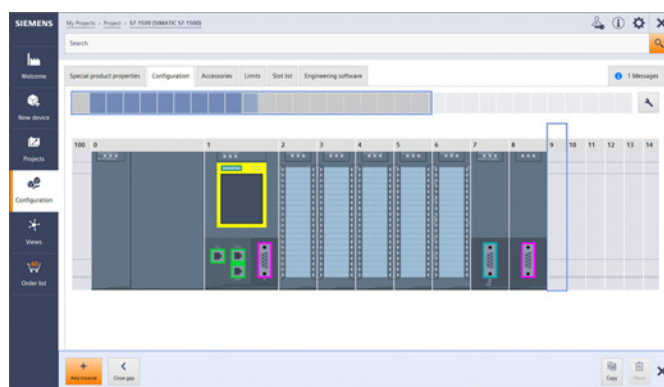
For you to get the most out of our portfolio quickly and easily.

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 the Siemens Industry Mall

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



System overview



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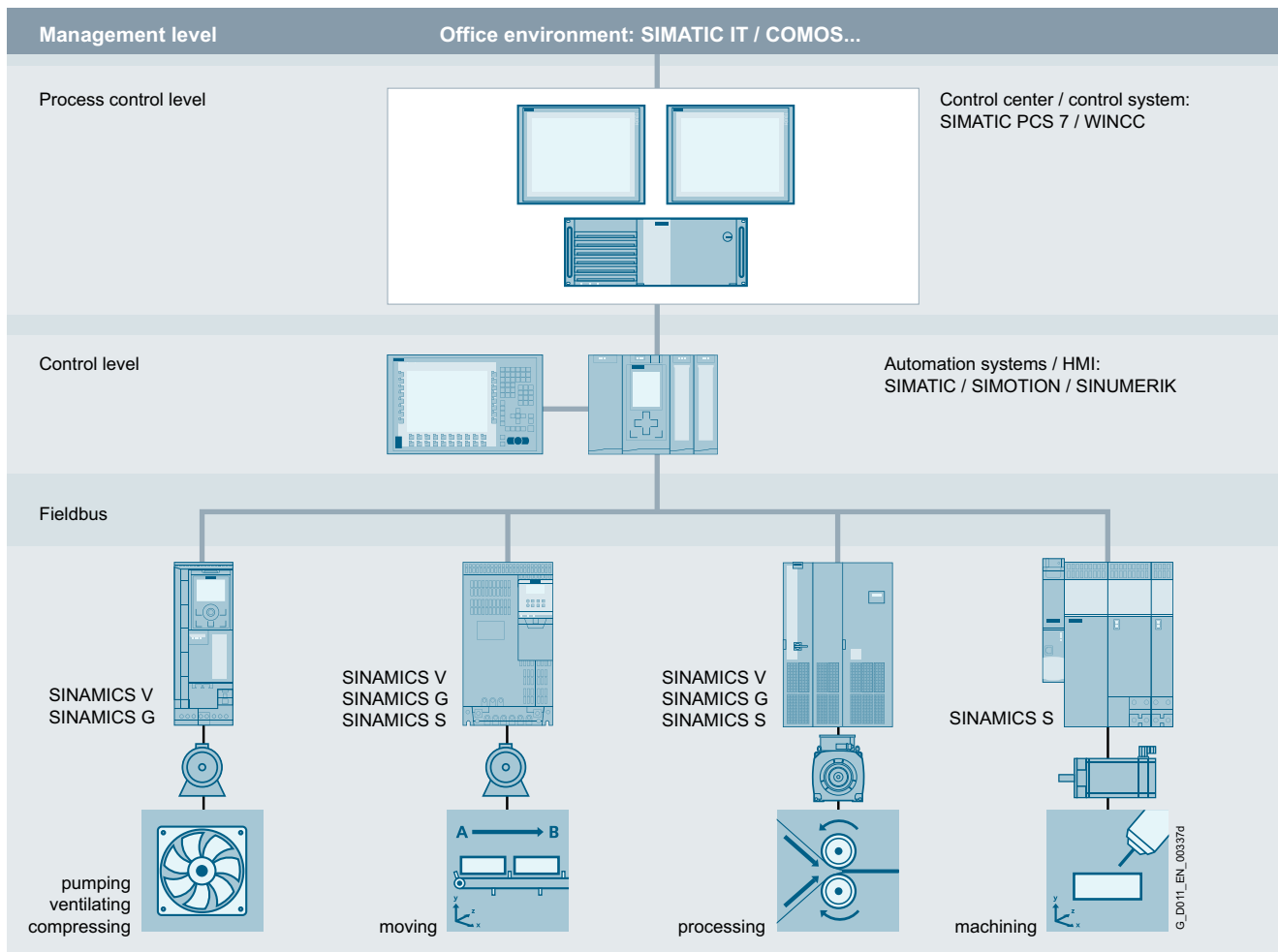
Further information about SINAMICS, SIMOTICS and SIMOGEAR can be found on the internet at
www.siemens.com/sinamics
www.siemens.com/simotics
www.siemens.com/simogear

System overview

The SINAMICS converter family

Overview

Integration in automation



Totally Integrated Automation and communication

SINAMICS is an integral component of the Siemens "Totally Integrated Automation" concept. Integrated SINAMICS systems covering configuration, data storage, and communication at automation level ensure low-maintenance solutions with the SIMATIC, SIMOTION and SINUMERIK control systems.

Depending on the application, the appropriate variable frequency drives can be selected and incorporated in the automation concept. With this in mind, the drives are clearly subdivided into their different applications. A wide range of communication options (depending on the drive type) are available for establishing a communication link to the automation system:

- PROFINET
- PROFIBUS
- EtherNet/IP
- Modbus TCP
- Modbus RTU
- AS-Interface
- BACnet MS/TP

Applications

SINAMICS is the comprehensive converter family from Siemens designed for machine and plant engineering applications. SINAMICS offers solutions for all drive tasks:

- Simple pump and fan applications in the process industry
- Demanding single drives in centrifuges, presses, extruders, elevators, as well as conveyor and transport systems
- Drive line-ups in textile, plastic film, and paper machines as well as in rolling mill plants
- Highly dynamic servo drives for machine tools, as well as packaging and printing machines

Overview

SINAMICS as part of the Siemens modular automation system**Innovative, energy-efficient and reliable drive systems and applications as well as services for the entire drive train**

The solutions for drive technology place great emphasis on the highest productivity, energy efficiency and reliability for all torque ranges, performance and voltage classes.

Siemens offers not only the right innovative variable frequency drive for every drive application, but also a wide range of energy-efficient low-voltage motors, geared motors, explosion-protected motors and high-voltage motors for combination with SINAMICS.

Furthermore, Siemens supports its customers with global pre-sales and after-sales services, with over 295 service points in 130 countries – and with special services e.g. application consulting or motion control solutions.

Energy efficiencyEnergy management process

Efficient energy management consultancy identifies the energy flows, determines the potential for making savings and implements them with focused activities.

Almost two thirds of the industrial power requirement is from electric motors. This makes it all the more important to use drive technology permitting energy consumption to be reduced effectively even in the configuration phase, and consequently to optimize plant availability and process stability. With SINAMICS, Siemens offers powerful energy efficient solutions which, depending on the application, enable a significant reduction in electricity costs.

System overview

The SINAMICS converter family

Overview

Up to 70 % potential for savings using variable-speed operation

SINAMICS enables great potential for savings to be realized by controlling the motor speed. In particular, huge potential savings can be recovered from pumps, fans and compressors which are operated with mechanical throttle and valves. Here, changing to variable-speed drives brings enormous economic advantages. In contrast to mechanical control systems, the power consumption at partial load operation is always immediately adjusted to the demand at that time. So energy is no longer wasted, permitting savings of up to 60 % – in exceptional cases even up to 70 %. Variable-speed drives also offer clear advantages over mechanical control systems when it comes to maintenance and repair. Current spikes when starting up the motor and strong torque surges become things of the past – and the same goes for pressure waves in pipelines, cavitation or vibrations which cause sustainable damage to the plant. Smooth starting and ramp-down relieve the load on the mechanical system, ensuring a significantly longer service life of the entire drive train.

Regenerative feedback of braking energy

In conventional drive systems, the energy produced during braking is converted to heat using braking resistors. Energy produced during braking is efficiently recovered to the supply system by versions of SINAMICS G and SINAMICS S drives with regenerative feedback capability and these devices do not therefore need a braking resistor. This permits up to 60 % of the energy requirement to be saved, e.g. in lifting applications. Energy which can be reused at other locations on a machine. Furthermore, this reduced power loss simplifies the cooling of the system, enabling a more compact design.

Energy transparency in all configuration phases

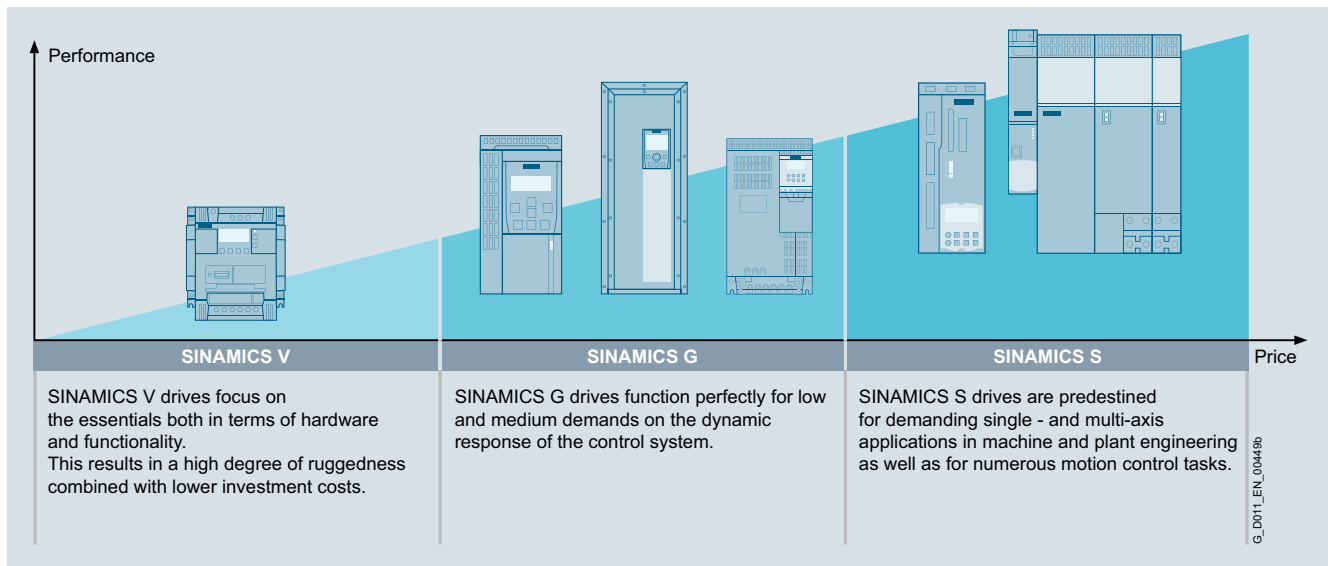
Early on, in the configuration phase, the SIZER for Siemens Drives (integrated in TIA Selection Tool) engineering tool provides information on the specific energy requirement. The energy consumption across the entire drive train is visualized and compared with different plant concepts.

SINAMICS in combination with energy-saving motors

Engineering integration stretches beyond the SINAMICS converter family to higher-level automation systems, and to a broad spectrum of energy-efficient motors with a wide range of performance classes, which, compared to previous motors, are able to demonstrate up to 10 % greater efficiency.

Variants

Depending on the application, the SINAMICS converter family offers the ideal variant for any drive task.



Overview

Platform concept

All SINAMICS variants are based on a platform concept. Joint hardware and software components, as well as standardized tools for dimensioning, configuration, and commissioning tasks ensure high-level integration across all components. SINAMICS handles a wide variety of drive tasks with no system gaps. The different SINAMICS variants can be easily combined with each other.

Quality management according to EN ISO 9001

SINAMICS conforms to the most exacting quality requirements. Comprehensive quality assurance measures in all development and production processes ensure a consistently high level of quality.

Of course, our quality management system is certified by an independent authority in accordance with EN ISO 9001.

IDS – Integration at its very best

The Siemens Integrated Drive Systems (IDS) solution offers perfectly matched drive components with which you can meet your requirements. The drive components reveal their true strengths as an Integrated Drive System over the full range from engineering and commissioning through to operation: Integrated system configuration is performed using the Drive Technology Configurator: Just select a motor and a converter and design them with the SIZER for Siemens Drives (integrated in TIA Selection Tool) engineering tool. The STARTER and SINAMICS Startdrive commissioning tools integrate the motor data and at the same time simplify efficient commissioning. Integrated Drive Systems are incorporated in the TIA Portal – this simplifies engineering, commissioning and diagnostics.

Low voltage										Direct voltage	Medium voltage
Standard performance frequency converters		Distributed frequency converters	Industry-specific frequency converters		Servo drives			High performance frequency converters		DC converters	Converters for applications with high outputs
SINAMICS V20 G120C G120	SINAMICS G130 G150	SINAMICS G115D G120D SIMATIC ET 200pro FC-2	SINAMICS G120X	SINAMICS G180	SINAMICS V90	SINAMICS S110	SINAMICS S210	SINAMICS S120 S120M	SINAMICS S150	SINAMICS DCM DCP ¹⁾	SINAMICS GH150 GH180 GM150 SM150 GL150 SL150 SH150
0.12 kW to 250 kW	75 kW to 2700 kW	0.37 kW to 7.5 kW	0.75 kW to 630 kW	2.2 kW to 6600 kW	0.05 kW to 7 kW	0.55 kW to 132 kW	0.05 kW to 7 kW	0.55 kW to 5700 kW	75 kW to 1200 kW	6 kW to 30 MW	0.15 MW to 85 MW
Pumps, fans, compressors, conveyor belts, mixers, mills, spinning machines, textile machines, refrigerated display counters, fitness equipment, ventilation systems, single-axis positioning applications in machine and plant engineering	Pumps, fans, compressors, conveyor belts, mixers, mills, extruders	Conveyor technology, single-axis positioning applications (G120D)	Pumps, fans, compressors, building management systems, process industry, HVAC, water/waste water industries	Pumps, fans, compressors, conveyor belts, extruders, mixers, mills, kneaders, centrifuges, separators	Handling machines, packaging machines, automatic assembly machines, metal forming machines, printing machines, winding and unwinding units	Single-axis positioning applications in machine and plant engineering	Packaging machines, handling equipment, feed and withdrawal devices, stacking units, automatic assembly machines, laboratory automation, wood, glass and ceramics industry, digital printing machines	Production machines (packaging, textile and printing machines, paper machines, plastic processing machines), machine tools, plants, process lines and rolling mills, marine drives, test bays	Test bays, cross cutters, centrifuges	Rolling mill drives, wire-drawing machines, extruders and kneaders, cableways and lifts, test bay drives	Pumps, fans, compressors, mixers, extruders, mills, crushers, rolling mills, conveyor technology, excavators, test bays, marine drives, blast furnace fans, retrofit
Catalog D 31.1	Catalog D 11	Catalog D 31.2	Catalog D 31.5	Catalog D 18.1	Catalog D 33	Catalog D 31.1	Catalog D 32	Catalogs D 21.3, D 21.4 NC 62	Catalog D 21.3	Catalog D 23.1, Industry Mall	Internet ²⁾

Engineering tools (e.g. Drive Technology Configurator, SIZER for Siemens Drives, STARTER and SINAMICS Startdrive)

¹⁾ DC/DC controllers, see Industry Mall.

²⁾ www.siemens.com/medium-voltage-converter

System overview

Drive selection

1

Overview

SINAMICS selection guide – typical applications

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
Pumping, ventilating, compressing 	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	V20 G120C G120X	G120X G130/G150 G180 ¹⁾ DCM	S120	G120	S110	S120
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/ lowering devices Elevators Escalators/ moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/ disengagers
	V20 G115D G120C ET 200pro FC-2 ²⁾	G120 G120D G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120 G120D	S110 S210 DCM	S120 S210 DCM
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	G120 G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120	S110 S210	S120 S210 DCM
Machining 	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

Using the SINAMICS selection guide

The varying range of demands on modern variable frequency drives requires a large number of different types. Selecting the optimum drive has become a significantly more complex process. The application matrix shown simplifies this selection process considerably, by suggesting the ideal SINAMICS drive for examples of typical applications and requirements.

- The application type is selected from the vertical column
 - Pumping, ventilating, compressing
 - Moving
 - Processing
 - Machining
- The quality of the motion type is selected from the horizontal row
 - Basic
 - Medium
 - High

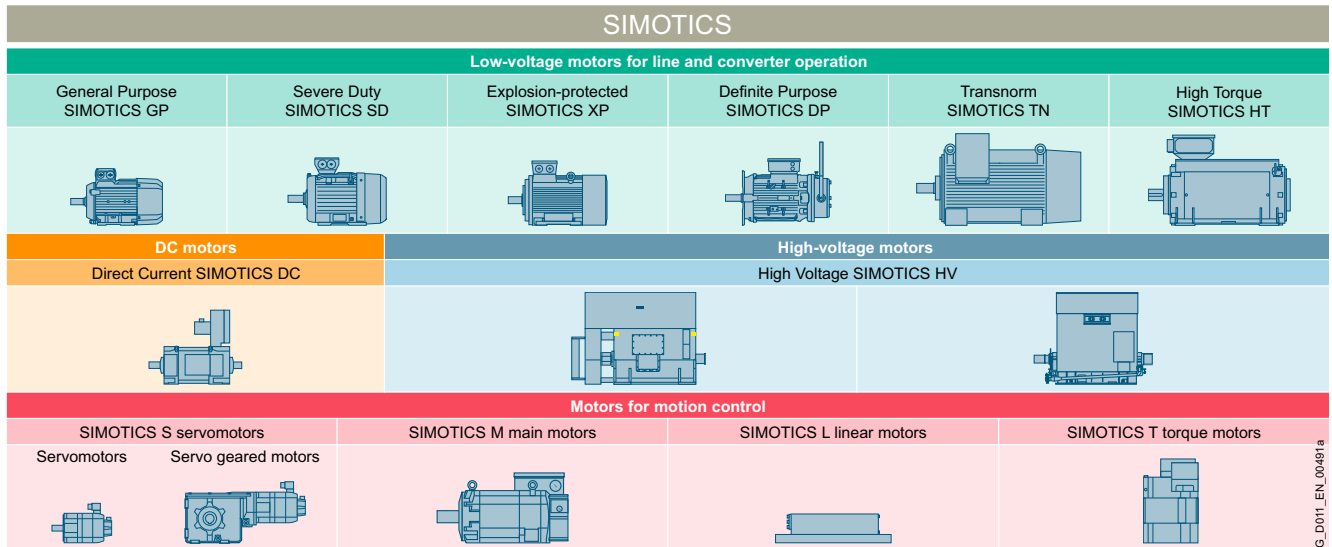
More Information

Further information about SINAMICS is available on the internet at www.siemens.com/sinamics
 Practical application examples and descriptions are available on the internet at www.siemens.com/sinamics-applications

¹⁾ Industry-specific converters.

²⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter is available at www.siemens.com/et200pro-fc

Overview



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SIMOTICS stands for

- 150 years of experience in building electric motors
- The most comprehensive range of motors worldwide
- Optimum solutions in all industries, regions and power/performance classes
- Innovative motor technologies of the highest quality and reliability
- Highest dynamic performance, precision and efficiency together with the optimum degree of compactness
- Our motors can be integrated into the drive train as part of the overall system
- A global network of skill sets and worldwide service around the clock

A clearly structured portfolio

The entire SIMOTICS product portfolio is transparently organized according to application-specific criteria in order to help users select the optimum motor for their application.

The product range extends from standard motors for pumps, fans and compressors to highly dynamic, precise motion control motors for positioning tasks and motion control in handling applications, as well as production machinery and machine tools, to DC motors and powerful high-voltage motors. Whatever it is that you want to move – we can supply the right motor for the task.

www.siemens.com/simotics

An outstanding performance for any job

A key characteristic of all SIMOTICS motors is their quality. They are robust, reliable, dynamic and precise to assure the requisite performance level for any process and deliver exactly the capabilities demanded by the application in hand. Thanks to their compact design, they can be integrated as space-saving units into installations. Furthermore, their impressive energy efficiency makes them effective as a means of reducing operating costs and protecting the environment.

A dense network of skill sets and servicing expertise around the world

SIMOTICS offers not only a wealth of sound experience gleaned from a development history which stretches back over around 150 years, but also the know-how of hundreds of engineers. This knowledge and our worldwide presence form the basis for a unique proximity to industries which feeds through in tangible terms to the specific motor configuration which is tailored to suit your application.

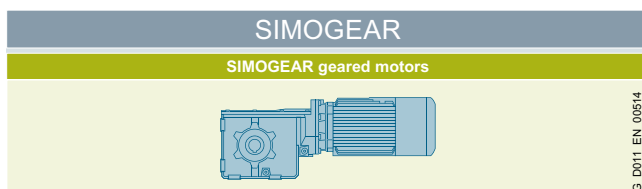
Our specialists are available to answer all your queries regarding any aspect of motor technology. At any time – wherever you are in the world. When you choose SIMOTICS, therefore, you reap the benefits of a global service network which is continuously accessible, thereby helping to optimize response times and minimize downtimes.

Perfection of the complete drive train

SIMOTICS is perfectly coordinated with other Siemens product families. In combination with the SINAMICS integrated converter family and the SIRIUS complete portfolio of industrial controls, SIMOTICS fits seamlessly as part of the complete drive train into automation solutions which are based on the SIMATIC, SIMOTION and SINUMERIK control systems.

SIMOGEAR geared motors

Overview



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The SIMOGEAR range of geared motors covers all common types such as helical, parallel shaft, bevel and worm geared motors and covers a power range from 0.09 kW to 55 kW and gearbox torques up to 19500 Nm. SIMOGEAR geared motors are fully compatible with many other manufacturers thanks to their market-standard connection dimensions.

www.siemens.com/simogear

System overview

Motion Control Encoder measuring systems

Übersicht

Motion Control Encoder measuring systems								
Encoder type	Incremental encoders			Absolute encoders				
								
Interface	sin/cos 1V _{pp}	RS422 (TTL)	HTL	DRIVE-CLiQ	SSI	EnDat	PROFIBUS DP	PROFINET IO
Resolution	1000 S/R 1024 S/R 2500 S/R	500 S/R 1000 S/R 1024 S/R 1250 S/R 1500 S/R 2000 S/R 2048 S/R 2500 S/R 3600 S/R 5000 S/R	100 S/R 500 S/R 1000 S/R 2500 S/R	Single-turn 24 bit Multi-turn 36 bit (24 bit Single-turn + 12 bit Multi-turn)	Single-turn 13 bit (8192 steps) Multi-turn 25 bit (8192 steps × 4096 revolutions)	Single-turn 13 bit (8192 steps) Multi-turn 25 bit (8192 steps × 4096 revolutions)	Single-turn 13 bit (8192 steps) Multi-turn 27 bit (8192 steps × 16384 revolutions)	Single-turn 13 bit (8192 steps) Multi-turn 27 bit (8192 steps × 16384 revolutions)
Catalog	D 21.4							

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 CNC controls
- SIMOTION Motion Control Systems
- SIMATIC programmable logic controllers
- SINAMICS drive systems

Motion control encoders are used with machine tools and production machines as additional external measuring systems. They are available as incremental or absolute 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, and movements of the machine while the power is off are not recorded.
- 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.

All motion control encoders are available as 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 converters or the Sensor Modules.

For motion control encoders with cables, the cable length including the connector is 1 m.

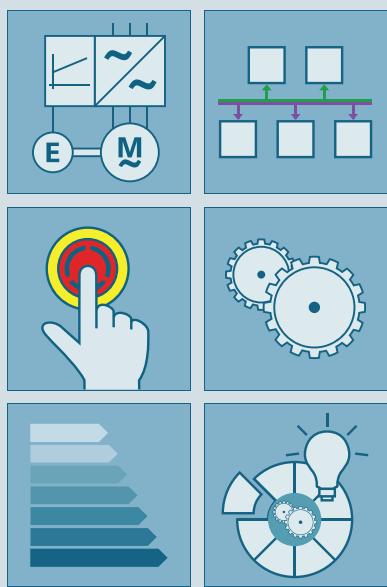
The following bending radii must be observed for the cable to the built-on encoder:

- One-time bending: ≥ 20 mm
- Continuous bending: ≥ 75 mm

More Information

- Internet:
www.siemens.com/sensor-systems
www.siemens.com/industrymall

Firmware functionality

**2/2**

2/2

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2/6

2/6

Firmware functionality

Introduction

Basic Drive Functions

Standard Technology Functions

Advanced Technology Functions

Common Engineering

Applications & Branch know-how

Further information about firmware functionality can be found on the internet at www.siemens.com/sinamics-firmware

Firmware functionality

Firmware functionality

Overview

The major part of the functionality of SINAMICS drives is implemented in software. This "embedded" **software** delivers the function of the product and is therefore a significant component of the overall product. The embedded software is also known as **firmware**, because it is firmly connected to specific hardware.

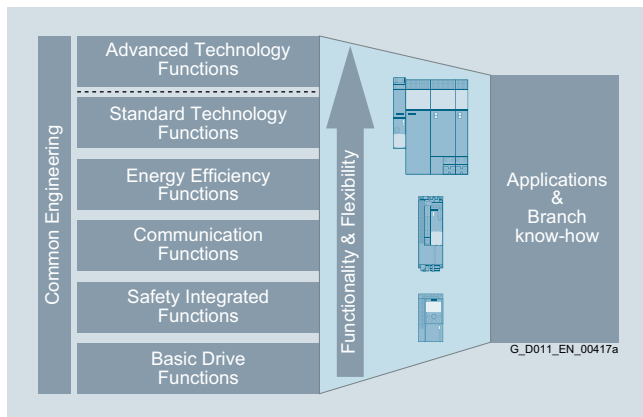
In the case of SINAMICS drives, the firmware is subdivided into the **operating system (OS)** with drivers for the hardware and the converter functions, which are also referred to as the **runtime (RT) functions**.

Introduction

The available firmware functions are so extensive that the overall functional scope has been structured into function groups corresponding to their main applications.

The 8 main groups are:

- Basic Drive Functions
- Standard Technology Functions
- Advanced Technology Functions
- Communication Functions
- Safety Integrated Functions
- Energy Efficiency Functions
- Common Engineering
- Applications & Branch know-how

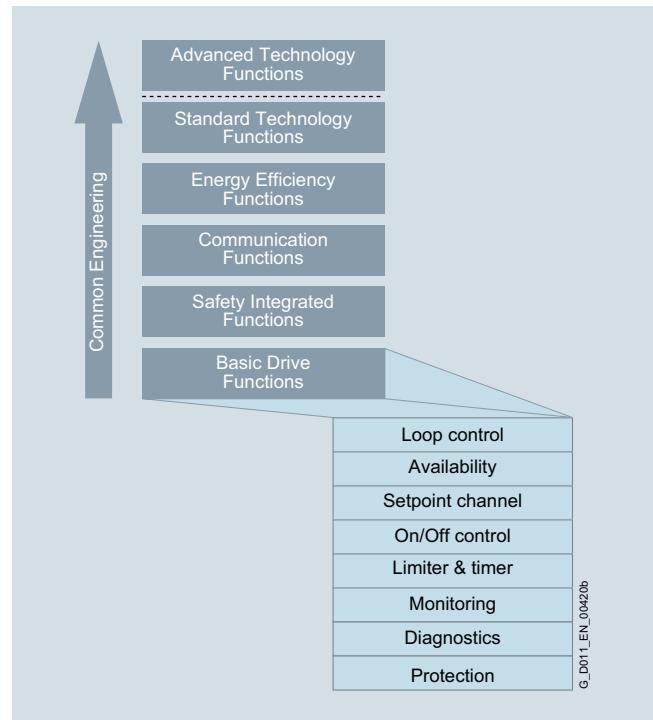


Functionality, including technology and configuration

Basic Drive Functions

The main groups, especially the "Basic Drive Functions", are divided up into further subgroups.

- Control modes
- Availability
- Setpoints and commands
- Limiters, timers and monitoring functions
- Diagnostics
- Protection



Basic Drive Functions - Control Functions

Control modes

The control methods are the core of the entire converter firmware. They are responsible for optimum movement of the connected motor and the attached machines. The better the control functions, the faster, better and more smoothly the machine operates, thereby significantly enhancing the quality of the production output.

A distinction is made between the following methods:

- V/f control (open-loop control)
- Vector control (closed-loop control)
- Servo control (closed-loop control)

Further classification refers to the control variables:

- Current control
- Speed control
- Torque control
- Position control
- Technological process control (pressure, flow rate, temperature, fill level, etc.)

Overview

Availability

Availability refers to the frequency ratio, namely how often or seldom a single device restricts the entire production process due to a problem. That is why it is important in terms of availability that a drive enters the faulty state only when it is essential for self-protection. Moreover, it is important that the cause of the pending problem is identified and eliminated as quickly as possible.

Features and measures to increase availability:

- Parallel connections, for example, to maintain emergency operation (possibly also at a lower rating), if a power unit fails
- Automatic restart
- Flying restart
- V_{dc} control with kinetic buffering
- Redundancy (hardware, communication, etc.)

Setpoints and commands

The setpoint channel is the link between the setpoint source and the motor control. The converter has a special feature that supports simultaneous input of two setpoints. Generation and subsequent modification of the total setpoint (influencing the direction, skip frequency, up/down ramp) take place in the setpoint channel.

Different sources of command usually result from the requirements to operate a drive from different places (on-site/remote), in different situations (standard/emergency mode) and/or different operating. The BICO binector connector technology allows SINAMICS to configure and combine the command and setpoint sources completely individually.

The following can be used for switching:

- Dataset switchover
- Switching elements among the Free Function Blocks (FFB)
- Fixed values

Limiters and monitoring functions

Limiters or limits are used to constrain input and/or output variables as appropriate to the connected machine; this means that not all positioning variables are used over their full range but are limited judiciously to enhance the safety and quality of the production process.

Timers/runtime counters are used to obtain information or make statements about the temporal course of a process.

- Recording application information for manufacturers
- Recording operating times for users
- Configurable timers for monitoring intervals
- Configurable timers for triggering activities at certain intervals (e.g. maintenance work)

Monitoring is used for early detection of conditions that may be detrimental or even dangerous to the connected machine, so that they can be counteracted expediently. If an appropriate countermeasure is not initiated, a protective response of the converter with probable fault shutdown will ultimately result.

Diagnostics

The "Diagnostics" subgroup comprises all those functions that provide assistance with determining the possible causes of a problem.

If problems occur in a process, or in the driven machine, further interpretation of the measured variables in the converter is required. To this end, different signals should be correlated with respect to time and then observed.

This includes:

- Error and alarm buffer
- Diagnostic buffer
- List of missing signals that interrupt operation
- Tracing for temporal assignment of signal profiles
- I/O simulation
- Telegram content diagnoses
- Terminal status

Protection

All protection functions counteract any possible damage to the converter and/or motor. This is why the shutdown thresholds cannot be parameterized but are factory-tuned and permanently set to match the built-in components. Alarm thresholds may be parameterized as a relative variable for shutdown threshold of some monitoring processes. Thus, a countermeasure that is sensitive to the process may still be initiated upon occurrence of the alarm.

Apart from protection of the hardware, protection of the parameterization and therefore protection of the intellectual expertise of the customer from unauthorized access and copying is also an important part of the protection functions.

- Write protection
- Know-how protection
- Copy protection

Firmware functionality

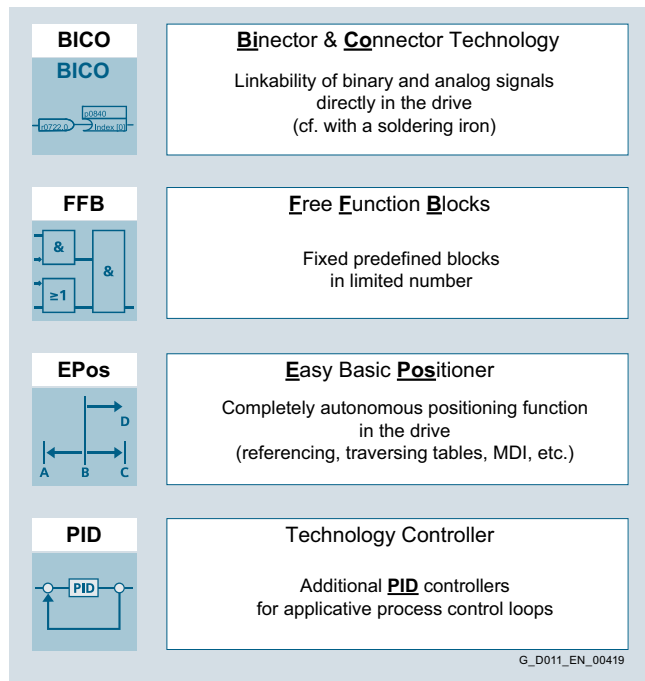
Firmware functionality

Overview

Standard Technology Functions

The Standard Technology Functions are not restricted to a specific SINAMICS product family, but they are available in full or at least partially in SINAMICS S120 as well as in SINAMICS G120.

- BICO technology
- Free function blocks (FFB)
- Basic positioner (EPos)
- Technology controller (PID)



Standard Technology Functions

The Standard Technology Functions significantly expand the application spectrum of the SINAMICS drives because the functions are not permanently and unalterably interconnected; rather, they are interrupted at defined access points and can be connected or wired differently. The BICO technology makes it possible.

The FFBs enable additional, freely interpretable adaptations of the binary and analog signal flow to the given machine application. However, the FFBs are limited in terms of the absolute quantity and the computing intervals (sampling times) that can be selected. These blocks are NOT multi-instance capable.

With Epos, comprehensive positioning tasks are autonomous in SINAMICS (i.e. their solution does not need a higher-level control). And moreover, this integrated functionality is also extremely flexible: It can be used for highly dynamic servo control as well as for simple applications with vector-controlled asynchronous motors. Up to 64 target positions, as well as the respective traversing speeds, can be permanently stored in the drive during commissioning. Axes can be positioned either absolutely or relatively.

It is, however, also possible to transfer these parameters as required from a higher-level controller. This means that target positions and velocities can even be changed on-the-fly during a positioning run.

The technology controller (PID controller) permits all types of simple process controls to be implemented. It can be used, for example, to control the line pressure, fill level, temperature, flow or also tension control or load balancing.

For more information, see section [Technology functions](#).

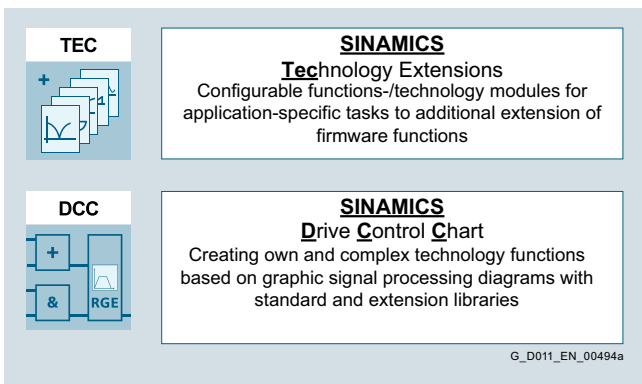
Overview

Advanced Technology Functions

The Advanced Technology Functions are the clear differentiating feature between the SINAMICS product families of SINAMICS G120 with the CU2xx-2 Control Units and SINAMICS S120 with the CU3x0-2 Control Units. The Advanced Technology Functions are only available for SINAMICS S120:

- SINAMICS Drive Control Chart (DCC)
- SINAMICS Technology Extensions (TEC)

The Advanced Technology Functions are characterized by maximum flexibility and performance whereby extremely individual and, at the same time, efficient solutions can be achieved.



Advanced Technology Functions

SINAMICS DCC comprises the block library, so-called DCB Drive Control Blocks and the DCC Editor for graphical inter-connection of blocks. SINAMICS DCC is primarily employed to solve arithmetic and control-related tasks or logic functions associated with complex applications.

In addition to the DCB Standard library, the DCB Extension library can also be used to create applications. The DCB Extension library is comprised of freely programmable blocks which are created for specific applications using DCB Studio and are then graphically interconnected with the DCC Editor in a similar fashion to standard blocks.

SINAMICS Technology Extensions (TECs) are configurable firmware expansions that are specifically created for use in a customized application with special requirements. This functionality can therefore be subsequently installed as an add-on to the standard scope of firmware functions. One example of a SINAMICS TEC is the VIBX vibration extinction for storage and retrieval systems.

For more information, see section Technology functions.

The functional scope of Advanced Technology Functions is scalable and flexible. Depending on the task, you can choose between configurable solutions provided by Siemens or freely created proprietary solutions in the drive.

Siemens provides	Configurable solution for	<ul style="list-style-type: none"> • Positioning • Simple signal processing (logic tasks) • Basic process control 	<p>Standard Technology Functions</p>	Easy Basic Positioner
	Configurable solution that can be modified as	<ul style="list-style-type: none"> • Application-specific tasks 		Free Function Blocks
Customers create/adapt themselves		<ul style="list-style-type: none"> • Application examples of: <ul style="list-style-type: none"> - Drive-related open-loop and closed-loop control tasks - Motion control functions 	<p>Advanced Technology Functions</p>	<p>SINAMICS Technology Extensions</p> <ul style="list-style-type: none"> • Vibration Extinguishment • Servo Coupling • Setpoint Generator • Polygonal line • Open Application Link •
		<ul style="list-style-type: none"> • General drive-related open-loop and closed-loop control tasks 		<p>SINAMICS Drive Control Chart</p> <ul style="list-style-type: none"> • DCB Standard • DCB Extension
		<ul style="list-style-type: none"> • Specific expanded functionality for complex tasks • Own function blocks in C/C++ to integrate your own know-how 		<ul style="list-style-type: none"> • DCB Standard • DCB Extension • DCB Studio • DCB Extension

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Depending on the technology function, a license may be required for the application.

Firmware functionality

Firmware functionality

Overview

Safety Integrated Functions

See section [Safety Integrated](#)

Communication Functions

See section [Communication](#)

Energy Efficiency Functions

See section [Energy efficiency](#)

Common Engineering

All functions of the converters are implemented to enable a common engineering approach to their handling no matter which type of drive is selected; i.e. if a function is used in drive x, it can be configured intuitively and commissioned in the same way in drive y. Knowledge gained can therefore be reused easily and efficiently. The configuration and commissioning tools in particular (such as SIZER for Siemens Drives (integrated in TIA Selection Tool), STARTER and SINAMICS Startdrive) reflect this approach..

For more information, see section [Engineering tools](#).

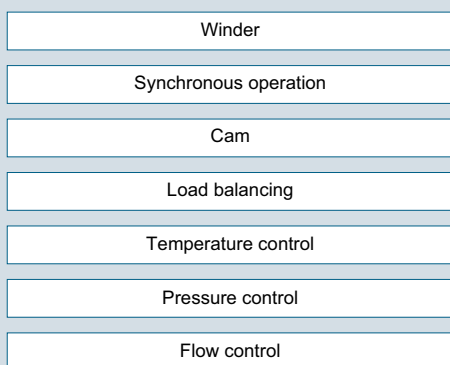
Applications & Branch know-how

Siemens has applied these technology functions (standard and/or advanced) to generate numerous application solutions. These applications can be downloaded from the Siemens application support website at www.siemens.com/sinamics-applications

The STARTER and SINAMICS Startdrive commissioning tools can then be used to activate and configure the applications and download them to the Control Units.

More information

Further information about firmware functionality can be found on the internet at www.siemens.com/sinamics-firmware



Applications & Branch know-how

Cascade control, bypass, multi-zone control, hibernation, essential service mode ESM, wobble generator

Line infeed functions, e.g. line transformer, dynamic grid support, ...

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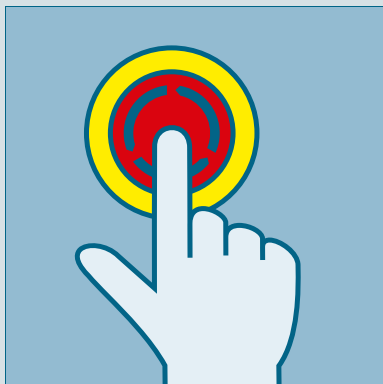
Applications & Branch know-how

Depending on the technology function, a license may be required for the application.

In some branch-specific Control Units (e.g. CU230P-2) branch-specific functions are also an integral part of the firmware.

For more information, see section [Drive applications](#).

Safety Integrated



3/2 Safety Integrated

3/2 Overview

3/3 Function

3/13 Integration

3/13 More information

3/14 Safety Integrated for SINAMICS G115D

3/14 Overview

3/14 Function

3/15 Safety Integrated for SINAMICS G120D

3/15 Overview

3/15 Benefits

3/17 Function

3/18 Safety Integrated for SINAMICS ET 200pro FC-2

3/18 Overview

3/18 Function

The Safety Integrated Function Manual contains detailed information about the safety functions.

<https://support.industry.siemens.com/cs/document/99668646>

Further manuals pertaining to Safety Integrated in drive systems can be found on the internet at

<https://support.industry.siemens.com/cs/ww/en/ps/13231/man>

Further information about Safety Integrated in SINAMICS can be found on the internet at www.siemens.com/safety-drives

Safety Integrated

Safety Integrated

Overview



Legal framework

Machine manufacturers and plant construction companies must ensure that their machines or plants cannot cause danger due to malfunctions in addition to the general risks of electric shock, heat or radiation.

In Europe, for example, compliance with the Machinery Directive 2006/42/EC is legally stipulated by the EU framework directive for occupational safety. In order to ensure compliance with this directive, it is recommended that the corresponding harmonized European standards are applied. This triggers the "assumption of conformity" and gives manufacturers and operators the legal security in terms of compliance with both national regulations and EU directives. The machine manufacturer uses the CE marking to document compliance with all relevant directives and regulations in the free movement of goods.

Safety-related standards

Functional safety is specified in various standards. For example, EN ISO 12100 specifies standards pertaining to machine safety (risk assessment and risk reduction). IEC 61508 specifies basic requirements for electronic and programmable safety-related systems. EN 62061 (only applicable for electrical and electronic control systems) and EN ISO 13849-1 define the functional and safety-related requirements of safety-oriented control systems.

The above-mentioned standards define different safety requirements that the machine has to satisfy in accordance with the risk, frequency of a dangerous situation, probability of occurrence and the opportunities for recognizing impending danger.

- EN ISO 13849-1:
Performance Level PL a ... e;
Category B, 1 ... 4
- EN 62061: Safety Integrity Level SIL 1 ... 3

Trend toward integrated safety systems

The trend toward greater complexity and higher modularity of machines has seen a shift in safety functions away from the classical central safety functions (for example, shutdown of the complete machine using a main disconnecting means) and into the machine control system and the drives. This is often accompanied by a significant increase in productivity because the setup times are shortened. Depending on the type of machine, it may even be possible to continue manufacturing other parts while the setup is in progress.

Safety Integrated Functions act much faster than those of a conventional design. The safety of a machine is increased further with Safety Integrated. Furthermore, thanks to the faster method of operation, safety measures controlled by integrated safety systems are perceived as less of a hindrance by the machine operator, therefore significantly reducing the motivation to consciously bypass safety functions.

Function

Safety functions integrated in SINAMICS drives

SINAMICS drives are characterized by a large number of Safety Integrated Functions. In combination with the sensors and safety control required for the safety functionality, they ensure that highly-effective protection for persons and machines is implemented in a practice-oriented manner.

They comply with the requirements of the following safety categories:

- PL d and Category 3 according to EN ISO 13849-1
- SIL 2 according to IEC 61508 and IEC 61800-5-2

Note:

The Safe Brake Test (SBT) diagnostic function meets the requirements for Category 2 according to EN ISO 13849-1.

The Safety Integrated functions are generally certified by independent institutes. You can obtain the corresponding test certificates and manufacturer's declarations from your Siemens contacts.

The Safety Integrated Functions that are currently available are described below. Their functional safety satisfies the requirements defined in the international standard IEC 61800-5-2 for variable-speed drive systems.

The safety functions integrated into the SINAMICS drive system can be roughly divided into four categories:

- **Functions for safely stopping a drive**
 - Safe Torque Off (STO)
 - Safe Stop 1 (SS1)
 - Safe Stop 2 (SS2)
 - Safe Operating Stop (SOS)
- **Functions for safe brake management**
 - Safe Brake Control (SBC)
 - Safe Brake Test (SBT)
(this diagnostic function exceeds the scope of IEC 61800-5-2)
- **Functions for safely monitoring the motion of a drive**
 - Safely-Limited Speed (SLS)
 - Safe Speed Monitor (SSM)
 - Safe Direction (SDI)
 - Safely-Limited Acceleration (SLA)
- **Functions for safely monitoring the position of a drive**
 - Safely-Limited Position (SLP)
 - Safe Position (SP) (this function exceeds the scope of IEC 61800-5-2)
 - Safe Cam (SCA)

Safe Torque Off (STO)

The STO function is the most common and basic drive-integrated safety function. It ensures that no torque-generating energy can continue to affect a motor and prevents unintentional start-ups.

Effect

This function is a mechanism that prevents the drive from restarting unexpectedly, in accordance with EN 60204-1, Section 5.4. The STO function suppresses the drive pulses (corresponds to Stop Category 0 according to EN 60204-1). The drive is reliably torque-free. This state is monitored internally in the drive.

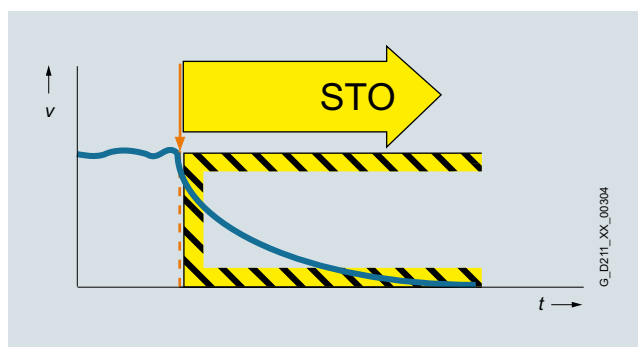
Application

STO has the immediate effect that the drive cannot supply any torque-generating energy. STO can be used wherever the drive will naturally reach a standstill due to load torque or friction in a sufficiently short time or when "coasting down" of the drive will not have any relevance for safety.

STO makes it possible for persons to work safely when the protective door is open (restart interlock) and is used on machines/installations with moving axes, e.g. on handling or conveyor systems.

Customer benefits

Some of the advantages of the Safety Integrated Function STO over conventional safety technology with electromechanical switchgear include the elimination of separate components as well as of the work that would be required to wire and service them, i.e. no wearing parts as a result of the electronic shutdown. Because of the fast electronic switching times, the function provides a shorter reaction time than the conventional solution comprising electromechanical components. When STO is triggered, the converter remains connected to the network and can be fully diagnosed.



Safety Integrated

Safety Integrated

Function

Safe Stop 1 (SS1)

The SS1 function causes a motor to stop rapidly and safely and switches the motor to torque-free mode after coming to a standstill by activating STO.

Effect

The SS1 function can safely stop the drive in accordance with EN 60204-1, Stop Category 1. When the SS1 function is selected, the drive brakes autonomously along a quick-stop ramp and automatically activates the Safe Torque Off and Safe Brake Control functions (if configured) when the parameterized safety delay time expires.

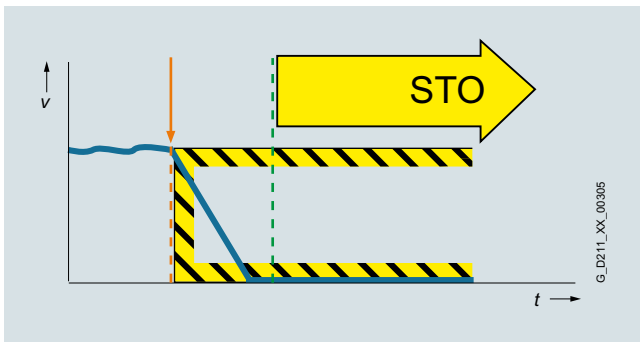
If the variant "SS1 with external stop (SS1E)" is parameterized, the drive does not brake autonomously when the function is selected. In this case, the higher-level control must bring the drive to a standstill within a parameterized STO transition time. The SBR (Safe Brake Ramp) and SAM (Safe Acceleration Monitor) functions are not active. SS1E is a useful function for drives that need to be stopped as a group by the Motion Control system in order to prevent potential damage to the machine or product.

Application

The SS1 function is used when, in the event of a safety-relevant incident, the drive must stop as quickly as possible with a subsequent transition into the STO state (e.g. EMERGENCY STOP). It is thus used to bring large centrifugal masses to a stop as quickly as possible for the safety of the operating personnel, or to brake motors at high speeds as quickly as possible. Examples of typical applications are saws, grinding machine spindles, centrifuges, winders and storage and retrieval machines.

Customer benefits

The targeted stopping of a drive by means of SS1 reduces the risk of danger, increases the productivity of a machine, and allows the safety clearances in a machine to be reduced. The principle is to bring the drive actively to a standstill, compared with just using the STO function. Complex mechanical brakes that are susceptible to wear are normally not required to brake the motor.



Safe Stop 2 (SS2)

The SS2 function brings the motor to a standstill quickly and safely and then activates the SOS function once the motor has stopped.

Effect

The Safe Stop 2 function can safely stop the drive in accordance with EN 60204-1, Stop Category 2. When the SS2 function is selected, the drive brakes autonomously along a quick stop ramp. In contrast to SS1, the drive control remains operational afterwards, i.e. the motor can supply the full torque required to maintain zero speed. Standstill is safely monitored (Safe Operating Stop function).

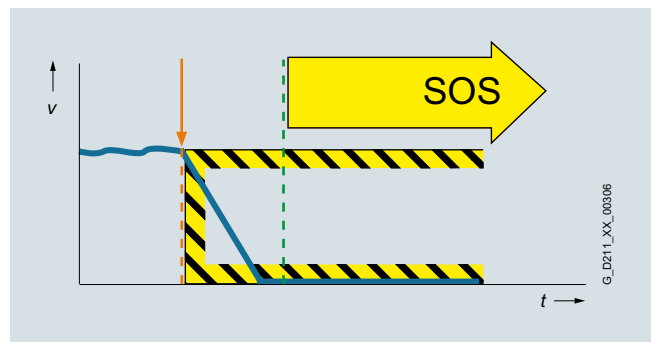
If the variant "SS2 with external stop (SS2E)" is parameterized, the drive does not brake autonomously when the function is selected. In this case, the higher-level control must bring the drive to a standstill within a parameterized Safe Operating Stop transition time. The SBR (Safe Brake Ramp) and SAM (Safe Acceleration Monitor) functions are not active. SS2E is a useful function for drives that need to be stopped as a group by the Motion Control system in order to prevent potential damage to the machine or product.

Application

As with SS1, the SS2 function ensures the quickest possible deceleration of the motor. However, the motor power is not switched off. Instead, a control system prevents it from leaving the standstill position – even if it is affected by external forces. Typical applications for SS2 include machine tools, for example.

Customer benefits

The SS2 function ensures a rapid axis stop. Because the control remains active, after the safety function is deselected, productive operation can continue without referencing. This ensures short setup and standstill times and high productivity.



Function

Safe Operating Stop (SOS)

With the SOS function, the stopped motor is held in position by the drive control system and its position is monitored.

Effect

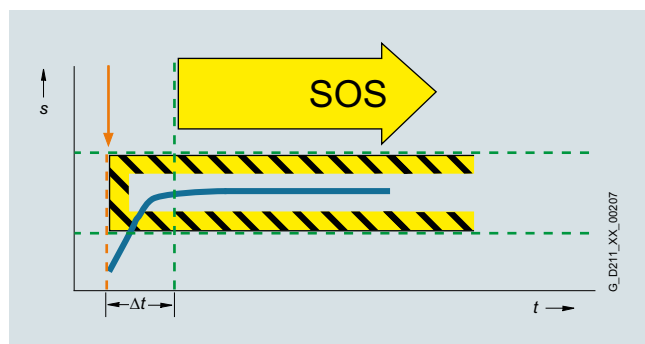
The SOS function constitutes safe standstill monitoring. The drive control remains in operation. The motor can therefore deliver the full torque to hold the current position. The actual position is reliably monitored. In contrast to safety functions SS1 and SS2, the speed setpoint is not influenced autonomously. After SOS has been activated, the higher-level control must bring the drive to a standstill within a parameterized time and then hold the position setpoint.

Application

SOS is an ideal solution for all those applications for which the machine or parts of the machine must be at a safe standstill for certain steps, but the drive must also supply a holding torque. It is ensured that despite counter torque the drive remains in its current position. In contrast to SS1 and SS2, the drive does not brake autonomously in this case. It expects the higher-level controller to ramp down the relevant axes as a coordinated group within an adjustable delay time. This can be used to prevent any damage to the machine or product. Typical applications for SOS include winders, converting and packaging machines and machine tools.

Customer benefits

No mechanical components are necessary to keep the axis in position despite any counterforce that may occur. Due to the short switching times and the fact that the drive control always remains active, setup and downtimes are reduced. Recalibration of the axis after exiting the SOS function is not necessary. The axis can immediately be moved again after deactivation of the SOS function.



Safe Brake Control (SBC)

The SBC function permits the safe control of a holding brake. SBC is always activated in parallel with STO.

Effect

A holding brake which is active in a de-energized state is controlled and monitored using safe two-channel technology. Due to the two-channel control, the brake may still be activated in the event of an insulation fault in the control cable. Errors of this kind are detected early by means of test pulses.

Note:

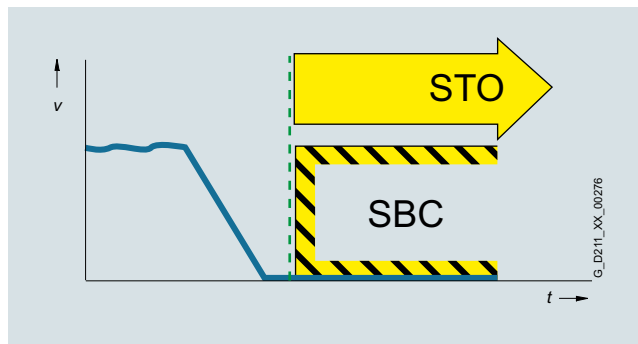
Safe Brake Control does not detect mechanical faults in the brake itself, such as worn brake linings. For Motor Modules in booksize format, the terminals for the motor brake are integrated. An additional Safe Brake Relay is required for Power Modules in blocksize format. An additional Safe Brake Adapter is necessary for Power Modules in chassis format.

Application

The SBC function is used in conjunction with the functions STO or SS1 to prevent the movement of an axis in the torque-free state, e.g. because of gravity.

Customer benefits

Again, the function saves the use of external hardware and the associated wiring.



Safety Integrated

Safety Integrated

Function

Safe Brake Test (SBT)

The SBT diagnostic function carries out a brake function test at regular intervals or before personnel enter the danger zone.

Effect

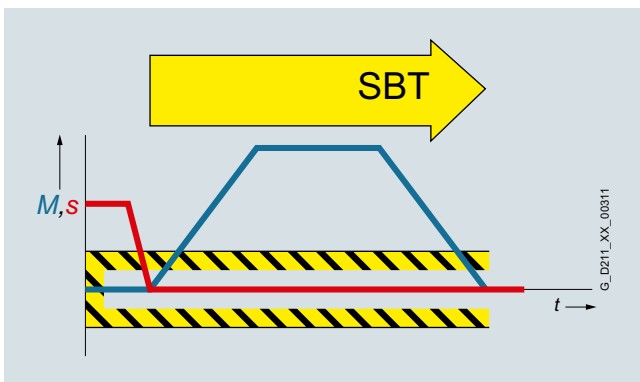
A good way to check the proper functioning of brakes that have become worn is to apply a torque to the closed brake. Drive systems that have two brakes, e.g. motor brake and external brake, can be tested with different torque values.

Application

The SBT diagnostic function is suitable for implementing a safe brake in combination with the SBC function.

Customer benefits

The function detects faults or wear in the brake mechanics. Automatically testing the effectiveness of brakes reduces maintenance costs and increases the safety and availability of the machine or plant.



Safely-Limited Speed (SLS)

The SLS function monitors the drive to ensure that it does not exceed a preset speed or velocity limit.

Effect

The SLS function monitors the drive against a parameterized speed limit. Four different limit values can be selected. As in the case of SOS, the speed setpoint is not influenced independently. After SLS has been selected, the higher-level control must bring the drive down below the selected speed limit within a parameterizable time. If the speed limit is exceeded, a customizable drive-integrated fault reaction occurs.

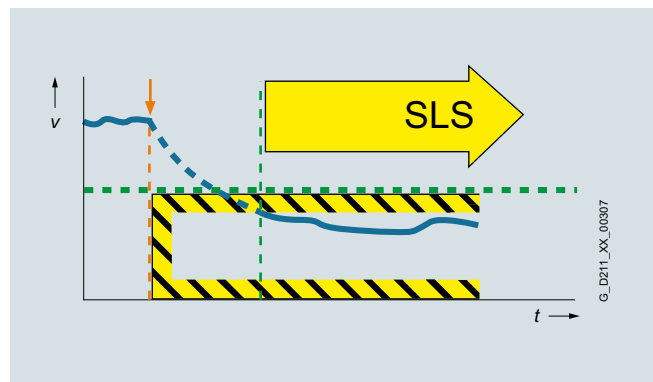
The SLS limit stage 1 can be multiplied by a factor that is transferred in 16-bit resolution via PROFIsafe. This allows an almost unlimited number of limits to be specified.

Application

The SLS function is used if people are in the danger zone of a machine and their safety can only be guaranteed by reduced speed. Typical application cases include those in which an operator must enter the danger zone of the machine for the purposes of maintenance or setting up, such as a winder in which the material is manually threaded by the operator. To prevent injury to the operator, the roller may only spin at a safely reduced speed. SLS is often also used as part of a two-stage safety concept. While a person is in a less critical zone, the SLS function is activated, and the drives are only stopped safely in a smaller area with higher potential risk. SLS can be used not only for operator protection, but also for machinery protection, e.g. if a maximum speed must not be exceeded.

Customer benefits

The SLS function can contribute to a significant reduction in downtime, or greatly simplify or even accelerate setup. The overall effect achieved is a higher availability of the machine. Moreover, external components such as speed monitors can be omitted.



Function

Safe Speed Monitor (SSM)

The SSM function warns when a drive is working below an adjustable speed limit. As long as it remains below the threshold, the function issues a safety-related signal.

Effect

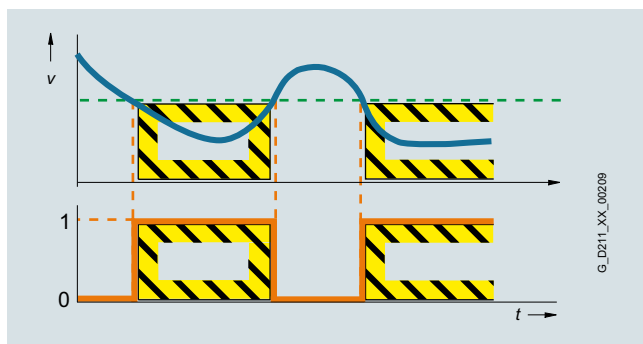
If a speed value drops below a parameterized limit, a safety-related signal is generated. This can, for example, be processed in a safety control unit to respond to the event by programming, depending on the situation.

Application

With the SSM function, in the simplest case, a safety door can be unlocked if the speed drops below a non-critical level. Another typical example is that of a centrifuge that may be filled only when it is operating below a configured speed limit.

Customer benefits

Unlike SLS, there is no drive-integrated fault reaction when the speed limit is exceeded. The safe feedback can be evaluated in a safety control unit, allowing the user to respond appropriately to the situation.



Safe Direction (SDI)

The SDI function ensures that the drive can only move in the selected direction.

Effect

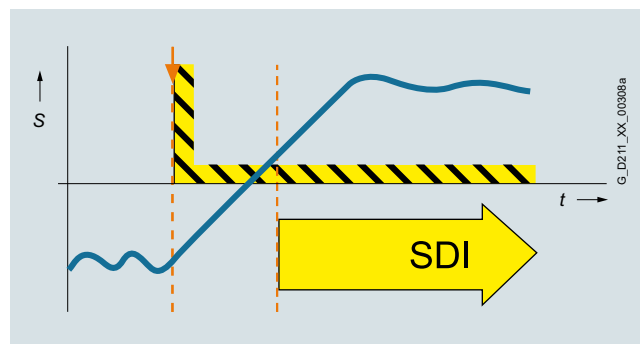
Deviation from the direction of motion currently being monitored is detected reliably and the configured drive-integrated fault reaction is initiated. It is possible to select which direction of rotation is to be monitored.

Application

The SDI function is used when the drive may only move in one direction. A typical application is to permit the operator access to a danger zone, as long as the machine is rotating in the safe direction, i.e. away from the operator. In this state, the operator can feed material into the work zone or remove material from the work zone without danger.

Customer benefits

The function saves the use of external components such as speed monitors and the associated wiring. The release of a danger zone while the machine is moving away from the operator increases productivity. Without the SDI function, the machine must be safely stopped during material loading and removal.



Safety Integrated

Safety Integrated

Function

Safely-Limited Acceleration (SLA)

The SLA function monitors that the drive does not exceed a pre-set acceleration limit value.

Effect

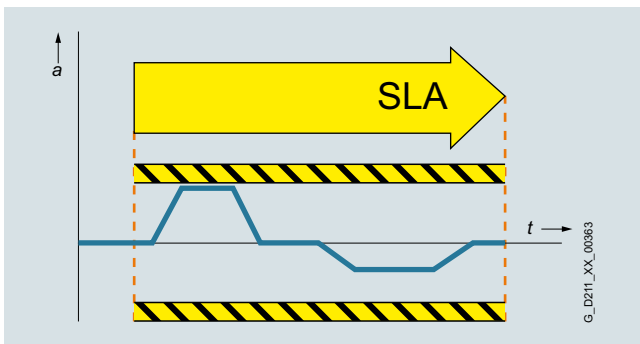
The SLA function monitors that the motor does not violate the defined acceleration limit (e.g. in setup mode). SLA detects early on whether the speed is increasing at an inadmissible rate (the drive accelerates uncontrollably) and initiates the stop response.

Application

The SLA function is used, e.g., for SIMATIC Safe Kinematics. SLA can only be used in safety systems with an encoder.

Customer benefits

The function monitors for maximum permissible acceleration in setup mode and safe monitoring of the tool center point with different kinematics.



Safely-Limited Position (SLP)

The SLP function monitors the axis to ensure that it remains within the permissible traversing range.

Effect

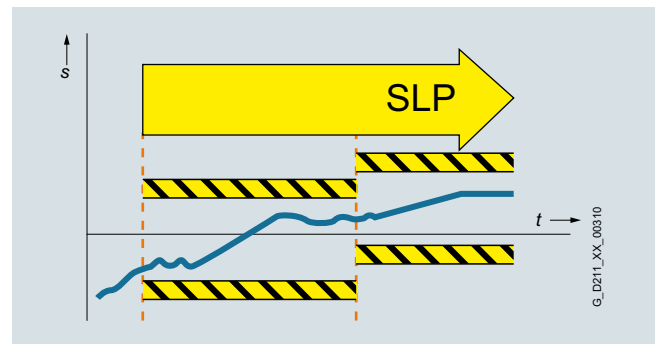
When SLP is activated, the traversing range limited by the configured software limit switches is safely monitored. If the permitted traversing range is exited, a configurable fault reaction occurs. It is possible to toggle between two traversing ranges, even when the machine is in operation.

Application

SLP is used for applications in which machine operators have to enter a protection area, e.g. for feeding in and removing material. Safe monitoring of the axis position ensures that the axis cannot move into the protection area released for operators and so place them in danger, for example, on storage and retrieval machines, gantry cranes or machining centers.

Customer benefits

SLP can be used for highly-effective protection area monitoring. The function does away with the use of external components such as hardware limit switches and the associated wiring expense. Due to the short reaction time following a limit overshoot, safety clearances can be reduced.



Function

Safe Position (SP)

The SP function transfers the actual position values determined safely in the drive over safe PROFIsafe communication to a safety control.

Effect

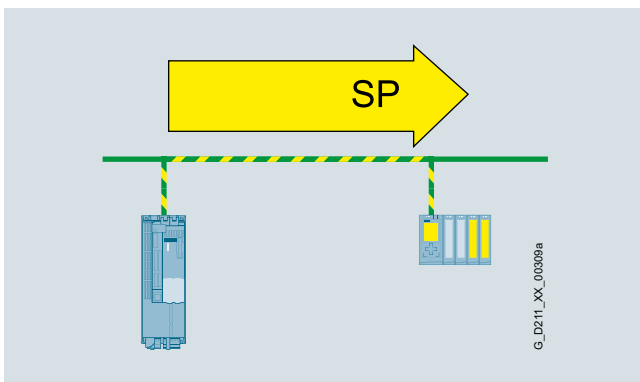
In contrast to the SLP function that monitors the current actual position value against a limit and, in the case of an overshoot, activates a drive-integrated fault reaction, SP transfers the current actual position values to the safety control. Position monitoring is implemented in the safety program of the control. Extended PROFIsafe telegrams are available for transferring the position values. The position values can be transferred in 16-bit or 32-bit resolution, as required. A time stamp is also transferred with the position values.

Application

Tailor-made safety concepts can be created using the SP function. It is ideal for use on machines that require flexible safety functions. It is extremely versatile and can be used, for example, to implement safe, axis-specific range detection by means of safe cams. The SP function can also be used to implement multi-axis safety concepts, multi-dimensional protection areas and zone concepts.

Customer benefits

Position monitoring or speed monitoring is implemented in the safety program of the control, so the user has the flexibility for implementing tailor-made safety functions. The reaction to a limit overshoot must also be specified in the safety program. This means a higher initial programming outlay, but it does offer the opportunity for initiating different fault reactions depending on the situation.



Safe Cam (SCA)

The SCA function enables safety-related monitoring of the position.

Effect

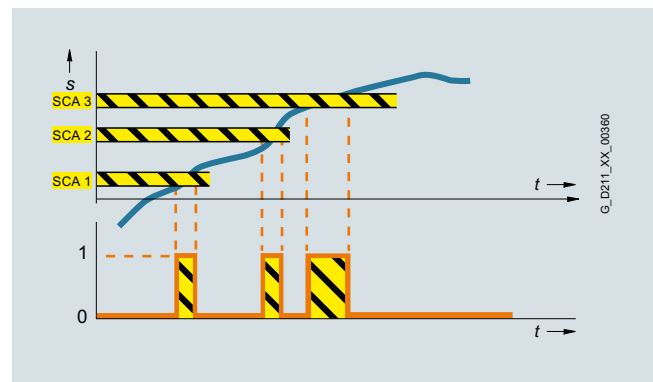
The SCA function outputs a safe signal if the drive is within a specified position range. It facilitates the realization of safe axis-specific range detection. Up to 30 safe cams can be parameterized per axis.

Application

It is only permissible that a protective door is opened if a drive is in a certain position range. The drive may only be traversed with reduced speed when it is located in a certain position range.

Customer benefits

The function enables safety-related switchover of safety functions. With SCA, safe electronic cam controllers can be implemented without additional hardware. With SCA, work and protection zone delimitations are reliably detected.



Safety Integrated

Safety Integrated

Function

Basic Functions, Extended Functions, and Advanced Functions

With SINAMICS G converters, the safety functions are basically implemented without encoders.

With SINAMICS S drives, the safety functions are implemented with encoders – individual safety functions can also be operated without encoders.

The Safety Integrated Functions are grouped into Basic Functions, Extended Functions, and Advanced Functions.

The Basic Functions are included in the standard scope of supply.

The Extended Functions must be activated by a license ¹⁾. The Advanced Functions for SINAMICS S120 must also be activated via a license.

- Basic Functions
 - Safe Torque Off (STO)
 - Safe Brake Control (SBC)
 - Safe Stop 1 (SS1)
- Extended Functions
 - Safe Stop 1 with external stop (SS1E)
 - Safe Stop 1 (SS1) with SBR or SAM
 - Safe Stop 2 with external stop (SS2E)
 - Safe Stop 2 (SS2) with SBR or SAM
 - Safe Operating Stop (SOS)
 - Safely-Limited Speed (SLS)
 - Safe Speed Monitor (SSM)
 - Safe Direction (SDI)
 - Safely-Limited Acceleration (SLA)
 - Safe Brake Test (SBT) diagnostic function
- Advanced Functions
 - Safely-Limited Position (SLP)
 - Safe Position (SP)
 - Safe Cam (SCA)

The license for Safety Integrated Advanced Functions also includes the license for Safety Integrated Extended Functions.

For the Extended Functions SS1 and SS2 with SAM, Safe Acceleration Monitor (SAM) is performed during braking to identify any faults already during the braking phase.

With SS1 and SS2, a Safe Brake Ramp (SBR) can be configured as an alternative.

The Basic Functions – activated via on-board terminals on the device, TM54F Terminal Module (only for SINAMICS S) or via PROFIsafe – do not require an encoder.

Activation of the Safety Integrated Functions

The safety functions for SINAMICS drives can be activated via terminals, e.g. for use of a conventional safety circuit.

For standalone safety solutions for small to medium-sized applications, it is frequently sufficient that the various sensing components are directly hardwired to the drive.

For integrated safety solutions, the safety-relevant sequences are generally processed and coordinated in the fail-safe SIMATIC controller. Here, the system components communicate via the PROFINET or PROFIBUS fieldbus. The safety functions are controlled via the safe PROFIsafe communication protocol.

SINAMICS drives can be easily integrated into the plant or system topology.

PROFIsafe

SINAMICS drives support the PROFIsafe profile based on PROFINET as well as on PROFIBUS.

PROFIsafe is an open communications standard that supports standard and safety-related communication over the same communication path (wired or wireless). A second, separate bus system is therefore not necessary. The telegrams that are sent are continually monitored to ensure safety-relevant communication.

Possible errors such as telegrams that have been lost, repeated or received in the incorrect sequence are avoided. This is done by consecutively numbering the telegrams in a safety-relevant fashion, monitoring their reception within a defined time and transferring an ID for transmitter and receiver of a telegram. A CRC (cyclic redundancy check) data security mechanism is also used.

The operating principle of Safety Integrated

Two independent switch-off signal paths

Two independent switch-off signal paths are available. All switch-off signal paths are low active. This ensures that the system is always switched to a safe state if a component fails or in the event of cable breakage. If a fault is discovered in the switch-off signal paths, the STO or SS1 function (depending on parameter settings) is activated and a system restart inhibited.

Two-channel monitoring structure

All the main hardware and software functions for Safety Integrated are implemented in two independent monitoring channels (e.g. switch-off signal paths, data management, data comparison). A cyclic crosswise comparison of the safety-relevant data in the two monitoring channels is carried out.

The monitoring functions in each monitoring channel work on the principle that a defined state must prevail before each action is carried out and a specific acknowledgement must be made after each action. If these expectations of a monitoring channel are not fulfilled, the drive coasts to a standstill (two channel) and an appropriate message is output.

Forced dormant error detection using test stop

The functions and switch-off signal paths must be tested at least once within a defined time in order to meet requirements as per EN ISO 13849-1 and IEC 61508 in terms of timely fault detection. This must be implemented either in cyclic manual mode or the test stop must be automatically initiated as part of the process. The test stop cycle is monitored, and after a specific time has been exceeded, an alarm is output. A test stop does not require a POWER ON. The acknowledgment is set by canceling the test stop request.

Examples of when forced dormant error detection must be performed:

- When the drives are at a standstill after the system has been switched on
- Before the protective door is opened
- At defined intervals (e.g. every 8 hours)
- In automatic mode, time and event-driven
- When the drives are at a standstill after the system has been switched on
- Before the protective door is opened
- At defined intervals (e.g. every 8 hours)
- In automatic mode, time and event-driven

¹⁾ Only applies to SINAMICS G Control Unit CU250S-2 and SINAMICS S. Available for SINAMICS G via hardware versions "-F".

Function

Safe speed/position sensing without/with encoder

Safe actual value sensing without encoder

A drive monitor with encoder is necessary for operation of a series of safety functions.

For applications with encoderless mode or with encoders that have no safety capability, the safety functions can also be implemented without encoder. It is not possible to use all safety functions in this case.

In operation without encoder, the actual speed values are calculated from the measured electrical actual values. This means that speed monitoring is also possible during operation without an encoder.

Safe actual value sensing with encoder

Incremental encoders or absolute encoders can be used for safe sensing of the position values on a drive.

Safe actual value sensing relies on redundant evaluation of the incremental tracks A/B that supply sin/cos signals of $1 V_{pp}$. Only encoders of the type whose A/B track signals are created and processed using purely analog techniques can be used.

HTL/TTL incremental encoders may also be used. In this case, safe actual value sensing is achieved by using two independent encoders. The minimum possible speed resolution must also be taken into account.

The encoder signals are input via Sensor Modules.

As an alternative, motors with an integrated DRIVE-CLiQ interface can be used. The speed or position actual values are generated directly in the motor as safe values and are transferred to the Control Unit over safe communication via DRIVE-CLiQ.

Certified built-on rotary encoders with DRIVE-CLiQ interface may also be used (see <https://support.industry.siemens.com/cs/document/65402168>).

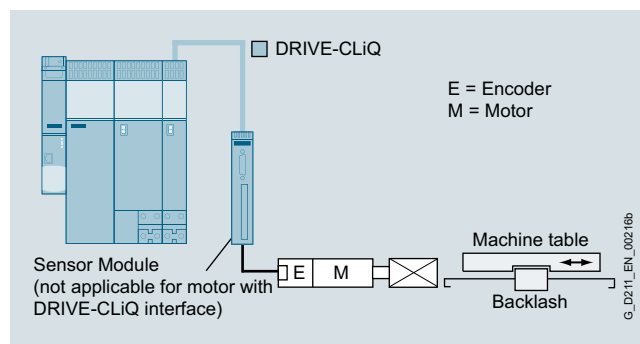
The encoder must be mechanically attached in such a manner that the encoder shaft is unable to unplug or slide off. For notes on this, see IEC 61800-5-2: 2016, Table D.16.

A list of Siemens motors that fulfill the electrical and mechanical requirements is available at: <https://support.industry.siemens.com/cs/document/33512621>

The following can be used for safe speed/position sensing:

- Single-encoder systems or
- Dual-encoder systems

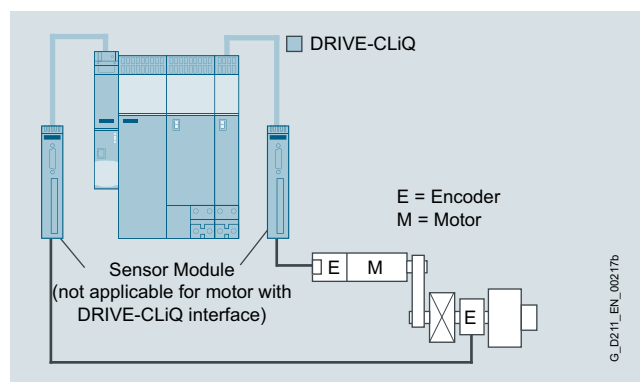
Single-encoder system



Example: Single-encoder system

In a single-encoder system, the motor encoder is used exclusively for safe actual value sensing.

Dual-encoder system



Example: Dual-encoder system

In the case of the dual-encoder system, the safe actual values for a drive are provided by two separate encoders. The actual values are transferred to the Control Unit over DRIVE-CLiQ. When motors without a DRIVE-CLiQ connection are used, a Sensor Module must be provided.

HTL/TTL incremental encoders can be used as an alternative with a dual-encoder system. Either two HTL/TTL encoders, one dual-HTL/TTL encoder or one HTL/TTL encoder and one sin/cos encoder can be used.

Safety Integrated

Safety Integrated

Function

The safety functions are listed below with criteria for actual value sensing:

	Functions	Abbreviation	With encoder	Without encoder	Description
Basic Functions	Safe Torque Off	STO	Yes	Yes	Safe Torque Off
	Safe Stop 1	SS1	Yes	Yes ¹⁾	Safe stopping process in accordance with stop category 1
	Safe Brake Control	SBC	Yes	Yes	Safe Brake Control
Extended Functions	Safe Torque Off	STO	Yes	Yes	Safe Torque Off
	Safe Stop 1	SS1	Yes	Yes ¹⁾	Safe stopping process in accordance with stop category 1
	Safe Brake Control	SBC	Yes	Yes	Safe Brake Control
	Safe Operating Stop	SOS	Yes	No	Safe monitoring of the standstill position
	Safe Stop 2	SS2	Yes	No	Safe stopping process in accordance with stop category 2
	Safely-Limited Speed	SLS	Yes	Yes ¹⁾	Safe monitoring of the maximum speed
	Safe Speed Monitor	SSM	Yes	Yes ¹⁾	Safe monitoring of the minimum speed
	Safe Direction	SDI	Yes	Yes ¹⁾	Safe monitoring of the direction of motion
	Safely-Limited Acceleration	SLA	Yes	No	Safely-Limited Acceleration
	Safe Brake Test	SBT	Yes	No	Diagnostic function for safe testing of the required holding torque of a brake
Advanced Functions	Safely-Limited Position	SLP	Yes	No	Safely-Limited Position
	Safe Position	SP	Yes	Yes ²⁾	Safe transfer of position values
	Safe Cam	SCA	Yes	No	Safe cams

¹⁾ The use of this safety function without encoder is permitted with asynchronous (induction) motors, synchronous motors from the SIEMOSYN series, or with SIMOTICS reluctance motors.

²⁾ Only for the transmission of relative position values. An encoder is required to transmit absolute position values.

Integration

The safety functions integrated in SINAMICS drives, including SIMATIC ET 200pro FC-2 frequency converters, are listed below.

Safety Integrated	Low voltage Standard Performance frequency converters SINAMICS						Distributed frequency converters SINAMICS G115D wall and motor-mounted			SIMATIC ET 200pro FC-2 ⁶⁾
	V20	G120C	G120		G130 G150 CU320-2	G120D CU240D-2	CU250D-2			
			CU230P-2	CU240E-2					CU250S-2	
Functions										
STO	-	✓	-	✓ ¹⁾	✓	✓	✓	✓	✓	✓
SS1	-	-	-	✓ ¹⁾	✓	✓	-	✓ ¹⁾	✓ ¹⁾	-
SS2	-	-	-	-	-	✓ ¹⁾	-	-	-	-
SOS	-	-	-	-	-	✓ ¹⁾	-	-	-	-
SBC	-	-	-	-	✓	✓	-	-	-	-
SBT	-	-	-	-	-	✓ ¹⁾	-	-	-	-
SLS	-	-	-	✓ ¹⁾	✓ ²⁾	✓ ¹⁾	-	✓ ¹⁾	✓ ¹⁾	-
SSM	-	-	-	✓ ¹⁾	✓ ²⁾	✓ ¹⁾	-	✓ ¹⁾	✓ ¹⁾	-
SDI	-	-	-	✓ ¹⁾	✓ ²⁾	✓ ¹⁾	-	✓ ¹⁾	✓ ¹⁾	-
SLA	-	-	-	-	-	✓ ¹⁾	-	-	-	-
SLP	-	-	-	-	-	✓ ¹⁾	-	-	-	-
SP	-	-	-	-	-	✓ ²⁾	-	-	-	-
SCA	-	-	-	-	-	✓ ²⁾	-	-	-	-
Control										
PROFIsafe	-	✓	-	✓	✓	✓	✓	✓	✓	-
F-DI	-	✓	-	✓	✓	✓	✓	✓	✓	-

Safety Integrated	Low voltage Industry-specific frequency converters SINAMICS			Servo converters			High performance frequency converters		
	G120P CU230P-2	G120X	G180	V90	S110 CU305	S210	S120 S120M CU310-2	CU320-2	S150 CU320-2
Functions									
STO	-	✓ ⁷⁾	✓	✓	✓	✓	✓	✓	✓
SS1	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SS2	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SOS	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SBC	-	-	-	-	✓	✓	✓	✓	✓
SBT	-	-	-	-	-	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SLS	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SSM	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SDI	-	-	-	-	✓ ²⁾	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SLA	-	-	-	-	-	✓	✓ ²⁾	✓ ²⁾	✓ ²⁾
SLP	-	-	-	-	-	-	✓ ³⁾	✓ ^{3) 4)}	✓ ⁵⁾
SP	-	-	-	-	-	-	✓ ³⁾	✓ ^{3) 4)}	✓ ⁵⁾
SCA	-	-	-	-	-	-	✓ ³⁾	✓ ^{3) 4)}	✓ ⁵⁾
Control									
PROFIsafe	-	-	-	-	✓	✓	✓	✓	✓
F-DI	-	✓	✓	✓	✓	✓	✓	✓	✓

More Information

The Safety Integrated Function Manual contains detailed information about the safety functions

<https://support.industry.siemens.com/cs/document/109744795>

Further manuals pertaining to Safety Integrated in drive systems can be found on the internet at

<https://support.industry.siemens.com/cs/ww/en/ps/13206/man>

More information about Safety Integrated in SINAMICS can be found on the internet at

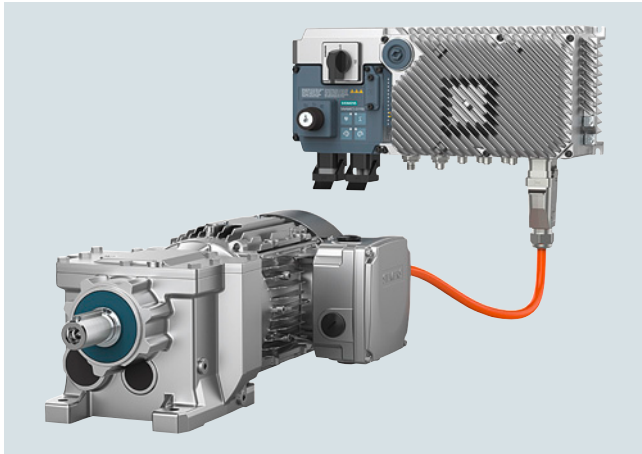
www.siemens.com/safety-drives

- 1) With fail-safe Control Unit.
- 2) With Safety Extended license.
- 3) With Safety Advanced license.
- 4) Safety Advanced license for cabinet modules on request.
- 5) Safety Advanced license on request.
- 6) Information on the SIMATIC ET 200pro FC-2 frequency converter – depending on the SIMATIC ET 200pro station – is available at: www.siemens.com/et200pro-fc
- 7) With external safety relay.

Safety Integrated

Safety Integrated for SINAMICS G115D

Overview



The SINAMICS G115D distributed drive system offers the Safe Torque Off (STO) function as a standard feature.

The Safety Integrated function is completely integrated into the drive system. It can be activated via fail-safe digital inputs on the converter or via PROFINET or PROFIBUS with PROFIsafe.

The Safety Integrated function is implemented electronically and therefore offers short response times in comparison to solutions with externally implemented monitoring functions.

Function

Function	Control	Encoder required	License required
STO	<ul style="list-style-type: none"> • F-DI • PROFIsafe 	No	No

Overview



The PM250D Power Modules are generally prepared for Safety Integrated.

In conjunction with a standard Control Unit, the drive provides the safety function STO.

In conjunction with a fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive with comprehensive safety functions.

The Safety Integrated functions are completely integrated into the drive system. They can be activated via fail-safe digital inputs on the Control Unit or via PROFINET or PROFIBUS with PROFIsafe.

The Safety Integrated functions are implemented electronically and therefore offer short response times in comparison to solutions with externally implemented monitoring functions.

Safety Integrated encoderless

The safety functions do not require a motor encoder; the implementation effort is minimal. Existing machines in particular can be updated with integrated safety technology without the need to change the motor or mechanical system.

The STO function can be used without any restrictions for all applications.

The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never cause acceleration. An encoder that is used for the purposes of motor control has no significance for the safety functions here.

Control Units

The availability of Safety Integrated functions depends on the type of Control Unit. Standard Control Units and fail-safe Control Units are available. All standard Control Units have STO.

The fail-safe Control Units offer Extended Functions (SLS, SDI, SSM) in addition to the Basic Functions (STO, SS1).

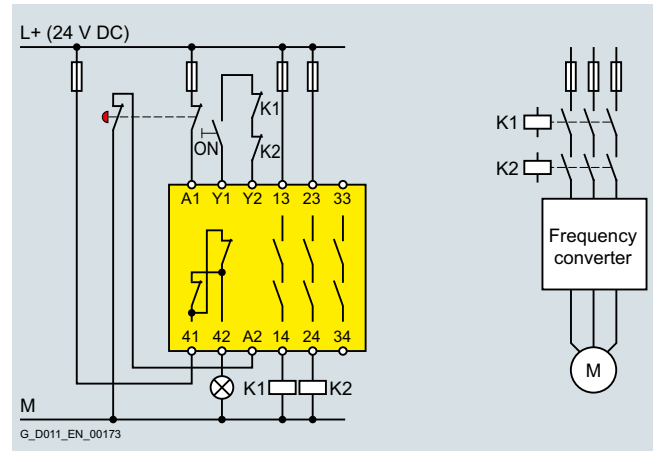
Benefits

Comparison between conventional and integrated safety systems

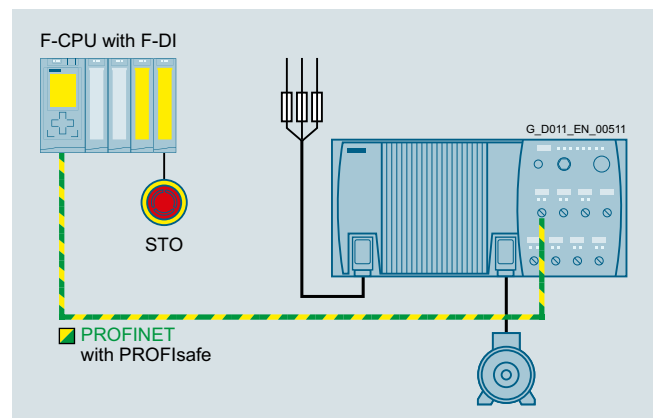
The safety functions integrated into the drive can greatly reduce the effort required to implement safety concepts.

The integrated safety functions provide support when setting up tailored safety concepts. Configurations of safety concepts are given below based on the example of the SINAMICS G120D.

Safe Torque Off (STO)



Classic implementation using an external circuit



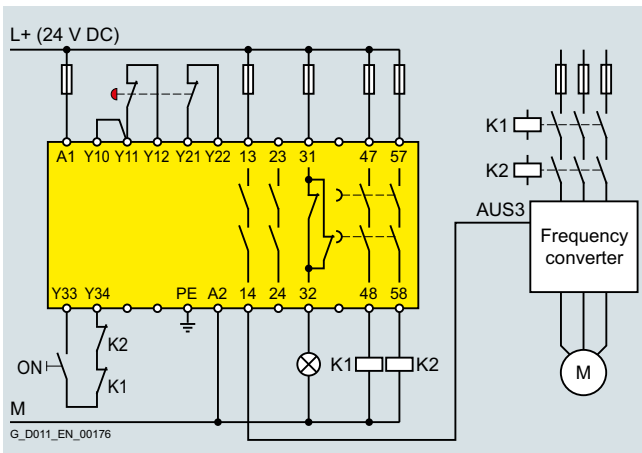
Integrated safety solution via PROFIsafe

Safety Integrated

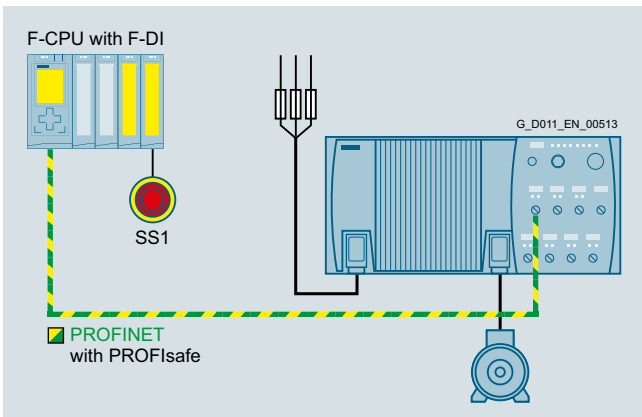
Safety Integrated for SINAMICS G120D

Benefits

Safe Stop 1 (SS1)

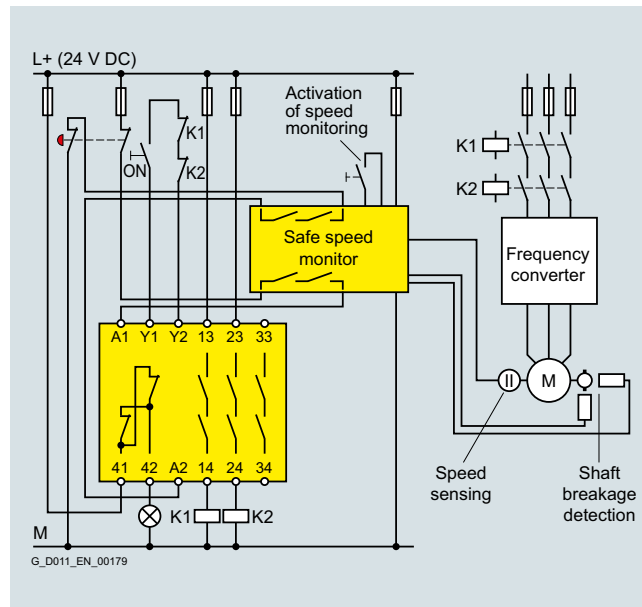


Classic implementation using an external circuit

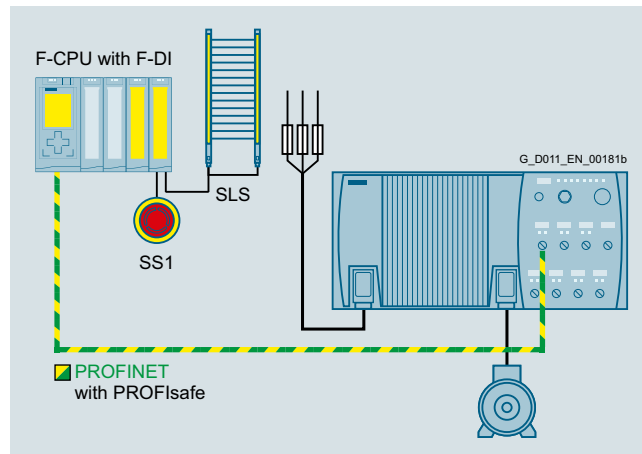


Integrated safety solution via PROFIsafe

Safely-Limited Speed (SLS)



Classic implementation using an external circuit



Integrated safety solution via PROFIsafe

Function

Function	Control	Underlying function	Reaction to limit overshoot	Encoder required	License required	Available in
Basic Functions						
STO	<ul style="list-style-type: none"> F-DI PROFIsafe 	–	–	No	No	<ul style="list-style-type: none"> CU240D-2 DP CU240D-2 PN CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO
SS1 time-controlled	<ul style="list-style-type: none"> F-DI PROFIsafe 	Following expiry of the parameterized delay time or if the speed falls below the minimum speed limit STO	STO	No	No	<ul style="list-style-type: none"> CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO
Extended Functions						
SS1 with SBR/SAM	<ul style="list-style-type: none"> F-DI PROFIsafe 	Safe Acceleration Monitor (SAM) or Safe Brake Ramp (SBR) during braking. Following expiry of the parameterized delay time or if the speed falls below the minimum speed limit STO	STO	No	No	<ul style="list-style-type: none"> CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO
SLS	<ul style="list-style-type: none"> F-DI PROFIsafe 	–	STO, SS1 (can be parameterized)	No	No	<ul style="list-style-type: none"> CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO
SDI	<ul style="list-style-type: none"> F-DI PROFIsafe 	–	STO, SS1 (can be parameterized)	No	No	<ul style="list-style-type: none"> CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO
SSM	<ul style="list-style-type: none"> Always active 	–	Signals that the speed has fallen below a specified value	No	No	<ul style="list-style-type: none"> CU240D-2 DP-F CU240D-2 PN-F CU240D-2 PN-F PP CU240D-2 PN-F FO CU250D-2 DP-F CU250D-2 PN-F CU250D-2 PN-F PP CU250D-2 PN-F FO

Safety Integrated

Safety Integrated for SIMATIC ET 200pro FC-2

Overview



SIMATIC ET 200pro FC-2

The SIMATIC ET 200pro FC-2 frequency converter offers the Safe Torque Off (STO) function as a standard feature.

The Safety Integrated function is completely integrated into the drive system. It is controlled via the SIMATIC ET 200pro system. The SIMATIC ET 200pro F-RSM Safety local isolator and PROFIsafe F-Switch Safety modules can be used to control the F0 Safety rail. The converter evaluates the F0 safety rail.

The Safety Integrated function is implemented electronically and therefore offers short response times in comparison to solutions with externally implemented monitoring functions.

Function

Function	Control	Encoder required	License required
STO	<ul style="list-style-type: none"> via SIMATIC ET 200pro system 	No	No

Energy efficiency



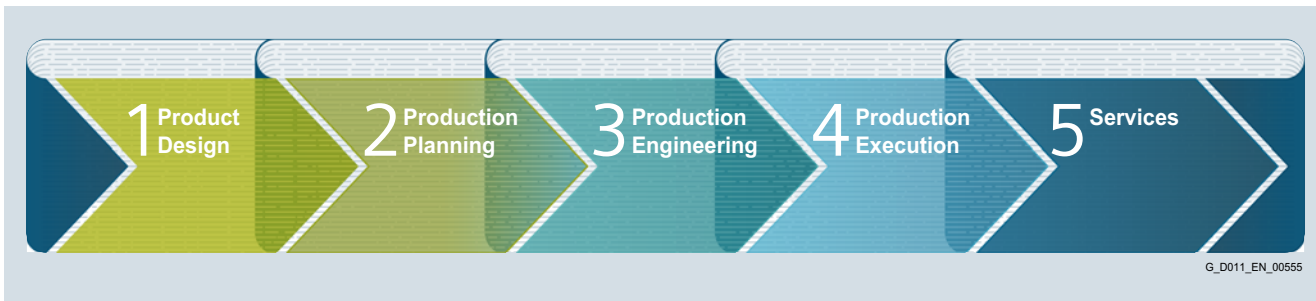
4/2	Energy efficiency
4/2	Success factor Energy Efficiency
4/3	SIMATIC Energy Suite – integrated energy management
4/4	Energy-efficient drives
4/5	Overview of the energy-saving functions for SINAMICS drives
4/7	Energy efficiency classes in accordance with EN 50598

Further information about energy efficiency including references from industrial production can be found at www.siemens.com/energy-efficiency www.siemens.com/energysaving

Energy efficiency

Energy efficiency

Overview



4

Success factor Energy Efficiency

Siemens helps you to optimize your energy demand, reduce your energy costs and increase your competitive advantage

Industry is facing enormous challenges: Production processes need to be highly productive, energy-efficient, and resource-saving. Siemens is offering an energy efficiency concept that continually and systematically reduces the power consumption of machines and equipment and thereby boosts the competitive advantage of industrial producers. When implementing energy-efficient solutions, Siemens not only assesses the production process as a whole, but also evaluates each individual production step.

1 Produkt Design

Improve your confidence in planning outcomes! It is important to know the costs associated with the operation of a production machine so that these can be taken into account in the machine design. For example, the SinaSave software application can help you to calculate how soon you will recoup your investment if you purchase an energy-efficient drive. The Mechatronic Support simulation package will also provide you with the means to test and optimize your machine concept, Helping you to save time, energy and operating expenses. See also the SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool).

SinaSave: www.siemens.com/sinasave

SIZER for Siemens Drives (integrated in the TIA Selection Tool): www.siemens.com/sizer

2 Production Planning

Make your plant more profitable! It is possible to carry out an on-screen simulation of individual machines and even the entire production process. By doing this, you can optimize the efficiency and productivity of production processes. For example, you can use the digital models and analysis functions provided by the Plant Simulation tool in order to optimize the motion sequences of your machines, prevent load peak overlaps, recover energy and optimize speeds.

Plant Simulation: www.siemens.com/tecnomatix

3 Production Engineering

Optimize the workflow! The SIMATIC Energy Manager PRO management tool helps you to achieve efficient control of energy and costs. But this requires perfectly coordinated communication and operation between hardware and software. Using the TIA Portal engineering framework, for example, it is easy to set up and optimize every single engineering process. You can then see at a glance the areas in your plant that can be made more productive and environmentally friendly. See also the STARTER commissioning tool and the SINAMICS Startdrive commissioning tool.

SIMATIC Energy Manager PRO:

www.siemens.com/energymanagerpro

TIA Portal: www.siemens.com/tia-portal

STARTER: www.siemens.com/starter

SINAMICS Startdrive: www.siemens.com/startdrive

4 Production Execution

Use innovative drive technology to reduce your energy consumption! The energy-efficient components and systems developed by Siemens can cut the energy consumption of a plant. Important components in an energy-efficient plant are, for example, frequency converters with regenerative feedback functions for applications with variable speeds or soft starters for fixed-speed drives. With its PROFlenergy system, Siemens is also offering solutions that permit centralized shutdown of loads or entire production units during production breaks – a vendor- and device-neutral interface for flexible use over short or long production breaks.

5 Services

Improve your productivity and efficiency while reducing total costs! With its Energy & Environmental Services, Siemens is offering a tailored consultancy that will provide you with the necessary support in designing and implementing systematic energy and environmental management solutions. It will give you the satisfaction of achieving maximum energy efficiency

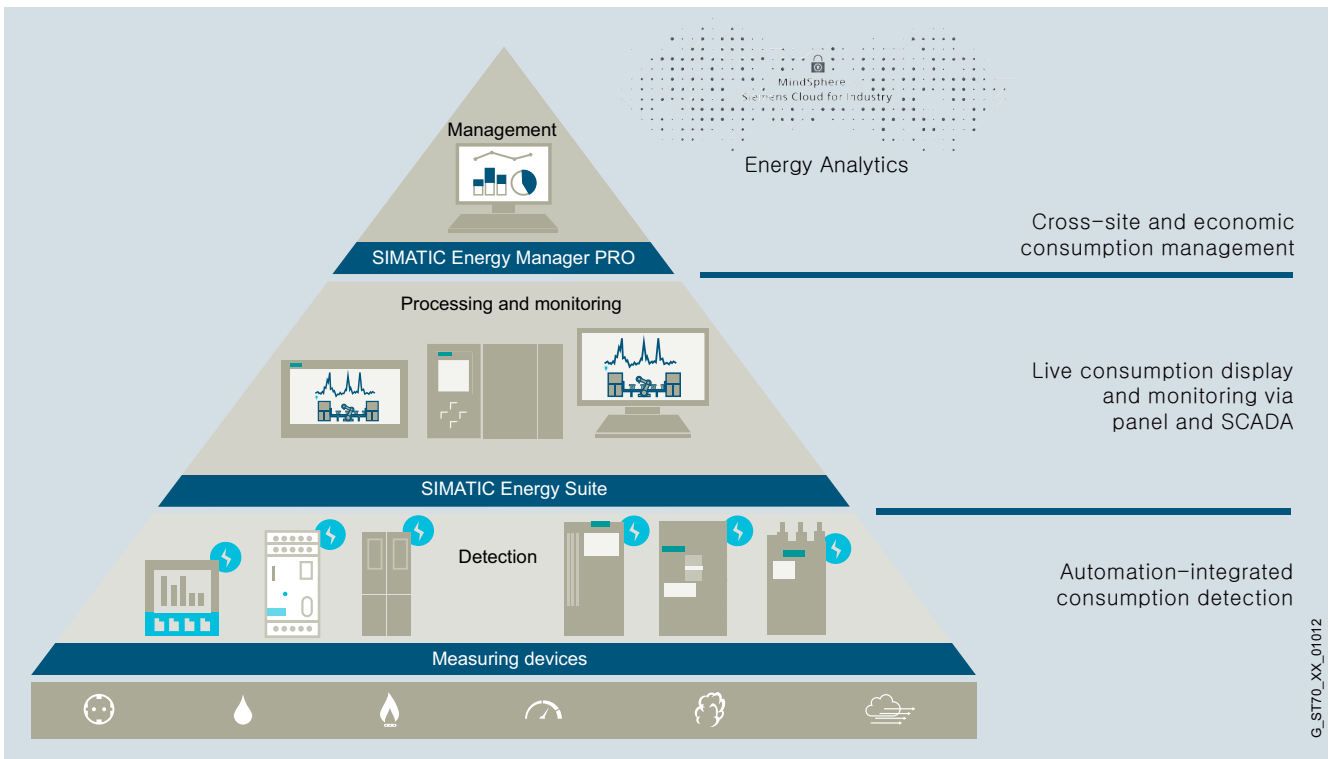
More information

Further information about energy efficiency including references from industrial production can be found at

www.siemens.com/energy-efficiency

www.siemens.com/energysaving

SIMATIC Energy Suite – integrated energy management



4

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A high energy consumption and automated production are typical for many industries.

If you want to keep your energy costs under control in the long term and you are already focusing on the digital future, you will equip your plant with integrated energy measuring technology, thus anchoring your energy management in the automation of your production processes – which is where most energy is consumed. SIMATIC Energy Suite as an integrated option for the TIA Portal efficiently links energy management with automation, thus creating energy transparency in production. The considerably simplified configuration of energy measuring components from the product families²⁾ SIMATIC, SENTRON, SINAMICS, SIRIUS and SIMOCODE significantly reduces the configuration costs. Thanks to the end-to-end connection to SIMATIC Energy Manager PRO¹⁾ or cloud-based Service Energy Analytics, you can seamlessly expand the recorded energy data to create a cross-site energy management system.

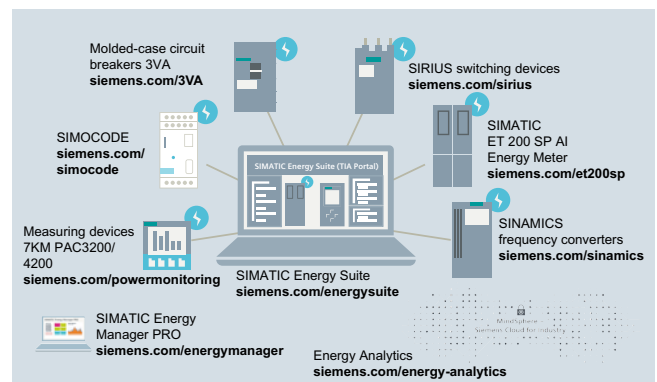
This additionally enables companies to satisfy all the required economic and energy management aspects – from the purchasing of energy and planning all the way to energy controlling.

The advantages at a glance:

- Automatic generation of energy management data
- Integration into TIA Portal and into automation
- Simple configuration

Highlights

- Simple and intuitive configuration instead of programming
- Automatic generation of the PLC energy program
- Convenient integration of measuring components from the Siemens portfolio and from the portfolio of other vendors
- Integrated into the TIA Portal and automation
- Archiving on WinCC Professional or PLC
- Seamless connection to Energy Manager PRO and Energy Analytics



Further information on
SIMATIC Energy Suite:
www.siemens.com/energysuite

Ready for
SIMATIC
Energy Suite

¹⁾ SIMATIC Energy Manager PRO is the innovative successor to SIMATIC B.Data

²⁾ Products of the SIMATIC, SENTRON, SINAMICS, SIRIUS and SIMOCODE product families. You can find details on the currently supported devices here:
www.siemens.com/energysuite-hardware

Energy efficiency

Energy-efficient drives

Overview

Energy-efficient SINAMICS drives save energy in an intelligent way

Exploit energy-saving potential and optimize energy consumption: You can - with intelligent SINAMICS drives. Depending on the application in question, energy consumption can be controlled by motor speed adjustment to suit the individual process and achieve the greatest possible energy savings. The energy consumption of drives for turbo machines can be cut by as much as 60 %. Regenerative feedback is also an option for many applications. Our portfolio of frequency converters is the most comprehensive and standardized range on the market and the first choice for anyone seeking an energy-efficient drive – at low-voltage or medium-voltage level.

Energy-efficient drives with intelligent functions

Depending on the application and load profile, the intelligent energy-saving functions of SINAMICS drives can cut energy consumption.

PROFenergy



Provides energy-related status data for the system components to create transparency for the energy management; energy savings by selective shut-down of plants or plant sections.

ECO-Modus



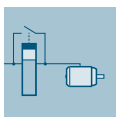
In ECO mode, the operating point of the motor in the partial-load range is automatically adjusted and optimized. This reduces motor losses, for example, in machines that do not need a high torque over the entire operating range.

Hibernation mode



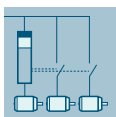
Variable-speed drives that are not required to operate continuously are switched to standby or "Hibernation mode". The drive is restarted again as soon as it is needed.

Bypass mode



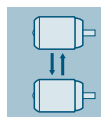
In bypass mode it is possible to "bypass" the converter electrically as soon as the motor is frequently operating close to its rated speed. This solution helps reduce converter losses and so increase overall efficiency.

Cascading



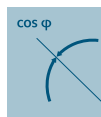
In pump, fan and compressor applications involving high outputs, the entire power demand is distributed among several motors. Phased connection and disconnection by means of partially or fully controlled cascades in combination with converters make a drive system more energy-efficient.

Energy balancing



Through the use of converters with coupled drives, energy is exchanged through the common DC link. Through the direct energy exchange from one converter to the next, it is possible to minimize power losses in the system.

Reactive power compensation



The use of SINAMICS converters with Active Line Modules reduces the capacitive and/or inductive reactive power in the machine. It is then possible to dispense with costly reactive power compensation systems.

Kinetic energy buffering



With dynamic reversing operations in single-axis and multi-axis systems, the kinetic energy available in the system is reused. A motor connected to the common DC link is used to buffer kinetic energy.

Electrical energy buffering



With dynamic reversing operations in single-axis and multi-axis systems, the kinetic energy available in the system is reused. A capacitor module connected to the common DC link is used to buffer electrical energy.

Optimized pulse patterns



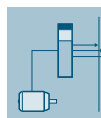
Thanks to optimized clock frequency and pulse pattern, SINAMICS G and SINAMICS S are perfectly suited to SIMOTICS motors and SIMOGEAR geared motors. The benefits: Optimization of performance and system efficiency, reduced system losses as well as lower temperature and noise levels.

Energy usage counter/Energy saving counter



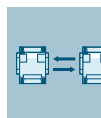
Actual energy usage can be displayed during operation. Furthermore, an energy saving counter can be installed to indicate the cumulative energy savings during machine operation as compared to a fixed-speed application.

Regenerative feedback



In conventional drive systems, the energy produced during braking is converted to heat using braking resistors. SINAMICS G and SINAMICSS converters with regenerative feedback capability need no braking resistor, and supply the resulting braking energy back into the line.

DC link coupling with SINAMICS V20



Applications with two SINAMICS V20 converters with the same power rating can share a common DC link in order to reuse regenerated energy.

Integration

Overview of the energy-saving functions for SINAMICS drives including SIMATIC ET 200pro FC-2 frequency converters

Energy-saving function	Low voltage									
	Standard performance frequency converters						Distributed frequency converters			
	SINAMICS						SINAMICS			SIMATIC
	V20	G120C	G120			G130 G150	G115D wall and motor- mounted	G120D	ET 200pro FC-2 ¹⁾	
			CU230P-2	CU240E-2	CU250S-2	CU320-2		CU240D-2	CU250D-2	
Functions										
ECO mode	✓	✓	✓	✓	✓	–	✓	✓	✓	✓
Hibernation mode	✓	–	✓	–	–	–	–	–	–	–
Bypass mode	–	–	✓	–	–	✓	–	–	–	–
Cascading	✓	–	✓	–	–	–	–	–	–	–
Energy balancing	✓	–	–	–	–	–	–	–	–	–
Reactive power compensation	–	–	–	–	–	–	–	–	–	–
Kinetic energy buffering	–	–	–	–	–	–	–	–	–	–
Electrical energy buffering	–	–	–	–	–	–	–	–	–	–
Optimized pulse patterns	–	–	–	–	–	✓	–	–	–	–
Energy usage counter/Energy saving counter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Regenerative feedback	–	–	✓ with PM250 Power Module	✓ with PM250 Power Module	✓ with PM250 Power Module	–	–	✓	✓	✓
Communication protocol and profile										
PROFINET	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
• PROFINET energy	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ready for SIMATIC Energy Suite										
Integrated energy management	–	✓	✓	✓	✓	–	✓	✓	✓	–

¹⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter – depending on the SIMATIC ET 200pro station – is available at: www.siemens.com/et200pro-fc

Energy efficiency

Energy-efficient drives

Integration

Energy-saving function	Low voltage Industry-specific frequency converters			Servo converters			High performance frequency converters		
	SINAMICS			V90	S110	S210	S120 S120M		S150
	G120P	G120X	G180				CU310-2	CU320-2	
Functions	CU230P-2				CU305		CU310-2	CU320-2	CU320-2
ECO mode	✓	✓	–	–	✓	–	✓	✓	–
Hibernation mode	✓	✓	–	–	–	–	–	–	–
Bypass mode	✓	✓	✓	–	–	–	✓	✓	✓
Cascading	✓	✓	–	–	–	–	–	–	–
Energy balancing	–	–	–	–	–	–	✓ for multi-axis drives only	✓ for multi-axis drives only	–
Reactive power compensation	–	–	–	–	–	–	✓ with Active Line Module	✓ with Active Line Module	✓
Kinetic energy buffering	–	–	✓	–	–	–	✓ for multi-axis drives only	✓ for multi-axis drives only	–
Electrical energy buffering	–	–	–	–	–	–	✓ for multi-axis drives only	✓ for multi-axis drives only	–
Optimized pulse patterns	–	–	–	–	–	–	✓	✓	✓
Energy usage counter/Energy saving counter	✓	✓	–	–	–	–	✓	✓	✓
Regenerative feedback	–	–	–	–	–	–	✓ with Smart Line Module or Active Line Module	✓ with Smart Line Module or Active Line Module	✓
Communication protocol and profile									
PROFINET	✓	✓	✓	–	✓	–	✓	✓	✓
• PROFINET energy	✓	✓	–	–	–	–	✓	✓	✓
Ready for SIMATIC Energy Suite									
Integrated energy management	✓	✓	–	–	–	–	✓	–	–

More information

Information on the SIMATIC ET 200pro FC-2 frequency converter with PROFINET or PROFIBUS DP - depending on the SIMATIC ET 200pro station - is available at www.siemens.com/et200pro-fc

Overview

Step by step to more efficiency

One of the core objectives of the European Union is a sustainable power industry. In industrial plants today, around 70 % of the power demand is from electrically driven systems. This high percentage contains huge potential for saving energy in electrical drives. For that reason, the European Union introduced minimum requirements for the energy efficiency of electric motors in the form of a statutory motor regulation as early as 2011.

These activities are extended by the 2019/1781 EU regulation dealing with stricter requirements for DOL (Direct On Line) motors and defining efficiency limits for frequency converters. The regulation provides a legal basis for technical content regarding the efficiency of specific products and services. Standardization, however, has played a leading role in determining the field and the available market technology.

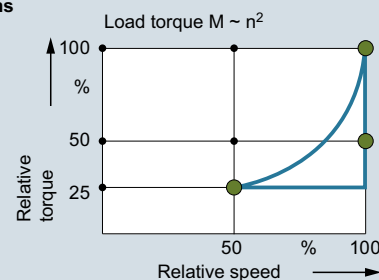
Energy efficiency improvement is supported through a systematic selection of the most efficient converter and drive system technology via the IEC 61800-9 series of standards. Part 1 specifies the methodology to determine the energy efficiency index of an application based on the extended product approach (EPA) and semi analytical models (SAMs), while Part 2 provides indicators for assessing the energy efficiency performance and the classification of converters and drive systems. To take account of the different use cases, consideration of eight application-relevant operating points has been introduced as mandatory for the first time. Determination of loss values at these eight points and definition of efficiency classes are laid down by the standard in a uniform way. This enables data relevant to operation, such as application-specific load profiles, to now be taken into account more easily in the energy efficiency analysis.

The standard is especially important for variable-speed drives of the following types:

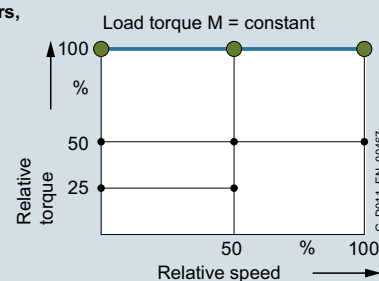
- for AC/AC converters without energy recovery functionality
- for motors with integrated converters
- for supply voltages of 100 V to 1000 V
- for power ratings of 0.12 kW to 1000 kW

To cover all applications of driven machines, the IEC 61800-9-2 standard defines operating points in full-load and partial-load operation, at which the losses of the motor and drive systems have to be determined. Based on the loss data at the operating points in partial-load operation, variable-speed drives can be explicitly considered in more detail. This makes their advantages especially clear.

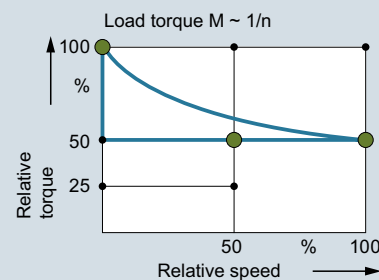
Centrifugal pumps, fans



Hoisting gear, extruders, conveyor belts



Winders, coilers



Duty cycles for different driven machines

Moreover, frequency converters and motor systems are classified in efficiency classes, which permit an initial rough estimate of the potential saving. Definition of reference systems is a key aspect of this because they provide standard reference values. The positioning of these reference systems defines the efficiency class. The relative distance from the reference system can be used as an absolute measure of the efficiency at the operating point in question.

Energy efficiency

Energy efficiency classes in accordance with IEC 61800-9-2

Overview

Advantages of the detailed loss consideration of IEC 61800-9-2 over the previous consideration of efficiencies and maximum loss values

For motors, the efficiency consideration was previously only defined for operation without a converter at 50/60 Hz. It provides a good way of comparing the energy efficiency of motors from different manufacturers for this use case.

The more detailed loss analysis of IEC 61800-9-2, on the other hand, is aimed at speed-controlled operation and therefore now also includes motors especially designed for converter operation in the energy analysis. These were previously not covered by the applicable standards.

Moreover, a loss analysis over the entire setting and load range of the motor is possible. This is done in accordance with the standard IEC 61800-9-2 with typical values.

For holistic consideration, it is essential to include all the relevant components of a drive system. The IEC 61800-9-2 standard defines this in detail. The standardized expression of power loss data as a percentage makes comparison considerably easier and more transparent.

The method also makes it possible to consider a motor that produces a holding torque at speed zero, for example. In this case, the efficiency is zero, but a power loss from current producing magnetization and holding torque does occur. In summary, the key advantage of standard IEC 61800-9-2 is the ability to perform the energy analysis of an electrical drive system based on standardized load profiles in all operating ranges due to uniform general conditions. This provides the user with complete transparency irrespective of the manufacturer.

Establishing efficiency classes of frequency converters (Complete Drive Modules CDM)

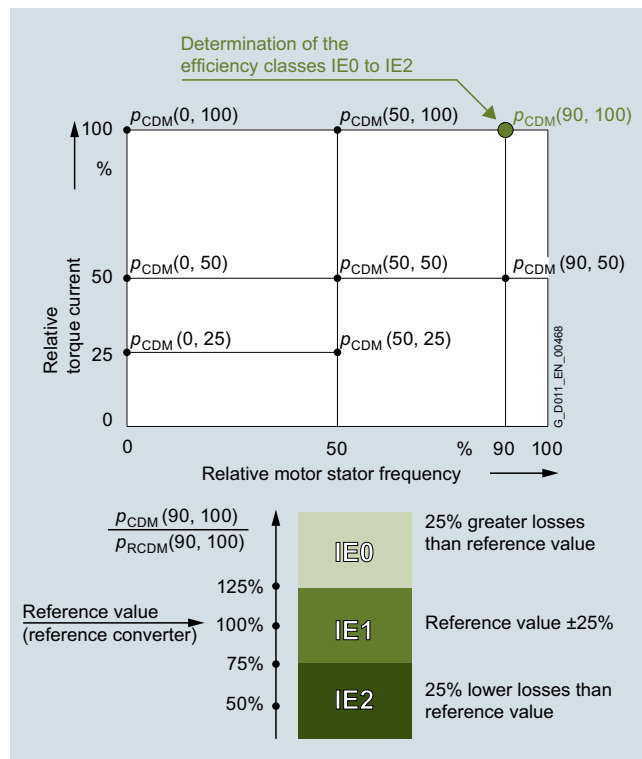
To avoid overmodulation and to ensure comparability between makes, which cannot be achieved otherwise, the efficiency classes of CDMs refer to the 90/100 operating point (90 % motor stator frequency, 100 % torque current).

Standard IEC 61800-9-2 defines the relative losses of a CDM in efficiency classes IE0 to IE2. With reference to the value of a CDM of efficiency class IE1 (reference converter), a CDM of efficiency class IE2 has 25 % lower losses and a CDM of efficiency class IE0 has 25 % higher losses.

The publication of the 2019/1781 EU regulation has made mandatory the fulfillment of the ecodesign requirements for the declaration of product conformity.

AC/AC converters belonging to the aforementioned categories (specific voltage and power level without regenerative capability) have to fulfill efficiency class IE2 in order to be approved for installation/utilization within EU.

Operating points for CDMs



Complete Drive Module (CDM) – determining the efficiency class

Establishing the efficiency classes of drive systems (Power Drive Systems PDS)

What is possible for the individual systems, of course, also applies to the entire electrical PDS (frequency converter plus motor). Detailed comparisons are now possible at this level, too. The reference values for the reference system provide clear indications of the energy performance of the PDS.

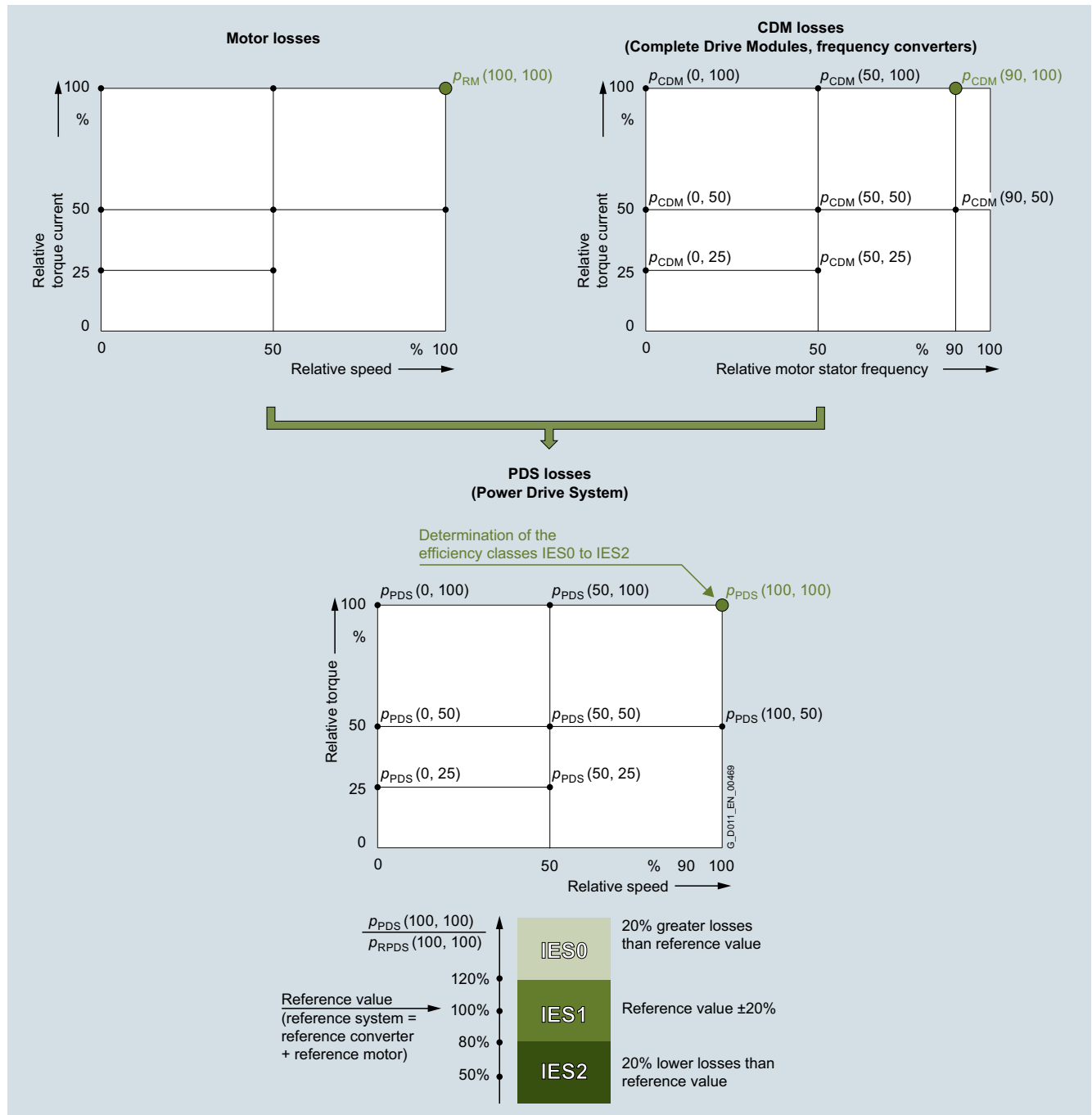
Because targeted matching of the motor and CDM provides additional potential for optimization in electrical drive systems, it is especially important for the user to consider the entire drive system.

For the efficiency class of a PDS, too, a specific load point is defined. In this case, the reference point used is the 100/100 operating point (100 % motor stator frequency, 100 % torque).

Standard IEC 61800-9-2 defines the relative losses of a PDS in efficiency classes IES0 to IES2. With reference to the value of a PDS of efficiency class IES1 (reference drive), a PDS of efficiency class IES2 has 20 % lower losses and a PDS of efficiency class IES0 has 20 % higher losses.

Overview

Operating points for PDS



Power Drive System (PDS) – determining the efficiency class

More information

An example of a highly efficient drive system with efficiency class IES2 is the new synchronous inductance drive system with SIMOTICS reluctance motors and SINAMICS drives. More information is available on the internet at www.siemens.com/drivesystem-reluctance, www.siemens.com/simotics-gp, www.siemens.com/simotics-sd

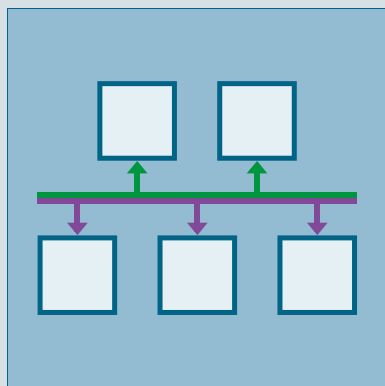
Power loss data of SINAMICS converters for single-axis drives are available on the internet at <https://support.industry.siemens.com/cs/document/94059311>. More information on current laws and standards, new standards, and mandatory guidelines is available on the internet at www.siemens.com/legislation-and-standards

Energy efficiency

Notes

4

Communication



5/2	Communication
5/2	Communications overview
5/4	PROFINET
5/8	PROFIdrive
5/9	PROFIBUS
5/10	Industrial Ethernet
5/11	EtherNet/IP
5/11	Modbus RTU
5/11	AS-Interface
5/11	USS

Further information regarding PROFINET and PROFIBUS can be found at www.profibus.com

Communication

Communication

Overview

Communication Overview

Digital bus systems are commonly used in industrial automation today. These handle communication between the control level, the machine control, the sensors and actuators. The SINAMICS product family offers integrated communication interfaces in all product groups – which can be used to connect the most important fieldbus systems in the simplest possible way.

The properties and special application areas of the various bus systems for SINAMICS converters incl. SIMATIC ET 200pro FC-2 frequency converters are briefly described in the following.

Protocol	Low voltage									
	Standard performance frequency converters						Distributed frequency converters			
	SINAMICS						SINAMICS			SIMATIC ET 200pro FC-2 ¹⁾
	V20	G120C	G120	G130 G150		G115D	G120D			
		CU230P-2	CU240E-2	CU250S-2	CU320-2		CU240D-2	CU250D-2		
PROFINET	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
- PROFINET RT	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
- PROFINET IRT isochronous	-	-	-	-	-	-	-	-	-	-
- PROFINET IRT not isochronous	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
- PROFINET Shared Device	-	✓	✓	✓	✓	✓	-	✓	✓	✓
- PROFINET media redundancy MRP (step-change)	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
- PROFINET media redundancy MRPD (bumpless)	-	✓	✓	✓	✓	✓	✓	✓	✓	-
- System redundancy S2	-	-	-	-	-	✓	-	-	-	-
- PROFIsafe	-	✓	-	✓	✓	✓	✓	✓	✓	✓
- PROFInergy	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
- PROFIdrive application class 1	-	✓	✓	✓	✓	✓	✓	✓	-	✓
- PROFIdrive application class 3	-	-	-	-	✓	-	-	-	✓	-
- PROFIdrive application class 4	-	-	-	-	-	-	-	-	-	-
PROFIBUS DP	-	✓	✓	✓	✓	✓	-	✓	✓	✓
- PROFIBUS DP equidistance and isochronous mode	-	-	-	-	-	-	-	-	-	-
- PROFIBUS DP peer-to-peer communication	-	✓	✓	✓	✓	✓	-	✓	✓	-
EtherNet/IP	-	✓	✓	✓	✓	✓	✓	✓	✓	-
Modbus TCP	-	-	-	-	-	✓	-	-	-	-
Modbus RTU	✓	✓	✓	✓	✓	-	-	-	-	-
AS-Interface	-	-	-	-	-	-	✓	-	-	-
BACnet MS/TP	-	-	✓	-	-	-	-	-	-	-
CANopen	-	-	-	-	✓	-	-	-	-	-
USS	✓	✓	✓	✓	✓	✓	-	-	-	-
FLN P1	-	-	✓	-	-	-	-	-	-	-
Webserver	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓ ²⁾	✓	✓ ²⁾	-	-	-

¹⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter with PROFINET, PROFIBUS DP or EtherNet/IP – depending on the SIMATIC ET 200pro station – is available at www.siemens.com/et200pro-fc

²⁾ Function possible with optional SINAMICS G120 Smart Access web server module.

Overview

Protocol	Low voltage								
	Industry-specific frequency converters			Servo converters			High performance frequency converters		
	SINAMICS								
	G120P	G120X	G180	V90	S110	S210	S120 S120M	CU320-2	S150
CU230P-2		CB08		CU305		CU310-2	CU320-2	CU320-2	
PROFINET	✓	✓	✓ ²⁾	✓	✓	✓	✓	✓	✓
- PROFINET RT	✓	✓	✓ ²⁾	✓	✓	✓	✓	✓	✓
- PROFINET IRT isochronous	-	-	-	✓	✓	✓	✓	✓	✓
- PROFINET IRT not isochronous	✓	✓	-	✓	✓	✓	✓	✓	✓
- PROFINET Shared Device	✓	✓	-	-	✓	✓	✓	✓	✓
- PROFINET media redundancy MRP (step-change)	✓	✓	✓ ²⁾	-	✓	✓	✓	✓	✓
- PROFINET media redundancy MRPD (bumpless)	✓	✓	-	-	✓	✓	✓	✓	✓
- System redundancy S2	-	-	✓ ²⁾	-	-	-	✓	✓	✓
- PROFIsafe	-	-	-	-	✓	✓	✓	✓	✓
- PROFIenergy	✓	✓	-	-	-	✓	✓	✓	✓
- PROFIdrive application class 1	✓	✓	-	✓	✓	-	✓	✓	✓
- PROFIdrive application class 3	-	-	-	✓	✓	-	✓	✓	✓
- PROFIdrive application class 4	-	-	-	✓	✓	✓	✓	✓	✓
PROFIBUS DP	✓	✓	✓ ²⁾	-	✓	-	✓	✓	✓
- PROFIBUS DP equidistance and isochronous mode	-	-	-	-	✓	-	✓	✓	✓
- PROFIBUS DP peer-to-peer communication	✓	✓	-	-	✓	-	✓	✓	✓
EtherNet/IP	✓	✓	-	-	-	-	-	✓	✓
Modbus TCP	-	-	✓ ²⁾	-	-	-	✓	✓	✓
Modbus RTU	✓	✓	✓ ²⁾	✓	-	-	-	-	-
AS-Interface	-	-	-	-	-	-	-	-	-
BACnet MS/TP	✓	✓	-	-	-	-	-	-	-
CANopen	-	-	✓ ²⁾	-	-	-	-	-	-
USS	✓	✓	-	✓	✓	-	✓	✓	✓
FLN P1	✓	-	-	-	-	-	-	-	-
Webserver	✓ ¹⁾	✓ ¹⁾	-	-	-	✓	✓	✓	✓

¹⁾ Function possible with optional SINAMICS G120 Smart Access web server module.

²⁾ Function possible with optional communications modules (additional PCBs) for SINAMICS G180.

Communication

PROFINET

Overview



PROFINET – the Ethernet standard for automation

PROFINET is the world's leading Industrial Ethernet standard for automation with more than 40 million nodes installed worldwide.

PROFINET makes companies more successful, because it speeds up processes and raises both productivity and plant availability.

Your advantages at a glance

Flexibility

Tailor-made plant concepts

- ▶ Industrial Wireless LAN
- ▶ Safety
- ▶ Flexible topologies
- ▶ Open standard
- ▶ Web tools
- ▶ Expandability

Efficiency

Optimal use of resources

- ▶ One cable for everything
- ▶ Device/network diagnostics
- ▶ Energy efficiency
- ▶ Simple wiring
- ▶ Fast device replacement
- ▶ Ruggedness/stability

Performance

Increased productivity

- ▶ Speed
- ▶ High precision
- ▶ Large quantity structures
- ▶ High transmission rate
- ▶ Redundancy
- ▶ Fast start-up

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Overview

Flexibility

Short response times and optimized processes are the basic requirements for competitiveness in global markets because the product lifecycles are becoming shorter and shorter.

PROFINET ensures maximum flexibility in plant structures and production processes, and it enables you to implement innovative machine and plant concepts. For example, mobile devices can also be integrated at locations that are difficult to access.

Flexible topologies

In addition to the linear structure characterized by the established fieldbuses, PROFINET also enables the use of star, tree and ring structures. This is made possible by switching technology via active network components, such as Industrial Ethernet switches and media converters, or by integrating switch functionality into the field devices. This results in increased flexibility in the planning of machines and plants, as well as savings in cabling.

The PROFINET network can be installed without any specialist knowledge at all and meets all requirements that are relevant to the industrial environment. The "PROFINET Installations Guidelines" assist manufacturers and users with network planning, installation and commissioning. Symmetrical copper cables or RFI-resistant fiber-optic cables are used, depending on the application. Devices from different manufacturers are easily connected via standardized and rugged plug-in connectors (up to IP65/IP67 degree of protection).

By integrating switch functionality into the devices, linear topologies can be created that are directly oriented toward an existing machine or plant structure. This reduces cabling overhead and cuts down on components such as external switches.

IWLAN

PROFINET also supports wireless communication with Industrial Wireless LAN, thus opening up new fields of application. For example, technologies subject to wear, such as trailing cables, can be replaced and automated guided vehicle systems and mobile operator panels can be used.

Safety

The PROFIsafe safety profile, which has been tried and tested with PROFIBUS and which permits the transmission of standard and safety-related data on a single bus cable, can also be used with PROFINET. No special network components are necessary for fail-safe communication, which means that standard switches and standard network transitions can continue to be used without any restrictions. In addition, fail-safe communication is equally possible via Industrial Wireless LAN (IWLAN).

Open standard

PROFINET, the open multi-vendor standard (IEC 61158/IEC 61784), is supported by PROFIBUS and PROFINET International (PI). It stands for maximum transparency, open IT communication, network security and simultaneous real-time communication.

Thanks to its openness, PROFINET provides the basis for a standardized automation network in the plant, to which all other machines and devices can be connected. Even the integration of existing plant components, for example using PROFIBUS, presents no problems due to the use of network transitions.

Use of web tools

Thanks to the unrestricted support of TCP/IP, PROFINET permits the use of standard web services such as web servers. Irrespective of the tool used, information from the automation level can be accessed from virtually any location using a commercially available internet browser. This considerably simplifies commissioning and diagnostics. Users can then decide for themselves how much openness to the IT world they want to allow for their machine or plant. This means that PROFINET can be used simply as an isolated plant network or connected via appropriate Security Modules, such as the SCALANCE S modules, to the office network or the internet. In this way, new remote maintenance concepts or the high-speed exchange of production data become possible.

Expandability

On the one hand, PROFINET facilitates the integration of existing systems and networks without any great effort. In this way, PROFINET safeguards investments in existing plant components that communicate via PROFIBUS and other fieldbuses such as AS-Interface. On the other hand, additional PROFINET nodes can be added at any time. By using additional network components, network infrastructures can be expanded using cabling or wireless methods – even while the plant is operating.

Communication

PROFINET

Overview

Efficiency

Greater global competition means that companies must use their resources economically and efficiently. This applies in particular to production. This is where PROFINET ensures greater efficiency. Simple engineering guarantees fast commissioning, while reliable devices ensure a high level of plant availability. Comprehensive diagnostic and maintenance concepts help to reduce plant downtimes and keep maintenance costs to a minimum.

One cable for everything

PROFINET permits simultaneous fieldbus communication with isochronous mode and standard IT communication (TCP/IP) on one cable. This real-time communication for the transmission of user/process data and diagnostic data takes place on a single cable. Specific profile communication (PROFIsafe, PROFIdrive and PROFIenergy) can be integrated without any additional cabling. This solution offers a wide scope of functions at a low level of complexity.

Device and network diagnostics

By retaining the tried and tested PROFIBUS device model, the same diagnostics information is available with PROFINET. In addition, module-specific and channel-specific data can also be read out from the devices during device diagnostics, enabling faults to be located quickly and easily. Apart from the availability of device information, the reliability of network operation has top priority in the network management.

In existing networks the Simple Network Management Protocol (SNMP) has established itself as the de facto standard for the maintenance and monitoring of the network components and their functions. PROFINET uses this standard and gives users the opportunity to maintain their networks with tools that are familiar to them, such as the SINEMA Server network management software.

For easier maintenance of PROFINET devices, both on-site and remotely via a secure VPN connection, application-specific websites can be set up on the web server of the field devices using the familiar HTML standard.

Energy efficiency

Moving toward the green factory: PROFIenergy is a profile that provides functions and mechanisms for PROFINET field devices that support energy-efficient production.

The profile, which is defined by the PNO and is independent of any manufacturers or devices, enables energy demand and costs to be significantly reduced: Using PROFIenergy, any specific loads that are not currently being used can be switched off. This achieves a noticeable reduction in energy costs during breaks in production. PROFIenergy permits the simple, automated activation and deactivation of technologically related plant components. It is coordinated centrally by means of a higher-level controller and is networked via PROFINET. This ensures that as much energy as possible is saved during long breaks. Temporarily switching off plant components contributes to the even distribution and most efficient use of energy.

The use of PROFIenergy is made easy for the machine builder by its integration into familiar series of products. In addition, PROFIenergy is defined in such a way that the necessary function blocks can easily be integrated into existing automation systems at a later stage.

Simple wiring

Particularly stringent demands are made on the installation of cables in the industrial environment. In addition, there is a requirement to set up industry-standard networks in the shortest possible time without any special knowledge.

With FastConnect, Siemens offers a high-speed installation system that meets all of these requirements. FastConnect is the standard-compliant, industry-standard cabling system consisting of cables, connectors and assembly tools for PROFINET networks. The time required for connecting terminals is minimized by the simple installation method using just a single tool, while installation errors are prevented by the practical color-coding. Both copper cables and glass fiber optic cables can be easily assembled on site in this way.

Fast device replacement

PROFINET devices are identified by means of a name assigned during configuration. When replacing a defective device, a new device can be recognized from its topology information by the IO controller and a new name can be assigned to it automatically. This means that no engineering tool is necessary for the replacement of equipment.

This mechanism can even be used for the initial commissioning of a complete system. This speeds up commissioning, particularly in the case of series machines.

Ruggedness

An automation network must be able to withstand most external sources of interference. The use of Switched Ethernet prevents faults in one section of the network from affecting the entire plant network. For areas that are particularly prone to radio frequency interference (RFI), PROFINET allows the use of fiber optic cables.

Performance

Productivity and product quality determine the level of success in the market. Precise motion control, dynamic drives, high-speed controllers and the deterministic synchronization of devices are therefore key factors in achieving superior production. They facilitate high production rates and optimum product quality at the same time.

Speed and precision

Fast motion control applications demand precise and deterministic exchange of data. This is implemented by means of drive controllers using isochronous real time (IRT).

With IRT and isochronous mode, PROFINET permits fast and deterministic communication. This synchronizes the various cycles of a system (input, network, CPU processing and output), even in the case of parallel TCP/IP traffic. The short cycle times of PROFINET make it possible to raise the productivity of machines and plants and to guarantee the product quality and high level of precision.

The standardized PROFIdrive profile permits vendor-independent communication between CPUs and drives.

Overview

Large quantity structures

The use of PROFINET makes it possible to overcome the existing restrictions regarding the scope of machines and systems that can be implemented. In one network, several different controllers can interact with their assigned field devices. The number of field devices per PROFINET network is virtually unlimited – the entire range of IP addresses is available.

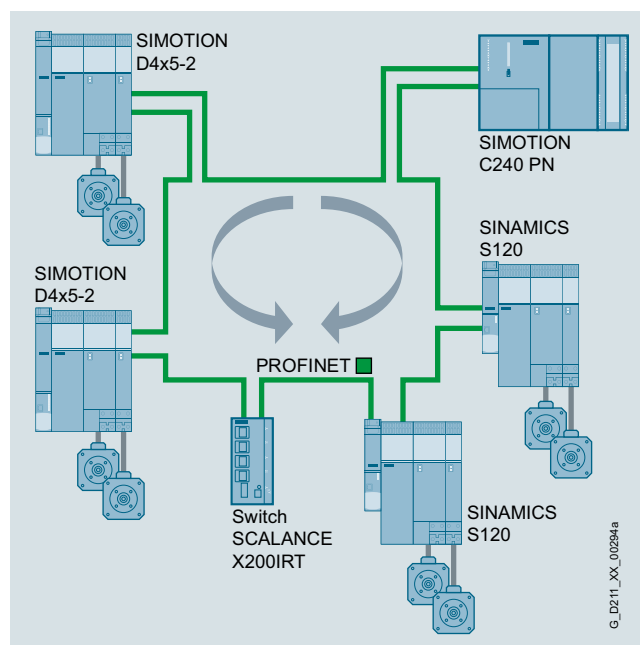
High data rate

By using 100 Mbit/s in full duplex mode, PROFINET achieves a significantly higher data rate than previous fieldbuses. This means that other plant data can be transmitted over TCP/IP without any problems, in addition to the process data. PROFINET therefore meets the combined industrial demands for simultaneously transmitting high-speed IO data and large volumes of data for additional sections of the application. Even the transmission of large volumes of data, such as that from cameras, has no adverse effect on the speed and precision of the IO data transmission, thanks to PROFINET mechanisms.

Media redundancy

A higher plant availability can be achieved with a redundant installation (ring topology). The media redundancy can be implemented not only with the aid of external switches, but also by means of integrated PROFINET interfaces. Using the media redundancy protocol (MRP), reconfiguration times of 200 ms can be achieved. If the communication is interrupted in just one part of the ring installation this means that a plant standstill is prevented and any necessary maintenance or repair work can be performed without any time pressure.

For motion control applications, PROFINET with IRT in ring topologies offers extended media redundancy for planned duplication (MRPD) which operates in a bumpless mode without any re-configuration time. If communication is interrupted (e.g. a cable break) the process can continue operating without interruption.



Bumpless media redundancy illustrated by example of SINAMICS S120 with SIMOTION and SCALANCE X200IRT

Benefits

- PROFINET is the open Industrial Ethernet standard for automation
- PROFINET is based on Industrial Ethernet
- PROFINET uses TCP/IP and IT standards
- PROFINET is real-time Ethernet
- PROFINET enables seamless integration of fieldbus systems
- PROFINET supports fail-safe communication via PROFI-safe and also via IWLAN

More information

More information is available on the internet at:
www.siemens.com/profinet

Communication

PROFdrive

Overview



PROFdrive – the standardized drive interface for PROFINET and PROFIBUS

PROFdrive defines the device behavior and technique to access internal device data for electric drives connected to PROFINET and PROFIBUS – from basic frequency converters up to high-performance servo controllers.

It describes in detail the practical use of communication functions – slave-to-slave communication, equidistance and clock cycle synchronization (isochronous mode) in drive applications. In addition, it specifies all device characteristics which influence interfaces connected to a controller over PROFINET or PROFIBUS. This also includes the state machine (sequence control), the encoder interface, scaling of values, definition of standard telegrams, access to drive parameters, etc.

The PROFdrive profile supports both central as well as distributed motion control concepts.

What are profiles?

For devices and systems used in automation technology, profiles define properties and modes of behavior. This allows manufacturers and users to define common standards. Devices and systems that comply with such a cross-manufacturer profile, are interoperable on a fieldbus and, to a certain degree, can be interchanged.

Are there different types of profiles?

A distinction is made between what are known as application profiles (general or specific) and system profiles:

- Application profiles (also device profiles) predominantly refer to devices (e.g. drives) and include an agreed selection regarding bus communication as well as specific device applications.
- System profiles describe classes of systems, including master functionality, program interfaces and integration resources.

Is PROFdrive fit for the future?

PROFdrive has been specified by the PROFIBUS and PROFINET International (PI) user organization, and is specified as a standard that is fit for the future through standard IEC 61800-7.

The basic philosophy: Keep it simple

The PROFdrive profile tries to keep the drive interface as simple as possible and free from technology functions. As a result, referencing models as well as the functionality and performance of the PROFINET/PROFIBUS master have either no or only little influence on the drive interface.

One drive profile – different application classes

The integration of drives into automation solutions depends very strongly on the particular drive application. In order to be able to address the complete, huge bandwidth of drive applications – from basic frequency converters up to synchronized multi-axis systems with a high dynamic performance – using just one profile, PROFdrive defines six application classes, to which most drive applications can be assigned:

- Class 1 – standard drives (pumps, fans, agitators, etc.)
- Class 2 – standard drives with technological functions
- Class 3 – positioning drives
- Class 4 – motion control drives with central, higher-level motion control intelligence and the patented "Dynamic Servo Control" positioning concept
- Class 5 – motion control drives with central, higher-level motion control intelligence and position setpoint interface
- Class 6 – motion control drives with distributed motion control intelligence integrated in the drives

Design

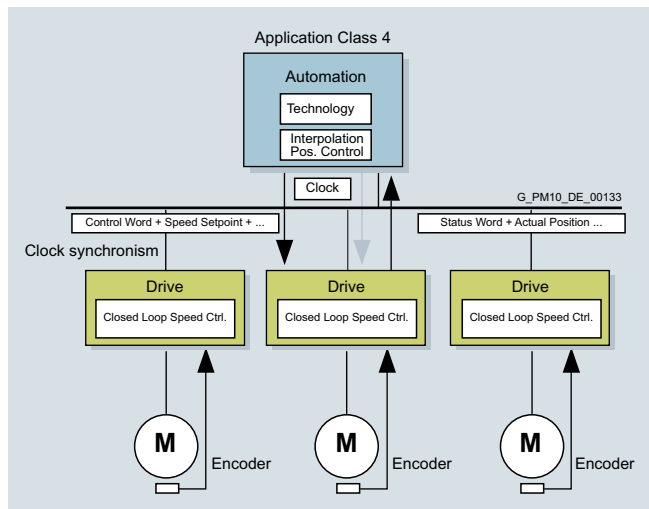
The device model of PROFdrive

PROFdrive defines a device model comprising function modules, which interoperate inside the device and which reflect the intelligence of the drive system. These modules have objects assigned to them which are described in the profile and are defined with respect to their functions. The overall functionality of a drive is therefore described through the sum of its parameters.

In contrast to other drive profiles, PROFdrive defines only the access mechanisms to the parameters as well as a subset of profile parameters (approx. 30) such as the fault buffer, drive control and device identification.

All other parameters are vendor-specific which gives drive manufacturers great flexibility with respect to implementing control functions. The elements of a parameter are accessed acyclically over data records.

As a communication protocol, PROFdrive uses DP-V0, DP-V1, and the DP-V2 expansions for PROFIBUS including the functions "Slave-to-Slave Communication" and "Isochronous Operation", or PROFINET IO with real-time classes RT and IRT.



More information

More information on PROFINET and PROFIBUS is available at: www.profibus.com

Overview



PROFIBUS – the proven, rugged bus system for automation engineering applications

The requirements of users for an open, non-proprietary communication system have resulted in the specification and standardization of the PROFIBUS protocol.

PROFIBUS defines the technical and functional features of a serial fieldbus system, with which the distributed field automation devices in the lower area (sensor/actuator level) can be networked up to the mid performance range (cell level).

Standardization according to IEC 61158/EN 50170 secures your investments for the future.

Using the conformity and interoperability test performed by the test laboratories authorized by PROFIBUS & PROFINET International (PI) and the certification of the devices by PI, users have the security of knowing that the quality and functionality is guaranteed, even in multi-vendor installations.

PROFIBUS versions

Two different PROFIBUS versions have been defined in order to comply with the widely varying requirements at field level:

- PROFIBUS PA (Process Automation) – the version for applications in process automation. PROFIBUS PA uses the intrinsically safe transmission technology specified in IEC 61158-2.
- PROFIBUS DP (Distributed Periphery) – this version, which is optimized for speed, is specifically tailored to the communication of automation systems with distributed I/O stations and drives. PROFIBUS DP sets itself apart as a result of very short response times and high noise immunity, and replaces cost-intensive, parallel signal transfer with 24 V and measured value transfer utilizing 0/4 ... 20 mA technology.

Design

Bus participants on PROFIBUS DP

PROFIBUS DP makes a distinction between two different master classes and one slave class:

DP master class 1

For PROFIBUS DP, DP master class 1 is the central component. In a defined and continually repeating message cycle the central master station exchanges information with distributed stations (DP slaves).

DP master class 2

Devices of this type (programming, configuring or operator control devices) are used during commissioning, for configuring the DP system, for diagnostics or for operating the active plant or system. A DP master class 2 can, for example, read input, output, diagnostic and configuration data of the slaves.

DP slave

A DP slave is an I/O device which receives output information or setpoints from the DP master, and as response, returns input information, measured values and actual values to the DP master. A DP slave never sends data automatically, but only when requested by the DP master.

The quantity of input and output information depends on the device, and for each DP slave in each send direction can be a maximum of 244 bytes.

Function

Functional scope in DP masters and DP slaves

The functional scope can differ between DP masters and DP slaves. The different functional scopes are classified as DP-V0, DP-V1 and DP-V2.

DP-V0 communication functions

The DP-V0 master functions consist of "Configuration", "Parameter Assignment" and "Reading Diagnostics Data", as well as cyclic reading of input data/actual values and writing output data/setpoints.

DP-V1 communication functions

The DP-V1 function expansions make it possible to perform acyclic read and write functions as well as processing cyclic data communication. This type of slave must be supplied with extensive parameterization data during start-up and during normal operation. These acyclically transferred parameterization data are only rarely changed in comparison to the cyclic setpoints, actual values, and measured values, and are transferred at lower priority in parallel with the cyclic high-speed user data transfer. Detailed diagnostic information can be transferred in the same way.

DP-V2 communication functions

The extended DP-V2 master functions mainly comprise functions for isochronous operation and slave-to-slave communication between DP slaves.

- Isochronous mode:
Isochronous mode is implemented by means of an equidistant signal in the bus system. This cyclic, equidistant cycle is sent by the DP master to all bus nodes in the form of a Global Control Telegram. Master and slaves can then synchronize their applications with this signal. The signal jitter between cycles is less than 1 μ s.
- Slave-to-slave communication:
The "publisher/subscriber" model is used to implement slave-to-slave communication. Slaves declared as publishers make their input data/actual values and measured values available to other slaves, the subscribers, for reading. This is performed by sending the response frame to the master as a broadcast. Slave-to-slave communication is therefore a cyclic process.

Integration

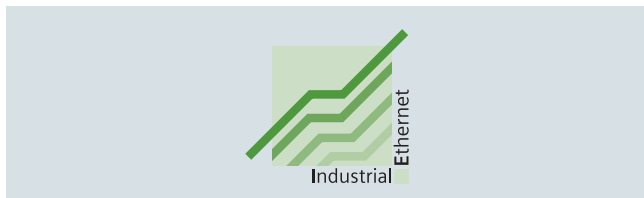
PROFIBUS with SINAMICS

SINAMICS uses the PROFIBUS DP protocol. SINAMICS drives can only be used as DP slaves.

Communication

Industrial Ethernet

Overview



Ethernet is the basic internet technology for worldwide networking. The many possibilities of intranet and internet, which have been available for office applications for a long time, are now utilized for production automation with Industrial Ethernet.

Apart from the use of information technology, the deployment of distributed automation systems is also on the increase. This entails breaking up complex control tasks into smaller, manageable and drive-based control systems. This increases the demand for communication and consequently a comprehensive and powerful communication system.

Industrial Ethernet provides a powerful area and cell network for the industrial field, compliant with the IEEE 802.3 (ETHERNET) standard.

Benefits

Ethernet enables a very fast data transfer (10/100 Mbit/s, 1/10 Gbit/s) and at the same time has full-duplex capability. It therefore provides an ideal basis for communication tasks in the industrial field. With a share of over 90 %, Ethernet is the number one network worldwide and offers important features which have essential advantages:

- Fast commissioning thanks to the simplest connection method
- High availability since existing networks can be extended without any adverse effects
- Almost unlimited communication performance because scalable performance is available through switching technology and high data rates when required
- Networking of different application areas such as office and production areas
- Company-wide communication based on WAN (Wide Area Network) technology or the internet
- Investment protection due to continuous compatibility with further developments
- Wireless communication using Industrial Wireless LAN

In order to make Ethernet suitable for industrial applications, considerable expansions with respect to functionality and design are required:

- Network components for use in harsh industrial environments
- Fast assembly of the RJ45 connectors
- Fail-safety through redundancy
- Expanded diagnostics and message concept
- Use of future-oriented network components (e.g. switches)

SIMATIC NET offers corresponding network components and products.

Integration

Industrial Ethernet with SINAMICS

SINAMICS provides Control Units and Communication Boards with PROFINET interface based on 100 Mbit/s Ethernet. This means that process communication in real-time, as well as engineering and HMI via standard TCP/IP are simultaneously possible.

It is also possible to access the web server in SINAMICS at the same time that process communication is in progress.

The CU310-2 and CU320-2 Control Units have an additional Ethernet interface at the front so that service and engineering tasks can be performed very easily.

Communication with SINAMICS over Industrial Ethernet

PG/PC/HMI communication

PG/PC/HMI communication is performed using protocols which are based on the basic TCP/IP protocol.

- Engineering and diagnostics with STARTER

IT communication

IT communication is performed using protocols which are based on the basic TCP/IP protocol. The most important IT protocols are:

- HTTP/HTTPS: Hypertext Transfer Protocol (Secure)
Using a standard internet browser, it is possible to retrieve pre-defined web pages containing diagnostic information from the device. Furthermore, user-defined web pages containing information defined by the user can be stored in the device.
- SNMP: Simple Network Management Protocol

Overview



Ethernet Industrial Protocol (EtherNet/IP) is an open standard for industrial networks. EtherNet/IP is used to transmit cyclic I/O data and acyclic parameter data. EtherNet/IP was developed by the ODVA (Open DeviceNet Vendor Association) and belongs to the international standard series IEC 61158.

Overview



As a simple fieldbus protocol, Modbus RTU can be used both cyclically and acyclically. Based on RS485 physical bus characteristics, up to 32 nodes can be networked to one bus segment and connected to a higher-level controller. This protocol is generally used when there are limited demands on data throughput.

Overview



AS-Interface serves as a cost-effective system for the lower field level of automation. AS-Interface was specially developed to meet the demands of connecting binary sensors and actuators as well as interfacing to the higher control level.

A straightforward, cost-effective installation with minimal connection costs was of paramount importance to the developers.

The AS-Interface is often used in systems where numerous actuators and sensors, installed across a wide area, need to be networked cost-effectively. Examples include conveyor and handling systems in airports, automated postal sorting, and the food and beverage industry.

Overview

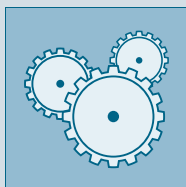
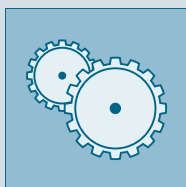
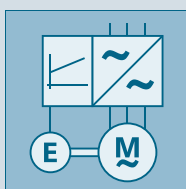
As a simple fieldbus protocol, USS (**U**niversal **S**erial **I**nterface protocol of Siemens AG, 1992) can be used both cyclically and acyclically. Based on RS485 physical bus characteristics, up to 32 nodes can be networked to one bus segment and connected to a higher-level controller. This protocol is generally used when there are limited demands on data throughput.

Communication

Notes

5

Technology functions



6/2 Free function blocks (FFB)

6/3 Basic positioner EPos

6/3 Function module basic positioner EPos

6/4 Functionality of the EPos basic positioner

Technology functions

Free function blocks (FFB)

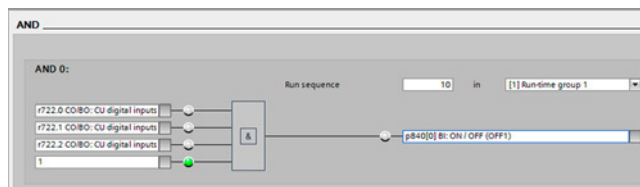
Overview

On specific SINAMICS devices, free function blocks (FFB) are available as a standard technology function, which can be called up as an additively activatable function module. The FFB can be used to connect simple binary states or several input signals to a control signal (e.g. ON command). Furthermore, analog signals can also be adapted.

In addition to logical operations such as AND/OR, arithmetic functions as well as more complex blocks such as smoothing elements, limit monitors, or storing elements are also available. All of the blocks can be flexibly interconnected with one another using BICO (Binector-Connector technology).

In the SINAMICS Startdrive engineering tool, the FFB can be comfortably parameterized via screens.

The user-friendly overview for parameter assignment is shown below, based on the example of the SINAMICS G120 inverter. In this example, three digital inputs which are linked to each other via a logical AND function block are acquired. The drive can only be released when all inputs have a HIGH signal.



Supported functions in the function module of the free function blocks (FFB)

Logical functions	Programming of Boolean logic and logic operations
Arithmetic functions	Programming of mathematical functions
Timer functions	Generating of pulses and switching delays
Memory functions	Programming of binary flip-flops
Switch functions	Programming of binary and numerical switches
Control functions	Programming of functions for open-loop and closed-loop control
Complex functions	Programming of threshold value monitors and control units

The table above shows an overview of the supported functions of the FFB. Depending on the SINAMICS inverter, up to 25 different block types are available. The number of available blocks per module type is limited. The blocks are not multi-instance-capable.

The sequence and calculation intervals (sampling times) can be selected for each block, but the calculation intervals are limited by the performance of the Control Unit.

Overview

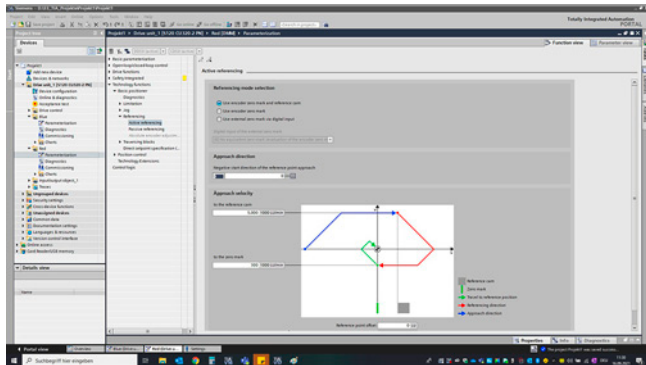
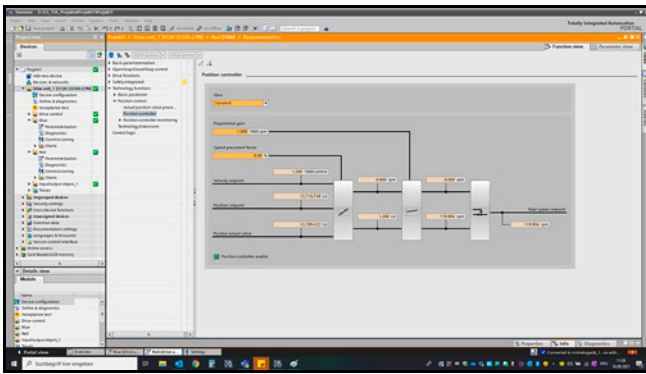
Function module basic positioner EPos

The basic positioner EPos is available as a standard technology function for the following SINAMICS Control Units and can be called as a function module that can be activated additionally.

- SINAMICS S120 CU310-2 and CU320-2 Control Units
- SINAMICS S110 CU305 Control Units
- SINAMICS G120 CU250S-2 Control Units
- SINAMICS G120D CU250D-2 Control Units

The basic positioner can be used to resolve basic motion control tasks without additional external technological outlay from the drive itself.

Integrated functionality for absolute and relative positioning of linear and rotary axes with motor encoders or machine encoders.



The EPos basic positioner in the SINAMICS drive system provides powerful and precise positioning functions. Due to its flexibility and adaptability, the basic positioner can be used for a wide range of positioning tasks.

The functions are easy to handle both during commissioning and during operation, and the comprehensive monitoring functions are outstanding.

Many applications can be carried out without external position controllers.

The EPos basic positioner is used to position linear and rotary axes (modulo) in absolute/relative terms with rotary as well as linear motor encoder or machine encoder (indirect or direct measuring system).

EPos is a function module that can be activated additionally in Servo Control and in Vector Control.

User-friendly configuring and commissioning, including control panel (operation using PC) and diagnostics, are possible with the STARTER and SINAMICS Startdrive commissioning tools.

In addition to extremely flexible positioning functions, EPos offers a high degree of user-friendliness and reliability thanks to integral monitoring and compensation functions.

Different operating modes and their functionality increase flexibility and plant productivity, for example, by means of "on-the-fly" and bumpless correction of the motion control.

Preconfigured PROFIdrive positioning frames are available which, when selected, automatically establish the internal "connection" to the basic positioner.

Technology functions

Basic positioner EPos

Overview

Functionality of the EPos basic positioner

Lower-level closed-loop position control with the following essential components

- Position actual value sensing (including the lower-level measuring probe evaluation and reference mark search)
- Position controller (including limits, adaptation and pre-control calculation)
- Monitoring functions (standstill, positioning and dynamic following error monitoring, cam signals)

Mechanical system

- Backlash compensation
- Modulo offset

Limitations

- Speed/acceleration/delay/jerk limitation
- Software limit switches (traversing range limitation by means of position setpoint evaluation)
- Stop cams (traversing range limitation using hardware limit switch evaluation)

Referencing or adjustment

- Set reference point (for an axis at standstill)
- Search for reference (separate mode including reversing cam functionality, automatic reversal of direction, homing to "output cam and encoder zero mark" or only "encoder zero mark" or "external zero mark (BERO)")
- Flying referencing (seamless referencing possible during "normal" traversing with the aid of the measuring input evaluation; generally evaluation, e.g. of a BERO. Subordinate function for the modes "jog", "direct setpoint input/MDI" and "traversing blocks")
- Absolute encoder alignment

Traversing block mode

- 64 traversing blocks for
 - SINAMICS S120 CU310-2 and CU320-2 Control Units
- 16 traversing blocks for
 - SINAMICS S110 CU305 Control Units
 - SINAMICS G120 CU250S-2 Control Units
 - SINAMICS G120D CU250D-2 Control Units
- Positioning using traversing blocks that can be stored in the drive unit including continuation conditions and specific jobs for a previously homed axis.
- Configuring traversing blocks using the traversing block editor in the relevant commissioning tool of the SINAMICS converter family
- A traversing block contains the following information:
 - Job number and job (e.g. positioning, waiting, GOTO block jump, setting of binary outputs, travel to fixed stop)
 - Motion parameters (target position, velocity, override for acceleration and deceleration)
 - Mode (e.g.: hide block, continuation conditions such as "Continue_with_stop", "Continue_flying" and "Continue_externally using high-speed measuring inputs")
 - Job parameters (e.g. wait time, block step conditions)

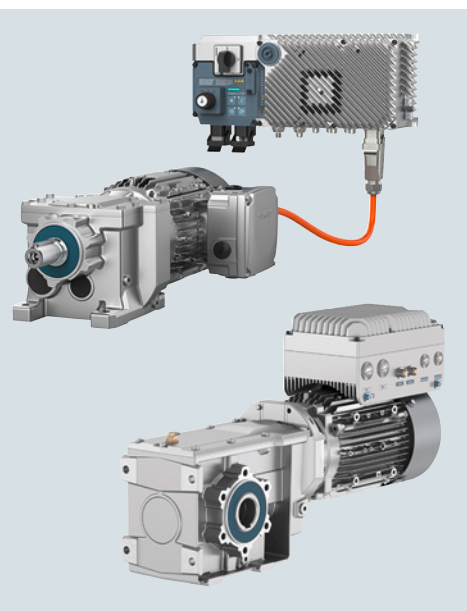
Direct setpoint specification (MDI) mode

- Positioning (absolute, relative) and setting-up (endless closed-loop position control) using direct setpoint inputs (e.g. via the PLC using process data)
- It is always possible to influence the motion parameters during traversing (on-the-fly setpoint acceptance) as well as for on-the-fly changes between the setup and positioning modes.
- The direct setpoint specification mode (MDI) can also be used in the relative positioning or setup mode if the axis is not referenced. This means that on-the-fly synchronization and re-referencing can be carried out using "flying referencing".

Jog mode

- Closed-loop position controlled traversing of the axis with "endless position controlled" or "jog incremental" modes (traverse through a "step width"), which can be toggled between

SINAMICS G115D distributed drive system 0.37 kW to 7.5 kW (0.5 to 10 hp)



SINAMICS G115D distributed drive system

- 7/2 Application
- 7/2 More information
- 7.1/1 System overview
- 7.2/1 Wall-mounted
- 7.3/1 Motor-mounted
- 7.4/1 Supplementary components

SINAMICS G115D distributed drive system

0.37 kW to 7.5 kW (0.5 to 10 hp)

Introduction

Application

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
Pumping, ventilating, compressing	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	V20 G120C G120X	G120X G130/G150 G180 ¹⁾ DCM	S120	G120	S110	S120
Moving	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	V20 G115D G120C ET 200pro FC-2 ²⁾	G120 G120D G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120 G120D	S110 S210 DCM	S120 S210 DCM
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	G120 G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120	S110 S210	S120 S210 DCM
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Laser cutting • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

The SINAMICS G115D distributed drive system meets all the requirements that system manufacturers place on drives for horizontal applications in conveyor technology with a focus on the intralogistics and airport industries as well as for horizontal applications in the automotive and food and beverage industries.

The converter is supplied as with degree of protection up to IP66 and sets standards in terms of efficiency – from the installation phase to commissioning and all the way to handling.

The SINAMICS G115D drive system is the first choice for users who want to move conveyed material quickly and efficiently.

Practical application examples and descriptions are available on the internet at

www.siemens.com/sinamics-applications
www.siemens.com/conveyor-technology

More information

You may also be interested in these frequency converters:

- With enhanced functionality, with positioning function in IP65 degree of protection ⇒ SINAMICS G120D
- More performance for the control cabinet in IP20 degree of protection ⇒ SINAMICS G120, SINAMICS G120C
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS G120

¹⁾ Industry-specific converters.

²⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter is available at:
www.siemens.com/et200pro-fc

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

7.1



7.1/2 **SINAMICS G115D distributed drive system**

- 7.1/2 SINAMICS G115D distributed drive system
- 7.1/5 SINAMICS G115D distributed converters wall-mounted
- 7.1/6 SIMOGEAR geared motors for/with SINAMICS G115D wall-mounted/motor-mounted
- 7.1/6 Structure of the Article No.
- 7.1/8 Orientation
- 7.1/10 SIMOGEAR geared motors for SINAMICS G115D wall-mounted
- 7.1/10 Motor type asynchronous motors IE2/IE3
- 7.1/12 Motor type synchronous reluctance motors IE4
- 7.1/14 SIMOGEAR geared motors with SINAMICS G115D motor-mounted
- 7.1/14 Motor type asynchronous motors IE2/IE3
- 7.1/15 Motor type synchronous reluctance motors IE4
- 7.1/16 Converter options
- 7.1/17 Supplementary system components and spare parts for SINAMICS G115D

7.1/18 **Configuring guide**

- 7.1/18 Determining the drive data
- 7.1/20 Configuring a gearbox
- 7.1/29 Configuring a brake

To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gearbox selection" or "Dimensional drawings" in the Industry Mall at:

www.siemens.com/sinamics-g115d/gear-selection-wall-mounted

or

www.siemens.com/sinamics-g115d/gear-selection-motor-mounted

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system

Overview

The SINAMICS G115D distributed drive system provides fully preconfigured and ready-to-connect solutions in a modular concept that includes the converter, motor and gearbox.

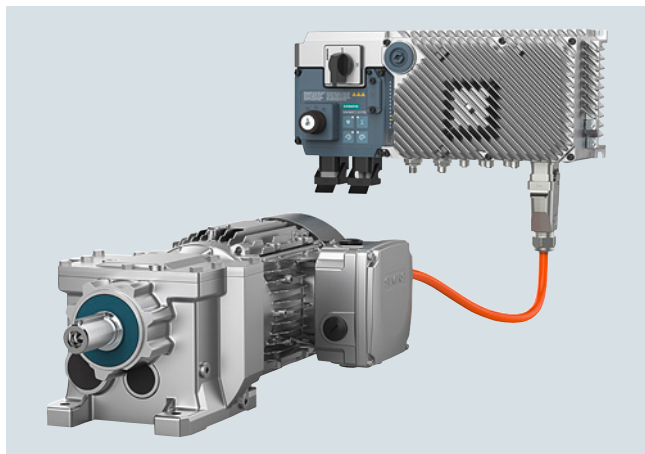
The converter supports SIMOGEAR 2KJ8 geared motors with three-phase asynchronous motors with efficiency class IE3 or high-efficiency synchronous reluctance motors with efficiency class IE4.

It meets all requirements for horizontal conveyor system applications – from simple speed control to sophisticated encoderless vector control. Integrated functions such as fast/slow speed switchover, Quick Stop and limit position disconnecter make the SINAMICS G115D particularly suitable for applications in conveyor systems.

For applications that require safety technology, the SINAMICS G115D offers the integrated STO (Safe Torque Off) function, which can be implemented without additional external components.

The SINAMICS G115D distributed drive system is available wall-mounted and motor-mounted.

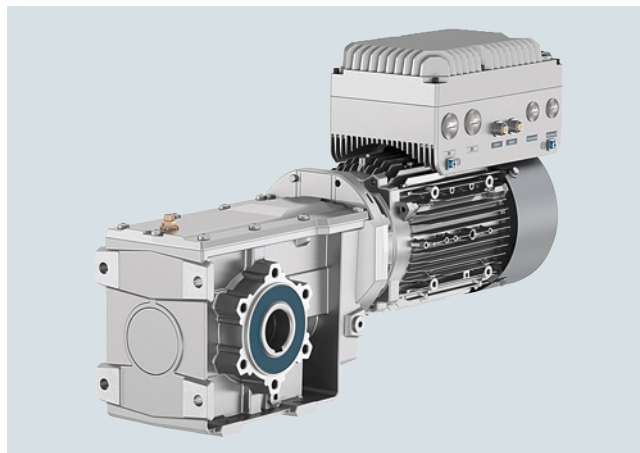
SINAMICS G115D distributed drive system, wall-mounted



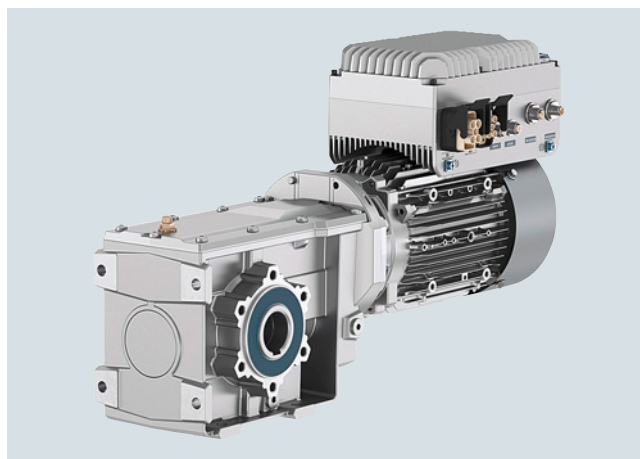
Example: SINAMICS G115D distributed drive system, wall-mounted, PROFINET, version with plug-in connection, FSA, 1.5 kW

The wall-mounted converter with its different versions (frame sizes FSA to FSC) in a performance range from 0.37 kW to 7.5 kW is suitable for a large number of different applications. Thanks to the compact design with degree of protection IP65 (plug-in connection) or IP66 (cable gland), it can be seamlessly integrated into the system.

SINAMICS G115D distributed drive system, motor-mounted



Example: SINAMICS G115D distributed drive system, motor-mounted, PROFINET, version with cable gland, FSA, 1.5 kW, SIMOGEAR motor LE 90, gearbox B49, hollow shaft



Example: SINAMICS G115D distributed drive system, motor-mounted, PROFINET, version with plug-in connection, FSA, 1.5 kW, SIMOGEAR motor LE 90, gearbox B49, hollow shaft

The motor-mounted converter with its different versions (frame sizes FSA and FSB) in a performance range from 0.37 kW to 4 kW is suitable for a large number of different applications. Thanks to its compact design with degree of protection up to IP65, it can be seamlessly integrated into the system.

Overview**Perfect combination with SIMATIC controllers and PROFINET**

Integration via PROFINET communication with PROFIsafe, AS-Interface, EtherNet/IP into a higher-level control system is very easy thanks to full TIA Portal integration, which provides a tool as well as an operating and data management concept. In addition, an optional web server module is available with the web server module SINAMICS G120 Smart Access (SAM) – a WLAN-based web server solution for simple and fast wireless setup with smartphone, tablet or laptop during commissioning and for diagnostics.

The SINAMICS G115D distributed drive system is ready for digitalization. All operating data can be transferred to the MindSphere cloud solution. The MindSphere application "Analyze MyDrives" facilitates the process evaluation of operating data, with the possibility of adaptation to individual customer requirements. This simplifies the recording and evaluation of the operating conditions of the drive system.

Reasons for using the SINAMICS G115D distributed drive system

- User-friendly modular solution – pre-configured and ready for connection
- Versatile, robust and reliable system
- New design for quick and easy installation, cabling and commissioning
- The wall-mounted and motor-mounted variants use the same platform
- No control cabinet required, thanks to the installation on the machine less space required and lower cooling requirements
- Long cables between the converters and the motors can be avoided (thus less power loss, reduced interference emissions, and lower costs for shielded cables and additional filters)
- Supports SIMOGEAR 2KJ8 geared motors with asynchronous motors and high-efficiency synchronous reluctance motors according to efficiency class IE4
- Worldwide use of the SIMOGEAR 2KJ8 geared motors independent of the line voltage
- Temperature range from -30 °C to 55 °C (suitable for installation in deep-freeze applications)
- Integrated safety, STO (Safe Torque Off) via fail-safe digital input F-DI or PROFIsafe
- Perfectly prepared for digitalization thanks to various communications interfaces and integration of the AMD (Analyze MyDrives) application into the MindSphere cloud solution
- Special properties for the intralogistics market (e.g. repair switches, local remote control, Safety Integrated, conveyor technology functions)

The family of distributed drive systems at Siemens

Siemens offers an innovative portfolio of frequency converters for optimal implementation in distributed drive solutions. The strengths of the individual members of the converter family allow easy adaptation to the most diverse application requirements:

- Identical connection systems
- User-friendly commissioning and configuration tools

Products from the family of distributed drives:

- SINAMICS G115D distributed drive system (wall and motor-mounted)
- SINAMICS G120D frequency converters
- SIMATIC ET 200pro FC-2 frequency converters
- SIRIUS M200D motor starters

Hardware configuration

The SINAMICS G115D distributed drive system is available as a wall-mounted and motor-mounted version, with degree of protection IP65/66.

The performance range for the wall-mounted version, for ranges from 0.37 kW to 7.5 kW and in the motor-mounted version, for ranges from 0.37 kW to 4 kW.

The converter is configurable regarding fieldbus communication (without, AS-Interface or PROFINET / EtherNet/IP) and connection method (cable gland or plug-in connection).

Furthermore, the wall-mounted version can be configured with a repair switch, local remote control and the control voltage of the motor holding brake.

State-of-the-art IGBT technology with pulse width modulation (PWM) is used for extremely reliable and flexible motor operation. The closed-loop control electronics control and monitor the power electronics and the connected motor in several different control modes that can be selected.

The sensors of the conveyor element can be connected to the digital inputs of the converter. These signals can be transmitted to the higher-level control for further processing via PROFINET, EtherNet/IP or AS-Interface.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system

Overview

Safety Integrated

The SINAMICS G115D distributed drive systems are already equipped with the Safety Integrated Function STO (Safe Torque Off), with certification according to IEC 61508 SIL 2 as well as EN ISO 13849-1 PL d and Category 3. This can be activated either via the PROFIsafe communication protocol or via the fail-safe digital input F-DI.

Drive Technology Configurator (DT Configurator)

The Drive Technology Configurator (DT Configurator) helps you configure the optimum drive technology products for a number of applications – starting with gearboxes, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems.

The DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SINAMICS Startdrive commissioning tool

SINAMICS Startdrive is a tool integrated into the TIA Portal for configuring, commissioning and diagnostics of the SINAMICS converter family. SINAMICS Startdrive (V16 update 4 and higher) can be used to implement converter tasks with most of the SINAMICS G and SINAMICS S converter series. The commissioning tool has been optimized in terms of simplicity, ease of use, and consistent use of the benefits of the TIA Portal to provide a uniform working environment for PLC, HMI and drives.

The SINAMICS Startdrive Basic commissioning tool is available for free on the internet at

www.siemens.com/startdrive

Drive dimensioning of the SINAMICS G115D distributed drive system with the TIA Selection Tool

The SINAMICS G115D distributed drive system is easily configured with the TIA Selection Tool under the Drive Dimensioning plug-in. It provides support when selecting the hardware and firmware components necessary to implement a drive task. The plug-in encompasses the configuration of the entire drive system and allows the handling of individual drives.

- Intuitive user interface, menu-based operation and help
- Configuration of the SINAMICS G115D distributed drive system
- Adjustable load cycles and various mechanical systems integrated
- Interface to the TIA Portal and Industry Mall

The TIA Selection Tool is available for free on the internet at

<http://www.siemens.com/tia-selection-tool-standalone>

SIMARIS planning tools for plants with SINAMICS drives (available soon)

Electrical planning: Even easier with software!

Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools:

- SIMARIS design for dimensioning
- SIMARIS project for calculating the space requirements of the distribution boards

Extended warranty

For SINAMICS G115D, Siemens offers an extended warranty of up to 4 years:

- 18-month standard warranty
- Optional extension via **Service Protect**
 - Free for the first 6 months after registering the product at: <https://myregistration.siemens.com>
 - With costs for 1 or 2 additional years for wall-mounted and motor-mounted versions (complete system with converter and geared motor)

You can find more information at:

<https://support.industry.siemens.com/cs/ww/en/sc/4842>

More information

Compact Operating Instructions are supplied in hard copy form in German, English and Chinese with every SINAMICS G115D.

To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gearbox selection" or "Dimensional drawings" in the Industry Mall at:

www.siemens.com/sinamics-g115d/gear-selection-wall-mounted

or

www.siemens.com/sinamics-g115d/gear-selection-motor-mounted

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions) as well as further technical specifications are available on the internet at:

www.siemens.com/sinamics-g115d/documentation

and in the Drive Technology Configurator (DT Configurator)

www.siemens.com/sinamics-g115d/configuration

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Selection and ordering data

SINAMICS G115D distributed converters wall-mounted · 380 ... 480 V 3 AC					
Rated power ¹⁾		Rated output current I_N ²⁾	Rated input current ³⁾	Frame size	SINAMICS G115D wall-mounted Degree of protection IP65/IP66/UL Type 4X with integrated line filter class A according to EN 55011
400 V kW	480 V hp	at 400 V A	at 400 V A		Data position in Article No.
					1 2 3 4 5 6 7 - 8 9 10 11 12 - 13 14 15 16
380 ... 480 V 3 AC · Rated pulse frequency 4 kHz · Input frequency 45 ... 66 Hz					
0.37	0.5	1.3	1.23	FSA	6 S L 3 5 2 - - X 0 - 3 A 0
0.55	0.75	1.7	1.58	FSA	6 S L 3 5 2 - - X 0 - 5 A 0
0.75	1	2.2	1.99	FSA	6 S L 3 5 2 - - X 0 - 7 A 0
1.1	1.5	3.1	2.69	FSA	6 S L 3 5 2 - - X 1 - 1 A 0
1.5	2	4.1	3.48	FSA	6 S L 3 5 2 - - X 1 - 5 A 0
2.2	3	5.9	5.18	FSB	6 S L 3 5 2 - - X 2 - 2 A 0
3.0	4	7.7	6.76	FSB	6 S L 3 5 2 - - X 3 - 0 A 0
4.0	5	10.2	8.95	FSB	6 S L 3 5 2 - - X 4 - 0 A 0
5.5	7.5	13.2	11.88	FSC	6 S L 3 5 2 - - X 5 - 5 A 0
7.5	10	19	17.11	FSC	6 S L 3 5 2 - - X 7 - 5 A 0

Article No. supplements

Brake control

180 V DC (independent of the line voltage) *)

380 ... 480 V AC (such as line voltage)

0

1

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

0

1

2

3

Connection type	Fieldbus communication	I/O	Motor	380 ... 480 V AC	24 V DC	
Cable gland with daisy chain	without	Cable gland *)				A 0
		Cable gland			Power supply unit integrated	H 0
M12	M12	Cable gland *)				A 2
		M12 Cable gland				A 6
		Q8/0	Cable gland			R 0
		Cable gland			2 × Power M12 ⁶⁾	R 1
		Cable gland			Power supply unit integrated	H 2
		M12	Cable gland		Power supply unit integrated	H 6
Plug-in connection without daisy chain	M12	M12	Q8/0	Q4/2	7/8* ⁵⁾	B 0
					Power M12 ⁶⁾	B 4
				Quickon ⁴⁾	Power M12 ⁵⁾	C 0
				MQ15 ⁴⁾	Power M12 ⁵⁾	D 0
				Q4/2	Power supply unit integrated	K 0
				Quickon ⁴⁾	Power supply unit integrated	L 0
Plug-in connection with daisy chain	M12	M12	Q8/0	2 × Q4/2	2 × 7/8* ⁵⁾	E 0
					2 × Power M12 ⁶⁾	E 4
					Power supply unit integrated	N 0

Fieldbus communication

AS-Interface ⁷⁾

Without fieldbus communication

PROFINET, EtherNet/IP ⁷⁾

A

B

F

* If you select "Brake voltage 180 V DC" and "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from **standard delivery time** to **delivery ex stock**.

- Rated power based on the rated output current I_N . The rated output current I_N is based on the duty cycle for high overload (HO).
- The rated output current I_N is based on the duty cycle for high overload (HO). These current values apply at 400 V and are specified on the rating plate of the converter.
- The input current depends on the motor load and line impedance. The input currents apply for a load at rated power for a line impedance corresponding to $u_K = 4\%$. The current values are specified on the rating plate of the converter.

- Not suitable for UL applications (FSA and FSB). Not available for FSC.
- Plug-in connector with fieldbus communication AS-Interface not available.
- Version with fieldbus communication AS-Interface cannot be ordered.
- For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for/with SINAMICS G115D wall-mounted/motor-mounted • Structure of the Article No.

Selection and ordering data

SIMOGEAR geared motors for/with SINAMICS G115D wall-mounted/motor-mounted • Structure of the Article No.

SIMOGEAR 2KJ8 geared motors

Data position in Article No.

1 2 3 4 5 6 7 - 8 9 10 11 12 - 13 14 15 16 - Z

2 K J 8 . . . - - - Z

Options with -Z and order code

Mounting position

Standard

M1	D 0 1
M2	D 0 2
M3	D 0 3
M4	D 0 4
M5	D 0 5
M6	D 0 6
Permitted deviation from the mounting position	D 0 9

Universal mounting position output side A (DE)

M1-A	D 1 1
M2-A	D 1 2
M3-A	D 1 3
M4-A	D 1 4
M5-A	D 1 5
M6-A	D 1 6

Universal mounting position output side B (NDE)

M1-B	D 2 1
M2-B	D 2 2
M3-B	D 2 3
M4-B	D 2 4
M5-B	D 2 5
M6-B	D 2 6

Standard options for mandatory selection (e.g. the shaft designs) are displayed in the DT Configurator.

For commissioning in the TIA Portal, the selection of the mounting position (e.g. order code **D01**) is important for the specification of the direction of rotation of the output shaft.

For more information and order codes [see section Options](#).

SINAMICS G115D distributed drive system • System overview




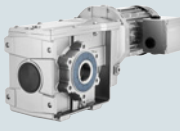

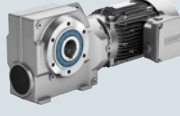
0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for/with SINAMICS G115D wall-mounted/motor-mounted • Orientation

Selection and ordering data

SIMOGEAR is the generation of geared motors from Siemens. The SIMOGEAR gearboxes are available as helical, parallel shaft, bevel, and helical worm geared motors.

SIMOGEAR geared motors

					
Helical gearbox Z and D	Helical gearbox E	Parallel shaft gearbox FZ and FD	Bevel gearbox B	Bevel gearbox K	Helical worm gearbox C
Sizes					
Z19 ... Z89 (2-stage) D19 ... D89 (3-stage)	E39 ... E89 (1-stage)	FZ29 ... FZ89 (2-stage) FD29 ... FD89 (3-stage)	B19 ... B49 (2-stage)	K39 ... K109 (3-stage)	C29 ... C89 (2-stage)
Maximum input torque					
12 Nm ... 2 110 Nm	9.8 Nm ... 245 Nm	25 Nm ... 2 270 Nm	7.7 Nm ... 560 Nm	40 Nm ... 2 900 Nm	14 Nm ... 1 680 Nm
Gearbox ratio					
3.4 ... 60.97 (2-stage) 39.34 ... 330.23 (3-stage)	1.29 ... 9.7	3.57... 65.21 (2-stage) 46.36 ... 357 (3-stage)	3.47 ... 59.28	5.17 ... 244.25	6.2 ... 363
Maximum motor power for the SINAMICS G115D distributed drive system wall-mounted					
7.5 kW	7.5 kW	7.5 kW	7.5 kW	7.5 kW	7.5 kW
Maximum motor power for the SINAMICS G115D distributed drive system motor-mounted					
4 kW	4 kW	4 kW	4 kW	4 kW	4 kW

Type designation of the SIMOGEAR gearboxes

The type designation is a meaningful name for SIMOGEAR geared motors. It provides information about the fundamental design of the geared motor and about its main technical features.

Example of gearbox type designation:		F	D	A	F	S	89
Gearbox type	Helical gearbox	-					
	Parallel shaft gearbox	F					
	Bevel gearbox, 2-stage	B					
	Bevel gearbox, 3-stage	K					
	Helical worm gearbox	C					
Stage	1-stage (for helical gearbox only)		E				
	2-stage		Z				
	3-stage		D				
Type							
Shaft	Solid shaft			-			
	Hollow shaft			A			
Mounting	Foot-mounted design				-		
	Foot/flange-mounted design				B		
	Flange-mounted design				F		
	Housing flange design				Z		
	Torque arm				D		
Connection	Feather key / without feather key					-	
	Shrink disk					S	
	Splined shaft					T	
Gearbox size	Helical gearbox, 1-stage						39 ... 89
	Helical gearbox, 2/3-stage						19 ... 89
	Parallel shaft gearbox, 2/3-stage						29 ... 89
	Bevel gearbox, 2-stage						19 ... 49
	Bevel gearbox, 3-stage						39 ... 109
	Helical worm gearbox, 2-stage						29 ... 89

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for/with SINAMICS G115D wall-mounted/motor-mounted • Orientation

Selection and ordering data

Type designation of the motors for the SINAMICS G115D distributed drive system

Example of motor type designation with the SINAMICS G115D distributed drive system:		LE	80	M	A	4	S	-	G	007	M	-	IO	-	HA
Motor															
Motor type	Three-phase motor	Aluminum housing	LE												
Motor frame size	Specified acc. to EN 50347			71...132											
Overall length	Overall length specified acc. to EN 50347				S, L, M										
	Packet length / power value				A, B, C										
Number of poles	4-pole					4									
Efficiency class	IE2 (High Efficiency)														
	IE3 (Premium Efficiency)														
	IE4 (Super Premium Efficiency) synchronous reluctance motors														
SINAMICS G115D distributed drive system															
SINAMICS G115D	Distributed converter									G					
Converter rated power	Wall-mounted	not defined in motor type designation													
		Motor-mounted	0.37 kW									003			
	0.55 kW										005				
	0.75 kW										007				
	1.1 kW										011				
	1.5 kW										015				
	2.2 kW										022				
	3 kW										030				
	4 kW									040					
5.5 kW									055						
7.5 kW									075						
Converter mounting type	Wall-mounted														
	Motor-mounted														
Fieldbus communication	Without fieldbus communication														
	AS-Interface														
	PROFINET, EtherNet/IP														
Options															
Motor brake	DC brake														L
	Enclosed brake														G
	Manual brake release														H
	Manual brake release with locking mechanism														HA
Canopy	With canopy														W

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type asynchronous motors IE2/IE3

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type asynchronous motors IE2/IE3 -> Configuration converter (see right page¹⁾)

P_N kW	T_N Nm	Motor Asynchronous motor	Efficiency class	$\cos \varphi$	λ	Article No. (Article No. supplements → see below)
Control range 1:5 / Motor speed range 300 ... 1 500 rpm						
0.37	2.36	LE71MB4E	IE2	0.74	0.58	2KJ8 ■■■ -2CF ■■ -0A ■■ -Z
0.55	3.50	LE80MA4E	IE2	0.76	0.64	2KJ8 ■■■ -2EA ■■ -0A ■■ -Z
0.75	4.77	LE80MB4P	IE3	0.76	0.61	2KJ8 ■■■ -2EG ■■ -0A ■■ -Z
1.1	7.00	LE90S4P	IE3	0.79	0.65	2KJ8 ■■■ -2GB ■■ -0A ■■ -Z
1.5	9.55	LE90L4P	IE3	0.82	0.69	2KJ8 ■■■ -2GG ■■ -0A ■■ -Z
2.2	14.00	LE100LA4P	IE3	0.82	0.70	2KJ8 ■■■ -2JB ■■ -0A ■■ -Z
3.0	19.10	LE100LB4P	IE3	0.83	0.70	2KJ8 ■■■ -2JG ■■ -0A ■■ -Z
4.0	25.46	LE112MC4P	IE3	0.83	0.70	2KJ8 ■■■ -2LB ■■ -0A ■■ -Z
5.5	35.00	LE132S4P	IE3	0.82	0.70	2KJ8 ■■■ -2NB ■■ -0A ■■ -Z
7.5	47.75	LE132M4P	IE3	0.78	0.65	2KJ8 ■■■ -2NG ■■ -0A ■■ -Z
Control range 1:10 / Motor speed range 300 ... 3 000 rpm						
0.55	1.75	LE71MB4E	IE2	0.68	0.54	2KJ8 ■■■ -2CF ■■ -1A ■■ -Z
0.75	2.36	LE80MA4E	IE2	0.70	0.57	2KJ8 ■■■ -2EA ■■ -1A ■■ -Z
1.1	3.50	LE80MB4P	IE3	0.73	0.57	2KJ8 ■■■ -2EG ■■ -1A ■■ -Z
1.5	4.77	LE90S4P	IE3	0.75	0.62	2KJ8 ■■■ -2GB ■■ -1A ■■ -Z
2.2	7.00	LE90L4P	IE3	0.80	0.68	2KJ8 ■■■ -2GG ■■ -1A ■■ -Z
3.0	9.55	LE100LA4P	IE3	0.80	0.69	2KJ8 ■■■ -2JB ■■ -1A ■■ -Z
4.0	12.73	LE100LB4P	IE3	0.80	0.69	2KJ8 ■■■ -2JG ■■ -1A ■■ -Z
5.5	17.50	LE112MC4P	IE3	0.81	0.70	2KJ8 ■■■ -2LB ■■ -1A ■■ -Z
7.5	23.87	LE132S4P	IE3	0.81	0.70	2KJ8 ■■■ -2NB ■■ -1A ■■ -Z
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm						
0.64	2.36	LE71MB4E	IE2	0.67	0.54	2KJ8 ■■■ -2CF ■■ -2A ■■ -Z
0.95	3.50	LE80MA4E	IE2	0.70	0.58	2KJ8 ■■■ -2EA ■■ -2A ■■ -Z
1.30	4.77	LE80MB4P	IE3	0.73	0.60	2KJ8 ■■■ -2EG ■■ -2A ■■ -Z
1.90	7.00	LE90S4P	IE3	0.76	0.63	2KJ8 ■■■ -2GB ■■ -2A ■■ -Z
2.60	9.55	LE90L4P	IE3	0.80	0.68	2KJ8 ■■■ -2GG ■■ -2A ■■ -Z
3.81	14.00	LE100LA4P	IE3	0.82	0.70	2KJ8 ■■■ -2JB ■■ -2A ■■ -Z
5.20	19.10	LE100LB4P	IE3	0.81	0.68	2KJ8 ■■■ -2JG ■■ -2A ■■ -Z
6.93	25.46	LE112MC4P	IE3	0.81	0.69	2KJ8 ■■■ -2LB ■■ -2A ■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
 Helical gearbox Z, 2-stage
 Helical gearbox D, 3-stage
 Parallel shaft gearbox FZ, 2-stage
 Parallel shaft gearbox FD, 3-stage
 Bevel gearbox B/K, 2/3-stage
 Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor

without
 Pt1000

0
1

Motor brake

without
 with (brake voltage 180 V DC)

0
1

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)

Selection of the special versions, see the Drive Technology Configurator (DT Configurator):

www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

¹⁾ Standard assignments of the 2KJ8 geared motors to the converters without converter derating are shown here.
 In order to compensate for possible derating, a converter up to max. two power levels higher may be selected.

This selection option is already integrated in the Drive Technology Configurator (DT Configurator) and will be available soon in the TIA Selection Tool.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D converters wall-mounted -> (Configuration with motor type synchronous reluctance motors, see next double page)

P_N kW	hp	Rated input current A	Rated output current I_N A	Converter size (frame size)	Article No.
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.37	0.50	1.23	1.3	FSA	6SL3520 - X 0-3A 0
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0

Article No. supplements

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

0
1
2
3

Connection type	Fieldbus communication	I/O	Motor	380 ... 480 V AC	24 V DC		
Cable gland with daisy chain	without	Cable gland *)				A 0	
		Cable gland			Power supply integrated	H 0	
	M12	Cable gland *)					A 2
		M12 Cable gland	Cable gland				A 6
			Q8/0	Cable gland			R 0
		Cable gland		2 × Power M12 ³⁾		R 1	
Plug-in connection without daisy chain	M12	M12 Cable gland	Cable gland		2 × Power M12 ³⁾	H 2	
			M12 Cable gland		Power supply integrated	H 6	
		M12 Q8/0	Q4/2		7/8* ²⁾		B 0
			Quickon ¹⁾		Power M12 ³⁾		B 4
			MQ15 ¹⁾		Power M12 ²⁾		C 0
			Q4/2		Power supply integrated		D 0
Quickon ¹⁾		Power supply integrated		K 0			
MQ15 ¹⁾		Power supply integrated		L 0			
Plug-in connection with daisy chain	M12	M12 Q8/0	2 × Q4/2		2 × 7/8* ²⁾	E 0	
					2 × Power M12 ³⁾	E 4	
					Power supply integrated	N 0	

Converter fieldbus communication

AS-Interface⁴⁾

Without fieldbus communication

PROFINET, EtherNet/IP⁴⁾

* If you select "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from "standard delivery time" to "delivery ex stock".

¹⁾ Not suitable for UL applications (FSA and FSB). Not available for FSC.

²⁾ Plug-in connector with fieldbus communication AS-Interface not available.

³⁾ Version with fieldbus communication AS-Interface cannot be ordered.

⁴⁾ For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type synchronous reluctance motors IE4

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type synchronous reluctance motors IE4 -> Configuration converter (right page ¹⁾)

P_N kW	T_N Nm	Motor Synchronous reluctance motor	Efficiency class	cos φ	Article No. (Article No. supplements → see below)
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.55	3.50	LE80MA4S	IE4	0.64	2KJ8 ■■■ -4EC ■■ -0A ■■ -Z
0.75	4.77	LE80MB4S	IE4	0.63	2KJ8 ■■■ -4EH ■■ -0A ■■ -Z
1.1	7.00	LE90S4S	IE4	0.66	2KJ8 ■■■ -4GC ■■ -0A ■■ -Z
1.5	9.55	LE90L4S	IE4	0.65	2KJ8 ■■■ -4GH ■■ -0A ■■ -Z
2.2	14.00	LE112MA4S	IE4	0.69	2KJ8 ■■■ -4LC ■■ -0A ■■ -Z
3.0	19.10	LE112MB4S	IE4	0.69	2KJ8 ■■■ -4LH ■■ -0A ■■ -Z
4.0	25.46	LE112MC4S	IE4	0.70	2KJ8 ■■■ -4LN ■■ -0A ■■ -Z
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.75	2.36	LE80MA4S	IE4	0.59	2KJ8 ■■■ -4EC ■■ -1A ■■ -Z
1.1	3.50	LE80MB4S	IE4	0.61	2KJ8 ■■■ -4EH ■■ -1A ■■ -Z
1.5	4.77	LE90S4S	IE4	0.62	2KJ8 ■■■ -4GC ■■ -1A ■■ -Z
2.2	7.00	LE90L4S	IE4	0.64	2KJ8 ■■■ -4GH ■■ -1A ■■ -Z
3.0	9.55	LE112MA4S	IE4	0.66	2KJ8 ■■■ -4LC ■■ -1A ■■ -Z
4.0	12.73	LE112MB4S	IE4	0.67	2KJ8 ■■■ -4LH ■■ -1A ■■ -Z
5.5	17.50	LE112MC4S	IE4	0.70	2KJ8 ■■■ -4LN ■■ -1A ■■ -Z
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
0.95	3.50	LE80MA4S	IE4	0.61	2KJ8 ■■■ -4EC ■■ -2A ■■ -Z
1.30	4.77	LE80MB4S	IE4	0.61	2KJ8 ■■■ -4EH ■■ -2A ■■ -Z
1.90	7.00	LE90S4S	IE4	0.64	2KJ8 ■■■ -4GC ■■ -2A ■■ -Z
2.60	9.55	LE90L4S	IE4	0.64	2KJ8 ■■■ -4GH ■■ -2A ■■ -Z
3.81	14.00	LE112MA4S	IE4	0.68	2KJ8 ■■■ -4LC ■■ -2A ■■ -Z
5.2	19.10	LE112MB4S	IE4	0.70	2KJ8 ■■■ -4LH ■■ -2A ■■ -Z
6.93	25.46	LE112MC4S	IE4	0.80	2KJ8 ■■■ -4LN ■■ -2A ■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
 Helical gearbox Z, 2-stage
 Helical gearbox D, 3-stage
 Parallel shaft gearbox FZ, 2-stage
 Parallel shaft gearbox FD, 3-stage
 Bevel gearbox B/K, 2/3-stage
 Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor without
 Pt1000

0
1

Motor brake without
 with (brake voltage 180 V DC)

0
1

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)

Selection of the special versions, see the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

¹⁾ Standard assignments of the 2KJ8 geared motors to the converters without converter derating are shown here.
 In order to compensate for possible derating, a converter up to max. two power levels higher may be selected.

This selection option is already integrated in the Drive Technology Configurator (DT Configurator) and will be available soon in the TIA Selection Tool.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D converters wall-mounted -> (Configuration with motor type asynchronous motors, see preceding double page)

P_N kW	hp	Rated input current A	Rated output current I_N A	Converter size (frame size)	Article No.
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0

Article No. supplements

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

Connection type	Fieldbus communication	I/O	Motor	380 ... 480 V AC	24 V DC	
Cable gland with daisy chain	without	M12	Cable gland *)			A 0
			Cable gland		Power supply integrated	H 0
			Cable gland *)			A 2
			M12 Cable gland			A 6
			Q8/0	Cable gland		R 0
			Cable gland		2 × Power M12 ³⁾	R 1
			Cable gland		Power supply integrated	H 2
Plug-in connection without daisy chain	M12	M12	Q8/0	Q4/2	7/8* ²⁾	B 0
					Power M12 ³⁾	B 4
				Quickon ¹⁾	Power M12 ²⁾	C 0
				MQ15 ¹⁾	Power M12 ²⁾	D 0
				Q4/2	Power supply integrated	K 0
				Quickon ¹⁾	Power supply integrated	L 0
				MQ15 ¹⁾	Power supply integrated	M 0
Plug-in connection with daisy chain	M12	M12	Q8/0	2 × Q4/2	2 × 7/8* ²⁾	E 0
					2 × Power M12 ³⁾	E 4
					Power supply integrated	N 0

Fieldbus communication

AS-Interface⁴⁾

Without fieldbus communication

PROFINET, EtherNet/IP⁴⁾

* If you select "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from "standard delivery time" to "delivery ex stock".

¹⁾ Not suitable for UL applications (FSA and FSB). Not available for FSC.

²⁾ Plug-in connector with fieldbus communication AS-Interface not available.

³⁾ Version with fieldbus communication AS-Interface cannot be ordered.

⁴⁾ For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor type asynchronous motors IE2/IE3

Selection and ordering data

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor type asynchronous motors IE2/IE3

-> Configuration motor type synchronous reluctance motors (see right page)

System rated power P_N kW	Drive rated torque T_N Nm	System input rated current I_N A	$\cos \varphi$ Nm	λ	Motor size		Converter size (frame size)	Article No. (Article No. supplements → see below)
					Asynchronous motor	Efficiency class		
Control range 1:5 / Motor speed range 300 ... 1 500 rpm								
0.37	2.36	0.97	0.74	0.58	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -3 ■■■ -Z
0.55	3.50	1.29	0.76	0.64	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -3 ■■■ -Z
0.75	4.77	1.64	0.76	0.61	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -3 ■■■ -Z
1.1	7.00	2.30	0.79	0.65	LE90S4P	IE3	FSA	2KJ8 ■■■ -2GB ■■ -3 ■■■ -Z
1.5	9.55	2.98	0.82	0.69	LE90L4P	IE3	FSA	2KJ8 ■■■ -2GG ■■ -3 ■■■ -Z
2.2	14.00	4.66	0.82	0.70	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -3 ■■■ -Z
3.0	19.10	6.31	0.83	0.70	LE100LB4P	IE3	FSB	2KJ8 ■■■ -2JG ■■ -3 ■■■ -Z
4.0	25.00	8.09	0.83	0.70	LE112MC4P	IE3	FSB	2KJ8 ■■■ -2LB ■■ -3 ■■■ -Z
Control range 1:10 / Motor speed range 300 ... 3 000 rpm								
0.55	1.75	1.29	0.68	0.54	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -4 ■■■ -Z
0.75	2.36	1.67	0.70	0.57	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -4 ■■■ -Z
1.1	3.50	2.34	0.73	0.57	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -4 ■■■ -Z
1.5	4.77	2.93	0.75	0.62	LE90S4P	IE3	FSA	2KJ8 ■■■ -2GB ■■ -4 ■■■ -Z
2.2	7.00	4.09	0.80	0.68	LE90L4P	IE3	FSB	2KJ8 ■■■ -2GG ■■ -4 ■■■ -Z
3.0	9.55	6.47	0.80	0.69	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -4 ■■■ -Z
4.0	12.73	8.29	0.80	0.69	LE100LB4P	IE3	FSB	2KJ8 ■■■ -2JG ■■ -4 ■■■ -Z
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm								
0.64	2.36	1.49	0.67	0.54	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -5 ■■■ -Z
0.95	3.50	2.08	0.70	0.58	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -5 ■■■ -Z
1.30	4.77	2.73	0.73	0.60	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -5 ■■■ -Z
1.90	7.00	3.62	0.76	0.63	LE90S4P	IE3	FSB	2KJ8 ■■■ -2GB ■■ -5 ■■■ -Z
2.60	9.55	4.82	0.80	0.68	LE90L4P	IE3	FSB	2KJ8 ■■■ -2GG ■■ -5 ■■■ -Z
3.81	14.00	8.14	0.82	0.70	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -5 ■■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
Helical gearbox Z, 2-stage
Helical gearbox D, 3-stage
Parallel shaft gearbox FZ, 2-stage
Parallel shaft gearbox FD, 3-stage
Bevel gearbox B/K, 2/3-stage
Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-motor-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor

without
Pt1000

0
1

Motor brake

without
with (brake voltage 180 V DC)

0
1

Converter fieldbus communication

Without fieldbus communication, cable gland
Without fieldbus communication, plug-in connection
AS-Interface, cable gland
AS-Interface, plug-in connection
PROFINET, EtherNet/IP, cable gland
PROFINET, EtherNet/IP, plug-in connection

B
C
D
E
F
G

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-motor-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)
- Configuration of the connection type of the converter (order codes **V01... V81**).

Selection of the special versions, see the Drive Technology Configurator (DT Configurator): www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Converter options

Options

Various connection types as well as connection sides can be selected for the converter fieldbus communications, as shown in the following table.

Connection types	Fieldbus communication	I/O	380 ... 480 V AC	24 V DC	Connection side (from the point of view of the motor shaft)	14th position of the Article No.	Additional identification code -Z with order code		
Without fieldbus communication (I/O Control)									
Cable gland with daisy chain	without	Cable gland			left	2KJ8 ...	B .. V01		
					right ²⁾	2KJ8 ...	B .. V06		
		M12			Cable gland	left	2KJ8 ...	B .. V04	
						right	2KJ8 ...	B .. V05	
					Power M12	left	2KJ8 ...	B .. V07	
						right	2KJ8 ...	B .. V08	
Plug-in connection without daisy chain	without	M12	Q4/2	7/8"	left	2KJ8 ...	C .. V10		
					right	2KJ8 ...	C .. V11		
					Power M12	left	2KJ8 ...	C .. V12	
						right	2KJ8 ...	C .. V13	
					Quickon ¹⁾	Power M12	left	2KJ8 ...	C .. V14
						right	2KJ8 ...	C .. V15	
		MQ15 ¹⁾	Power M12	left	2KJ8 ...	C .. V16			
				right	2KJ8 ...	C .. V17			
			M12	2 x Q4/2	2 x 7/8"	left	2KJ8 ...	C .. V20	
						right	2KJ8 ...	C .. V21	
						2 x Power M12	left	2KJ8 ...	C .. V22
					right		2KJ8 ...	C .. V23	
AS-Interface									
Cable gland with daisy chain	M12	Cable gland				- ³⁾	left	2KJ8 ...	D .. V02
			right	2KJ8 ...			D .. V03		
		M12	Cable gland	left			2KJ8 ...	D .. V04	
				right			2KJ8 ...	D .. V05	
Plug-in connection without daisy chain	M12	M12	Q4/2	- ³⁾	left	2KJ8 ...	E .. V10		
					right	2KJ8 ...	E .. V11		
			Quickon ¹⁾		- ³⁾	left	2KJ8 ...	E .. V14	
					right	2KJ8 ...	E .. V15		
			MQ15 ¹⁾		- ³⁾	left	2KJ8 ...	E .. V16	
						right	2KJ8 ...	E .. V17	
Plug-in connection with daisy chain	M12	M12	2 x Q4/2	- ³⁾	left	2KJ8 ...	E .. V20		
					right	2KJ8 ...	E .. V21		
PROFINET, EtherNet/IP									
Cable gland with daisy chain	M12	Cable gland			left	2KJ8 ...	F .. V02		
					right	2KJ8 ...	F .. V03		
		M12			Cable gland	left	2KJ8 ...	F .. V04	
						right	2KJ8 ...	F .. V05	
					Cable gland	Power M12	left	2KJ8 ...	F .. V07
							right	2KJ8 ...	F .. V08
Plug-in connection without daisy chain	M12	M12	Q4/2	7/8"	left	2KJ8 ...	G .. V10		
					right	2KJ8 ...	G .. V11		
					Power M12	left	2KJ8 ...	G .. V12	
						right	2KJ8 ...	G .. V13	
					Quickon ¹⁾	Power M12	left	2KJ8 ...	G .. V14
							right	2KJ8 ...	G .. V15
		MQ15 ¹⁾	Power M12	left	2KJ8 ...	G .. V16			
				right	2KJ8 ...	G .. V17			
		Plug-in connection with daisy chain	M12	M12	2 x Q4/2	2 x 7/8"	left	2KJ8 ...	G .. V20
							right	2KJ8 ...	G .. V21
					2 x Power M12		left	2KJ8 ...	G .. V22
							right	2KJ8 ...	G .. V23
Power supply									
Integrated power supply unit for 24 V DC power supply						2KJ8 ...	V70		

¹⁾ Not suitable for UL applications.

²⁾ The cable gland with daisy chain with connection side right (order code **V06**) can only be selected with integrated power supply unit for 24 V DC power supply (order code **V70**).

³⁾ The 24 V DC power supply is provided via the M12 plug-in connector for fieldbus communication.

6SL3255-0AA00-5AA0



Selection and ordering data

Supplementary system components for SINAMICS G115D

Description	Article No.
Fuses	
<ul style="list-style-type: none"> 10 A for FSA 16 A for FSB 32 A for FSC 	3NA3803 3NA3805 3NA3812
External braking resistors	
Continuous braking power	
<ul style="list-style-type: none"> 200 W for FSA 240 W for FSA 480 W for FSA 200 W for FSB 240 W for FSB 600 W for FSB 600 W for FSC 1200 W for FSC 	6SL3501-1BE32-0AA0 6SL3501-1BE32-4AA0 6SL3501-1BE34-8AA0 6SL3501-1BE32-0BA0 6SL3501-1BE32-4BA0 6SL3501-1BE36-0BA0 6SL3501-1BE36-0CA0 6SL3501-1BE41-2CA0
SINAMICS SD memory card	
<ul style="list-style-type: none"> 512 MB, empty For motor-mounted version also available with order code: 512 MB + firmware V4.7 SP13 For motor-mounted version also available with order code: 	6SL3054-4AG00-2AA0 2KJ8 -Z V80 6SL3054-7TG00-2BA0 2KJ8 -Z V81
SINAMICS G120 Smart Access	6SL3255-0AA00-5AA0
Web server module for wireless commissioning, operation and diagnostics using a smartphone, tablet, or laptop	
Interface kit	6SL3555-0XA00-0AA0
for web server module SINAMICS G120 Smart Access	
MindConnect IOT2040	9AC2112-0AA00-1YA2
to connect to the Cloud MindSphere via PN with up to 30 data points per second	
MindConnect Nano	9AC2112-8BA12-0KA1
to connect to the Cloud MindSphere via PN with up to 250 data points per second	
PC converter connection kit 2	6SL3255-0AA00-2CA0
USB cable (3 m (9.84 ft) long)	
Installation kit	
<ul style="list-style-type: none"> for SINAMICS G115D wall-mounted for SINAMICS G115D motor-mounted 	6SL3566-2GW00-0GA0 6SL3566-2GM00-0GA0
Cover kit	6SL3566-2GA00-0GA0
for outputs 380 ... 480 V AC (Q4/2) and 24 V DC (7/8" and M12)	
Connecting cables	
An overview of all available accessories (e.g. plugs and cables) can be found under the following link: www.siemens.com/distributeddrives-supplementaryproducts	
PROFINET connecting cable	
IE connecting cable	
M12-180/M12-180 axial outlet	
<ul style="list-style-type: none"> 0.3 m (0.98 ft) 0.5 m (1.64 ft) 1 m (3.28 ft) 1.5 m (4.92 ft) 2 m (6.56 ft) 3 m (9.84 ft) 5 m (16.41 ft) 10 m (32.81 ft) 15 m (49 ft) 	6XV1870-8AE30 6XV1870-8AE50 6XV1870-8AH10 6XV1870-8AH15 6XV1870-8AH20 6XV1870-8AH30 6XV1870-8AH50 6XV1870-8AN10 6XV1870-8AN15
PROFINET connecting cable	
IE connecting cable M12-180/IE FC	
RJ45 plug 145 axial outlet	
<ul style="list-style-type: none"> 2 m (6.56 ft) 3 m (9.84 ft) 5 m (16.41 ft) 10 m (32.81 ft) 15 m (49 ft) 	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15
PROFINET connectors	
IE M12 plug PRO axial outlet	
<ul style="list-style-type: none"> 1 unit 8 units 	6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8
AS-Interface M12 branch	3RK1901-2NR20

Description	Article No.
Connecting cables/plug-in connectors for 24 V DC power supply	
7/8" plug-in connector axial outlet	
<ul style="list-style-type: none"> Pin insert (OUT) Female contact insert (IN) 	6GK1905-0FA00 6GK1905-0FB00
Connecting cables/plug-in connectors for 24 V DC power supply	
7/8" plug-in cable axial outlet	
<ul style="list-style-type: none"> 0.3 m (0.98 ft) 0.5 m (1.64 ft) 1 m (3.28 ft) 1.5 m (4.92 ft) 2 m (6.56 ft) 3 m (9.84 ft) 5 m (16.41 ft) 10 m (32.81 ft) 15 m (49 ft) 	6XV1822-5BE30 6XV1822-5BE50 6XV1822-5BH10 6XV1822-5BH15 6XV1822-5BH20 6XV1822-5BH30 6XV1822-5BH50 6XV1822-5BN10 6XV1822-5BN15
Plug-in connectors for digital inputs and digital outputs	6ES7194-6KA00-0XA0
Y cable for distributed I/Os for dual connection of I/Os using single cables, 5-pole, M12, 200 mm (7.87 in)	
Connecting cable pre-assembled at one end to connect to the line supply	
<ul style="list-style-type: none"> 1.5 m (4.92 ft) 5 m (16.41 ft) 	3RK1911-0DB13 3RK1911-0DB33
Connector set Q4/2 (angled) for energy supply	
<ul style="list-style-type: none"> 2.5 mm² 4 mm² 6 mm² 	3RK1911-2BE50 3RK1911-2BE10 3RK1911-2BE30
Quickon system connector for connections for 380 ... 480 V AC	
<ul style="list-style-type: none"> Quickon nut Quickon connector 	6SL3566-4NA00-0GA0 6SL3566-4MA00-0GA0
Connector set Q4/2 (angled) for power loop-through	
<ul style="list-style-type: none"> 2.5 mm² 4 mm² 	3RK1911-2BF50 3RK1911-2BF10
Training case	
SINAMICS G115D training case	6AG1067-1AA38-0AA0
SINAMICS G115D distributed drive system, motor-mounted, PROFINET, FSA, 0.37 kW, SIMOGEAR 2KJ8 helical geared motor, incl. SIMATIC S7-1200F and MindConnect IoT 2040	
Spare parts for SINAMICS G115D	
Electronic Modules	
<ul style="list-style-type: none"> FSA, 0.37 kW FSA, 0.55 kW FSA, 0.75 kW FSA, 1.1 kW FSA, 1.5 kW FSB, 2.2 kW FSB, 3 kW FSB, 4 kW FSC, 5.5 kW FSC, 7.5 kW 	6SL3500-0XE50-3- ■ AA0 6SL3500-0XE50-5- ■ AA0 6SL3500-0XE50-7- ■ AA0 6SL3500-0XE51-1- ■ AA0 6SL3500-0XE51-5- ■ AA0 6SL3500-0XE52-2- ■ AA0 6SL3500-0XE53-0- ■ AA0 6SL3500-0XE54-0- ■ AA0 6SL3500-0XE55-5- ■ AA0 6SL3500-0XE57-5- ■ AA0
Fieldbus communication	
<ul style="list-style-type: none"> AS-Interface Without fieldbus communication PROFINET, EtherNet/IP 	A B F
Spare parts kit	
<ul style="list-style-type: none"> for SINAMICS G115D wall-mounted for SINAMICS G115D motor-mounted 	6SL3500-0XK51-0AA0 6SL3500-0XK50-0AA0
Replacement fan	6SL3500-0XF51-0AA0
for SINAMICS G115D wall-mounted	

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Determining the drive data

Overview

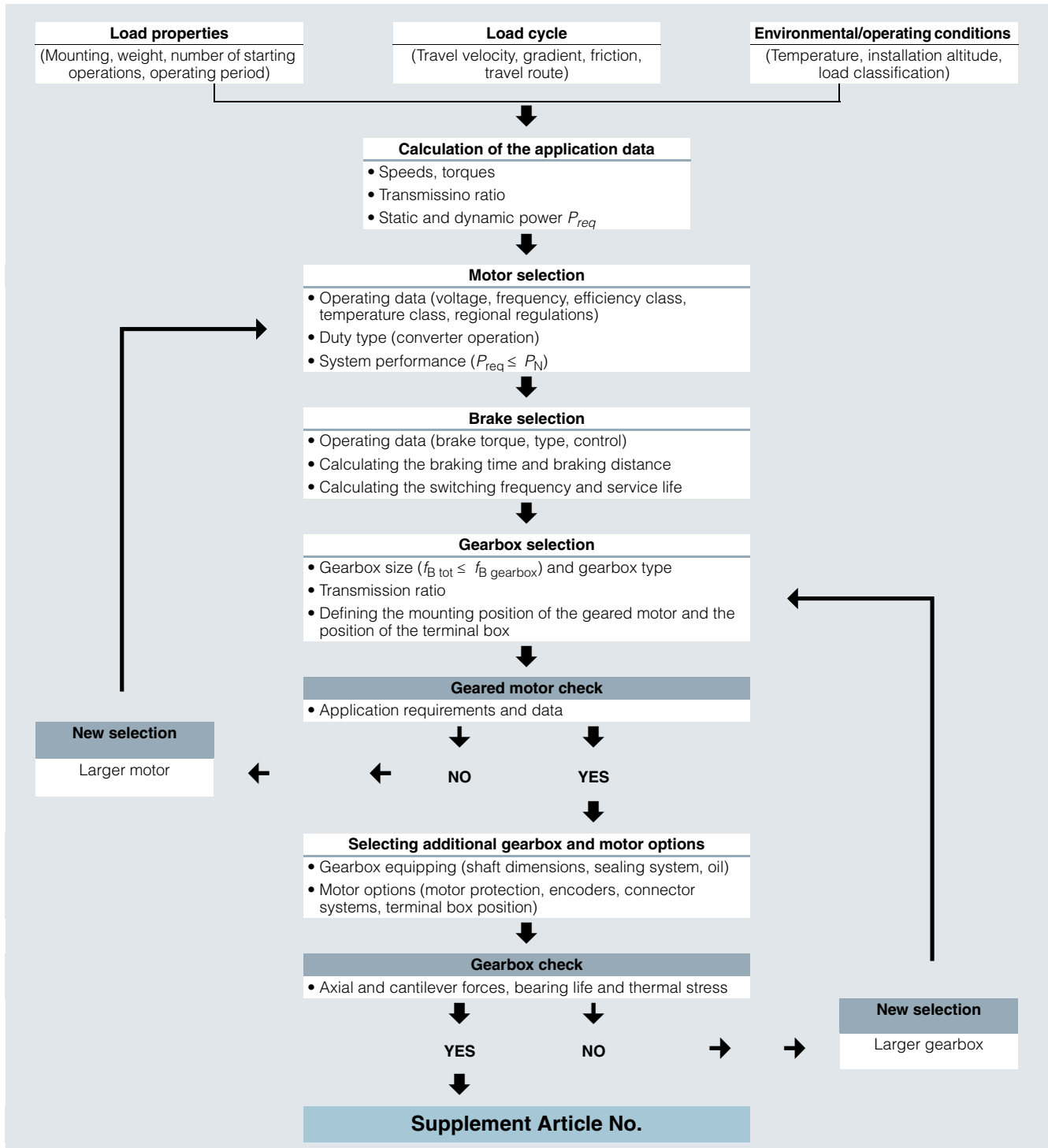
General configuring notes are provided for the standard versions in this catalog.

SIMOGEAR geared motors permit individual solutions to be created for a wide range of drive applications. In order to select the correct drive, initially specific data for the application must be known or determined.

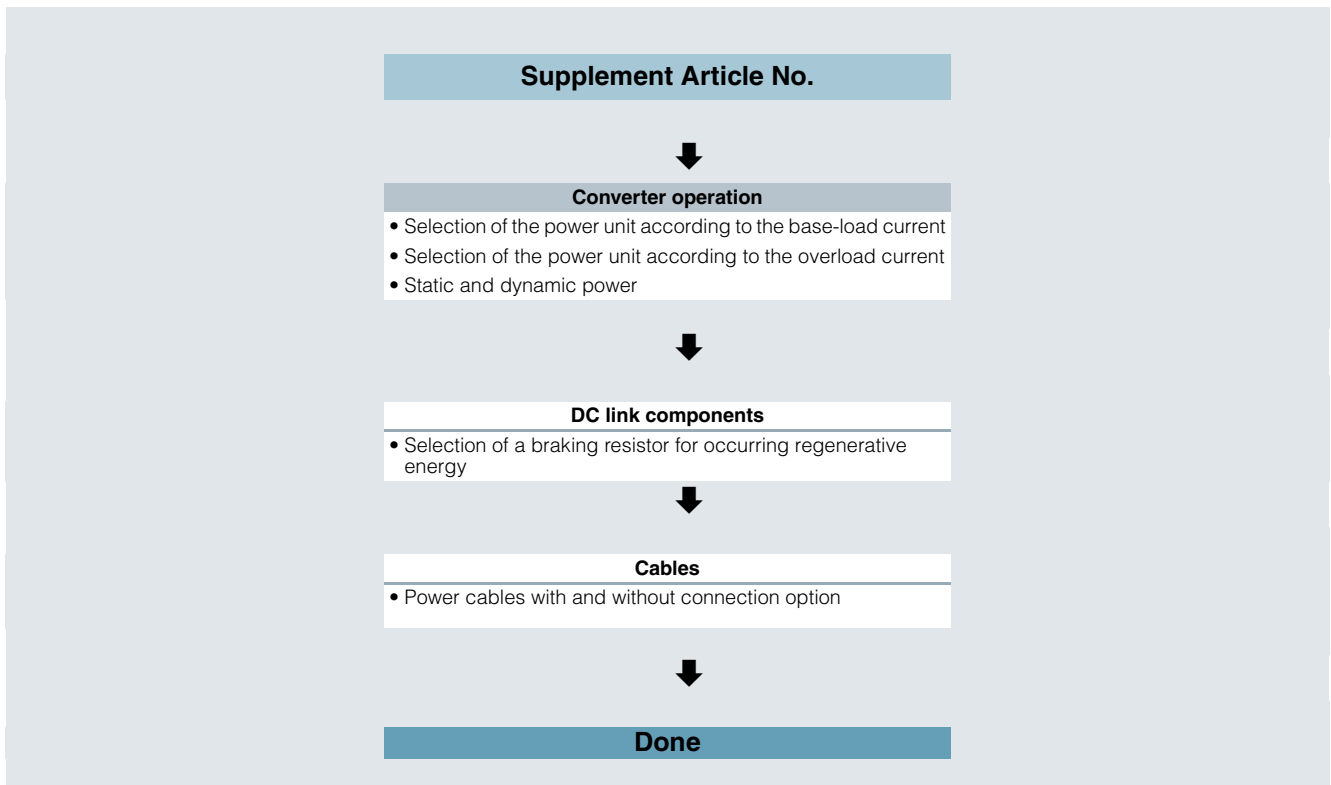
For drives operating under special conditions, e.g. frequent reversing, short-time or intermittent duty, abnormal temperatures, reversal braking, extreme cantilever forces at the gearbox output shaft, etc. please contact your Siemens contact person with all of your technical questions.

You will find additional information on our internet site at www.siemens.com/geared-motors

The flow diagram illustrates the process for selecting and dimensioning a geared motor using a traction drive as an example. However, the specific requirements and boundary conditions associated with the application in question must always be taken into account.



7
1

Overview

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a gearbox

Overview

Standards

DIN/ISO	
DIN 743	Output shafts
ISO 281, ISO 76	Bearings
DIN 7190	Press-fit connection
DIN 6892	Parallel key connection
DIN 3990	Cylindrical gear toothing
DIN 3991	Bevel gear toothing
DIN 3996	Worm gear toothing

Calculation to AGMA available on request.

Gearbox efficiency

The efficiency of the gearbox is determined in part by the gear teeth, the rolling bearing friction, and the shaft seal friction.

Helical, parallel shaft and bevel gearboxes

SIMOGEAR helical, parallel shaft, and bevel geared motors have a very high efficiency. Generally, efficiencies of 96 % (2-stage) and 94 % (3-stage) can be assumed. These gearbox types can be operated with energy-efficient motors to create an excellent solution.

Helical worm gearboxes

The first stage of the helical worm gearbox is designed as a helical stage. With the optimally tuned transmission ratios of the worm stage, the best possible overall efficiency is achieved, which is considerably higher than that of worm gearboxes alone.

Precise efficiency data can be found in the tables in chapter "Helical worm gearboxes".

Owing to the high degrees of efficiency, the SIMOGEAR helical worm gearboxes are not self-locking.

- Running-in period

The tooth flanks on new helical worm gearboxes will not yet be fully smoothed, meaning that the friction angle will be greater and efficiency lower during the running-in period. The higher the transmission ratio, the more pronounced the effect.

The running-in process should take approximately 24 hours of operation at full load. In most cases, the catalog values will then be reached.

Efficiency optimization

As a result of the large range of transmission ratios, in many cases, instead of a 3-stage gearbox, a 2-stage SIMOGEAR gearbox can be used.

This means that the efficiency is improved by approximately 2 % when compared to conventional drives.

Further, the efficiency can be improved by optimizing the mounting position and the input speed.

Splashing losses

For certain gearbox constructions, the first stage can be completely immersed in the gearbox oil. In the case of large gearboxes with a high input speed, particularly with vertical mounting positions, this may lead to increased splashing losses, which cannot be neglected.

If you wish to use gearboxes such as these, then please contact Siemens. If at all possible, you should choose horizontal types of construction in order to keep splashing losses to a minimum.

Overview

Service factor

The service factor f_B is a safety factor for the gearboxes that takes the operating conditions of the drive into account.

The following applies to selecting a suitable drive:

$$f_B \geq f_{B\text{req}}$$

The gearbox size or rated gearbox torque and the resulting service factor are not standardized and depend on the manufacturer.

Service factor (f_B)

The service factor is calculated from the drive data you selected and can be obtained from the [DT Configurator](#).

Determining the required service factor ($f_{B\text{req}}$)

In standard operation, i.e. with a uniform load provided by the driven machine, small masses to be accelerated, and a low number of switching operations, the service factor of $f_{B\text{req}} = 1$ can be selected.

For operating conditions that deviate from this, the required service factor must be calculated with the following formulas.

- For helical, parallel shaft and bevel gearboxes

$$f_{B\text{req}} = f_{B1} \cdot f_{BT}$$

- For helical worm gearboxes

$$f_{B\text{req}} = f_{B1} \cdot f_{B2} \cdot f_{BT}$$

Determining the service factor driven machine (f_{B1})

The service factor of the driven machine f_{B1} is determined from the load classification, switching frequency, and operating period per day.

- Load groups of driven machines

Load classification	Mass acceleration factor (m_{BF})	Driven machine (examples)
I Almost shock-free	≤ 0.3	Electric generators, belt conveyors, apron conveyors, screw conveyors, lightweight elevators, electric hoists, machine tool feed drives, turbo blowers, centrifugal compressors, mixers and agitators when mixing materials with uniform density
II Moderate shock loads	≤ 3	Machine tool main drives, heavy elevators, slewing gear, cranes, shaft ventilators, mixers and agitators when mixing materials with non-uniform densities, reciprocating pumps with multiple cylinders, metering pumps
III Heavy shock loads	≤ 10	Punching presses, shears, rubber kneaders, machinery used in rolling mills and the iron and steel industry, mechanical shovels, heavy centrifuges, heavyweight metering pumps, rotary drilling rigs, briquetting presses, pug mills

Mass acceleration factor (m_{BF})

The mass acceleration factor m_{BF} is calculated as follows:

$$m_{BF} = \frac{J_X}{(J_{\text{mot}} + J_B)}$$

All external moments of inertia are moments of inertia of the driven machine and the gearbox, which are to be reduced to the motor speed.

The calculation is made using the following formula:

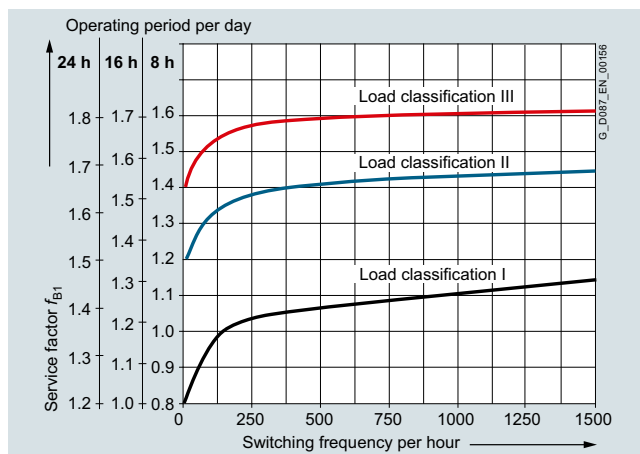
$$J_X = J_2 \cdot \left(\frac{n_2}{n_1}\right)^2 = \frac{J_2}{(i)^2}$$

In most cases the relatively insignificant moment of inertia of the gearbox can be ignored.

The mass acceleration factor m_{BF} is calculated as follows with reference to the gearbox and the adapter:

$$m_{BF} = \frac{J_X + J_G + J_{AD}}{(J_{\text{mot}} + J_B)}$$

Code	Description	Unit
f_B	Service factor	-
f_{B1}	Service factor driven machine	-
f_{B2}	Service factor short-time duty	-
$f_{B\text{req}}$	Required service factor	-
f_{BT}	Service factor ambient temperature	-
i	Transmission ratio	-
J_2	Moment of inertia of the load referred to the output speed of the gearbox	kgm ²
J_{AD}	Moment of inertia of the adapter referred to the input speed	kgm ²
J_B	Moment of inertia of the brake	kgm ²
J_G	Moment of inertia of the gearbox referred to the input speed	kgm ²
J_{mot}	Moment of inertia of the motor	kgm ²
J_X	Moment of inertia of the load referred to the input speed	kgm ²
m_{BF}	Mass acceleration factor	-
n_1	Input speed of the gearbox	rpm
n_2	Output speed of the gearbox	rpm



Service factor f_{B1}

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

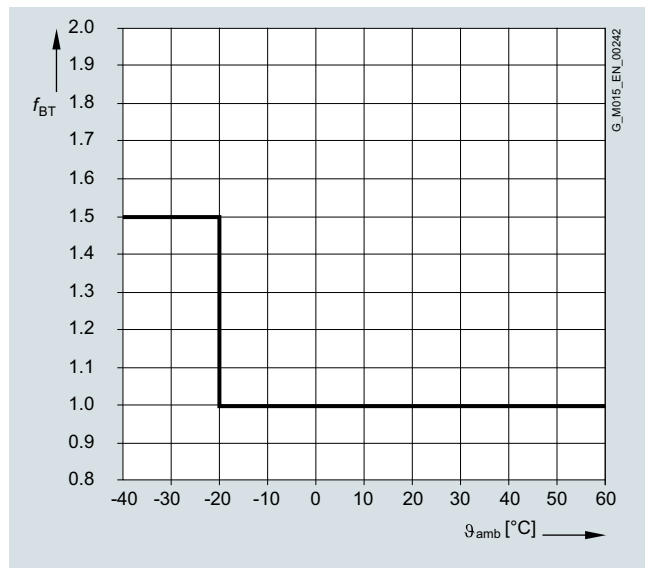
Configuring guide • Configuring a gearbox

Overview

Determining the service factor ambient temperature (f_{BT})

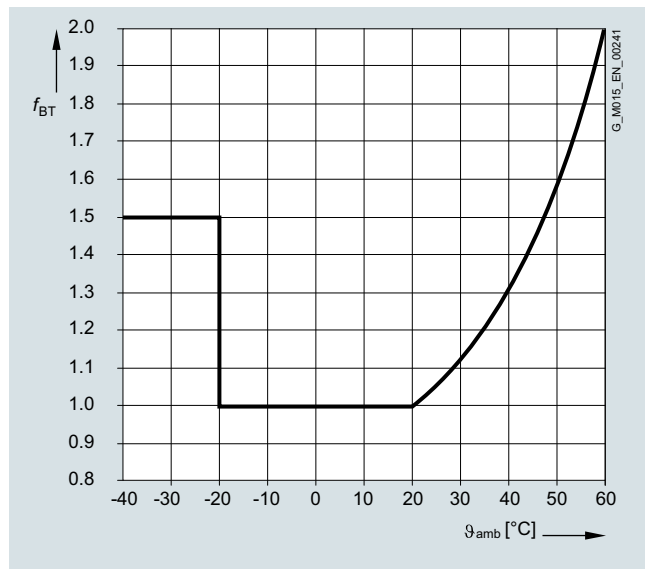
If the drive warms up to an operating temperature above -20 °C at max. 70 % load, $f_{BT}=1$ can be set.

- For helical, parallel shaft and bevel gearboxes



Service factor ambient temperature

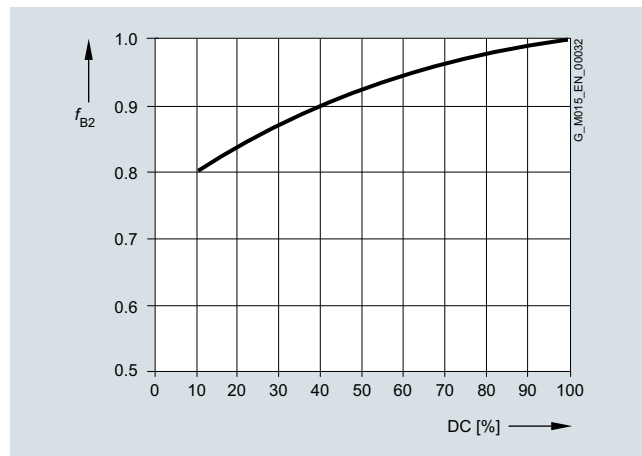
- For helical worm gearboxes



Service factor ambient temperature for helical worm gearboxes

Determining the service factor short-time duty (f_{B2})

- For helical worm gearboxes



Service factor short-time duty

Note:

When selecting and dimensioning drives with the following special application conditions, please contact Siemens.

- Frequent reversing
- Short time and intermittent operation
- Abnormal temperatures
- Reversal braking
- Extreme and/or circulating radial forces at the gearbox output shaft
- Fluctuating loads

Overview

Required torque

Once the load situation (drive data) and the service factor have been clarified, the required output torque can be determined.

$$T_2 = \frac{P_{\text{mot}} \cdot 9550}{n_1 / (i \cdot \eta)} = \frac{P_{\text{mot}} \cdot 9550}{n_2} \cdot \eta$$

Code	Description	Unit
η	Gearbox efficiency	%
i	Transmission ratio	-
n_1	Input speed of the gearbox	rpm
n_2	Output speed of the gearbox	rpm
P_{mot}	Motor power	kW
T_2	Required output torque of the driven machine	Nm

Input speed

For converter operation, the gearboxes are driven at variable speeds.

When configuring the system, we recommend that the maximum input speed in continuous operation is maintained, wherever possible, at 1 500 rpm.

At higher motor speeds above 1 500 rpm you will generally experience higher than average noise levels and a lower than average bearing service life. This depends to a large extent on the transmission ratio and gearbox size in question. Furthermore, higher speeds additionally influence the thermal properties and service intervals of the gearbox.

Direction of rotation

All geared motors are connected as standard so that the motor rotates in the clockwise direction.

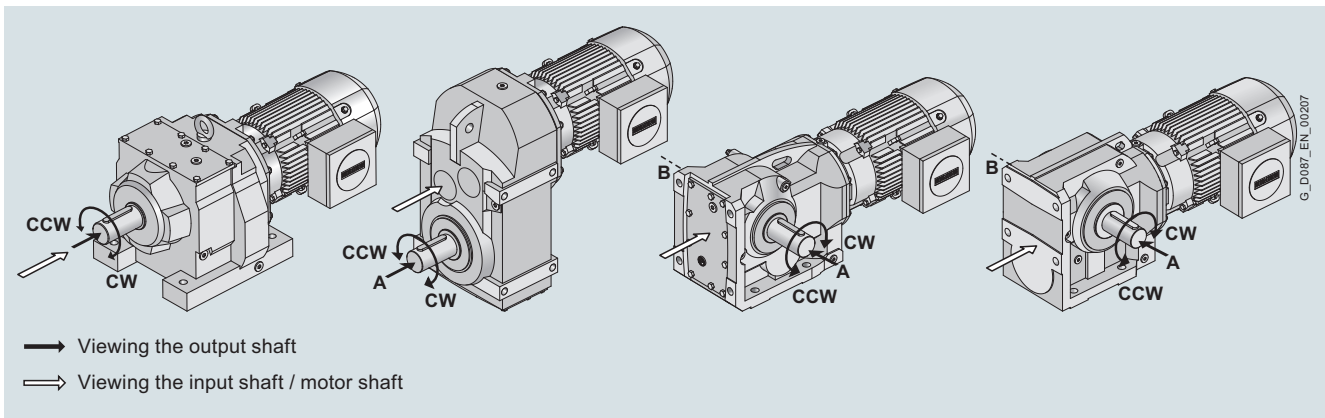
The direction of rotation, which is taken into account in the converter parameterization, depends on the gearbox type, number of gearbox stages and output side.

Note:

For bevel gearboxes B and K and helical worm gearboxes C, the direction of rotation must be specified when viewing the DE (A) or NDE (B).

Direction of rotation, input to output

Gearbox type	Size	Gearbox stages	Output side	Direction of rotation	
				Input shaft	Output shaft
Z	19 ... 89	2	-	CW	CW
D	19 ... 89	3	-	CW	CCW
FZ	29 ... 89	2	-	CW	CW
FD	29 ... 89	3	-	CW	CCW
B	19 ... 49	2	A	CW	CW
			B	CW	CCW
K	39 ... 109	3	A	CW	CCW
			B	CW	CCW
C	29 ... 89	2	A	CW	CW
			B	CW	CCW



Definition of the direction of rotation

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a gearbox

Overview

Gearbox fastening

Gearboxes and geared motors are normally secured by bolts of grade 8.8.

When the largest possible motor frame size is attached to the gearbox and with a higher load classification, elevated levels of vibration and/or smaller service factors, further measures need to be taken for flange-mounted designs of gearboxes and geared motors.

Recommended bolt quality for DZ/ZZ and DF/ZF:

Helical gearboxes DZ/ZZ and DF/ZF with the smallest available output flanges must be bolted to the mounting surface with bolts of grade 10.9 (see table).

Gearbox type		Flange	Strength class of bolt/nut
DZ/ZZ29	DF/ZF29	A120	10.9 ¹⁾
DZ/ZZ39	DF/ZF39	A120	10.9 ¹⁾
DZ/ZZ49	DF/ZF49	A140	10.9
DZ/ZZ59	DF/ZF59	A160	10.9
DZ/ZZ69	DF/ZF69	A200	10.9
DZ/ZZ79	DF/ZF79	A250	10.9
DZ/ZZ89	DF/ZF89	A300	10.9

Recommended bolt quality for FF/FAF and KF/KAF:

Parallel shaft gearboxes FF/FAF and bevel gearboxes KF/KAF in combination with larger motors must be bolted to the mounting surface with bolts of grade 10.9 (see table).

Gearbox type		Flange	Motor frame size						
			63	71	80	90	100	112	132
FF/FAF39	KF/KAF39	A160	8.8	8.8	8.8	10.9	10.9		
FF/FAF49	KF/KAF49	A200	8.8	8.8	8.8	8.8	10.9	10.9	
FF/FAF69	KF/KAF69	A250	8.8	8.8	8.8	8.8	8.8	8.8	10.9
FF/FAF79	KF/KAF79	A250	8.8	8.8	8.8	8.8	8.8	8.8	10.9
FF/FAF89	KF/KAF89	A300		8.8	8.8	8.8	8.8	10.9	10.9
	KF/KAF109	A350			8.8	8.8	8.8	8.8	8.8

We recommend that you consider the following possibilities:

- Selection of a larger output flange
- Use of bolts of grade 10.9
- Use of an anaerobic adhesive to improve the friction lock between the gearbox and the mounting surface

¹⁾ Use suitable washers underneath the bolt head.

Overview

Shaft load and bearing service life

Available radial force

The radial forces either come from the driven machine (mixer, hoisting gear) or they are caused by the transmission elements.

The available radial force F_{Ravail} at the output shaft is obtained as follows:

- The required geared motor output torque T_2
- Average diameter of the mounted transmission element d_0
- Transmission element type, e.g. chain wheel

The transmission element type determines the additional factor C (see table).

The ambient temperature determines the additional factor T .

$$F_{Ravail} = 2000 \cdot \frac{T_2}{d_0} \cdot C \cdot T$$

Additional factor C for the transmission element type

Transmission element	Explanation	Additional factor C
Gear wheel	> 17 teeth	1.00
	≤ 17 teeth	1.15
Chain wheel	≥ 20 teeth	1.00
	14 ... 19 teeth	1.25
	≤ 13 teeth	1.40
Toothed belts	Preloading force	1.50
V-belts	Preloading force	2.00
Flat belts	Preloading force	2.50
Agitator/mixer	Rotating radial force	2.50

Additional factor T for ambient temperature

Temperature range	Low-temperature factor T
-20 °C ... +60 °C	1.0
-21 °C ... -40 °C	1.5

Permissible radial force

The permissible radial force F_{R2} is determined by the required bearing service life, among other things. The nominal service life L_{h10} is determined in accordance with ISO 281. Normally, calculating the nominal bearing service life is completely adequate.

The bearing service life can be calculated for special operating conditions and in special cases on request, based on the modified service life L_{na} .

The selection tables specify the permissible radial force F_{R2} for the output shafts of foot-mounted gearboxes with solid shaft "1" (For further information and order codes see [Gearbox options](#)). These table values refer to the force application point at the center of the shaft extension and are minimum values, which apply under the most unfavorable conditions (force application angle, mounting position, direction of rotation).

If the values in the table are not sufficient, or if other gearbox designs are being used, please contact Siemens.

Permissible axial force

If no radial force is present, then max. 50 % of the permissible radial force can be applied as a permissible axial force F_{ax} (tension or compression).

Higher permissible radial and axial forces

The permissible radial force load can be increased, taking the force application angle α and the direction of rotation into account. Installing reinforced bearings also means that higher loads are permitted on the output shaft.

If higher radial or axial forces or combined loads comprising radial and axial forces occur, then please contact Siemens.

Note:

Bevel gearboxes B and K and helical worm gearboxes C in type of construction M1 with foot mounting on the face side: A maximum of 50 % of the radial force F_{R2} specified in the tables is permissible.

Helical geared motors ZB and DB in foot/flange-mounted designs:

When transmitting torque through the flange surface, a maximum of 50 % of the radial force F_{R2} specified in the tables is permissible.

Variables for defining shaft load and bearing service life

Code	Description	Unit
α	Force application angle	°
a	Gearbox constant	kNmm
b, d, l, y, z	Gearbox constants	mm
C	Additional factor to calculate the radial force	-
d_0	Average diameter of the mounted transmission element	mm
F_{ax}	Permissible axial force	N
F_x	Permissible radial force from out of center force application point	N
F_{xperm1}	Permissible radial force, limited by the bearing service life, at a distance of x from the shaft shoulder	N
F_{xperm2}	Permissible radial force, limited by the shaft strength, at a distance of x from the shaft shoulder	N
F_{Ravail}	Available radial force from the mounted transmission element	N
F_{R2}	Permissible radial force at the center of shaft extension (l/2)	N
L_{h10}	Nominal service life	h
L_{na}	Modified service life	h
T	Additional factor for ambient temperature	-
T_2	Geared motor output torque	Nm
x	Distance from the shaft shoulder up to the point where force is applied	mm

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a gearbox

Overview

Definition of the point of application of radial and axial forces

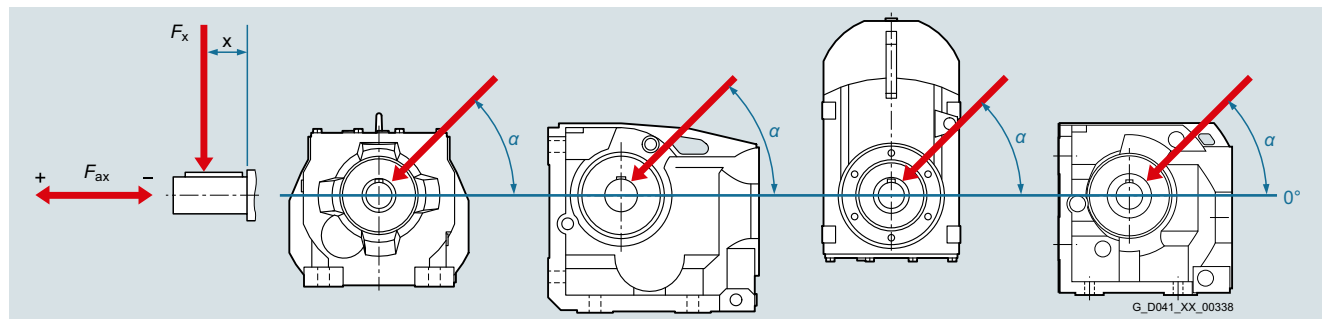


Diagram showing force application point

Radial force conversion for out of center force application point

If the force is not applied at the center of the shaft extension, the permissible radial force must be calculated using the following formula.

The lower value of F_{xperm1} (bearing service life) and F_{xperm2} (strength) is the permissible radial force. The calculation is applicable without axial force.

Permissible radial force according to the bearing service life

$$F_{xperm1} = F_{R2} \cdot \frac{y}{(z + x)}$$

Permissible radial force according to the shaft strength

$$F_{xperm2} = \frac{a}{(b + x)}$$

- Gearbox constants for calculating the radial force

Gearbox size	Constants					
	y mm	z mm	a kNmm	b mm	d mm	l mm
Helical gearboxes Z and D						
19	91	71	52.8	12	20	40
29	104	79	137	12	25	50
39	116	91	109	0	25	50
49	138	108	260	15	30	60
59	143.5	108.5	414	19	35	70
69	169	134	385	0	35	70
79	172.5	132.5	536	0	40	80
89	212.5	162.5	929	0	50	100
Helical gearboxes E						
39	99.5	79.5	60	0	20	40
49	119.0	94.0	100	0	25	50
69	139.6	109.6	183	0	30	60
89	154.4	114.4	320	0	40	80
Parallel shaft gearboxes F						
29	108.5	83.5	159	0	25	50
39	123.5	98.5	146	0	25	50
49	154.5	124.5	239	0	30	60
69	175	140	378	0	35	70
79	191	151	544	0	40	80
89	226	176	884	0	50	100

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a gearbox

Overview

- Gearbox constants for calculating the radial force

Gearbox size	Constants					
	y mm	z mm	a kNmm	b mm	d mm	l mm
Bevel gearboxes B						
19	97.5	77.5	38	0	20	40
29	117	97	83	0	20	40
39	143.5	113.5	209	0	30	60
49	175	140	392	0	35	70
Bevel gearboxes K						
39	123.5	98.5	152	0	25	50
49	154.5	124.5	235	0	30	60
69	175	140	378	0	35	70
79	191	151	556	0	40	80
89	226	176	916	0	50	100
109	256	196	1470	0	60	120
Helical worm gearboxes C						
29	117.5	97.5	84	0	20	40
39	123.5	98.5	157	0	25	50
49	154.5	124.5	236	0	30	60
69	171.5	136.5	410	0	35	70
89	220.0	175.0	736	0	45	90

Permissible torque for SIMOLOC assembly system

It is important to note that the maximum permissible torque is dependent on the selected machine shaft diameter.

Diameter of customer's shaft	Max. permissible torque T2					
	Nm					
	29	39	49	69	79	89
Metric shafts						
20	115					
25	150	205				
30		290	375			
35			480	460	840	
40				600	1 000	1 110
50						1 750
Imperial shafts						
0.75"	100					
1"	150	205				
1.1875"		290	375			
1.25"		290	415			
1.375"			480	460	840	
1.4375"			480	500	915	
1.5"				545	1 000	
1.625"				600	1 000	1 180
1.75"						1 375
1.9375"						1 680
2"						1 750

SINAMICS G115D distributed drive system • System overview

0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a gearbox

Overview

Additional moments of inertia

The motor moment of inertia with standard fan is specified in the motor selection lists.

Motor protection

Temperature-dependent protective devices are integrated in the motor winding and can be implemented as **temperature sensors** (Pt1000).

The rated response temperatures of the protective devices depend on the thermal class of the motors.

Degrees of protection

The motors are supplied in IP55 to standard IEC 60034-5. They can be installed in dusty or humid environments. The motors are suitable for operation in tropical climates. Guide value below 60 % relative air humidity for a coolant temperature of +40 °C.

Other requirements on request.

First digit	Brief description	Second digit	Brief description
4	The motor is protected against solid objects larger than 1 mm.	4	The motor is protected against water splashed from all sides.
5	The motor is protected against dust.	5	The motor is protected against strong jets of water.
6	The machine is dust-tight.	6	The motor is protected against "heavy seas" or powerful jets of water.
		7	The motor is protected against immersion.
		8	The motor is protected against long periods of immersion under pressure.

The first digit of the degree of protection indicates the degree to which an enclosure provides protection against contact and the ingress of foreign bodies.

The second digit indicates the protection that an enclosure offers regarding the ingress of water.

Increased corrosion protection as well as additional protective measures for the winding (protection against moisture and acid, corrosion protection in the motor) can support the selected degree of protection.

The degree of protection only refers to the motor. When selecting higher degrees of protection, the equipment on the gearbox side should be taken into account (seals, vents).

Cooling and ventilation

When the geared motor is mounted and the air intake is restricted, you must ensure that a minimum clearance is maintained between the fan cover and the wall and that the cooling air is not immediately drawn in again.

Further, it must be guaranteed that the cooling air flow to the gearbox is not obstructed. As a consequence, the gearbox operating temperature can be further reduced.

Bearing system

The bearing service life of motors with horizontal mounting is 40 000 hours if there is no additional axial loading at the coupling output and 20 000 hours when utilized according to the maximum admissible load. This assumes that the motor is operated at 50 Hz. The nominal bearing service life is reduced for converter operation at higher frequencies.

In order to achieve the calculated lifetime in continuous operation, the admissible vibration values (measured at end shield) must be determined according to evaluation zones A and B stipulated in ISO 10816. If higher vibration velocities occur in operation, special measures must be taken.

Please contact Siemens in this regard.

Overview

The brakes can be used as holding brakes. A holding brake is suitable for holding masses and loads at a fixed position.

The brakes are designed as fail-safe spring-operated brakes. When the brake is mounted, it increases the length of the motor. The dimensions are shown in the dimensional drawings.

The spring-operated disk brakes are suitable for a standard ambient temperature range of -20 to +40 °C.

Optionally also possible for -20 to +55 °C with order code **K94** or for -30 to +40 °C with order code **K97**.

Variables

Code	Description	Unit
f_{br}	Braking torque correction factor	-
J_{AD}	Moment of inertia of the adapter	kgm ²
J_B	Moment of inertia of the brake	kgm ²
J_G	Moment of inertia of the gearbox	kgm ²
J_{mot}	Moment of inertia of the motor	kgm ²
J_X	Moment of inertia of the load referred to the motor shaft	kgm ²
k	Factor for taking into account operating conditions	-
L_N	Service life of the brake lining until the maximum air gap is reached	h
n_{br}	Braking speed	rpm
η	Efficiency	%
Q_{perm}	Permissible operating energy	J
s_{br}	Braking distance	m
t_1	Brake application time	ms
t_{br}	Braking time	s
T_{2br}	Rated braking torque of the brake (dynamic after 100 rpm) in accordance with DIN VDE 0580	Nm
T_{4br}	Rated holding torque of the brake in accordance with DIN VDE 0580	Nm
T_x	Reduced load torque on the motor shaft	Nm
v	Travel velocity	m/s
W_1	Friction energy per braking operation	J
W_{tot}	Friction energy until the brake lining is replaced	MJ
W_V	Friction energy until the brake is readjusted	MJ
Z	Switching frequency	1/h

Determining the braking torque

The braking torque must be selected in accordance with the particular drive application.

The following criteria are decisive when it comes to making the selection:

- Static safety
- Required braking time
- Permissible brake delay
- Possible braking distance
- Brake wear

The braking torque is determined using the safety factor k , which can be selected in the range from 1.0 to 2.5. As a general rule of thumb, the factor for horizontal motion is approx. 1.0 to 1.5 and for vertical motion approx. 2.0 to 2.5. However, the precise braking torque depends to a large extent on the particular operating conditions.

The rated braking torque is referred to a speed of $n = 100$ rpm and decreases with increasing motor speed. When calculating the braking torque, this is taken into account using the correction factor f_{br} . This means that the rated braking torque is applicable for most braking operations for converter operation.

For line operation, braking is directly from the motor speed. In addition, for vertical conveyors, the increased speed when moving downwards must be taken into account.

$$T_{br} > T_x \cdot k \cdot f_{br}$$

Braking torques as a function of the speed and permissible speed limits

The braking torque available decreases with increasing motor speed.

The maximum permissible speeds, which the emergency stops can be executed from, should be considered as guide values and must be checked for the specific operating conditions.

The maximum permissible friction energy depends on the switching frequency. Increased wear can be expected when the brakes are used for emergency stops.

Braking energy per braking operation

The braking energy W per braking operation comprises the energy of the moments of inertia to be braked and the energy which must be applied in order to brake against a load torque.

T_x is positive if the load torque is working against the braking torque (horizontal motion, upward vertical motion).

T_x is negative if it supports the brake (downward vertical motion).

The permissible operating energy Q_{perm} must be checked against the relevant switching frequency. This is of particular importance for emergency-stop circuits.

$$W_1 = \frac{T_{2br}}{T_{2br} \pm T_x \cdot \eta} \cdot \frac{(J_G + J_{AD} + J_{mot} + J_x + J_B \cdot \eta) \cdot n_{br}^2}{182.5}$$

$$W_1 < Q_{perm}$$

Service life of the brake lining

The service life of the brake lining L_N until the air gap has to be readjusted depends on various factors. The main influencing factors include the masses to be braked, the motor speed, the switching frequency, and, therefore, the temperature at the friction surfaces.

This means it is not possible to specify a value for the friction energy until readjustment that is valid for all operating conditions. However, a wear calculation can be made according to the friction energy, so that the service life can be defined in normal operation.

Brake service life

The brake lining is subject to wear as a result of friction. As a consequence, the air gap increases and the brake application time lengthens.

Service life of the brake lining

$$L_N = \frac{W_V}{W_1 \cdot Z}$$

SINAMICS G115D distributed drive system • System overview

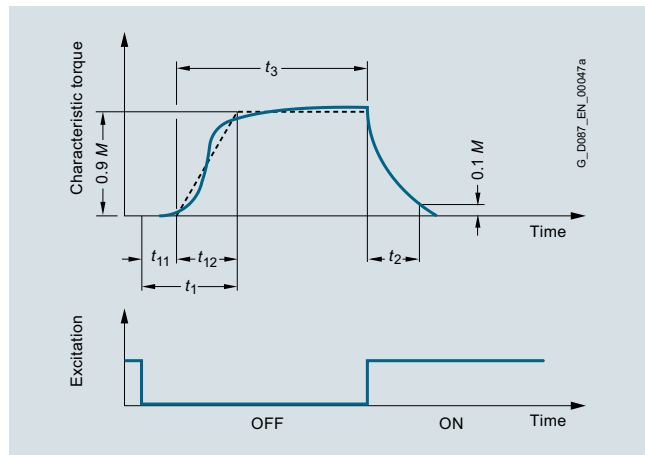
0.37 kW to 7.5 kW (0.5 to 10 hp)

Configuring guide • Configuring a brake

Overview

Brake control

Definition of operating times (VDI 2241)



Brake switching times

Switching times:

- t_1 Brake application time
- t_2 Disconnection time
- t_3 Slipping time
- t_{11} Response time
- t_{12} Rise time

Brake switching time

The total time it takes the motor to come to a standstill comprises the following times:

- Brake application time t_1
- Braking time t_{br}

The first is the time it takes the brake to reach 90 % of its braking torque. This time may be circuit- and control-dependent.

The braking time is determined as follows:

$$t_{br} = \frac{(J_G + J_{AD} + J_{mot} + J_B + J_x \cdot \eta) \cdot n_{br}}{9.55 \cdot (T_{2br} \pm T_x \cdot \eta)}$$

If T_x supports the braking operation, T_x is positive; otherwise it is negative.

Braking distance

Braking distance s_{br} is the distance traveled by the driven machine during braking time t_{br} and application time t_1 .

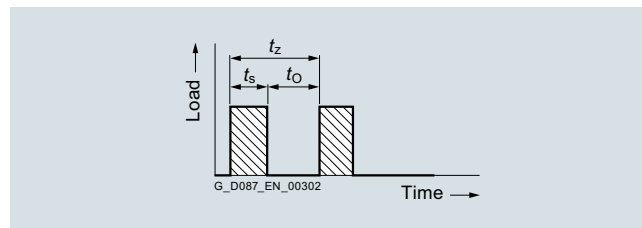
The formula below applies to horizontal motion and upward vertical motion.

$$s_{br} = v \cdot \left(\frac{t_1}{1000} + 0.5 \cdot t_{br} \right)$$

Relative duty cycle

The relative duty cycle DC is the ratio between the load duration and the cyclic duration. The cyclic duration is the sum of the ON times (operational periods) and the no-voltage periods.

$$DC = \frac{t_s}{t_s + t_o} \cdot 100$$

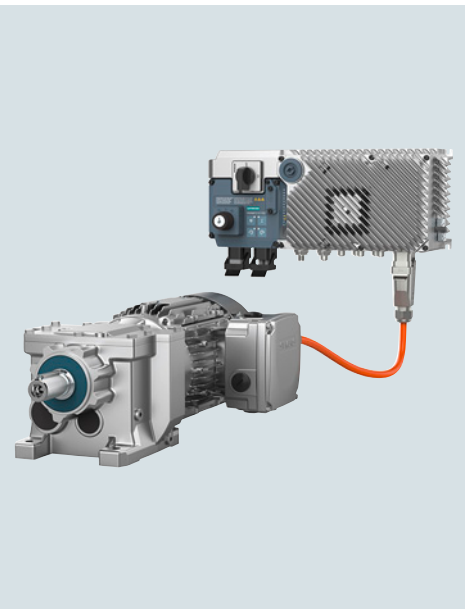


Relative duty cycle

Code	Description	Unit
DC	Relative duty cycle	%
t_s	Closing time (duty cycle)	s
t_o	Open time (off-load factor)	s
t_z	Cycle time (duty cycle time)	s

SINAMICS G115D distributed drive system • Wall-mounted 0.37 kW to 7.5 kW (0.5 to 10 hp)

7.2



7.2/2	SINAMICS G115D distributed drive system wall-mounted
7.2/2	Overview
7.2/3	Benefits
7.2/3	Application
7.2/4	Design
7.2/5	Function
7.2/6	Integration
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7.2/9	SINAMICS G115D distributed converters wall-mounted
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7.2/16	Dimensional drawings
7.2/18	SIMOGEAR geared motors for SINAMICS G115D wall-mounted
	<u>Selection and ordering data</u>
7.2/18	Structure of the Article No.
7.2/20	Orientation
7.2/22	Motor type asynchronous motors IE2/IE3
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	<u>Options</u>
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To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gearbox selection" or "Dimensional drawings" in the Industry Mall at:
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Overview

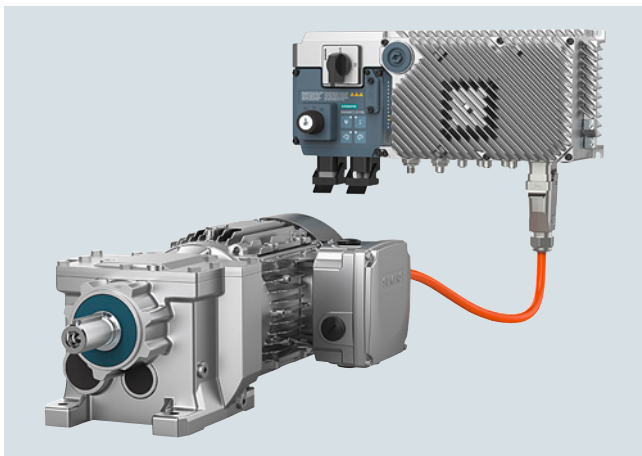
The SINAMICS G115D distributed drive system provides fully preconfigured and ready-to-connect solutions in a modular concept that includes the converter, motor and gearbox.

The wall-mounted converter with different unit versions (frame sizes FSA to FSC) in a performance range from 0.37 kW to 7.5 kW is suitable for a large number of different applications. The converter supports SIMOGEAR 2KJ8 geared motors with three-phase asynchronous motors with efficiency class up to IE3 or high-efficiency synchronous reluctance motors with efficiency class IE4.

It meets all requirements for horizontal conveyor system applications – from simple speed control to sophisticated encoderless vector control. Thanks to the compact design with degree of protection IP65 (plug-in connection) or IP66 (cable gland), it can be seamlessly integrated into the system.

The integrated conveyor technology functions make the SINAMICS G115D particularly suitable for applications in conveyor systems.

For applications that require safety technology, the SINAMICS G115D offers the integrated STO (Safe Torque Off) function, which can be implemented without additional external components.



Example: SINAMICS G115D distributed drive system, wall-mounted, PROFINET, version with plug-in connection, FSA, 1.5 kW, local remote control with key-operated switch and repair switch

Perfect combination with SIMATIC controllers and PROFINET

Integration via PROFINET communication with PROFIsafe, AS-Interface, EtherNet/IP into a higher-level control system is very easy thanks to full TIA Portal integration, which provides a tool as well as an operating and data management concept. In addition, an optional web server module is available with the web server module SINAMICS G120 Smart Access (SAM) – a WLAN-based web server solution for simple and fast wireless setup with smartphone, tablet or laptop during commissioning and for diagnostics.

The SINAMICS G115D distributed drive system is ready for digitalization. All operating data can be transferred to the MindSphere cloud solution. The MindSphere application "Analyze MyDrives" facilitates the process evaluation of operating data, with the possibility of adaptation to individual customer requirements. This simplifies the recording and evaluation of the operating conditions of the drive system.

Reasons for using the SINAMICS G115D distributed drive system

- User-friendly modular solution – pre-configured and ready for connection
- Versatile, robust and reliable system
- New design for quick and easy installation, cabling and commissioning
- The wall-mounted and motor-mounted variants use the same platform
- No control cabinet required, thanks to the installation on the machine less space required and lower cooling requirements
- Long cables between the converters and the motors can be avoided (thus less power loss, reduced interference emissions, and lower costs for shielded cables and additional filters)
- Supports SIMOGEAR 2KJ8 geared motors with asynchronous motors and high-efficiency synchronous reluctance motors according to efficiency class IE4
- Worldwide use of the SIMOGEAR 2KJ8 geared motors independent of the line voltage
- Temperature range from -30 °C to 55 °C (suitable for installation in deep-freeze applications)
- Integrated safety, STO (Safe Torque Off) via fail-safe digital input F-DI or PROFIsafe
- Perfectly prepared for digitalization thanks to various communications interfaces and integration of the AMD (Analyze MyDrives) application into the MindSphere cloud solution
- Special properties for the intralogistics market (e.g. repair switches, local remote control, Safety Integrated, conveyor technology functions)

The family of distributed drive systems at Siemens

Siemens offers an innovative portfolio of frequency converters for optimal implementation in distributed drive solutions. The strengths of the individual members of the converter family allow easy adaptation to the most diverse application requirements:

- Identical connection systems
- User-friendly commissioning and configuration tools

Products from the family of distributed drives:

- SINAMICS G115D distributed drive system (wall and motor-mounted)
- SINAMICS G120D frequency converters
- SIMATIC ET 200pro FC-2 frequency converters
- SIRIUS M200D motor starters

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Overview

Hardware configuration

The SINAMICS G115D distributed drive system is available as a wall-mounted and motor-mounted version, with degree of protection IP65/66.

The performance range for the wall-mounted version, for ranges from 0.37 kW to 7.5 kW and in the motor-mounted version, for ranges from 0.37 kW to 4 kW.

The converter is configurable regarding fieldbus communication (without, AS-Interface or PROFINET / EtherNet/IP) and connection method (cable gland or plug-in connection). Furthermore, the wall-mounted version can be configured with a repair switch, local remote control and the control voltage of the motor holding brake.

State-of-the-art IGBT technology with pulse width modulation (PWM) is used for extremely reliable and flexible motor operation. The closed-loop control electronics control and monitor the power electronics and the connected motor in several different control modes that can be selected.

The sensors of the conveyor element can be connected to the digital inputs of the converter. These signals can be transmitted to the higher-level control for further processing via PROFINET, EtherNet/IP or AS-Interface.

Safety Integrated

The SINAMICS G115D distributed drive systems are already equipped with the Safety Integrated Function STO (Safe Torque Off), with certification according to IEC 61508 SIL 2 as well as EN ISO 13849-1 PL d and Category 3. This can be activated either via the PROFIsafe communication protocol or via the fail-safe digital input F-DI.

Benefits

Easy commissioning

- Pre-assembled and pre-commissioned system with SIMOGEAR
- Loop-through of 24 V DC and 380 to 480 V 3 AC and communication – no T distributors necessary
- Internal braking resistor – typical applications can be implemented without external braking resistor; optional external braking resistors are available for higher regenerative energy.
- Robust with degree of protection IP65/66, ambient temperature from -30 °C to 55 °C
- Quick and easy commissioning options:
 - via local DIP switches and potentiometers
 - via web server module SINAMICS G120 Smart Access (SAM) with web server and WLAN connection for using a smartphone, tablet or laptop in just a few steps
 - via TIA Portal with SINAMICS Startdrive for the use of a PC
- Wiring of the drive system either via screw connections or via plug connectors. Communication (PROFINET, EtherNet/IP or AS-Interface) generally via plug connectors
- Local diagnostics with LEDs
- Uploading, backup and cloning of the parameters with SINAMICS SD memory card

Full functionality

- Integrated communication: PROFINET, EtherNet/IP and AS-Interface
- Integrated Safety Functions (STO locally via fail-safe digital input F-DI or via PROFIsafe communication protocol)
- Inputs/outputs can be used as distributed I/O of the PLC
- Basic PLC functions and additional functions for conveyor technology:
 - Horizontal conveyors: fast/slow, Quick Stop, 1 or 2 directions
 - Rotary table: fast/slow, Quick Stop, 2 or 3 positions and limit trip
 - Corner transfer conveyors lift drive: fast/slow, Quick Stop and limit trip
 - Traversing carriage: fast/slow, Quick Stop and limit trip

Efficient engineering

- Full integration in Totally Integrated Automation, Totally Integrated Automation Portal and Integrated Drive System
- Intuitive selection tools
 - Drive Technology Configurator (DTC)
 - TIA Selection Tool (TST)
- SINAMICS Startdrive as part of the TIA Portal offers complete integration for intuitive parameterization
- Automatic diagnostics in combination with SIMATIC control

Flexible commissioning functions

- Integrated conveyor technology functions
 - Quick Stop function for fast reaction times for the sensors, e.g. roller conveyors, belt conveyors
 - Limit switch function, e.g. for rotary table, corner transfer unit
- Graphical commissioning of the conveyor technology functions in just a few steps
- Integrated inputs/outputs with variable assignment
- Use of the same software tool (SINAMICS Startdrive) as for all SINAMICS drives

Extended warranty

For SINAMICS G115D, Siemens offers an extended warranty of up to 4 years:

- 18-month standard warranty
- Optional extension via **Service Protect**
 - Free for the first 6 months after registering the product at: <https://myregistration.siemens.com>
 - With costs for 1 or 2 additional years for wall-mounted and motor-mounted versions (complete system with converter and geared motor)

You can find more information at:

<https://support.industry.siemens.com/cs/ww/en/sc/4842>

Application

The SINAMICS G115D distributed drive system is ideally suited for horizontal conveyor applications, e.g.:

- Roller, belt and chain conveyors
- Simple rotary tables
- Simple transverse shuttles

Reliable operation in harsh environments

The SINAMICS G115D distributed drive system is suitable for use in harsh environments

- Degree of protection IP65 (plug-in connector) or IP66 (cable gland)
- Use in ambient temperatures from -30 °C to 55 °C
- Coated PCBs for increased resistance to humidity and dust (Class 3C2), operation according to EN 60721-3-3

SINAMICS G115D distributed drive system • Wall-mounted

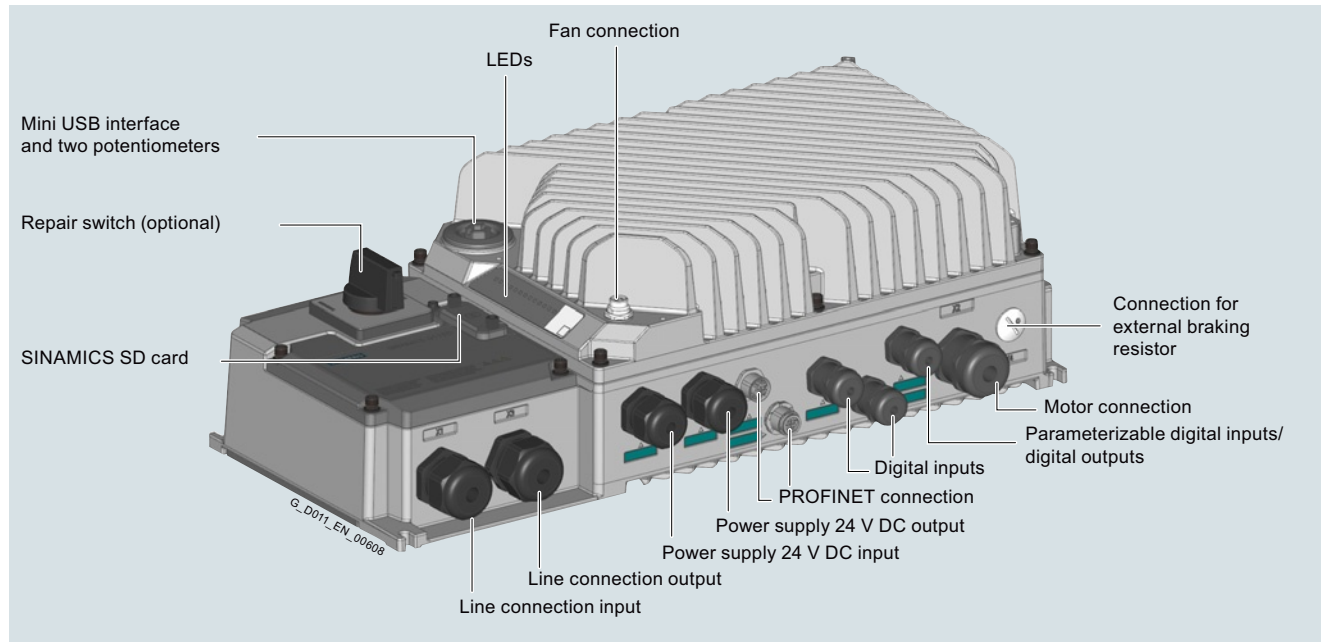
0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Design

The converter is configurable regarding fieldbus communication (without, AS-Interface or PROFINET / EtherNet/IP) and connection system (cable gland or plug-in connection).

Furthermore, the wall-mounted version can be configured with a repair switch, local remote control and the control voltage of the motor holding brake.



Example: SINAMICS G115D, wall-mounted, version with cable gland and optional repair switch

Repair switch

The wall-mounted converter is available as a version with an integrated repair switch. The repair switch isolates the SINAMICS G115D distributed drive system on the line side from the line supply. It can be secured against reconnection. The switch position can be evaluated with a status signal.

Local remote control with key-operated switch

Master control can be toggled between automatic mode (PLC) and local remote mode using the local remote control. This can also be used to switch off the converter and acknowledge pending faults. Additional functions include switching over between continuous and jog mode, starting the motor including direction of rotation and deactivating the Quick Stop in the manual mode.

24 V DC power supply

The SINAMICS G115D converter is available as a version with an integrated 24 V DC power supply. If this is switched off in a version with the integrated repair switch, the 24 V DC power supply continues to remain active.

Brake control

As standard, brake control with 180 V DC (independent of the line voltage) is integrated. An optional brake control with 380 V to 480 V AC (same as the line voltage) can be selected.

Supplementary system components

SINAMICS SD memory card

The parameter settings of the converter and the firmware can be stored on the optional SINAMICS SD memory card. When service is required, the data are automatically downloaded from the memory card in the converter and the system is ready for use again without further interventions.

External braking resistors

Regenerative energy is converted to heat via the internal braking resistor integrated as standard. Optional external braking resistors are available for higher regenerative energy.

Installation kit

An installation kit with cable glands for the line supply (X1/X3), the motor (X2), the 24 V DC power supply (X01/X02) and the digital inputs/digital outputs (X07/X08/X05) can be ordered for the connection.

Cover kit

The cover kit is used to protect the unused connector plugs for line supply, loop-through (X3) and 24 V DC loop-through (X02).

Connecting cables for communication

Flexible plug-in cables to transfer data between the PROFINET/Industrial Ethernet stations or AS-Interface stations, as well as for 24 V DC power supply.

Connecting cables for line supply, power loop-through and power bus distribution

Connector sets to connect to the line supply and the outgoing motor feeder are available as accessories as well as pre-assembled motor cables for connection to the motor.

PC converter connection kit 2 (mini USB interface cable) for communication with a PC

For controlling and commissioning a converter directly from a PC if the appropriate software (commissioning tool SINAMICS Startdrive V16 update 4 and higher) is installed.

SINAMICS G120 Smart Access (SAM) web server module

Smart Access for the SINAMICS G115D distributed drive system with web server for easy commissioning and diagnostics via WLAN with a smartphone, tablet or laptop in just a few steps.

Interface kit for SINAMICS G120 Smart Access (SAM) web server module

With the interface kit, the SINAMICS G120 Smart Access web server module can be connected to the SINAMICS G115D converter.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Design

SINAMICS G115D training case

The SINAMICS G115D training case is a convincing demonstration system thanks to its compact design. It is suitable for direct customer presentations as well as for testing in the technical department. The functions of SINAMICS G115D in combination with a SIMOGEAR geared motor can be demonstrated and tested quickly and easily with this case.

Spare parts

Electronic Modules

The entire drive electronics is located in the Electronic Module. Thus, in most service cases only this module must be replaced. If a converter fails, this replacement can be performed easily and quickly.

Spare parts kit

A spare parts kit is available, which contains small parts such as seals, cover caps and screws.

Replacement fan

A replacement fan is available, which consists of a pre-assembled unit comprising cover, fan and screws.

Function

Technology functions

Specific functions for conveyor technology:

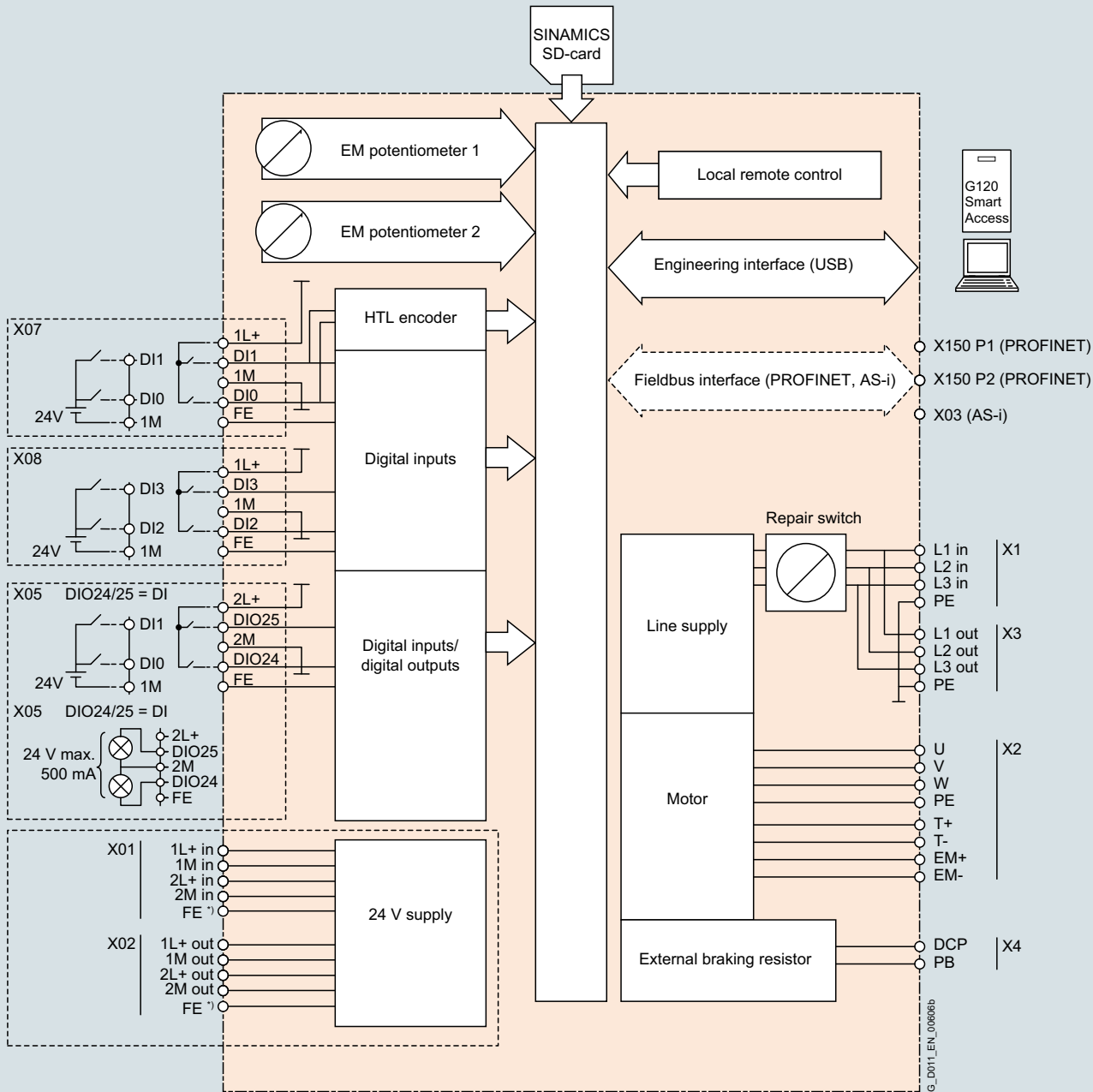
- Integrated communication: PROFINET / EtherNet/IP or AS-Interface
Furthermore, the “Without fieldbus communication (I/O Control)” version is available.
- Integrated Safety Functions (STO locally via fail-safe digital input F-DI or via PROFIsafe communication protocol)
- Inputs/outputs can be used as distributed I/O of the PLC
- Basic PLC functions and additional functions for conveyor technology:
 - Chain and belt conveyors: fast/slow, Quick Stop, 1 or 2 directions
 - Rotary table: fast/slow, Quick Stop, 2 or 3 positions and limit trip
 - Corner transfer conveyors lift drive: fast/slow, Quick Stop and limit trip
 - Traversing carriage: fast/slow, Quick Stop and limit trip

SINAMICS G115D distributed drive system • Wall-mounted

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SINAMICS G115D distributed drive system wall-mounted

Integration



1) The functional earth FE is not connected when using the connection type "plug-in connection".

Connection example for SINAMICS G115D, wall-mounted

7
2

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Configuration

The following configuring tools and engineering tools are available for the SINAMICS G115D:

Drive Technology Configurator (DT Configurator)

The Drive Technology Configurator (DT Configurator) helps you configure the optimum drive technology products for a number of applications – starting with gearboxes, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems. The DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SINAMICS Startdrive commissioning tool (V16 update 4 and higher)

SINAMICS Startdrive is a tool integrated into the TIA Portal for configuring, commissioning and diagnostics of the SINAMICS converter family. SINAMICS Startdrive (V16 update 4 and higher) can be used for implementing drive tasks with most of the SINAMICS G and SINAMICS S converter series. The commissioning tool has been optimized in terms of simplicity, ease of use, and consistent use of the benefits of the TIA Portal to provide a uniform working environment for PLC, HMI and drives.

The SINAMICS Startdrive commissioning tool is available for free on the internet at:

www.siemens.com/startdrive

Drive dimensioning of the SINAMICS G115D distributed drive system with the TIA Selection Tool

The SINAMICS G115D distributed drive system is easily configured with the TIA Selection Tool under the Drive Dimensioning plug-in. It provides support when selecting the hardware and firmware components necessary to implement a drive task. The plug-in encompasses the configuration of the entire drive system and allows the handling of individual drives.

- Intuitive user interface, menu-based operation and help
- Configuration of the SINAMICS G115D distributed drive system
- Adjustable load cycles and various mechanical systems integrated
- Interface to the TIA Portal and Industry Mall

The TIA Selection Tool is available for free on the internet at www.siemens.com/tia-selection-tool-standalone

SIMARIS planning tools for plants with SINAMICS drives (available soon)

Electrical planning: Even easier with software!

Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools:

- SIMARIS design for dimensioning
- SIMARIS project for calculating the space requirements of the distribution boards

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed drive system wall-mounted

Technical specifications

General technical specifications	SINAMICS G115D distributed converters	SIMOGEAR 2KJ8 geared motors (for SINAMICS G115D wall-mounted)
Mechanical specifications		
Vibration and shock load • Transport according to EN 60721-3-2: 1997 • Operation according to EN 60721-3-3: 1995	Class 1M2 Class 3M2	– –
Maximum permissible vibration and shock load	–	ISO 20816-1 Zone A
Ambient conditions		
External 24 V supply According to IEC 60204-1	Touch-proof SELV or PELV power supply. The supply voltage must not exceed 60 V DC under single-fault conditions.	Touch-proof SELV or PELV power supply. The supply voltage must not exceed 60 V DC under single-fault conditions.
Protection class According to IEC 61800-5-1	Class I (with protective grounding conductor)	Class I (with protective grounding conductor)
Degree of protection The degree of protection according to IEC 60034-5 (EN 60034-5) only refers to the motor.	IP65 (for plug-in connection) IP66 (for cable gland) IP65 (for cable gland and motor connection Q8/0) UL type 4X (except for MQ15/Quickon versions)	IP55 IP56 ¹⁾ , IP65, when selecting these higher degrees of protection, the gearbox side should be taken into account (seals, vents). UL TEFC
Permissible ambient or coolant temperature (air) during operation	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Relative air humidity	<95 % condensation, icing and salt mist not permissible	<95 % condensation, icing and salt mist not permissible
Environmental class/ harmful chemical substances Operation acc. to EN 60721-3-3	Class 3C2	Class 3C2
Degree of pollution According to EN 61800-5-1	2	2
Permissible noise limits According to EN 60034-9: 2008-01	–	Limit values for the motors on the converter are undershot. By increasing the clock frequency on the converter, the motor noises can also be reduced.
Certification for fail-safe versions		
• According to EN ISO 13849-1 • According to IEC 61508 • According to EN ISO 13849-1 • PFH according to IEC 61800-5-2 • PFD according to IEC 61508 • Duration of assignment T1	Category 3 SIL 2 PL d <50 × 10 ⁻⁹ <50 × 10 ⁻⁵ 20 years	– – – – – –
Standards		
Compliance with standards ²⁾	UL 61800-5-1 (UL list number E355661), CE, UKCA, RCM, EAC, KC	UL 1004-1 and UL 1004-6 CSA-C22.2 No. 100 CE, UKCA, EAC
CE marking, according to	Low-Voltage Directive 2014/35/EU Eco-design requirements of EU Directive 2019/1781	Machinery Directive 2006/42/EC Eco-design requirements of EU Directive 2019/1781 EMC Directive 2014/30/EU RoHS Directive 2011/65/EU
EMC Directive • Frame sizes FSA to FSC with integrated line filter	Category C2 according to EN 61800-3 (corresponds to class A according to EN 55011)	–

More information

Compact Operating Instructions are supplied in hard copy form in German, English and Chinese with every SINAMICS G115D.

To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gear-box selection" or "Dimensional drawings" in the Industry Mall at: www.siemens.com/sinamics-g115d/gear-selection-wall-mounted

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions) as well as further technical specifications are available on the internet at:

www.siemens.com/sinamics-g115d/documentation

and in the Drive Technology Configurator (DT Configurator): www.siemens.com/sinamics-g115d/configuration

¹⁾ No brake and no 10 or 12-pole plug possible.

²⁾ The SINAMICS G115D drive system does not fall in the area of validity of the China Compulsory Certification (CCC). The SIMOGEAR 2KJ8 geared motors are designed exclusively for converter operation and the rated frequency of the asynchronous motors is not 50 Hz; therefore they do not fall in the area of validity of the China national standards GB 18613-2020 and CEL 007-2021 (China Energy Label).

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Selection and ordering data

SINAMICS G115D distributed converters wall-mounted - 380 ... 480 V 3 AC					
Rated power ¹⁾		Rated output current I_N ²⁾	Rated input current ³⁾	Frame size	SINAMICS G115D wall-mounted Degree of protection IP65/IP66/UL Type 4X with integrated line filter class A according to EN 55011
400 V kW	480 V hp	at 400 V A	at 400 V A		Data position in Article No.
					1 2 3 4 5 6 7 - 8 9 10 11 12 - 13 14 15 16
380 ... 480 V 3 AC · Rated pulse frequency 4 kHz · Input frequency 45 ... 66 Hz					
0.37	0.5	1.3	1.23	FSA	6 S L 3 5 2 - - X 0 - 3 A 0
0.55	0.75	1.7	1.58	FSA	6 S L 3 5 2 - - X 0 - 5 A 0
0.75	1	2.2	1.99	FSA	6 S L 3 5 2 - - X 0 - 7 A 0
1.1	1.5	3.1	2.69	FSA	6 S L 3 5 2 - - X 1 - 1 A 0
1.5	2	4.1	3.48	FSA	6 S L 3 5 2 - - X 1 - 5 A 0
2.2	3	5.9	5.18	FSB	6 S L 3 5 2 - - X 2 - 2 A 0
3.0	4	7.7	6.76	FSB	6 S L 3 5 2 - - X 3 - 0 A 0
4.0	5	10.2	8.95	FSB	6 S L 3 5 2 - - X 4 - 0 A 0
5.5	7.5	13.2	11.88	FSC	6 S L 3 5 2 - - X 5 - 5 A 0
7.5	10	19	17.11	FSC	6 S L 3 5 2 - - X 7 - 5 A 0

Article No. supplements

Brake control

180 V DC (independent of the line voltage) *)

380 ... 480 V AC (such as line voltage)

0

1

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

0

1

2

3

Connection type	Fieldbus communication	I/O	Motor	380 ... 480 V AC	24 V DC	
Cable gland with daisy chain	without	Cable gland *)				A 0
		Cable gland			Power supply unit integrated	H 0
M12	M12	Cable gland *)				A 2
		M12 Cable gland				A 6
		Q8/0	Cable gland			R 0
		Cable gland			2 × Power M12 ⁶⁾	R 1
		Cable gland			Power supply unit integrated	H 2
		M12	Cable gland		Power supply unit integrated	H 6
Plug-in connection without daisy chain	M12	M12	Q8/0	Q4/2	7/8* ⁵⁾	B 0
					Power M12 ⁶⁾	B 4
				Quickon ⁴⁾	Power M12 ⁵⁾	C 0
				MQ15 ⁴⁾	Power M12 ⁵⁾	D 0
				Q4/2	Power supply unit integrated	K 0
				Quickon ⁴⁾	Power supply unit integrated	L 0
Plug-in connection with daisy chain	M12	M12	Q8/0	2 × Q4/2	2 × 7/8* ⁵⁾	E 0
					2 × Power M12 ⁶⁾	E 4
					Power supply unit integrated	N 0

Fieldbus communication

AS-Interface ⁷⁾

Without fieldbus communication

PROFINET, EtherNet/IP ⁷⁾

A

B

F

* If you select "Brake voltage 180 V DC" and "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from **standard delivery time** to **delivery ex stock**.

- Rated power based on the rated output current I_N . The rated output current I_N is based on the duty cycle for high overload (HO).
- The rated output current I_N is based on the duty cycle for high overload (HO). These current values apply at 400 V and are specified on the rating plate of the converter.
- The input current depends on the motor load and line impedance. The input currents apply for a load at rated power for a line impedance corresponding to $u_K = 4\%$. The current values are specified on the rating plate of the converter.

- Not suitable for UL applications (FSA and FSB). Not available for FSC.
- Plug-in connector with fieldbus communication AS-Interface not available.
- Version with fieldbus communication AS-Interface cannot be ordered.
- For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Technical specifications

Converters - General technical specifications	
Line voltage	380 V (-10 %) ... 480 V (+10 %) 3 AC
Line supply requirements	$u_K < 4\%$ ($R_{SC} > 25$)
Short-circuit power ratio R_{SC}	
Input frequency	45 ... 66 Hz
Output frequency	
• Control mode V/f	0 ... 550 Hz
• Control mode Vector	0 ... 240 Hz
Pulse frequency	4 kHz (standard); 4 ... 16 Hz (in steps of 2 kHz) see derating data
Power factor	0.80 ... 0.91
Converter efficiency acc. to IEC 61800-9-2	95 ... 98 %
Efficiency class acc. to IEC 61800-9-2	IE2
Output voltage, max. as % of input voltage	87 ... 95 %
Overload capability	
• High overload (HO)	2 × rated output current for 3 s, followed by 1.5 × rated output current for 57 s, over a cycle time of 300 s
Electromagnetic compatibility	Integrated line filter category C2 according to EN 61800-3 (corresponds to class A according to EN 55011)
Possible braking methods	<ul style="list-style-type: none"> • Dynamic brake with internal braking resistor • Dynamic brake with external braking resistors $R_{min} = 200\ \Omega$ (for FSA), $R_{min} = 80\ \Omega$ (for FSB), $R_{min} = 40\ \Omega$ (for FSC) • Electromechanical (EM) brake: <ul style="list-style-type: none"> - 180 V DC (independent of the line voltage, max. output current 0.8 A) Disconnection on the DC side permits short brake application times. - 380 ... 480 V AC (such as line voltage, max. output current 1 A)
Degree of protection	IP65 (for plug-in connection) IP66 (for cable gland) IP65 (for cable gland and motor connection Q8/0) UL type 4X (except for MQ15/Quickon versions)

Converters - General technical specifications	
Operating temperature	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Permissible mounting positions	All Derating for specific mounting positions, see operating instruction on the internet at: www.siemens.com/sinamics-g115d/ documentation
Relative air humidity	<95 % condensation, icing and salt mist not permissible
Cooling	
• 0.37 ... 3 kW	Natural cooling
• 4 ... 7.5 kW	External cooling with mounted fan
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating Over 1000 m (3281 ft) to 4000 m (13124 ft) see derating data
Short Circuit Current Rating (SCCR) ¹⁾	65 kA
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Phase failure detection • Overvoltage • Overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Converter overtemperature • Parameter locking
Compliance with standards	UL 61800-5-1 (UL list number E355661), CE, UKCA, RCM, EAC, KC
CE marking, according to	Low-Voltage Directive 2014/35/EU Eco-design requirements of EU Directive 2019/1781 Filtered variants also: EMC Directive 2014/30/EU

¹⁾ Applies to industrial control cabinet installations according to
NEC Article 409 or UL 508A.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Technical specifications

Converter	I/O	AS-Interface	PROFINET, EtherNet/IP
6SL352 . . . X . . . -	. AB0	. AA0	. AF0
Electrical specifications			
Operating voltage	External 24 V DC		
Current consumption (from the 24 V DC supply)			
• With Power Module frame size FSA	250 mA	290 mA	290 mA
• With Power Module frame size FSA without fan (2.2 kW and 3 kW)	250 mA	290 mA	290 mA
• With Power Module frame size FSB with fan (4 kW)	510 mA	550 mA	550 mA
• With Power Module frame size FSC with fan	540 mA	580 mA	580 mA
Interfaces			
Digital inputs (not isolated)	4 programmable, PNP, SIMATIC compatible		
• Optional for safe inputs, parameterizable	2 DI = 1F-DI		
• Optionally usable as encoder inputs	2, for connection of an HTL encoder (A and B track)		
• Conductor cross-section (only for version with cable gland)	0.25 ... 0.34 mm ² (24 ... 22 AWG) with end sleeves		
Digital outputs	2, switchable DI/DO		
• Optional for safe inputs, parameterizable	–		
• Conductor cross-section (only for version with cable gland)	0.25 ... 0.34 mm ² (24 ... 22 AWG) with end sleeves		
Bus interface			
Motor temperature sensor	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000
Control of a mechanical motor brake	✓	✓	✓
Slot for SINAMICS SD memory card	✓	✓	✓
Commissioning interface			
• PROFINET	–	–	✓
• Mini-USB	✓	✓	✓
Safety functions			
Integrated safety functions acc. to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3	Safe Torque Off (STO)		
• F-DI	✓	✓	✓
• PROFIsafe	–	–	✓ (not with EtherNet/IP)
Open-loop/closed-loop control methods			
V/f linear/quadratic/parameterizable	✓		
V/f with flux current control (FCC)	✓		
Vector control, sensorless	✓		
Torque control, sensorless	✓		

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted**Technical specifications**

Converter	I/O	AS-Interface	PROFINET, EtherNet/IP
6SL352 . . . X . . . -	. AB0	. AA0	. AF0
Software functions			
Fixed frequencies	✓		
Signal interconnection with BICO technology	✓		
Automatic restart after line supply failure or operating fault	✓		
Slip compensation	✓		
Free function blocks (FFB) for logical and arithmetic operations	✓		
Ramp smoothing	✓		
4 selectable drive data sets	✓		
4 selectable command data sets (CDS) (manual/auto)	✓		
Flying restart	✓		
JOG	✓		
Cyclic recording of ramp-up and ramp-down	-	✓	✓
Technology controller (PID)	✓		
Conveyor technology functions	-	✓	✓
Thermal motor protection	✓		
Thermal converter protection	✓		
Setpoint input	✓		
Motor identification	✓		
Motor holding brake	✓		
Mechanical specifications and ambient conditions			
Degree of protection	IP65/IP66/UL type 4X		
Operating temperature	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics		
Storage temperature	-40 ... +70 °C (-40 ... 158 °F)		
Relative air humidity	<95 % condensation, icing and salt mist not permissible		

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Technical specifications

Line voltage 380 ... 480 V 3 AC 6SL352 . -		SINAMICS G115D distributed converters				
		. X . . 0-3A . 0	. X . . 0-5A . 0	. X . . 0-7A . 0	. X . . 1-1A . 0	. X . . 1-5A . 0
Rated output current I_N ¹⁾	A	1.3	1.7	2.2	3.1	4.1
Maximum output current I_{max}	A	2.6	3.4	4.4	6.2	8.2
Rated power	kW	0.37	0.55	0.75	1.1	1.5
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η according to IEC 61800-9-2		94.60	95.40	96.23	96.67	96.87
Power loss ²⁾ according to IEC 61800-9-2 at rated output current	kW	0.034	0.038	0.043	0.054	0.067
Internal braking resistor						
• Continuous braking power P_{DB} (ambient temperature ≤ 40 °C (104 °F))	W	10	10	10	10	10
• Peak power P_{max} (cycle time 12 s within 120 s (corresponds to 10 % on-load factor)) (ambient temperature ≤ 40 °C (104 °F))	W	100	100	100	100	100
Rated input current ³⁾	A	1.23	1.58	1.99	2.69	3.48
Line supply connection U1/L1, V1/L2, W1/L3, PE						
• Conductor cross-section	mm ²	1.5 ... 6 14 ... 9 AWG	1.5 ... 6 14 ... 9 AWG	1.5 ... 6 14 ... 9 AWG	1.5 ... 6 14 ... 9 AWG	1.5 ... 6 14 ... 9 AWG
PE connection (external connection)						
• Conductor cross-section (recommended)	mm ²	10	10	10	10	10
Motor connection						
• Conductor cross-section						
- U2, V2, W2, PE	mm ²	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG
- Motor brake	mm ²	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG
- Temperature sensor	mm ²	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG
Degree of protection		IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X
Frame size		FSA	FSA	FSA	FSA	FSA
Dimensions						
• Width	mm (in)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)	380 (14.96)
• Height ⁴⁾	mm (in)	156 (6.14)	156 (6.14)	156 (6.14)	156 (6.14)	156 (6.14)
• Depth	mm (in)	129 (5.08)	129 (5.08)	129 (5.08)	129 (5.08)	129 (5.08)
Weight, approx. The exact weights can be found in the data sheet resulting from the configuration on the DT Configurator.	kg (lb)	6.8 (14.99)	6.8 (14.99)	6.8 (14.99)	6.8 (14.99)	6.8 (14.99)

¹⁾ The rated output current I_N is based on the duty cycle for high overload (HO).

²⁾ Typical values. More information can be found on the internet at <https://support.industry.siemens.com/cs/document/94059311>

³⁾ The input current depends on the motor load and line impedance. The input currents apply for load at rated power for a line impedance corresponding to $u_K = 4\%$.

⁴⁾ The height values are valid without taking into account the connection. Depending on the connection type, the additional height is:
- For version with cable gland: 30 mm (1.18 in)
- For version with cable gland and motor connection Q8/0: 42 mm (1.65 in)
- For version with plug-in connection: 47.5 mm (1.87 in)
- For version with 24 V DC power supply: 60 mm (2.3 in)
The version with cable gland has no cable gland in the delivery state. The dimensions with cable gland apply to the converter with cable gland equipped with the optionally available installation kit for SINAMICS G115D wall-mounted.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Technical specifications

Line voltage 380 ... 480 V 3 AC 6SL352 . -		SINAMICS G115D distributed converters				
		. X . . 2-2A . 0	. X . . 3-0A . 0	. X . . 4-0A . 0	. X . . 5-5A . 0	. X . . 7-5A . 0
Rated output current I_N ¹⁾	A	5.9	7.7	10.2	13.2	19
Maximum output current I_{max}	A	11.8	15.4	20.4	26.4	38
Rated power	kW	2.2	3	4	5.5	7.5
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η according to IEC 61800-9-2		96.87	96.85	96.74	97.68	97.69
Power loss ²⁾ according to IEC 61800-9-2 at rated output current	kW	0.096	0.126	0.173	0.171	0.246
Internal braking resistor						
• Continuous braking power P_{DB} (ambient temperature ≤ 40 °C (104 °F))	W	10	10	10	20	20
• Peak power P_{max} (cycle time 12 s within 120 s (corresponds to 10 % on-load factor)) (ambient temperature ≤ 40 °C (104 °F))	W	100	100	100	200	200
Rated input current ³⁾	A	5.18	6.76	8.95	11.88	17.11
Line supply connection U1/L1, V1/L2, W1/L3, PE						
• Conductor cross-section	mm ²	2.5 ... 6 13 ... 9 AWG	2.5 ... 6 13 ... 9 AWG	2.5 ... 6 13 ... 9 AWG	4 ... 6 11 ... 9 AWG	4 ... 6 11 ... 9 AWG
PE connection (external connection)						
• Conductor cross-section (recommended)	mm ²	10	10	10	10	10
Motor connection						
• Conductor cross-section - U2, V2, W2, PE	mm ²	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	4 12 AWG	4 12 AWG
- Motor brake	mm ²	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG	0.75 ... 4 18 ... 12 AWG
- Temperature sensor	mm ²	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG	0.75 ... 1.5 18 ... 16 AWG
Degree of protection		IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X	IP65/IP66/UL type 4X
Frame size		FSB	FSB	FSB	FSC	FSC
Dimensions						
• Width	mm (in)	425 (16.73)	425 (16.73)	425 (16.73)	425 (16.73)	425 (16.73)
• Height ⁴⁾	mm (in)	180 (7.09)	180 (7.09)	180 (7.09)	180 (7.09)	180 (7.09)
• Depth	mm (in)	134 (5.28)	134 (5.28)	169 (6.65)	169 (6.65)	169 (6.65)
Weight, approx. The exact weights can be found in the data sheet resulting from the configuration on the DT Configurator.	kg (lb)	8.4 (18.52)	8.4 (18.52)	8.8 (19.40)	9.1 (20.07)	9.1 (20.07)

¹⁾ The rated output current I_N is based on the duty cycle for high overload (HO).

²⁾ Typical values. More information can be found on the internet at <https://support.industry.siemens.com/cs/document/94059311>

³⁾ The input current depends on the motor load and line impedance. The input currents apply for load at rated power for a line impedance corresponding to $u_K = 4\%$.

⁴⁾ The height values are valid without taking into account the connection. Depending on the connection type, the additional height is:

- For version with cable gland: 30 mm (1.18 in)
- For version with cable gland and motor connection Q8/0: 42 mm (1.65 in)
- For version with plug-in connection: 47.5 mm (1.87 in)
- For version with 24 V DC power supply: 60 mm (2.3 in)

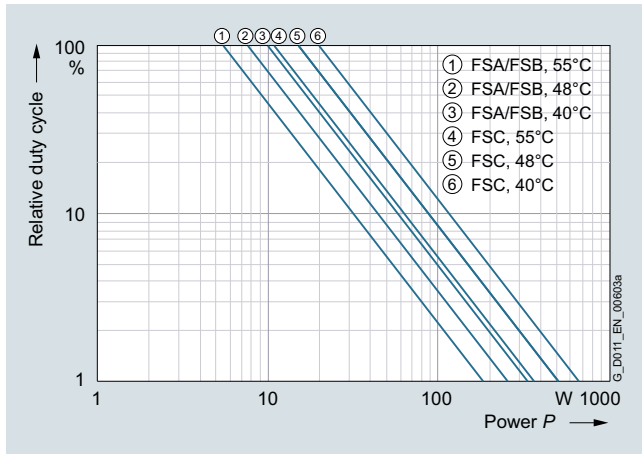
The version with cable gland has no cable gland in the delivery state. The dimensions with cable gland apply to the converter with cable gland equipped with the optionally available installation kit for SINAMICS G115D wall-mounted.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Characteristic curves



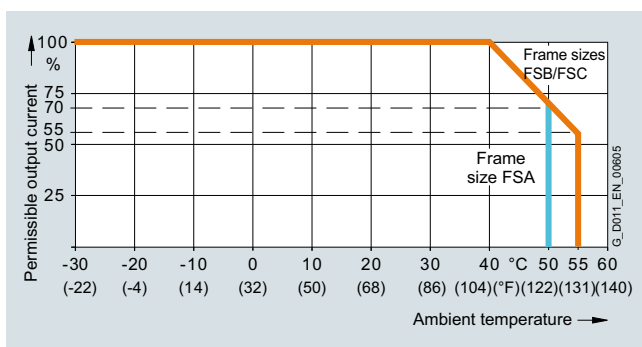
SINAMICS G115D, internal braking resistor, relative duty cycle in relation to a cycle of 120 s

Derating data

Pulse frequency

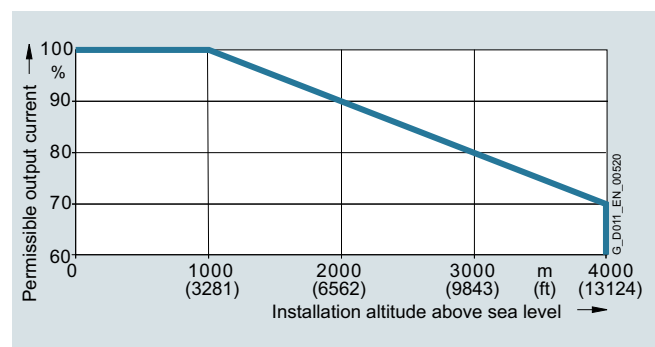
Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.5	1.3	1.11	0.91	0.78	0.65	0.59	0.52
0.55	0.75	1.7	1.45	1.19	1.02	0.85	0.77	0.68
0.75	1	2.2	1.87	1.54	1.32	1.1	0.99	0.88
1.1	1.5	3.1	2.64	2.17	1.86	1.55	1.4	1.24
1.5	2	4.1	3.49	2.87	2.46	2.05	1.85	1.64
2.2	3	5.9	5.02	4.13	3.54	2.95	2.66	2.36
3	4	7.7	6.55	5.39	4.62	3.85	3.47	3.08
4	5	10.2	8.67	7.14	6.12	5.1	4.59	4.08
5.5	7.5	13.2	11.22	9.24	7.92	6.6	5.94	5.28
7.5	10	19	16.15	13.3	11.4	9.5	8.55	7.6

Ambient temperature



Permissible output current as a function of the ambient temperature

Installation altitude



Permissible output current as a function of the installation altitude

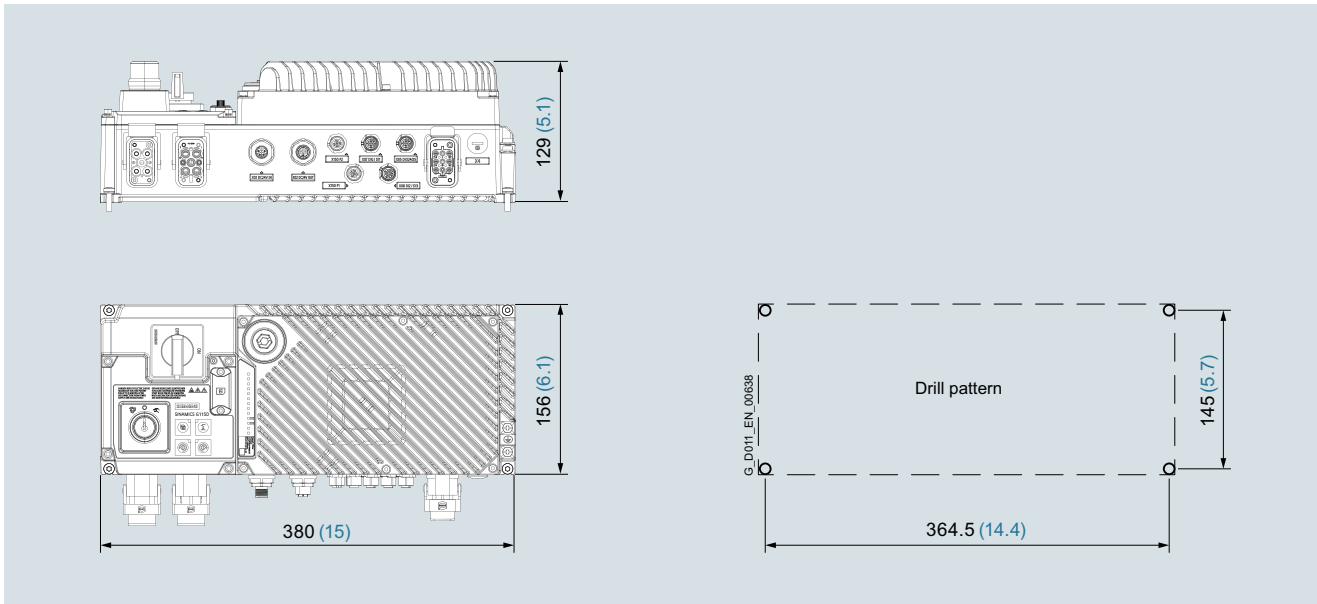
No derating necessary at the permissible input voltage depending on the installation altitude.

SINAMICS G115D distributed drive system • Wall-mounted

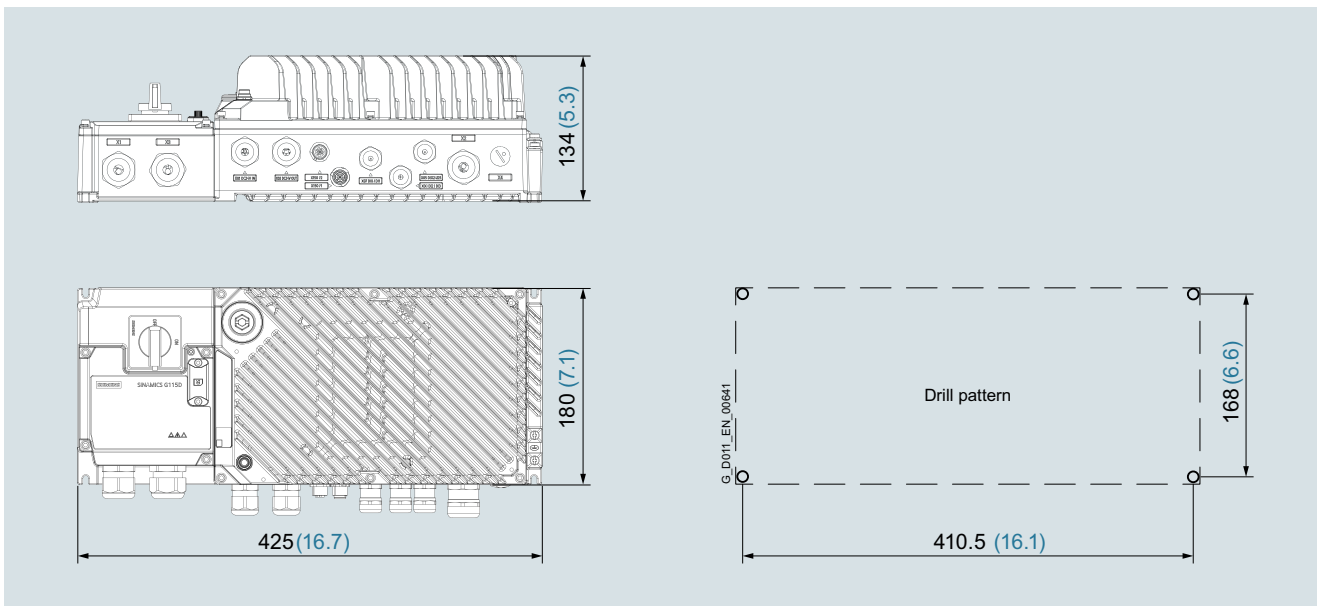
0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Dimensional drawings



SINAMICS G115D frame size FSA, without fan



SINAMICS G115D frame size FSB, without fan, rated power 2.2 kW and 3 kW

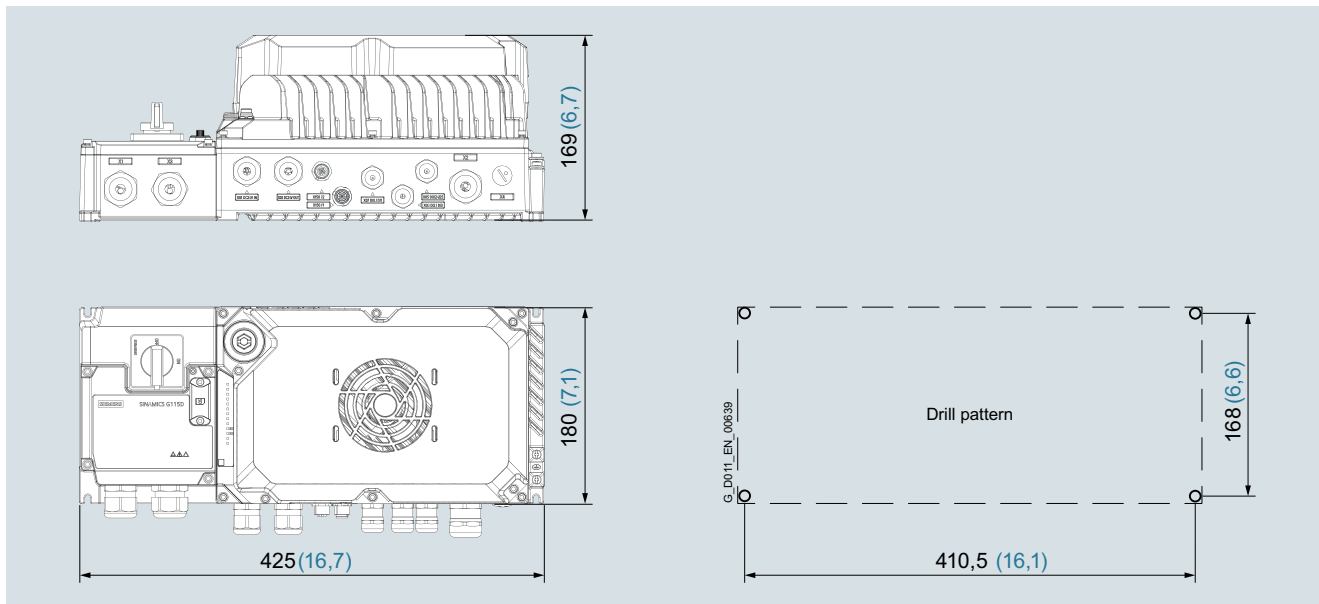
7
2

SINAMICS G115D distributed drive system • Wall-mounted

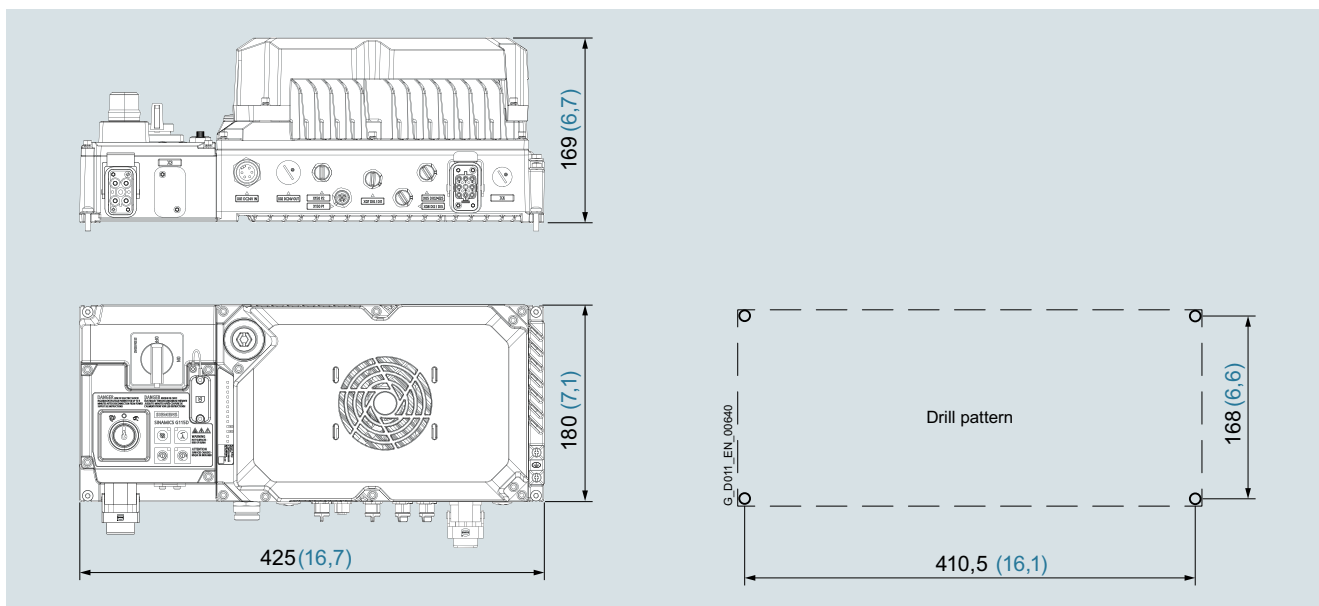
0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D distributed converters wall-mounted

Dimensional drawings



SINAMICS G115D frame size FSB, with fan, rated power 4 kW



SINAMICS G115D frame size FSC, with fan

The height values are valid without taking into account the connection. Depending on the connection type, the additional height is:

- For version with cable gland: 30 mm (1.18 in)
- For version with cable gland and motor connection Q8/0: 42 mm (1.65 in)
- For version with plug-in connection: 47.5 mm (1.87 in)
- For version with 24 V DC power supply: 60 mm (2.36 in)

The version with cable gland has no cable gland in the delivery state. The dimensions with cable gland apply to the converter with cable gland equipped with the optionally available installation kit for SINAMICS G115D wall-mounted.

Mounted with 4 M5 bolts, 4 M5 nuts, 4 M5 washers.

Ventilation clearance required (for wall mounting) at the drive end of the converter: 200 mm (7.9 in).

Ventilation clearance required (for wall mounting) at the non-drive end of the converter: 150 mm (5.9 in).

All dimensions in mm (values in brackets are in inches).

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Structure of the Article No.

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Structure of the Article No.

SIMOGEAR 2KJ8 geared motors

Data position in Article No.

1 2 3 4 5 6 7 - 8 9 10 11 12 - 13 14 15 16 - Z

2 K J 8 . . . - - - Z

Options with -Z and order code

Mounting position

Standard

M1	D 0 1
M2	D 0 2
M3	D 0 3
M4	D 0 4
M5	D 0 5
M6	D 0 6
Permitted deviation from the mounting position	D 0 9

Universal mounting position output side A (DE)

M1-A	D 1 1
M2-A	D 1 2
M3-A	D 1 3
M4-A	D 1 4
M5-A	D 1 5
M6-A	D 1 6

Universal mounting position output side B (NDE)

M1-B	D 2 1
M2-B	D 2 2
M3-B	D 2 3
M4-B	D 2 4
M5-B	D 2 5
M6-B	D 2 6

Standard options for mandatory selection (e.g. the shaft designs) are displayed in the DT Configurator.

For commissioning in the TIA Portal, the selection of the mounting position (e.g. order code **D01**) is important for the specification of the direction of rotation of the output shaft.

For more information and order codes [see section Options](#).

SINAMICS G115D distributed drive system • Wall-mounted

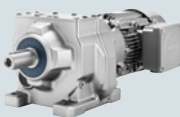


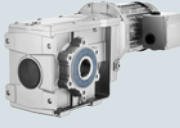

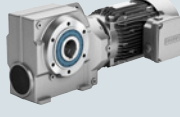
0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Orientation

Selection and ordering data

SIMOGEAR is the generation of geared motors from Siemens. The SIMOGEAR gearboxes are available as helical, parallel shaft, bevel, and helical worm geared motors.

SIMOGEAR geared motors

Helical gearbox Z and D	Helical gearbox E	Parallel shaft gearbox FZ and FD	Bevel gearbox B	Bevel gearbox K	Helical worm gearbox C
					
Sizes					
Z19 ... Z89 (2-stage) D19 ... D89 (3-stage)	E39 ... E89 (1-stage)	FZ29 ... FZ89 (2-stage) FD29 ... FD89 (3-stage)	B19 ... B49 (2-stage)	K39 ... K109 (3-stage)	C29 ... C89 (2-stage)
Maximum input torque					
12 Nm ... 2 110 Nm	9.8 Nm ... 245 Nm	25 Nm ... 2 270 Nm	7.7 Nm ... 560 Nm	40 Nm ... 2 900 Nm	14 Nm ... 1 680 Nm
Gearbox ratio					
3.4 ... 60.97 (2-stage) 39.34 ... 330.23 (3-stage)	1.29 ... 9.7	3.57... 65.21 (2-stage) 46.36 ... 357 (3-stage)	3.47 ... 59.28	5.17 ... 244.25	6.2 ... 363
Maximum motor power for the SINAMICS G115D distributed drive system wall-mounted					
7.5 kW	7.5 kW	7.5 kW	7.5 kW	7.5 kW	7.5 kW

Type designation of the SIMOGEAR gearboxes

The type designation is a meaningful name for SIMOGEAR geared motors. It provides information about the fundamental design of the geared motor and about its main technical features.

Example of gearbox type designation:		F	D	A	F	S	89
Gearbox type	Helical gearbox	-					
	Parallel shaft gearbox	F					
	Bevel gearbox, 2-stage	B					
	Bevel gearbox, 3-stage	K					
	Helical worm gearbox	C					
Stage	1-stage (for helical gearbox only)		E				
	2-stage		Z				
	3-stage		D				
Type							
Shaft	Solid shaft			-			
	Hollow shaft			A			
Mounting	Foot-mounted design				-		
	Foot/flange-mounted design				B		
	Flange-mounted design				F		
	Housing flange design				Z		
	Torque arm				D		
Connection	Feather key / without feather key					-	
	Shrink disk					S	
	Splined shaft					T	
Gearbox size	Helical gearbox, 1-stage						39 ... 89
	Helical gearbox, 2/3-stage						19 ... 89
	Parallel shaft gearbox, 2/3-stage						29 ... 89
	Bevel gearbox, 2-stage						19 ... 49
	Bevel gearbox, 3-stage						39 ... 109
	Helical worm gearbox, 2-stage						29 ... 89

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Orientation

Selection and ordering data

Type designation of the motors for the SINAMICS G115D distributed drive system wall-mounted

Example of motor type designation with the SINAMICS G115D distributed drive system wall-mounted:		LE 80 M A 4 S - G W - IO - HA									
Motor											
Motor type	Three-phase motor Aluminum housing	LE									
Motor frame size	Specified acc. to EN 50347	71...132									
Overall length	Overall length specified acc. to EN 50347		S, L, M								
	Packet length / power value			A, B, C							
Number of poles	4-pole				4						
Efficiency class	IE2 (High Efficiency)					E					
	IE3 (Premium Efficiency)					P					
	IE4 (Super Premium Efficiency) synchronous reluctance motors					S					
SINAMICS G115D distributed drive system											
SINAMICS G115D	Distributed converter					G					
	Converter mounting type	Wall-mounted					W				
	Fieldbus communication	Without fieldbus communication AS-Interface PROFINET, EtherNet/IP							IO ASi PN		
Options											
Motor brake	DC brake										L
	Enclosed brake										G
	Manual brake release										H
	Manual brake release with locking mechanism										HA
Canopy	With canopy										W

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type asynchronous motors IE2/IE3

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type asynchronous motors IE2/IE3 -> Configuration converter (s. right page ¹⁾)

P_N kW	T_N Nm	Motor Asynchronous motor	Efficiency class	$\cos \varphi$	λ	Article No. (Article No. supplements → see below)
Control range 1:5 / Motor speed range 300 ... 1 500 rpm						
0.37	2.36	LE71MB4E	IE2	0.74	0.58	2KJ8 ■■■ -2CF ■■ -0A ■■ -Z
0.55	3.50	LE80MA4E	IE2	0.76	0.64	2KJ8 ■■■ -2EA ■■ -0A ■■ -Z
0.75	4.77	LE80MB4P	IE3	0.76	0.61	2KJ8 ■■■ -2EG ■■ -0A ■■ -Z
1.1	7.00	LE90S4P	IE3	0.79	0.65	2KJ8 ■■■ -2GB ■■ -0A ■■ -Z
1.5	9.55	LE90L4P	IE3	0.82	0.69	2KJ8 ■■■ -2GG ■■ -0A ■■ -Z
2.2	14.00	LE100LA4P	IE3	0.82	0.70	2KJ8 ■■■ -2JB ■■ -0A ■■ -Z
3.0	19.10	LE100LB4P	IE3	0.83	0.70	2KJ8 ■■■ -2JG ■■ -0A ■■ -Z
4.0	25.46	LE112MC4P	IE3	0.83	0.70	2KJ8 ■■■ -2LB ■■ -0A ■■ -Z
5.5	35.00	LE132S4P	IE3	0.82	0.70	2KJ8 ■■■ -2NB ■■ -0A ■■ -Z
7.5	47.75	LE132M4P	IE3	0.78	0.65	2KJ8 ■■■ -2NG ■■ -0A ■■ -Z
Control range 1:10 / Motor speed range 300 ... 3 000 rpm						
0.55	1.75	LE71MB4E	IE2	0.68	0.54	2KJ8 ■■■ -2CF ■■ -1A ■■ -Z
0.75	2.36	LE80MA4E	IE2	0.70	0.57	2KJ8 ■■■ -2EA ■■ -1A ■■ -Z
1.1	3.50	LE80MB4P	IE3	0.73	0.57	2KJ8 ■■■ -2EG ■■ -1A ■■ -Z
1.5	4.77	LE90S4P	IE3	0.75	0.62	2KJ8 ■■■ -2GB ■■ -1A ■■ -Z
2.2	7.00	LE90L4P	IE3	0.80	0.68	2KJ8 ■■■ -2GG ■■ -1A ■■ -Z
3.0	9.55	LE100LA4P	IE3	0.80	0.69	2KJ8 ■■■ -2JB ■■ -1A ■■ -Z
4.0	12.73	LE100LB4P	IE3	0.80	0.69	2KJ8 ■■■ -2JG ■■ -1A ■■ -Z
5.5	17.50	LE112MC4P	IE3	0.81	0.70	2KJ8 ■■■ -2LB ■■ -1A ■■ -Z
7.5	23.87	LE132S4P	IE3	0.81	0.70	2KJ8 ■■■ -2NB ■■ -1A ■■ -Z
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm						
0.64	2.36	LE71MB4E	IE2	0.67	0.54	2KJ8 ■■■ -2CF ■■ -2A ■■ -Z
0.95	3.50	LE80MA4E	IE2	0.70	0.58	2KJ8 ■■■ -2EA ■■ -2A ■■ -Z
1.30	4.77	LE80MB4P	IE3	0.73	0.60	2KJ8 ■■■ -2EG ■■ -2A ■■ -Z
1.90	7.00	LE90S4P	IE3	0.76	0.63	2KJ8 ■■■ -2GB ■■ -2A ■■ -Z
2.60	9.55	LE90L4P	IE3	0.80	0.68	2KJ8 ■■■ -2GG ■■ -2A ■■ -Z
3.81	14.00	LE100LA4P	IE3	0.82	0.70	2KJ8 ■■■ -2JB ■■ -2A ■■ -Z
5.20	19.10	LE100LB4P	IE3	0.81	0.68	2KJ8 ■■■ -2JG ■■ -2A ■■ -Z
6.93	25.46	LE112MC4P	IE3	0.81	0.69	2KJ8 ■■■ -2LB ■■ -2A ■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
Helical gearbox Z, 2-stage
Helical gearbox D, 3-stage
Parallel shaft gearbox FZ, 2-stage
Parallel shaft gearbox FD, 3-stage
Bevel gearbox B/K, 2/3-stage
Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor

without
Pt1000

0
1

Motor brake

without
with (brake voltage 180 V DC)

0
1

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)

Selection of the special versions, see the Drive Technology Configurator (DT Configurator):

www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

¹⁾ Standard assignments of the 2KJ8 geared motors to the converters without converter derating are shown here.
In order to compensate for possible derating, a converter up to max. two power levels higher may be selected.

This selection option is already integrated in the Drive Technology Configurator (DT Configurator) and will be available soon in the TIA Selection Tool.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D converters wall-mounted -> (Configuration with motor type synchronous reluctance motors, see next double page)

P_N kW	hp	Rated input current A	Rated output current I_N A	Converter size (frame size)	Article No.
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.37	0.50	1.23	1.3	FSA	6SL3520 - X 0-3A 0
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0

Article No. supplements

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

Connection type Fieldbus communication I/O Motor 380 ... 480 V AC 24 V DC

Cable gland with daisy chain	without	Cable gland *)		A 0		
		Cable gland		H 0		
	M12	Cable gland *)		A 2		
		M12	Cable gland	A 6		
			Q8/0	Cable gland	R 0	
		Cable gland		2 × Power M12 ³⁾	R 1	
		Cable gland		Power supply integrated	H 2	
Plug-in connection without daisy chain	M12	M12	Q8/0	Q4/2	7/8* ²⁾	B 0
					Power M12 ³⁾	B 4
		Quickon ¹⁾		Power M12 ²⁾	C 0	
		MQ15 ¹⁾		Power M12 ²⁾	D 0	
		Q4/2		Power supply integrated	K 0	
		Quickon ¹⁾		Power supply integrated	L 0	
		MQ15 ¹⁾		Power supply integrated	M 0	
Plug-in connection with daisy chain	M12	M12	Q8/0	2 × Q4/2	2 × 7/8* ²⁾	E 0
					2 × Power M12 ³⁾	E 4
					Power supply integrated	N 0

Converter fieldbus communication

AS-Interface⁴⁾

Without fieldbus communication

PROFINET, EtherNet/IP⁴⁾

* If you select "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from "standard delivery time" to "delivery ex stock".

¹⁾ Not suitable for UL applications (FSA and FSB). Not available for FSC.

²⁾ Plug-in connector with fieldbus communication AS-Interface not available.

³⁾ Version with fieldbus communication AS-Interface cannot be ordered.

⁴⁾ For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type synchronous reluctance motors IE4

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor type synchronous reluctance motors IE4 -> Configuration converter (right page ¹⁾)

P_N kW	T_N Nm	Motor Synchronous reluctance motor	Efficiency class	cos φ	Article No. (Article No. supplements → see below)
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.55	3.50	LE80MA4S	IE4	0.64	2KJ8 ■■■ -4EC ■■ -0A ■■ -Z
0.75	4.77	LE80MB4S	IE4	0.63	2KJ8 ■■■ -4EH ■■ -0A ■■ -Z
1.1	7.00	LE90S4S	IE4	0.66	2KJ8 ■■■ -4GC ■■ -0A ■■ -Z
1.5	9.55	LE90L4S	IE4	0.65	2KJ8 ■■■ -4GH ■■ -0A ■■ -Z
2.2	14.00	LE112MA4S	IE4	0.69	2KJ8 ■■■ -4LC ■■ -0A ■■ -Z
3.0	19.10	LE112MB4S	IE4	0.69	2KJ8 ■■■ -4LH ■■ -0A ■■ -Z
4.0	25.46	LE112MC4S	IE4	0.70	2KJ8 ■■■ -4LN ■■ -0A ■■ -Z
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.75	2.36	LE80MA4S	IE4	0.59	2KJ8 ■■■ -4EC ■■ -1A ■■ -Z
1.1	3.50	LE80MB4S	IE4	0.61	2KJ8 ■■■ -4EH ■■ -1A ■■ -Z
1.5	4.77	LE90S4S	IE4	0.62	2KJ8 ■■■ -4GC ■■ -1A ■■ -Z
2.2	7.00	LE90L4S	IE4	0.64	2KJ8 ■■■ -4GH ■■ -1A ■■ -Z
3.0	9.55	LE112MA4S	IE4	0.66	2KJ8 ■■■ -4LC ■■ -1A ■■ -Z
4.0	12.73	LE112MB4S	IE4	0.67	2KJ8 ■■■ -4LH ■■ -1A ■■ -Z
5.5	17.50	LE112MC4S	IE4	0.70	2KJ8 ■■■ -4LN ■■ -1A ■■ -Z
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
0.95	3.50	LE80MA4S	IE4	0.61	2KJ8 ■■■ -4EC ■■ -2A ■■ -Z
1.30	4.77	LE80MB4S	IE4	0.61	2KJ8 ■■■ -4EH ■■ -2A ■■ -Z
1.90	7.00	LE90S4S	IE4	0.64	2KJ8 ■■■ -4GC ■■ -2A ■■ -Z
2.60	9.55	LE90L4S	IE4	0.64	2KJ8 ■■■ -4GH ■■ -2A ■■ -Z
3.81	14.00	LE112MA4S	IE4	0.68	2KJ8 ■■■ -4LC ■■ -2A ■■ -Z
5.2	19.10	LE112MB4S	IE4	0.70	2KJ8 ■■■ -4LH ■■ -2A ■■ -Z
6.93	25.46	LE112MC4S	IE4	0.80	2KJ8 ■■■ -4LN ■■ -2A ■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
 Helical gearbox Z, 2-stage
 Helical gearbox D, 3-stage
 Parallel shaft gearbox FZ, 2-stage
 Parallel shaft gearbox FD, 3-stage
 Bevel gearbox B/K, 2/3-stage
 Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor without
 Pt1000

0
1

Motor brake without
 with (brake voltage 180 V DC)

0
1

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-wall-mounted
 and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)

Selection of the special versions, see the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

¹⁾ Standard assignments of the 2KJ8 geared motors to the converters without converter derating are shown here.
 In order to compensate for possible derating, a converter up to max. two power levels higher may be selected.

This selection option is already integrated in the Drive Technology Configurator (DT Configurator) and will be available soon in the TIA Selection Tool.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SINAMICS G115D converters wall-mounted -> (Configuration with motor type asynchronous motors, see preceding double page)

P_N kW	hp	Rated input current A	Rated output current I_N A	Converter size (frame size)	Article No.
Control range 1:5 / Motor speed range 300 ... 1 500 rpm					
0.55	0.75	1.58	1.7	FSA	6SL3520 - X 0-5A 0
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
Control range 1:10 / Motor speed range 300 ... 3 000 rpm					
0.75	1.0	1.99	2.2	FSA	6SL3520 - X 0-7A 0
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm					
1.1	1.5	2.69	3.1	FSA	6SL3520 - X 1-1A 0
1.5	2.0	3.48	4.1	FSA	6SL3520 - X 1-5A 0
2.2	3.0	5.18	5.9	FSB	6SL3520 - X 2-2A 0
3.0	4.0	6.76	7.7	FSB	6SL3520 - X 3-0A 0
4.0	5.0	8.95	10.2	FSB	6SL3520 - X 4-0A 0
5.5	7.5	11.88	13.2	FSC	6SL3520 - X 5-5A 0
7.5	10	17.11	19	FSC	6SL3520 - X 7-5A 0

Article No. supplements

Operating options

Without operating option *)

Repair switch

Local remote control

Repair switch and local remote control

Connection type	Fieldbus communication	I/O	Motor	380 ... 480 V AC	24 V DC		
Cable gland with daisy chain	without		Cable gland *)			A 0	
			Cable gland		Power supply integrated	H 0	
	M12			Cable gland *)			A 2
				M12 Cable gland			A 6
				Q8/0	Cable gland		R 0
				Cable gland		2 × Power M12 ³⁾	R 1
				Cable gland		Power supply integrated	H 2
Plug-in connection without daisy chain	M12	M12	Q8/0	Q4/2	7/8* ²⁾	B 0	
					Power M12 ³⁾	B 4	
					Quickon ¹⁾	Power M12 ²⁾	C 0
					MQ15 ¹⁾	Power M12 ²⁾	D 0
					Q4/2	Power supply integrated	K 0
					Quickon ¹⁾	Power supply integrated	L 0
					MQ15 ¹⁾	Power supply integrated	M 0
Plug-in connection with daisy chain	M12	M12	Q8/0	2 × Q4/2	2 × 7/8* ²⁾	E 0	
					2 × Power M12 ³⁾	E 4	
					Power supply integrated	N 0	

Fieldbus communication

AS-Interface⁴⁾

Without fieldbus communication

PROFINET, EtherNet/IP⁴⁾

* If you select "Without operating option" in combination with one of the connection types **A0**, **A2** or **E0**, the delivery time will change from "standard delivery time" to "delivery ex stock".

¹⁾ Not suitable for UL applications (FSA and FSB). Not available for FSC.

²⁾ Plug-in connector with fieldbus communication AS-Interface not available.

³⁾ Version with fieldbus communication AS-Interface cannot be ordered.

⁴⁾ For fieldbus communication (AS-Interface, PROFINET or EtherNet/IP) the connection types **A0** and **H0** are not possible.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Additional information for the basic configuration

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Additional information for the basic configuration

Type	Motor	Rated power P_N kW	Rated torque T_N Nm	Maximum short-time torque T_{max} Nm	Efficiency η 4/4 load %	Efficiency class acc. to IEC TS 60034-30-2	Relative starting torque T_{St}/T_N	
							Standard	Maximum
Control range 1:5 / Motor speed range 300 ... 1 500 rpm								
<i>Motor type asynchronous motors IE2/IE3</i>								
2KJ8 ■■■ -2CF ■■ -0A ■■ -Z	LE71MB4E	0.37	2.36	4.72	71.70	IE2	1.3	2.0
2KJ8 ■■■ -2EA ■■ -0A ■■ -Z	LE80MA4E	0.55	3.50	7.00	77.90	IE2	1.3	2.0
2KJ8 ■■■ -2EG ■■ -0A ■■ -Z	LE80MB4P	0.75	4.77	9.54	82.10	IE3	1.3	2.0
2KJ8 ■■■ -2GB ■■ -0A ■■ -Z	LE90S4P	1.10	7.00	14.00	82.40	IE3	1.3	2.0
2KJ8 ■■■ -2GG ■■ -0A ■■ -Z	LE90L4P	1.50	9.55	19.10	84.20	IE3	1.3	2.0
2KJ8 ■■■ -2JB ■■ -0A ■■ -Z	LE100LA4P	2.20	14.00	28.00	87.10	IE3	1.3	2.0
2KJ8 ■■■ -2JG ■■ -0A ■■ -Z	LE100LB4P	3.00	19.10	38.20	86.70	IE3	1.3	2.0
2KJ8 ■■■ -2LB ■■ -0A ■■ -Z	LE112MC4P	4.00	25.46	50.92	88.20	IE3	1.3	2.0
2KJ8 ■■■ -2NB ■■ -0A ■■ -Z	LE132S4P	5.50	35.00	70.00	89.20	IE3	1.3	2.0
2KJ8 ■■■ -2NG ■■ -0A ■■ -Z	LE132M4P	7.50	47.75	95.50	89.80	IE3	1.3	2.0
<i>Motor type synchronous reluctance motors IE4</i>								
2KJ8 ■■■ -4EC ■■ -0A ■■ -Z	LE80MA4S	0.55	3.50	7.00	81.90	IE4	1.3	2.0
2KJ8 ■■■ -4EH ■■ -0A ■■ -Z	LE80MB4S	0.75	4.77	9.54	84.90	IE4	1.3	2.0
2KJ8 ■■■ -4GC ■■ -0A ■■ -Z	LE90S4S	1.10	7.00	14.00	85.60	IE4	1.3	2.0
2KJ8 ■■■ -4GH ■■ -0A ■■ -Z	LE90L4S	1.50	9.55	19.10	86.70	IE4	1.3	2.0
2KJ8 ■■■ -4LC ■■ -0A ■■ -Z	LE112MA4S	2.20	14.00	28.00	90.00	IE4	1.3	2.0
2KJ8 ■■■ -4LH ■■ -0A ■■ -Z	LE112MB4S	3.00	19.10	38.20	89.70	IE4	1.3	2.0
2KJ8 ■■■ -4LN ■■ -0A ■■ -Z	LE112MC4S	4.00	25.46	50.92	90.60	IE4	1.3	2.0
Control range 1:10 / Motor speed range 300 ... 3 000 rpm								
<i>Motor type asynchronous motors IE2/IE3</i>								
2KJ8 ■■■ -2CF ■■ -1A ■■ -Z	LE71MB4E	0.55	1.75	3.50	78.50	IE2	1.3	2.0
2KJ8 ■■■ -2EA ■■ -1A ■■ -Z	LE80MA4E	0.75	2.36	4.72	81.30	IE2	1.3	2.0
2KJ8 ■■■ -2EG ■■ -1A ■■ -Z	LE80MB4P	1.10	3.50	7.00	84.00	IE3	1.3	2.0
2KJ8 ■■■ -2GB ■■ -1A ■■ -Z	LE90S4P	1.50	4.77	9.54	84.20	IE3	1.3	2.0
2KJ8 ■■■ -2GG ■■ -1A ■■ -Z	LE90L4P	2.20	7.00	14.00	86.90	IE3	1.3	2.0
2KJ8 ■■■ -2JB ■■ -1A ■■ -Z	LE100LA4P	3.00	9.55	19.10	87.10	IE3	1.3	2.0
2KJ8 ■■■ -2JG ■■ -1A ■■ -Z	LE100LB4P	4.00	12.73	25.46	88.70	IE3	1.3	2.0
2KJ8 ■■■ -2LB ■■ -1A ■■ -Z	LE112MC4P	5.50	17.50	35.00	88.10	IE3	1.3	2.0
2KJ8 ■■■ -2NB ■■ -1A ■■ -Z	LE132S4P	7.50	23.87	47.74	89.50	IE3	1.3	2.0
<i>Motor type synchronous reluctance motors IE4</i>								
2KJ8 ■■■ -4EC ■■ -1A ■■ -Z	LE80MA4S	0.75	2.36	4.72	84.30	IE4	1.3	2.0
2KJ8 ■■■ -4EH ■■ -1A ■■ -Z	LE80MB4S	1.10	3.50	7.00	87.30	IE4	1.3	2.0
2KJ8 ■■■ -4GC ■■ -1A ■■ -Z	LE90S4S	1.50	4.77	9.54	87.00	IE4	1.3	2.0
2KJ8 ■■■ -4GH ■■ -1A ■■ -Z	LE90L4S	2.20	7.00	14.00	89.00	IE4	1.3	2.0
2KJ8 ■■■ -4LC ■■ -1A ■■ -Z	LE112MA4S	3.00	9.55	19.10	89.40	IE4	1.3	2.0
2KJ8 ■■■ -4LH ■■ -1A ■■ -Z	LE112MB4S	4.00	12.73	25.46	90.50	IE4	1.3	2.0
2KJ8 ■■■ -4LN ■■ -1A ■■ -Z	LE112MC4S	5.50	17.50	35.00	91.50	IE4	1.3	2.0
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm								
<i>Motor type asynchronous motors IE2/IE3</i>								
2KJ8 ■■■ -2CF ■■ -2A ■■ -Z	LE71MB4E	0.64	2.36	4.72	77.70	IE2	1.3	2.0
2KJ8 ■■■ -2EA ■■ -2A ■■ -Z	LE80MA4E	0.95	3.50	7.00	81.70	IE2	1.3	2.0
2KJ8 ■■■ -2EG ■■ -2A ■■ -Z	LE80MB4P	1.30	4.77	9.54	84.80	IE3	1.3	2.0
2KJ8 ■■■ -2GB ■■ -2A ■■ -Z	LE90S4P	1.90	7.00	14.00	85.70	IE3	1.3	2.0
2KJ8 ■■■ -2GG ■■ -2A ■■ -Z	LE90L4P	2.60	9.55	19.10	86.30	IE3	1.3	2.0
2KJ8 ■■■ -2JB ■■ -2A ■■ -Z	LE100LA4P	3.81	14.00	28.00	88.00	IE3	1.3	2.0
2KJ8 ■■■ -2JG ■■ -2A ■■ -Z	LE100LB4P	5.20	19.10	38.20	88.30	IE3	1.3	2.0
2KJ8 ■■■ -2LB ■■ -2A ■■ -Z	LE112MC4P	6.93	25.46	50.92	88.80	IE3	1.3	2.0
<i>Motor type synchronous reluctance motors IE4</i>								
2KJ8 ■■■ -4EC ■■ -2A ■■ -Z	LE80MA4S	0.95	3.50	7.00	85.40	IE4	1.3	2.0
2KJ8 ■■■ -4EH ■■ -2A ■■ -Z	LE80MB4S	1.30	4.77	9.54	87.80	IE4	1.3	2.0
2KJ8 ■■■ -4GC ■■ -2A ■■ -Z	LE90S4S	1.90	7.00	14.00	88.30	IE4	1.3	2.0
2KJ8 ■■■ -4GH ■■ -2A ■■ -Z	LE90L4S	2.60	9.55	19.10	89.00	IE4	1.3	2.0
2KJ8 ■■■ -4LC ■■ -2A ■■ -Z	LE112MA4S	3.81	14.00	28.00	90.80	IE4	1.3	2.0
2KJ8 ■■■ -4LH ■■ -2A ■■ -Z	LE112MB4S	5.20	19.10	38.20	91.10	IE4	1.3	2.0
2KJ8 ■■■ -4LN ■■ -2A ■■ -Z	LE112MC4S	6.93	25.46	50.92	91.90	IE4	1.3	2.0

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Additional information for the basic configuration

Selection and ordering data

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Additional information for the basic configuration

Type	Motor	Holding torque M_{4Br}	Working brake torque M_{2Br}	Maximum switching energy per braking W kJ	Motor moment of inertia J_{mot}		Weight m_{mot}		
		Nm	Nm		with brake 10^{-4} kgm ²	without brake	with brake kg	without brake	
Control range 1:5 / Motor speed range 300 ... 1 500 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8	■ ■ ■ ■ -2CF ■ ■ -0A ■ ■ -Z	LE71MB4E	3.2	4.0	3.0	9.65	9.50	7.85	7.00
2KJ8	■ ■ ■ ■ -2EA ■ ■ -0A ■ ■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00
2KJ8	■ ■ ■ ■ -2EG ■ ■ -0A ■ ■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00
2KJ8	■ ■ ■ ■ -2GB ■ ■ -0A ■ ■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00
2KJ8	■ ■ ■ ■ -2GG ■ ■ -0A ■ ■ -Z	LE90L4P	12.8	16.0	12	51.00	49.00	21.60	19.00
2KJ8	■ ■ ■ ■ -2JB ■ ■ -0A ■ ■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00
2KJ8	■ ■ ■ ■ -2JG ■ ■ -0A ■ ■ -Z	LE100LB4P	25.6	32.0	24	144.50	140.00	33.90	30.00
2KJ8	■ ■ ■ ■ -2LB ■ ■ -0A ■ ■ -Z	LE112MC4P	32.0	40.0	24	174.50	170.00	37.90	34.00
2KJ8	■ ■ ■ ■ -2NB ■ ■ -0A ■ ■ -Z	LE132S4P	40.0	50.0	36	475.00	460.00	72.40	64.00
2KJ8	■ ■ ■ ■ -2NG ■ ■ -0A ■ ■ -Z	LE132M4P	50.4	63.0	36	475.00	460.00	72.40	64.00
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8	■ ■ ■ ■ -4EC ■ ■ -0A ■ ■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00
2KJ8	■ ■ ■ ■ -4EH ■ ■ -0A ■ ■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00
2KJ8	■ ■ ■ ■ -4GC ■ ■ -0A ■ ■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00
2KJ8	■ ■ ■ ■ -4GH ■ ■ -0A ■ ■ -Z	LE90L4S	12.8	16.0	12	45.00	43.00	24.60	22.00
2KJ8	■ ■ ■ ■ -4LC ■ ■ -0A ■ ■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LH ■ ■ -0A ■ ■ -Z	LE112MB4S	25.6	32.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LN ■ ■ -0A ■ ■ -Z	LE112MC4S	32.0	40.0	24	118.50	114.00	42.90	39.00
Control range 1:10 / Motor speed range 300 ... 3 000 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8	■ ■ ■ ■ -2CF ■ ■ -1A ■ ■ -Z	LE71MB4E	3.2	4.0	3	9.65	9.50	7.85	7.00
2KJ8	■ ■ ■ ■ -2EA ■ ■ -1A ■ ■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00
2KJ8	■ ■ ■ ■ -2EG ■ ■ -1A ■ ■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00
2KJ8	■ ■ ■ ■ -2GB ■ ■ -1A ■ ■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00
2KJ8	■ ■ ■ ■ -2GG ■ ■ -1A ■ ■ -Z	LE90L4P	10.4	13.0	12	51.00	49.00	21.60	19.00
2KJ8	■ ■ ■ ■ -2JB ■ ■ -1A ■ ■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00
2KJ8	■ ■ ■ ■ -2JG ■ ■ -1A ■ ■ -Z	LE100LB4P	25.6	32.0	24	144.50	140.00	33.90	30.00
2KJ8	■ ■ ■ ■ -2LB ■ ■ -1A ■ ■ -Z	LE112MC4P	32.0	40.0	24	174.50	170.00	37.90	34.00
2KJ8	■ ■ ■ ■ -2NB ■ ■ -1A ■ ■ -Z	LE132S4P	40.0	50.0	36	475.00	460.00	72.40	64.00
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8	■ ■ ■ ■ -4EC ■ ■ -1A ■ ■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00
2KJ8	■ ■ ■ ■ -4EH ■ ■ -1A ■ ■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00
2KJ8	■ ■ ■ ■ -4GC ■ ■ -1A ■ ■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00
2KJ8	■ ■ ■ ■ -4GH ■ ■ -1A ■ ■ -Z	LE90L4S	10.4	13.0	12	45.00	43.00	24.60	22.00
2KJ8	■ ■ ■ ■ -4LC ■ ■ -1A ■ ■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LH ■ ■ -1A ■ ■ -Z	LE112MB4S	25.6	32.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LN ■ ■ -1A ■ ■ -Z	LE112MC4S	32.0	40.0	24	118.50	114.00	42.90	39.00
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8	■ ■ ■ ■ -2CF ■ ■ -2A ■ ■ -Z	LE71MB4E	3.2	4.0	3	9.65	9.50	7.85	7.00
2KJ8	■ ■ ■ ■ -2EA ■ ■ -2A ■ ■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00
2KJ8	■ ■ ■ ■ -2EG ■ ■ -2A ■ ■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00
2KJ8	■ ■ ■ ■ -2GB ■ ■ -2A ■ ■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00
2KJ8	■ ■ ■ ■ -2GG ■ ■ -2A ■ ■ -Z	LE90L4P	12.8	16.0	12	51.00	49.00	21.60	19.00
2KJ8	■ ■ ■ ■ -2JB ■ ■ -2A ■ ■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00
2KJ8	■ ■ ■ ■ -2JG ■ ■ -2A ■ ■ -Z	LE100LB4P	25.6	32.0	24	144.50	140.00	33.90	30.00
2KJ8	■ ■ ■ ■ -2LB ■ ■ -2A ■ ■ -Z	LE112MC4P	32.0	40.0	24	174.50	170.00	37.90	34.00
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8	■ ■ ■ ■ -4EC ■ ■ -2A ■ ■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00
2KJ8	■ ■ ■ ■ -4EH ■ ■ -2A ■ ■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00
2KJ8	■ ■ ■ ■ -4GC ■ ■ -2A ■ ■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00
2KJ8	■ ■ ■ ■ -4GH ■ ■ -2A ■ ■ -Z	LE90L4S	12.8	16.0	12	45.00	43.00	24.60	22.00
2KJ8	■ ■ ■ ■ -4LC ■ ■ -2A ■ ■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LH ■ ■ -2A ■ ■ -Z	LE112MB4S	25.6	32.0	24	96.50	92.00	37.90	34.00
2KJ8	■ ■ ■ ■ -4LN ■ ■ -2A ■ ■ -Z	LE112MC4S	32.0	40.0	24	118.50	114.00	42.90	39.00

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

Clicking to the Industry Mall

6SL3255-0AA00-5AA0

Supplementary system components and spare parts for SINAMICS G115D wall-mounted



Selection and ordering data

Supplementary system components for SINAMICS G115D wall-mounted

Description	Article No.
Fuses	
• 10 A for FSA	3NA3803
• 16 A for FSB	3NA3805
• 32 A for FSC	3NA3812
External braking resistors Continuous braking power	
• 200 W for FSA	6SL3501-1BE32-0AA0
• 240 W for FSA	6SL3501-1BE32-4AA0
• 480 W for FSA	6SL3501-1BE34-8AA0
• 200 W for FSB	6SL3501-1BE32-0BA0
• 240 W for FSB	6SL3501-1BE32-4BA0
• 600 W for FSB	6SL3501-1BE36-0BA0
• 600 W for FSC	6SL3501-1BE36-0CA0
• 1200 W for FSC	6SL3501-1BE41-2CA0
SINAMICS SD memory card	
• 512 MB, empty	6SL3054-4AG00-2AA0
• 512 MB + firmware V4.7 SP13	6SL3054-7TG00-2BA0
SINAMICS G120 Smart Access Web server module for wireless commissioning, operation and diagnostics using a smartphone, tablet, or laptop	6SL3255-0AA00-5AA0
Interface kit for web server module SINAMICS G120 Smart Access	6SL3555-0XA00-0AA0
MindConnect IOT2040 to connect to the Cloud MindSphere via PN with up to 30 data points per second	9AC2112-0AA00-1YA2
MindConnect Nano to connect to the Cloud MindSphere via PN with up to 250 data points per second	9AC2112-8BA12-0KA1
PC converter connection kit 2 USB cable (3 m (9.84 ft) long)	6SL3255-0AA00-2CA0
Installation kit for SINAMICS G115D wall-mounted	6SL3566-2GW00-0GA0
Cover kit for outputs 380 ... 480 V AC (Q4/2) and 24 V DC (7/8" and M12)	6SL3566-2GA00-0GA0
Connecting cables An overview of all available accessories (e.g. plugs and cables) can be found under the following link: www.siemens.com/distributeddrives-supplementaryproducts	
PROFINET connecting cable IE connecting cable M12-180/M12-180 axial outlet	
• 0.3 m (0.98 ft)	6XV1870-8AE30
• 0.5 m (1.64 ft)	6XV1870-8AE50
• 1 m (3.28 ft)	6XV1870-8AH10
• 1.5 m (4.92 ft)	6XV1870-8AH15
• 2 m (6.56 ft)	6XV1870-8AH20
• 3 m (9.84 ft)	6XV1870-8AH30
• 5 m (16.41 ft)	6XV1870-8AH50
• 10 m (32.81 ft)	6XV1870-8AN10
• 15 m (49 ft)	6XV1870-8AN15
PROFINET connecting cable IE connecting cable M12-180/IE FC RJ45 plug 145 axial outlet	
• 2 m (6.56 ft)	6XV1871-5TH20
• 3 m (9.84 ft)	6XV1871-5TH30
• 5 m (16.41 ft)	6XV1871-5TH50
• 10 m (32.81 ft)	6XV1871-5TN10
• 15 m (49 ft)	6XV1871-5TN15
PROFINET connectors IE M12 plug PRO axial outlet	
• 1 unit	6GK1901-0DB20-6AA0
• 8 units	6GK1901-0DB20-6AA8
AS-Interface M12 branch	3RK1901-2NR20

Description	Article No.
Connecting cables/plug-in connectors for 24 V DC power supply 7/8" plug-in connector axial outlet	
• Pin insert (OUT)	6GK1905-0FA00
• Female contact insert (IN)	6GK1905-0FB00
Connecting cables/plug-in connectors for 24 V DC power supply 7/8" plug-in cable axial outlet	
• 0.3 m (0.98 ft)	6XV1822-5BE30
• 0.5 m (1.64 ft)	6XV1822-5BE50
• 1 m (3.28 ft)	6XV1822-5BH10
• 1.5 m (4.92 ft)	6XV1822-5BH15
• 2 m (6.56 ft)	6XV1822-5BH20
• 3 m (9.84 ft)	6XV1822-5BH30
• 5 m (16.41 ft)	6XV1822-5BH50
• 10 m (32.81 ft)	6XV1822-5BN10
• 15 m (49 ft)	6XV1822-5BN15
Plug-in connectors for digital inputs and digital outputs	6ES7194-6KA00-0XA0
Y cable for distributed I/Os for dual connection of I/Os using single cables, 5-pole, M12, 200 mm (7.87 in)	
Connecting cable pre-assembled at one end to connect to the line supply	
• 1.5 m (4.92 ft)	3RK1911-0DB13
• 5 m (16.41 ft)	3RK1911-0DB33
Connector set Q4/2 (angled) for energy supply	
• 2,5 mm ²	3RK1911-2BE50
• 4 mm ²	3RK1911-2BE10
• 6 mm ²	3RK1911-2BE30
Quickon system connector for connections for 380 ... 480 V AC	
• Quickon nut	6SL3566-4NA00-0GA0
• Quickon connector	6SL3566-4MA00-0GA0
Connector set Q4/2 (angled) for power loop-through	
• 2,5 mm ²	3RK1911-2BF50
• 4 mm ²	3RK1911-2BF10

Training case

SINAMICS G115D training case SINAMICS G115D distributed drive system, motor-mounted, PROFINET, FSA, 0.37 kW, SIMOGEAR 2KJ8 helical geared motor, incl. SIMATIC S7-1200F and MindConnect IoT 2040	6AG1067-1AA38-0AA0
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Spare parts for SINAMICS G115D wall-mounted

Description	Article No.
Electronic Modules	
• FSA, 0.37 kW	6SL3500-0XE50-3AA0
• FSA, 0.55 kW	6SL3500-0XE50-5AA0
• FSA, 0.75 kW	6SL3500-0XE50-7AA0
• FSA, 1.1 kW	6SL3500-0XE51-1AA0
• FSA, 1.5 kW	6SL3500-0XE51-5AA0
• FSB, 2.2 kW	6SL3500-0XE52-2AA0
• FSB, 3 kW	6SL3500-0XE53-0AA0
• FSB, 4 kW	6SL3500-0XE54-0AA0
• FSC, 5.5 kW	6SL3500-0XE55-5AA0
• FSC, 7.5 kW	6SL3500-0XE57-5AA0
Fieldbus communication	
• AS-Interface	A
• Without fieldbus communication	B
• PROFINET, EtherNet/IP	F
Spare parts kit for SINAMICS G115D wall-mounted	6SL3500-0XK51-0AA0
Replacement fan for SINAMICS G115D wall-mounted	6SL3500-0XF51-0AA0

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

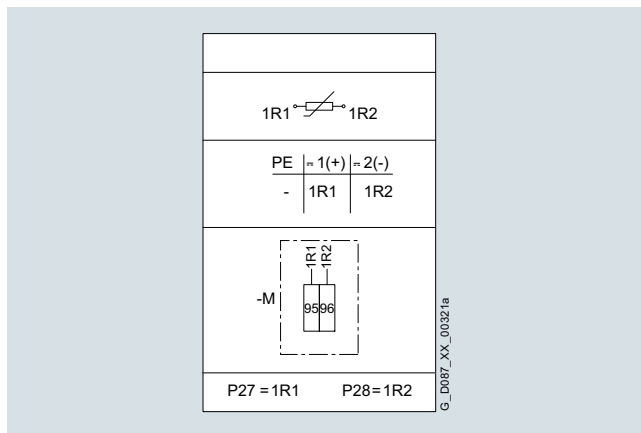
Pt1000 resistance thermometer

The resistance thermometer has a chip for a temperature sensor, the resistance of which changes in relation to temperature according to a series of reproducible basic values. The changes in resistance are transferred as changes in current. At 0 °C, the measurement resistances are adjusted to 1000 Ω for the Pt1000, and correspond to the accuracy class B (i.e. the relationship between resistance and temperature). The limit deviation is ±0.3 °C, and the admissible deviations are defined in EN 60751.

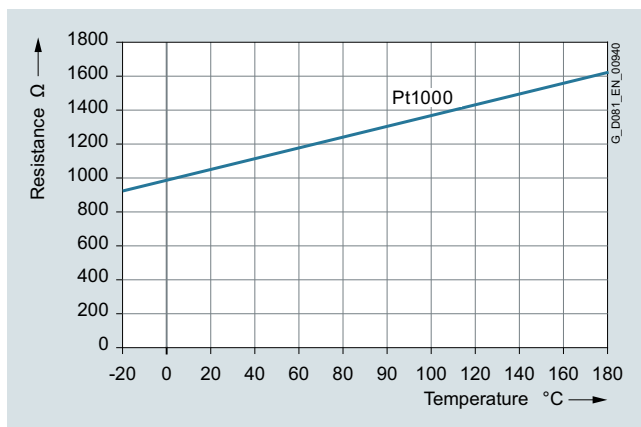
Pure metals undergo larger changes in resistance than alloys and have relatively constant temperature coefficients.

Temperatures for alarm and tripping can be set as required when using converters from Siemens that determine the motor temperature in accordance with the measuring principle described above. With these devices, the measured signal is evaluated directly in the converter. [For further details, see Catalog IC 10.](#)

Motor protection	11th position of the Article No.
	2KJ8 -Z
Without motor protection	0
Pt1000 resistance thermometer	1



Connection circuit diagram



Pt1000 resistance thermometer characteristic

Increased air humidity/temperature with 30 to 60 g water per m³ of air

The motors in the standard range are designed for up to 30 g water per m³. A design for increased air humidity in the range between 30 and 60 g water per m³ air as a function of the temperature is possible, as shown in the following table.

Relative humidity	Temperature						
	+20 °C	+30 °C	+40 °C	+50 °C	+60 °C	+70 °C	+80 °C
10 %	2	3	5	8	13	20	29
15 %	3	5	8	12	19	30	44
20 %	3	6	10	17	26	39	58
25 %	4	8	13	21	32	49	
30 %	5	9	15	25	39	59	
35 %	6	11	18	29	45		
40 %	7	12	20	33	52		
45 %	8	14	23	38	58		
50 %	9	15	26	41			
55 %	10	17	28	46			
60 %	10	19	31	50			
65 %	11	20	33	54			
70 %	12	21	36	58			
75 %	13	23	38				
80 %	14	24	41				
85 %	15	26	43				
90 %	16	27	46				
95 %	16	29	49				
100 %	17	30	51				

Increased air humidity/temperature with 30 to 60 g water per m³ of air

Winding and insulation	Additional identification code -Z with order code
	2KJ8 -Z
Increased air humidity/temperature with 30 to 60 g water per m³ of air	Order code N54

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options**Options****Degrees of protection**Note:

The degree of protection only applies to the electrical equipment (motor, brake). Depending on the application area, the applicable measures must be applied to the gearbox.

Available degrees of protection

Degree of protection	Additional identification code -Z with order code	Order code
IP55	2KJ8 ... - ... - ... -Z	K01
IP56 (not for design with plug connector, not for design with brake)		K02
IP65 (No restrictions)		K03

Ventilation

The motors have radial-flow fans, which cool regardless of the direction of rotation of the motor (cooling method IC 411, IEC 60034-6). The air flows from the non-drive end (NDE) to the drive end (DE).

The motor fan can either be a standard fan or metal fan.

Note:

Standard fans made of plastic are not suitable for ambient temperatures under -25 °C. At lower temperatures, a metal fan **M21** must be used.

Standard fan

As standard, the motors are equipped with a plastic fan. This can be used for the entire standard ambient temperature range.

Metal fan

As an alternative to the standard plastic fans, aluminum fans are available for the motors.

Metal fans are used for specific environmental conditions, e.g.:

- If there are solid or dirt particles, such as wood chips, textile fibers in the cooling air
- Special motor designs for increased ambient temperatures exceeding +60 °C
- At temperatures below -25 °C

Ventilation	Additional identification code -Z with order code	Order code
Metal fan	2KJ8 ... - ... - ... -Z	M21

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

Motor connection, circuit and terminal box

Location and position of the terminal box

The terminal box of the motor can be mounted in four different locations or positions. The position of the terminal box must always be viewed from the drive end (DE) of the motor.

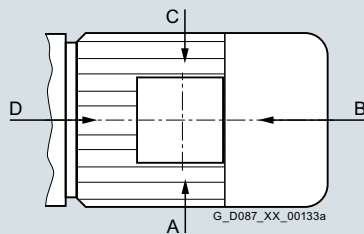
The standard position of the terminal box is on the right-hand side, with the cable entry from below (1A).

The terminal box is always located at the non-drive end (NDE) of the motor.

• Selection data, cable entry

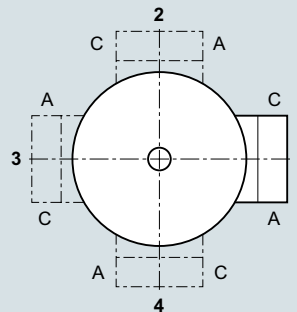
Terminal box position	Position of the cable entry	Additional identification code -Z with order code	
		2KJ8 ... - ... -Z	Order code
Motor	LE71 ... 132		
1	A		M55
	B		M56
	C		M57
	D		M58
2	A		M59
	B		M60
	C		M61
	D		M62
3	A		M63
	B		M64
	C		M65
	D		M66
4	A		M67
	B		M68
	C		M69
	D		M70

Position of the cable entry



Terminal box position

When viewing DE



Terminal box position and cable entry

Motor connection

Three-phase motors are connected to the three phase conductors L1, L2 and L3 of a converter.

When the three phases operate in sequence and are connected to the terminals of the motor in alphabetical order U1, V1 and W1, the motor rotates clockwise when viewing the DE motor shaft.

The direction of rotation of the motor can be reversed if two connecting cables are interchanged. Labeled terminals are provided to connect the protective conductor.

The connections for a brake or thermal motor protection are also located in the terminal box.

Note:

Different sizes of terminal box are used depending on the connections required.

Additional notes see "Terminal box type" on page 7.2/33.

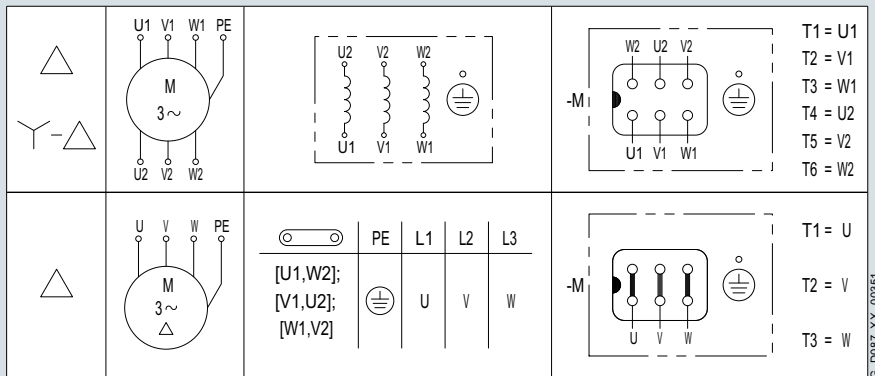
SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

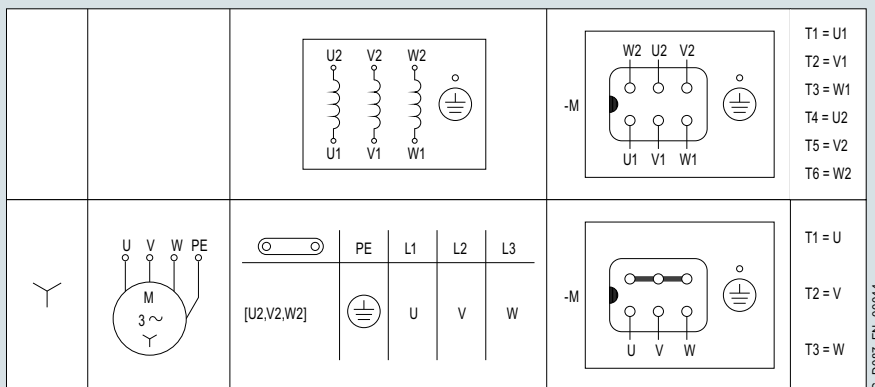
- Motor connection Δ/Y



Connection circuit diagram, motor connection Δ/Y

- ① Motor connection
- ② Circuit diagram symbols
- ③ Winding arrangement in the motor
- ④ Comparison:
Terminal designation acc. to NEMA MG1/acc. to IEC 60034-8
- ⑤ Location of the jumpers on the terminal board and juxtaposition of the line connection with the motor connection

- Motor connection Y



Connection circuit diagram, motor connection Y

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

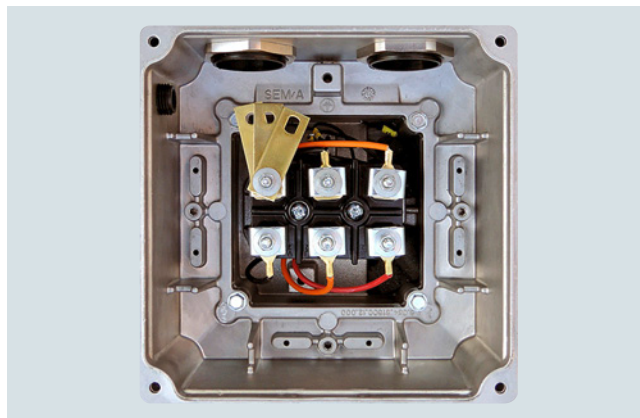
Terminal box type

The terminal box contains all the electrical connections that are installed in the motor. Different terminal box sizes are used depending on the connections required.



Terminal box type gk030, TB1E00, TB1F00, TB1H00

- Cable entry metric



Terminal box type gk127, TB1E10, TB1F10, TB1H10

Motor frame size	Motor options Brake	Terminal box type	Cable entry metric
71	Without	gk030	1 x M25 x 1.5 + 1 x M20 x 1.5
	With	gk127	
80 ... 90	Without	TB1E100	2 x M32 x 1.5
	With	TB1E10	
100 ... 112	Without	TB1F00	2 x M32 x 1.5
	with	TB1F10	
132	Without	TB1H00	2 x M32 x 1.5
	With	TB1H10	

External grounding

- Maximum conductor connection for external grounding

Motor frame size	Thread size
71 ... 90	M4
100 ... 112	M5
132	M6

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

Motor plug

The motor connection (star or delta connection) depends on the choice of the control range:

- Control range 1:5 Y connection
- Control range 1:8.7 D connection
- Control range 1:10 D connection

The specified motor connection is carried out by the customer in the mating connector.

The motor plug is supplied ready for use, and replaces the terminal box with terminal board.

The motor plug for SIMOGEAR geared motors for SINAMICS G115D is supplied in EMC design as standard.

In the basic design, the motor plug connection is in position B, [see page 7.2/31](#). The dimensions depend on the motor frame size.

Particularly in cases where a brake with a manual release lever is used in the direction of the non-drive end (NDE), a check must be made to ensure that the motor plug does not collide with the manual release lever in the direction of the drive end (DE).

The main advantages of a motor plug over a terminal box with terminals are as follows:

- Quick installation
- Reduction of installation and repair times for end users
- No wiring errors due to the plug system
- Replacement of a geared motor without having to make any intervention in the electronics

The winding connections and, optionally, the power supply for the brake and the signal cables for the temperature sensors are connected in the plug housing.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

10E motor plug (type 1 acc. to ISO 23570-3)

The motor plug is compatible with the products from the ECOFAST field device system. It is available for motor frame sizes 71 to 132 and can be used for line voltages at the motor plug ≤ 500 V and rated currents ≤ 16 A.

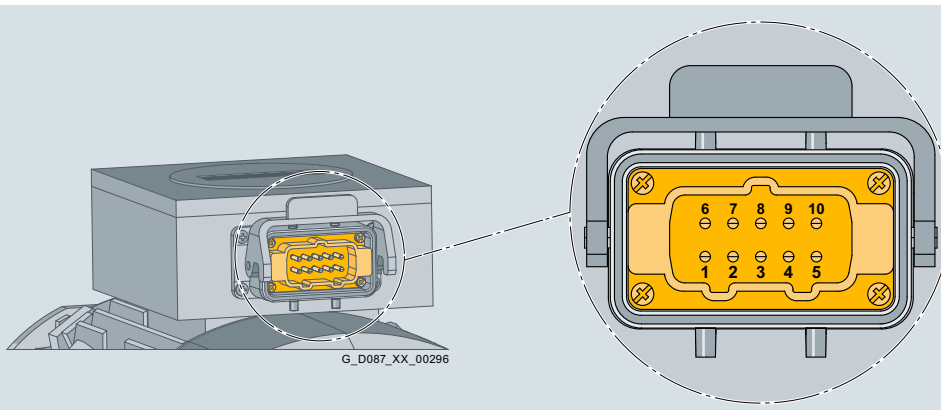
The motor plug can be used in the temperature range from -40 up to $+60$ °C. A special design is required for higher temperatures.

The Y or D connection must be carried out by the customer in the mating connector.

• Technical data

Number of contacts	10 + ⊕
Max. voltage	500 V
Max. current load per PIN	16 A
Specifications	CE, UKCA, EAC, cUL-Rus
Degree of protection	IP65

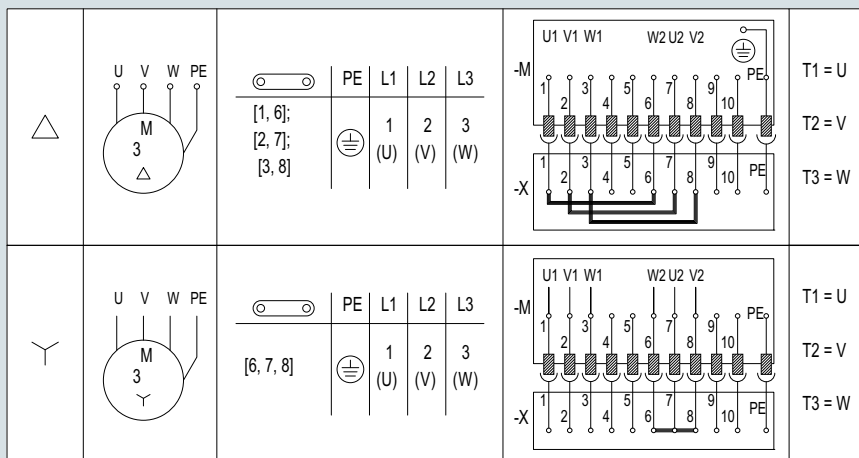
Motor plug	Additional identification code -Z with order code
	2KJ8 -Z Order code
10E motor plug (1 bracket) EMC	N06



10 E motor plug with pin assignments

• Connection assignment 10 E

PIN	1	2	3	4	5	6	7	8	9	10	PE
Connection	U1	V1	W1	Brake	Brake	W2	U2	V2	Temperature-dependent winding protection		Protective conductor



Connection circuit diagram for motor winding

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

Brake

Design and principle of operation

Single-disk, spring-operated brakes have two friction surfaces. When the brake is in a zero current state, a braking torque is generated using several springs.

The brake is released electromagnetically. When the motor brakes, the rotor which can be axially shifted on the hub or the shaft is pressed via the armature disk against the friction surface by means of the springs. In the braked state, there is a gap between the armature disk and the solenoid assembly.

To release the brake, the solenoid is energized with DC voltage. The resulting magnetic force pulls the armature disk against the spring force on to the solenoid component.

The spring force is then no longer applied to the rotor, which can rotate freely.

Note:

The standard design brakes are not suitable for ambient temperatures below -20 °C. Increased corrosion protection is used, when the motor is used at ambient temperatures of below -20 °C.

For ambient temperatures higher than 45 °C, the brakes must be considered in detail.

The following reduction of the max. permissible duty cycle must be observed during increased ambient temperatures:

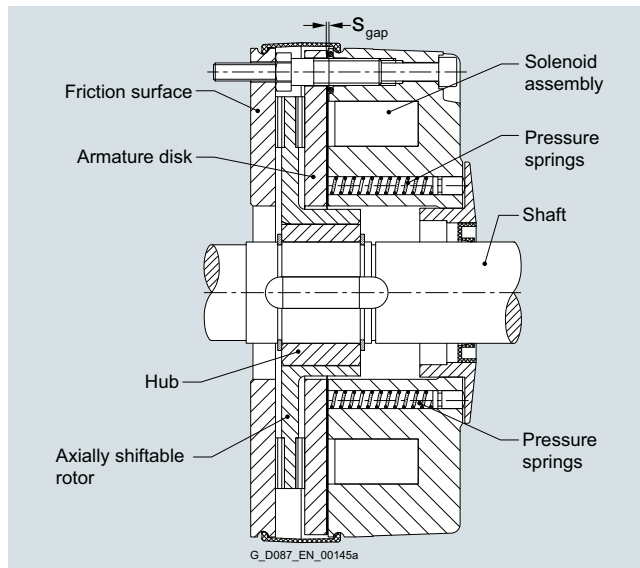
Ambient temperature	Max. permissible duty cycle based on 10 min.
-30 °C ... +40 °C	100 %
+55° C	75 %

You will find the configuring notes for the permissible duty cycle on [page 7.1/30](#).

Selecting the brake

• Brake assignment

Motor frame size	Motor type	Rated motor power [kW]			Brakes											Article No.	
		Control range	Braking torque [Nm]														
		1:5	1:10	1:8,7	L4	L8	L8	L16	L16	L16	L16	L32	L32	L32	L80	L80	
Asynchronous motor																	
71	LE71MB4E	0,37	0,55	0,64	✓												2KJ8...-2CF.1-...-Z
80	LE80MA4E	0,55	0,75	0,95		✓											2KJ8...-2EA.1-...-Z
	LE80MB4P	0,75	1,1	1,3			✓										2KJ8...-2EG.1-...-Z
90	LE90S4P	1,1	1,5	1,9				✓									2KJ8...-2GB.1-...-Z
	LE90L4P	1,5	-	2,6					✓								2KJ8...-2GG.1-...-Z
		-	2,2	-						✓							
100	LE100LA4P	2,2	3	3,81						✓							2KJ8...-2JB.1-...-Z
	LE100LB4P	3	4	5,2								✓					2KJ8...-2JG.1-...-Z
112	LE112MC4P	4	5,5	6,93									✓				2KJ8...-2LB.1-...-Z
132	LE132S4P	5,5	7,5	-											✓		2KJ8...-2NB.1-...-Z
	LE132M4P	7,5	-	-												✓	2KJ8...-2NG.1-...-Z
Synchronous reluctance motor																	
80	LE80MA4S	0,55	0,75	0,95		✓											2KJ8...-4EC.1-...-Z
	LE80MB4S	0,75	1,1	1,3			✓										2KJ8...-4EH.1-...-Z
90	LE90S4S	1,1	1,5	1,9				✓									2KJ8...-4GC.1-...-Z
	LE90L4P	1,5	-	2,6					✓								2KJ8...-4GH.1-...-Z
		-	2,2	-						✓							
112	LE112MA4S	2,2	3	3,81							✓						2KJ8...-4LC.1-...-Z
	LE112MB4S	3	4	5,2								✓					2KJ8...-4LH.1-...-Z
	LE112MC4S	4	5,5	6,93									✓				2KJ8...-4LN.1-...-Z



Brake

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

Brake options

Manual brake release

Brakes can be supplied with a manual brake release lever. The manual brake release lever can be used to release the brake at zero current. When the brake has been released, the motor shaft can rotate freely in order to bring the output shaft to a certain position or for use as an emergency release in the event of a power failure, for example.

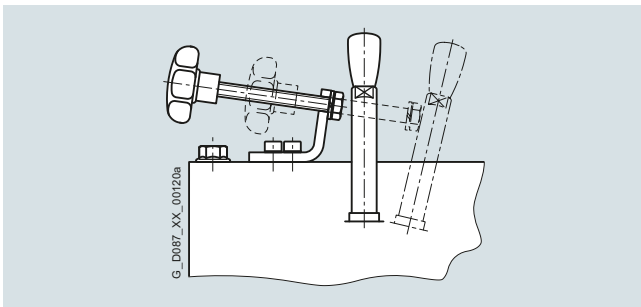
The manual brake release lever can be fixed in the released position using an additional locking mechanism mounted on the brake.

The manual brake release lever can be mounted in various different positions. The position of the manual brake release lever relates to the standard design of the motor. The standard position is "2".

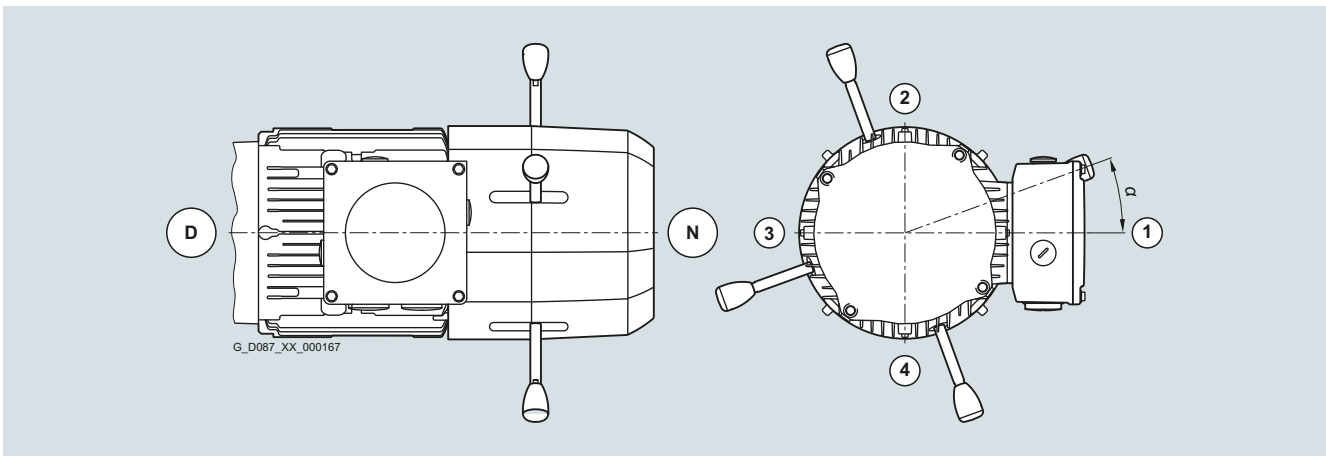
Brake option	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
Manual brake release lever		C02
Manual brake release lever with locking mechanism		C03

Note

Terminal box and manual brake release lever with locking mechanism must not be in the same position.



Example of manual brake release lever with locking mechanism for brake



Manual brake release lever position

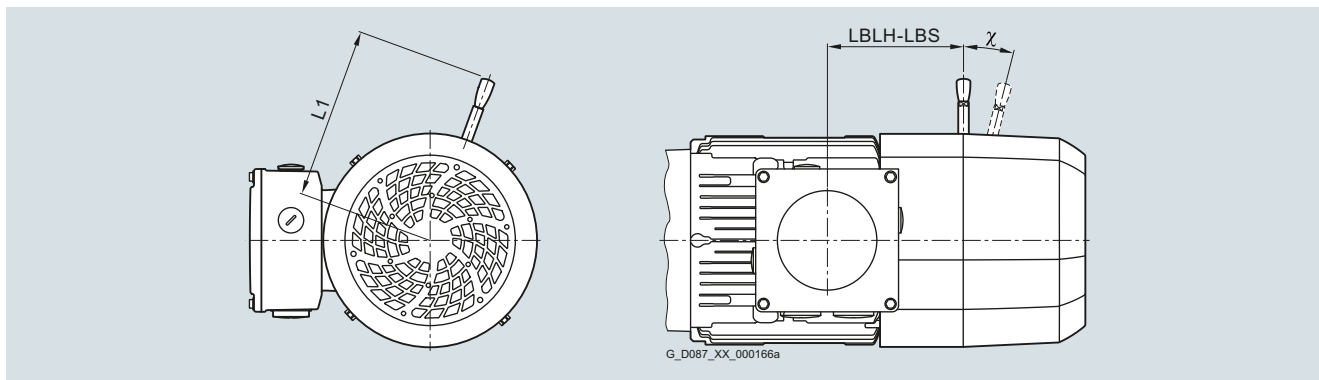
Manual brake release lever position	Motor frame size								Additional identification code -Z with order code	Order code
	71	63	71	80	90	100	112	132		
	Angle α								2KJ8 -Z	
1	0°	0°	10°	0°	0°	0°	0°	0°		C26
2	90°	90°	100°	90°	90°	90°	90°	90°		C27
3	180°	180°	190°	180°	180°	180°	180°	180°		C28
4	-	270°	280°	270°	270°	270°	270°	270°		C29

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options**Options**

The dimensions of the manual brake release lever depend on the size.



Dimensions, manual brake release lever

Motor frame size	Brake type	Terminal box position	Distance		Center of the terminal box up to the center of the manual brake release lever mm	Angle manual brake release lever With the brake released Tolerance +3°
			Centerline of the motor up to the outermost position of the manual brake release lever Without locking mechanism mm	Centerline of the motor up to the outermost position of the manual brake release lever With locking mechanism mm		
			L1	L1	LBLH-LBS	χ
71	L4	1A, 2A, 3A, 4A	107	127	71.8	12°
80	L8	1A, 2A, 3A, 4A	116	136	97.8	10°
90	L16	1A, 2A, 3A, 4A	132	151	113.9	9°
100	L16	1A, 2A, 3A, 4A	132	151	126.9	9°
	L32	1A, 2A, 3A, 4A	161	161	128.9	10°
112	L32	1A, 2A, 3A, 4A	161	161	128.9	10°
132	L80	1A, 2A, 3A, 4A	240	240	158.0	10°

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Motor options

Options

Enclosed brake

The brakes can be supplied as enclosed brakes.

Enclosed brakes include a dust protection ring around the circumference and an integrated shaft sealing ring at the shaft outlet. This prevents the release and penetration of dust, moisture, and other pollution. Other advantages are reduced noise when applying the brake.

In addition, a condensation drain hole can be incorporated in the dust protection ring for brakes.

The enclosed brake can also be shipped in combination with a manual brake release lever and a manual brake release lever with locking mechanism.

Brake option	Additional identification code -Z with order code	Order code
Enclosed brake	2KJ8 -Z	C01
Enclosed brake with condensation drain hole		C11

Brake cable protection

The brake cable of the geared motors is normally routed through the cable gland of the terminal box.

For motor frame sizes 71 to 132, we are offering an optional version of brake cable routing which ensures enhanced protection for the brake cable. In this version, the brake cable is brought into the motor directly under the fan cover through a hole in the base of the terminal box. This arrangement ensures that most of the cable is covered and protected against mechanical damage.

Brake option	Additional identification code -Z with order code	Order code
Brake cable protection	2KJ8 -Z	C80

Reduced-noise rotor-hub connection

The brakes are supplied with a reduced-noise rotor-hub connection. This reduces rattling noise of the rotor, particularly at low speeds and in converter operation.

Technical data of the brake ¹⁾

The opening and closing times are calculated on the basis of the life cycle and total wear of the brake and should be taken into account when the system is configured.

The values stated in parentheses are the values for new brakes calculated according to DIN VDE 0580.

Brake type	Rated holding torque	Rated braking torque	Power consumption	Current consumption	Disconnection time	Application time ($t_1 = t_{11} + t_{12}$)			Maximum operating energy per brake operation	Entire operating energy until the maximum air gap is reached	Weight	Moment of inertia
						t_1	Response time t_{11}	Rise time t_{12}				
	T_{4br} +40 % Nm	T_{2br} -20 %/+20 % (at 100 rpm) Nm	at +20 °C W	$I_{br(DC)}$ at 180 V DC	t_2 Standard excitation ms	ms	ms	ms	W_{1max}	W_V	m	J_{Br} 10 ⁻⁴ kgm ²
L4	3.2	4	20	0.112	53 (45)	28 (28)	(15)	(13)	3	36	0.85	0.15
L8/5	4	5	25	0.139	51 (35)	39 (40)	(24)	(16)	7.5	75.6	1.5	0.61
L8	6.4	8	25	0.139	71 (57)	39 (31)	(15)	(16)	7.5	64.8	1.5	0.61
L16/10	8	10	30	0.167	90 (48)	59 (58)	(35)	(23)	12	108	2.6	2
L16/13	10.4	13	30	0.167	97 (60)	53 (50)	(30)	(20)	12	108	2.6	2
L16	12.8	16	30	0.167	118 (76)	45 (47)	(28)	(19)	12	108	2.6	2
L16/20	16	20	30	0.167	123 (93)	42 (38)	(23)	(15)	12	80	2.6	2
L32/23	18.4	23	40	0.223	126 (82)	80 (75)	(40)	(35)	24	260	3.9	4.5
L32	25.6	32	40	0.223	186 (115)	66 (53)	(28)	(25)	24	212	3.9	4.5
L32/40	32	40	40	0.223	189 (140)	60 (45)	(24)	(21)	24	165	3.9	4.5
L80/50	40	50	55	0.306	178 (160)	149 (90)	(42)	(48)	36	396	8.4	15
L80/63	50.4	63	55	0.306	233 (170)	125 (72)	(34)	(38)	36	396	8.4	15

¹⁾ Values refer to brake in its delivery state.

SINAMICS G115D distributed drive system • Wall-mounted

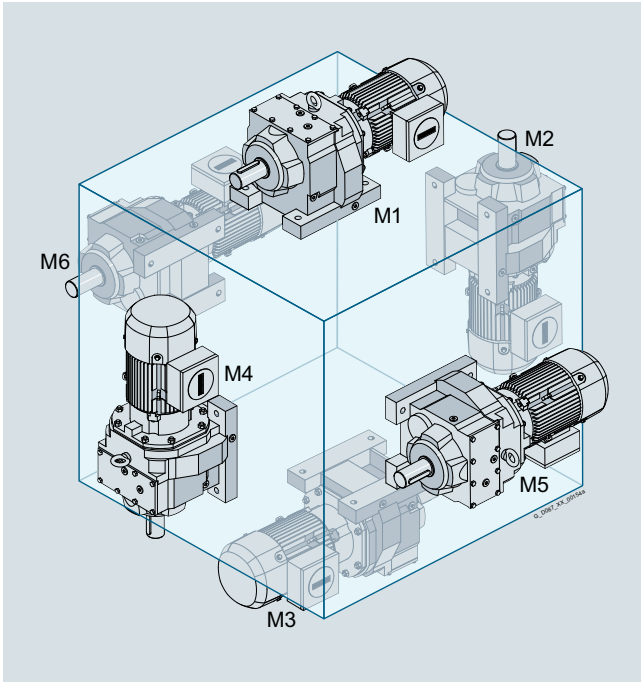
0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

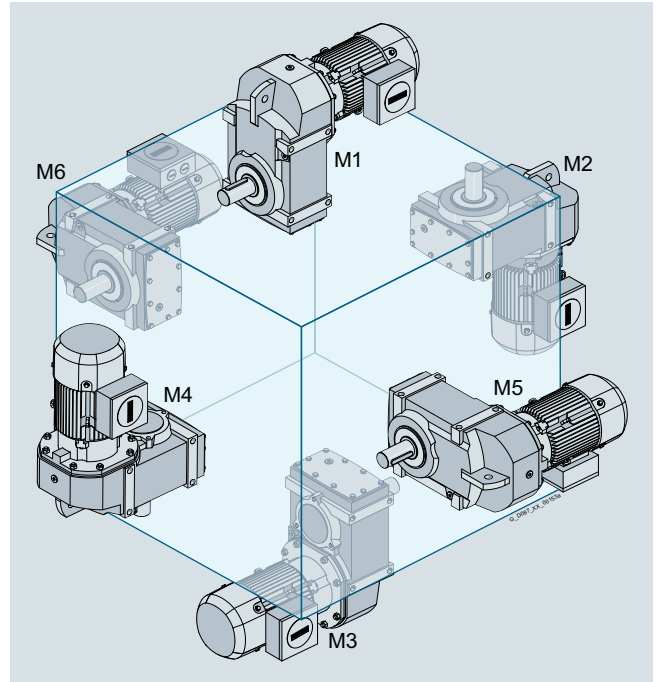
Options

Mounting positions

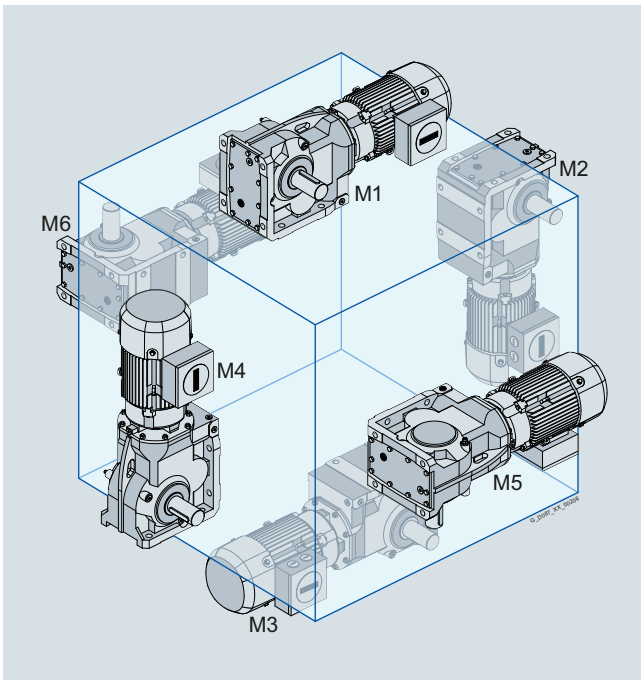
The mounting position must be specified when you place your order to ensure that the gearbox is supplied with the correct quantity of oil.



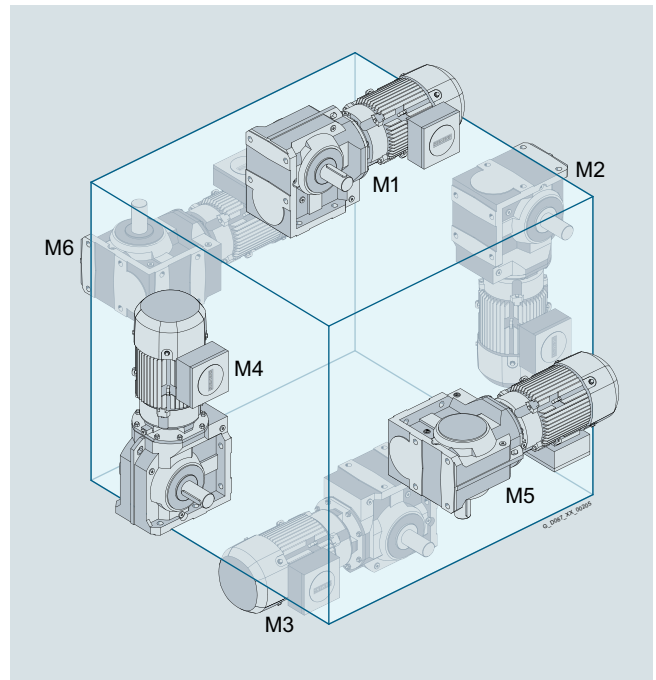
Helical geared motors



Parallel shaft geared motors



Bevel geared motors



Helical worm geared motors

SINAMICS G115D distributed drive system • Wall-mounted




0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Mounting type	Mounting position	Additional identification code -Z with order code	
		2KJ8 . . . - -Z	Order code
Helical gearboxes and parallel shaft gearboxes			
Foot-mounted design	M1		D01
Flange-mounted design	M2		D02
Housing flange design	M3		D03
	M4		D04
	M5		D05
	M6		D06
Bevel gearboxes and helical worm gearboxes			
Output side A			
Foot-mounted design	M1-A		D11
Flange-mounted design	M2-A		D12
Housing flange design	M3-A		D13
	M4-A		D14
	M5-A		D15
	M6-A		D16
Output side B			
Foot-mounted design	M1-B		D21
Flange-mounted design	M2-B		D22
Housing flange design	M3-B		D23
	M4-B		D24
	M5-B		D25
	M6-B		D26

Explanation of the symbols used to represent mounting positions

Symbol	
Oil valves	
	Venting
	Oil drain
	Oil level checking screw

Note:

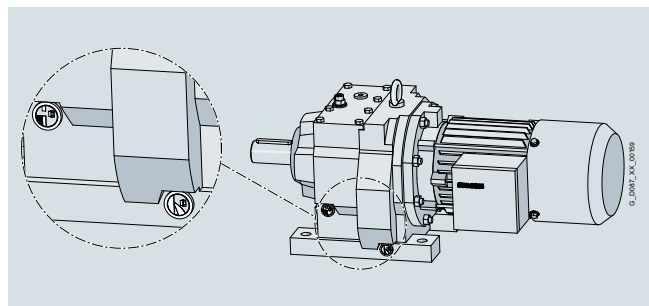
The [Drive Technology Configurator \(DT Configurator\)](#) can be used to configure SIMOGEAR geared motors.

The DT Configurator can be used on the internet without requiring any installation.

The DT Configurator can be found in the Industry Mall at the following address:

www.siemens.com/dt-configurator

For the selected mounting position, the 3D images show the exact position of the oil valves.



Dimensional drawing from DT Configurator with details

Mounting types

Design	Possible for						Additional identification code -Z with order code	
	D, Z	E	F	B	K	C	2KJ8 . . . - -Z	Order code
Foot-mounted design	✓	✓	✓	✓	✓	✓		-
Foot/flange-mounted design	✓ ¹⁾	-	-	-	-	-		H71
Flange-mounted design (A type)	✓	✓	✓	✓	✓	✓		H74
Housing flange (C type)	✓	✓	✓	✓	✓	✓		H76
Shaft-mounted design (torque arm)	-	-	✓	✓	✓	✓		H72

¹⁾ Only for sizes 29 to 89

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Parallel shaft gearboxes F.AD. in a shaft-mounted design

The rubber buffers (supplied loose) are used to flexibly support the gearbox on the housing plate provided.

When mounting, the rubber buffers must be pretensioned to the dimension specified in the dimensional drawing.

The elastomer used for support is manufactured out of natural rubber $70^\circ \pm 5$ Shore A. The rubber buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.

The dimensions of the torque arm can be seen in the dimensional drawings.

Mounting type	Additional identification code -Z with order code	Order code
	2KJ83 -Z	
	2KJ84 -Z	
Shaft-mounted design		H72

Bevel gearboxes KAD. in a shaft-mounted design

The torque arm of bevel gearboxes K is mounted on the underside of the housing. The rubber buffers are used to flexibly support the gearbox on the torque arm.

The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.

The dimensions of the torque arm can be seen in the dimensional drawings.

Mounting type	Additional identification code -Z with order code	Order code
	2KJ85 -Z	
Shaft-mounted design		H72

Bevel gearboxes BAD. in a shaft-mounted design

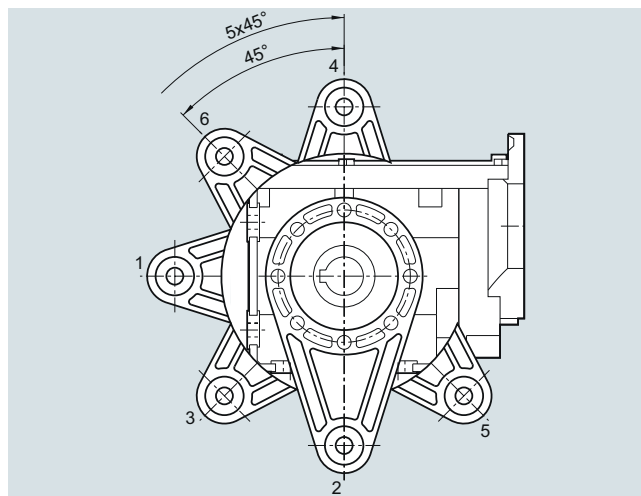
The torque arm can be screwed to the gearbox housing at various positions.

When ordered, the torque arm is supplied loose.

Mounting type	Additional identification code -Z with order code	Order code
	2KJ85 -Z	
Shaft-mounted design		H72

- Shaft-mounted design for sizes 19 and 29

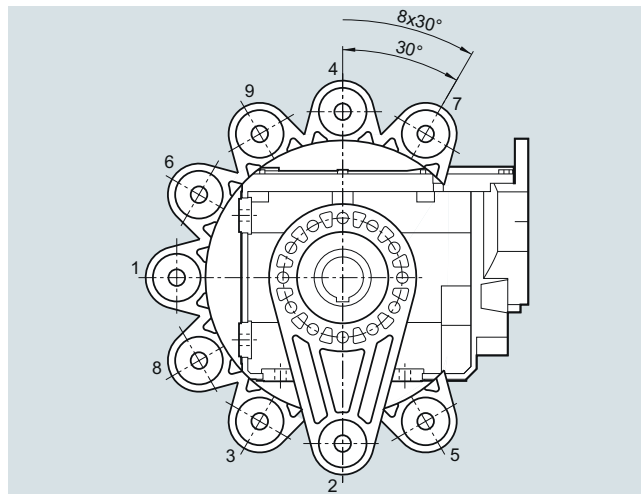
The elastomer used for support is manufactured out of natural rubber 90° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -30 and $+60$ °C.



Bevel gearboxes BAD, sizes 19 and 29

- Shaft-mounted design for sizes 39 and 49

The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.



Bevel gearboxes BAD, sizes 39 and 49

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Helical worm gearboxes CAD. in a shaft-mounted design

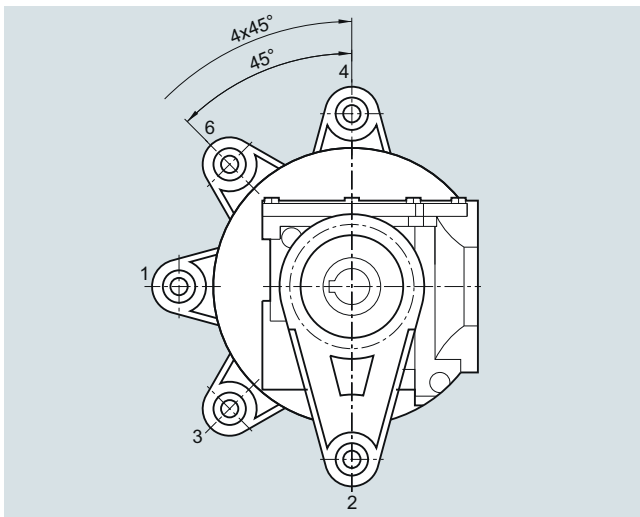
The torque arm can be screwed to the gearbox housing at various positions.

When ordered, the torque arm is supplied loose.

Mounting type	Additional identification code -Z with order code	Order code
Shaft-mounted design	2KJ86 -Z	H72

- Shaft-mounted design for size 29

The elastomer used for support is manufactured out of natural rubber 90° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -30 and +60 °C.



Helical worm gearboxes CAD, size 29

- Shaft-mounted design for sizes 39 to 89

The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and +60 °C.

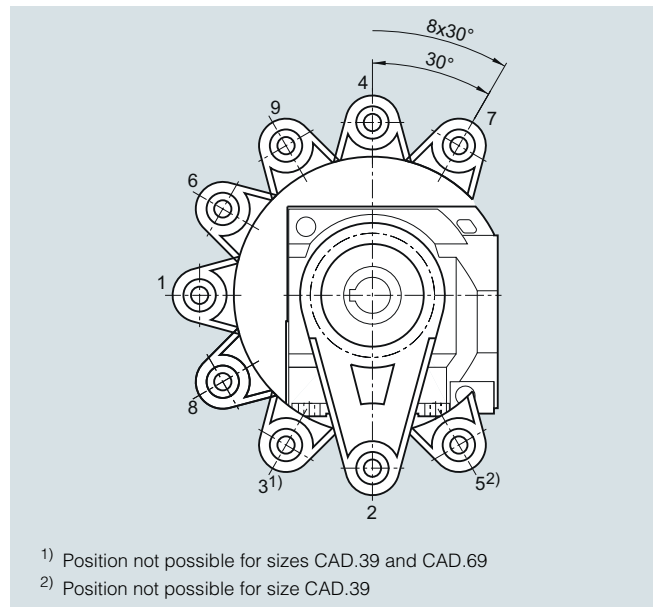
Shaft-mounted design	Additional identification code -Z with order code	Order code
	2KJ86 -Z	G09

Figure 1

G09

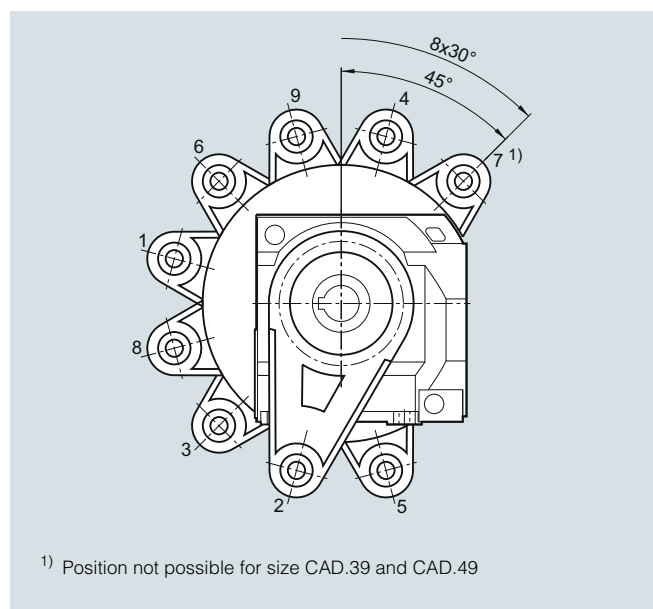
Figure 2

G10



- 1) Position not possible for sizes CAD.39 and CAD.69
- 2) Position not possible for size CAD.39

Helical worm gearboxes CAD, Figure 1, sizes 39 to 89



- 1) Position not possible for size CAD.39 and CAD.49

Helical worm gearboxes CAD, Figure 2, sizes 39 to 89

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Shaft design

Shaft design	Dimensions mm						Ambient temperature range	Additional identification code -Z with order code
Helical gearboxes Z and D								
Gearbox size	19	29	39	49	59	69		2KJ81. -Z 2KJ82. -Z
Solid shaft	V20 x 40 V16 x 28 V16 x 40	V25 x 50	V25 x 50 V30 x 60	V30 x 60	V35 x 70 V30 x 60 V40 x 80	V35 x 70	-40 ... +60 °C	Order code H31 H32 H33
Solid shaft without feather key	VG20 x 40	VG25 x 50	VG25 x 50	VG30 x 60	VG35 x 70	VG35 x 70		H40
Solid shaft, inches	V0.75" x 1.57" V1" x 1.97"	V1" x 1.97"	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.375" x 2.76"		H66
Gearbox size	79	89						2KJ81. -Z 2KJ82. -Z
Solid shaft	V40 x 80 V35 x 70 V50 x 100	V50 x 100 V60 x 120					-40 ... +60 °C	H31 H32 H33
Solid shaft without feather key ¹⁾	VG40 x 80	VG50 x 100						H40
Solid shaft, inches	V1.625" x 3.15"	V2.125" x 3.94"						H66
Helical gearboxes E								
Gearbox size	39	49	69	89				2KJ80. -Z
Solid shaft	V20 x 40	V25 x 50	V30 x 60	V40 x 80			-40 ... +60 °C	H31
Solid shaft, inches	V0.75" x 1.57"	V1" x 1.97"	V1.25" x 2.36"	V1.625" x 3.15"				H66
Parallel shaft gearboxes F								
Gearbox size	29	39	49	69	79	89		2KJ83. -Z 2KJ84. -Z
Solid shaft	V25 x 50	V25 x 50 V35 x 70	V30 x 60 V40 x 80	V35 x 70	V40 x 80 V50 x 100	V50 x 100	-40 ... +60 °C	H31 H33
Solid shaft without feather key ¹⁾	VG25 x 50	VG25 x 50	VG30 x 60	VG35 x 70	VG40 x 80	VG50 x 100		H40
Solid shaft, both ends ¹⁾³⁾		VD25 x 50	VD30 x 60	VD35 x 70	VD40 x 80	VD50 x 100		H64
Solid shaft, both ends without feather key ¹⁾³⁾			VDG30 x 60	VDG35 x 70	VDG40 x 80	VDG50 x 100		H65
Solid shaft, inches	V1" x 1.97"	V1"x1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.625" x 3.15"	V2" x 3.94"		H66
Hollow shaft	H25	H30 H25	H35 H30	H40	H40	H50		H35 H36
Hollow shaft, inches	H1"	H1.25"	H1.375"	H1.5"	H1.5"	H2"		H67
Hollow shaft with shrink disk	HS25	HS30	HS35	HS40	HS40	HS50		H50
SIMOLOC assembly system, metric	HF25 HF20	HF30 HF25	HF35 HF30	HF40 HF35	HF40 HF35	HF50 HF40	-20 ... +60 °C	H53 H54
SIMOLOC assembly system, imperial dimensions	HF1.0" HF0.75"	HF1.25" HF1.1875"	HF1.375" HF1.4375"	HF1.5" HF1.625"	HF1.5" HF1.625"	HF2.0" HF1.9375"		H55 H56
		HF1.0"	HF1.25"	HF1.4375"	HF1.4375"	HF1.75"		H57
		-	HF1.1875"	HF1.375"	HF1.375"	HF1.625"		H58
Splined hollow shaft		N30	N35	N35	N45	N50	-40 ... +60 °C	H61
Bevel gearboxes B								
Gearbox size	19	29	39	49				2KJ85. -Z
Solid shaft	V20 x 40	V20 x 40	V30 x 60	V35 x 70			-40 ... +60 °C	H31
Solid shaft without feather key	VG20 x 40	VG20 x 40	VG30 x 60	VG35 x 70				H40
Solid shaft, both ends ²⁾	VD20 x 40	VD20 x 40	VD30 x 60	VD35 x 70				H64
Solid shaft, inches	V0.75" x 1.57"	V0.75" x 1.57"	V1" x 1.97"	V1.375" x 2.76"				H66
Hollow shaft	H20	H20 H25	H30 H35	H40 H35				H35 H36
Hollow shaft, inches	H0.75"	H0.75"	H1.25"	H1.5"				H37 H67

¹⁾ Can only be selected in conjunction with foot-mounted or housing flange design.

²⁾ Can only be selected in conjunction with foot-mounted design.

³⁾ Restricted motor sizes in conjunction with shaft extensions at both ends; for precise dimensioning, use the functionality of the DT Configurator.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Shaft design	Dimensions mm						Ambient temperature range	Additional identification code -Z with order code	Order code
Bevel gearboxes B									
Gearbox size	19	29	39	49				2KJ85. -Z	
Hollow shaft with shrink disk	HS20	HS20	HS35	HS40			-40 ... +60 °C		H50
SIMOLOC assembly system, metric		HF25	HF30	HF35			-20 ... +60 °C		H53
		HF20	HF25	HF30				H54	
				HF40				H60	
SIMOLOC assembly system, imperial dimensions		HF1.0"	HF1.25"	HF1.375"					H55
		HF0.75"	HF1.1875"	HF1.4375"				H56	
			HF1.0"	HF1.25"				H57	
				HF1.1875"				H58	
				HF1.625"				H59	
Bevel gearboxes K									
Gearbox size	39	49	69	79	89	109		2KJ85. -Z	
Solid shaft	V25 x 50	V30 x 60	V35 x 70	V40 x 80	V50 x 100	V60 x 120	-40 ... +60 °C		H31
	V35 x 70	V40 x 80		V50 x 100		V80 x 170		H33	
Solid shaft without feather key	VG25 x 50	VG30 x 60	VG35 x 70	VG40 x 80	VG50 x 100	VG60 x 120			H40
Solid shaft, both ends ¹⁾	VD25 x 50	VD30 x 60	VD35 x 70	VD40 x 80	VD50 x 100	VD60 x 120			H64
Solid shaft, both ends without feather key ¹⁾		VDG30 x 60	VDG35 x 70	VDG40 x 80	VDG50 x 100	VDG60 x 120			H65
Solid shaft, inches	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.625" x 3.15"	V2" x 3.94"	V2.375" x 4.72"			H66
Hollow shaft	H30	H35	H40	H40	H50	H60			H35
	H25	H30							H36
						H70			H37
Hollow shaft, inches	H1.25"	H1.375"	H1.5"	H1.5"	H2"	H2.375"			H67
Hollow shaft with shrink disk	HS30	HS35	HS40	HS40	HS50	HS65			H50
SIMOLOC assembly system, metric	HF30	HF35	HF40	HF40	HF50	HF65	-20 ... +60 °C		H53
	HF25	HF30	HF35	HF35	HF40	HF60		H54	
SIMOLOC assembly system, imperial dimensions	HF1.25"	HF1.375"	HF1.5"	HF1.5"	HF2.0"				H55
	HF1.1875"	HF1.4375"	HF1.625"	HF1.625"	HF1.9375"			H56	
	HF1.0"	HF1.25"	HF1.4375"	HF1.4375"	HF1.75"			H57	
		HF1.1875"	HF1.375"	HF1.375"	HF1.625"			H58	
Splined hollow shaft	N30	N35	N35	N45	N50	N65	-40 ... +60 °C		H61
Helical worm gearboxes C									
Gearbox size	29	39	49	69	89			2KJ86. -Z	
Solid shaft	V20 x 40	V25 x 50	V30 x 60	V35 x 70	V45 x 90		-40 ... +60 °C		H31
				V40 x 80 ¹⁾	V50 x 100 ¹⁾			H32	
		V35 x 70 ¹⁾	V40 x 80 ¹⁾	V50 x 100 ¹⁾	V70 x 140 ¹⁾			H33	
Solid shaft without feather key	VG20 x 40	VG25 x 50	VG30 x 60	VG35 x 70	VG45 x 90			H40	
Solid shaft, both ends ²⁾	VD20 x 40	VD25 x 50	VD30 x 60	VD35 x 70	VD45 x 90			H64	
Solid shaft, inches	V0.75" x 1.57"	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.75" x 3.54"			H66	
Hollow shaft	H20	H25	H30	H40	H50			H35	
		H30	H35	H45	H60			H36	
Hollow shaft, inches	H0.75"	H1.25"	H1.375"	H1.5"	H2"			H67	
Hollow shaft with shrink disk	HS20	HS30	HS35	HS40	HS50			H50	
				HS50	HS60			H52	
SIMOLOC assembly system, metric	HF25	HF30	HF35	HF40	HF50		-20 ... +60 °C		H53
	HF20	HF25	HF30	HF35	HF40			H54	
SIMOLOC assembly system, imperial dimensions	HF1.0"	HF1.25"	HF1.375"	HF1.5"	HF2.0"				H55
	HF0.75"	HF1.1875"	HF1.4375"	HF1.625"	HF1.9375"			H56	
		HF1.0"	HF1.25"	HF1.4375"	HF1.75"			H57	
			HF1.1875"	HF1.375"	HF1.625"			H58	

¹⁾ Can only be selected in conjunction with foot-mounted or housing flange design.

²⁾ Can only be selected in conjunction with foot-mounted design.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options**Options**Hollow shaft cover• Sealing cap

The bore of the hollow shaft is sealed using a plastic sealing cap.

Gearboxes in size 39 and larger with hollow shaft and shrink disk have a rotating protective cap.

The dimensions of the rotating protective cap can be seen in the dimensional drawings provided in the gearbox chapters.

For safety reasons, stationary protective covers may be required.

• Protective cover

For sizes 19 to 89, a stationary protective cover for the hollow shaft or hollow shaft with shrink disk versions can be selected.

The dimensions of the protective cover can be seen in the separate dimensional drawing provided in the gearbox chapters.

Hollow shaft cover	Additional identification code -Z with order code	
	2KJ8 -Z	Order code
Protective cover		G60

Reinforced output shaft bearings

The gearboxes can be supplied with the standard design or with a reinforced output shaft bearing design. The reinforced bearings allow higher radial and combined forces (radial and axial) to be absorbed.

Design	Possible for								Additional identification code -Z with order code	Order code
Helical gearboxes Z and D										
Gearbox size	19	29	39	49	59	69	79	89	2KJ81 -Z 2KJ82 -Z	
Radially reinforced output shaft bearings						✓	✓	✓		G20
Parallel shaft gearboxes F										
Gearbox size	29	39	49	69	79	89			2KJ83 -Z 2KJ84 -Z	
Radially reinforced output shaft bearings			✓ ¹⁾	✓	✓	✓				G20
Bevel gearboxes K										
Gearbox size	39	49	69	79	89	109			2KJ85 -Z	
Radially reinforced output shaft bearings		✓ ¹⁾	✓	✓	✓	✓				G20

¹⁾ Not possible for flange-mounted design with solid shaft (gearbox type FZF, FDF, KF).

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Lubrication and sealing

Gearboxes can be used for different applications. The following lubricants and sealing systems can be selected to ensure an optimum configuration.

The temperature rise of the gearbox during operation increases the oil sump temperature. In selecting the oil, pay attention to the upper limit of the recommended oil sump temperature.

Note:

- For ambient conditions with a high air humidity and salt-laden air, we recommend that only mineral or PAO oils are used.
- For gearboxes with CLP ISO PG oils for applications in the USA, the approval must be checked. Alternatively, a different type of oil must be used (e.g. CLP ISO PAO oil).

Lubrication

The gearboxes are initially filled at the factory with a high-quality lubricant. Lubricants permitted for the various gearbox types and applications are listed in the lubricant table.

Other oils from various lubricant manufacturers that have been approved by Siemens AG can be found on the internet in the Service and Support pages in the List of approved and recommended gear lubricants T 7300:

<https://support.industry.siemens.com/cs/document/44231658>

Oil quantities

The lubricant quantity depends on the gearbox type, size and mounting position. The corresponding oil quantities are specified in the operating instructions and on the rating plate of the geared motor.

Sealing

The standard models of gearbox are supplied with high-quality radial shaft sealing rings with dust protection lips. This sealing design is reliable for a wide range of applications.

Special application areas and environmental conditions require special radial shaft sealing rings and materials, which are coordinated with the particular gearbox oil and environment. This coordinated sealing system results in a high reliability and availability of the plant.

When compared to standard sealing systems, the maintenance intervals can be extended. This therefore reduces maintenance costs.

Selection of lubricant

Application	Oil type Designation acc. to DIN 51502	Permissible oil sump temperature range in operation [°C]	Additional identification code -Z with order code 2KJ8 -Z Order code	Ambient temperature range		
				Standard [°C]	Extended [°C]	[°C]
Helical gearboxes Z, D and E, parallel shaft gearboxes F and bevel gearboxes K				-15 ... +40	-30 ... +40	-20 ... +55
Standard	CLP ISO VG220	-15 ... +80	K06	✓		
	CLP ISO PAO VG220	-30 ... +100	K12	✓	✓	✓ ¹⁾
	CLP ISO PAO VG68	-40 ... +60	K13		✓	
	CLP ISO PG VG460	-25 ... +110	K08	✓		✓
	CLP ISO PG VG220	-25 ... +110	K07	✓		✓
Foodstuff area	CLP ISO H1 VG460	-25 ... +100	K11	✓		✓ ¹⁾
	CLP ISO H1 VG100	-30 ... +90	K14	✓	✓	✓ ¹⁾
Biodegradable oil	CLP ISO E VG220	-20 ... +100	K10	✓		✓ ¹⁾
Bevel gearboxes B and helical worm gearboxes C				-15 ... +40	-30 ... +40	-20 ... +55
Standard	CLP ISO PG VG220	-25 ... +110	K07	✓		✓
	CLP ISO PAO VG220	-30 ... +100	K12	✓	✓	✓ ¹⁾
	CLP ISO PAO VG460	-25 ... +110	K16	✓		✓
	CLP ISO PAO VG68	-40 ... +60	K13		✓	
	CLP ISO PG VG460	-25 ... +110	K08	✓		✓
Foodstuff area	CLP ISO H1 VG460	-25 ... +100	K11	✓		✓ ¹⁾
	CLP ISO H1 VG100	-30 ... +90	K14	✓		✓ ¹⁾

CLP = mineral oil

CLP PG = polyglycol oil

E = Ester oil, organic oil (bio oil / risk of water pollution, class WGK1)

PAO = Poly-alpha-olefin oil

CLP H1 = physiologically safe oil (USDA-H1 approval)

¹⁾ Observe the thermal load.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

Rolling bearing greases for gearboxes and motors

The rolling bearings of gearboxes and motors are lubricated in the factory with a rolling bearing grease that is coordinated with the selected application area. The quantity of grease between the rolling elements and the space in front of the bearing depends on the operating conditions and the gearbox mounting position. For operation in the selected application areas, it is not necessary to relubricate the rolling bearings.

We recommend that the grease filling of the rolling bearings is also changed when the oil or shaft sealing rings are replaced.

Other greases supplied by different lubricant manufacturers that have been approved by Siemens AG are specified in the List of approved and recommended gearbox lubricants T 7300.

Sealing system

• Overview

Output shaft sealing	Description	Ambient condition	Additional identification code -Z with order code	
			2KJ8 -Z	Order code
Normal environmental stress				
Standard seal	High-quality NBR radial shaft sealing ring with dust protection lip.	Environment with low dust and pollution levels with low moisture.		-
Longer service life				
Seal with longer service life	The radial shaft sealing ring with protective lip is designed with an additional seal on the internal gearbox side. The sealing system has a high degree of reliability due to its resistance to impurities in the oil.	Environment with low dust and pollution levels with low moisture.		G23
Longer service life and increased environmental stress				
Seal for increased environmental stress	This seal is equipped with an additional fiber disk. In addition to the longer service life, it also provides increased protection against higher environmental stress as a result of dust and dirt deposits. As a consequence, the sealing system has a high degree of reliability. For additional environmental stress, e.g. water jets or significant levels of pollution as a result of production materials, please contact your local Siemens office.	Environments with increased pollution and dust levels as well as low moisture. Typical applications: Production areas with increased pollution and dust, such as wood chips, dusts or granulate as well as occasional spray water.		G24
High temperature-resistant				
Seal for high temperatures	High-quality FKM radial shaft sealing ring with dust protection lip.	Environment with low dust and pollution levels with low moisture.		G25

• Selection of seal

Seal	Permissible oil sump temperature range in operation [°C]	Additional identification code -Z with order code 2KJ8 -Z	Ambient temperature range		
			Standard [°C]	Extended [°C]	[°C]
Helical gearboxes Z, D and E, parallel shaft gearboxes F and bevel gearboxes K					
			-15 ... +40	-30 ... +40	-20 ... +55
Standard seal	-40 ... +80	-	✓	✓	✓
Seal for a longer service life	-40 ... +100	G23	✓	✓	✓
Seal for increased environmental stress	-40 ... +80	G24 ¹⁾	✓	✓	✓
Seal, high temperature-resistant	-25 ... +110	G25	✓	-	✓
Bevel gearboxes B and helical worm gearboxes C					
			-15 ... +40	-30 ... +40	-20 ... +55
Standard	-40 ... +80	-	✓	✓	✓
Seal for a longer service life	-40 ... +100	G23 ²⁾	✓	✓	✓
Seal for increased environmental stress	-40 ... +80	G24 ¹⁾²⁾	✓	-	✓
Seal, high temperature-resistant	-25 ... +110	G25	✓	-	✓

¹⁾ Not admissible in conjunction with food oils and biodegradable oils.

²⁾ Not possible with bevel gearbox B19.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options

Options

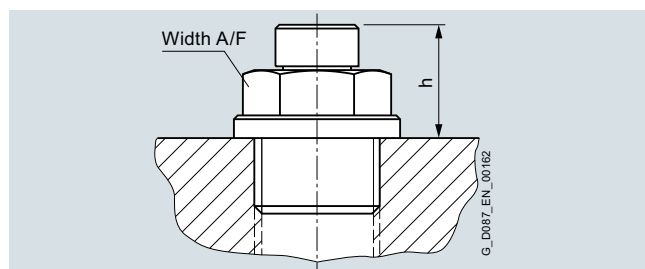
Venting and oil level control

Pressure breather valve

Gearboxes from size 39 are supplied with an installed pressure breather valve; this is suitable for both indoor and outdoor use. Gearbox sizes 19 and 29 can be operated in mounting positions M1, M3, M5, and M6 without requiring a pressure breather valve. For mounting positions M2 and M4, they are equipped with a pressure breather valve.

A stainless-steel version of the pressure breather valve is also available for use in special ambient conditions.

Venting	Additional identification code -Z with order code	Order code
Pressure breather valve	2KJ8. -Z	G45
Pressure breather valve stainless steel		G49



Pressure breather valve

• Technical data

Size	Width across flats Width A/F	Thread	Dimension h mm
Helical gearboxes Z and D			
19 ... 39	12	G 1/8 A	15
49 ... 79	13	G 1/4 A	15
89	17	G 3/8 A	15
Helical gearboxes E			
39	12	G 1/8 A	15
49 ... 69	13	G 1/4 A	15
89	17	G 3/8 A	15
Parallel shaft gearboxes F			
29, 39	12	G 1/8 A	15
49 ... 79	13	G 1/4 A	15
89	17	G 3/8 A	15
Bevel gearboxes B			
19 ... 39	12	G 1/8 A	15
49	13	G 1/4 A	15
Bevel gearboxes K			
39	12	G 1/8 A	15
49 ... 89	13	G 1/4 A	15
109	17	G 3/8 A	15
Helical worm gearboxes C			
29, 39	12	G 1/8 A	15
49 ... 89	13	G 1/4 A	15

Oil drain

• Magnetic oil drain screw

For gearboxes from size 39, a magnetic oil drain screw is available that is inserted in the oil drain hole. This serves to collect any metal particles in the gearbox oil.

Oil drain	Additional identification code -Z with order code	Order code
Magnetic oil drain screw	2KJ8. -Z	G53

• Oil drain valve

For gearboxes from size 39, an oil drain valve is available in either a straight or angled design. The oil drain valve is supplied complete with screw plug as a kit.

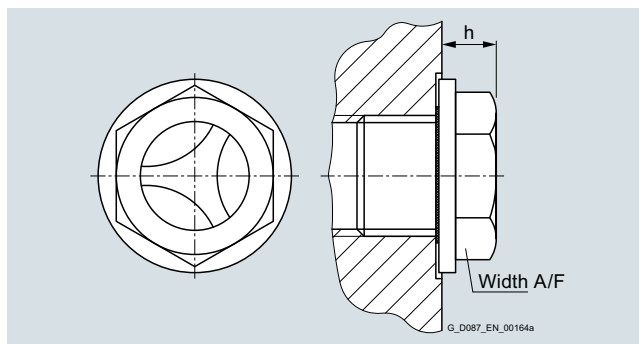
Oil drain	Additional identification code -Z with order code	Order code
Oil drain valve, straight	2KJ8. -Z	G53
Oil drain valve, angled		G55

Oil level checking screw

For gearboxes from size 49, the oil level is checked using the oil level checking screw. The oil sight glass is available with a reflector for visual monitoring.

The oil sight glass on both sides is also available for the bevel gearbox and helical worm gearbox in mounting position M2 and M4.

Oil level checking screw	Additional identification code -Z with order code	Order code
Oil sight glass with reflector	2KJ8. -Z	G34
Oil sight glass with reflector on both sides		G35



Oil sight glass with reflector

• Technical data

Size	Width across flats Width A/F	Thread	Dimension h mm
Helical gearboxes Z and D			
49 ... 79	16	G 1/4 A	10
89	19	G 3/8 A	9
Helical gearboxes E			
49 ... 69	16	G 1/4 A	10
89	19	G 3/8 A	9
Parallel shaft gearboxes F			
49 ... 79	16	G 1/4 A	10
89	19	G 3/8 A	9
Bevel gearboxes B			
49	16	G 1/4 A	10
Bevel gearboxes K			
49 ... 89	16	G 1/4 A	10
109	19	G 3/8 A	9
Helical worm gearboxes C			
49 ... 89	16	G 1/4 A	10

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • Gearbox options**Options**Oil expansion unit

The oil expansion unit increases the expansion space for the lubricant. For certain types of construction and at high operating temperatures, this avoids that lubricant escapes.

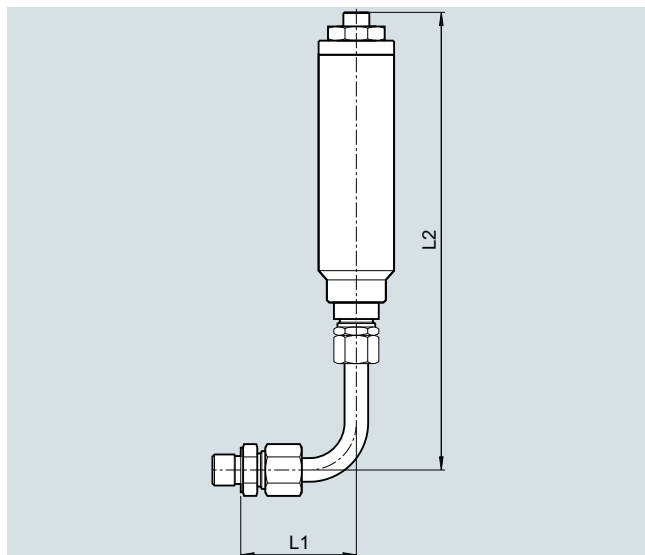
The expansion unit is supplied as a mounting kit, and can be mounted onto the geared motor vertically or at an angle.

The oil expansion unit can be used at the following ambient temperatures:

- Oil expansion unit type 1 -40 to +120 °C

For different ambient temperatures, please contact Siemens.

Venting	Additional identification code -Z with order code	
Oil expansion unit	2KJ8.....-Z	Order code G47



Oil expansion unit type 1

• Technical data

Size	Motor frame size	Width across flats		Thread	Dimension L1	Dimension L2
			Width A/F			
Helical gearboxes Z and D						
39	71 ... 90	17/19		G1/8A	49	194
	100				71	172
49 ... 69	71 ... 112	19/19		G1/4A	49	194
	132				71	172
79	80 ... 90	19/19		G1/4A	49	194
	100 ... 132				71	172
89	100 ... 132	22/19		G3/8A	49	194
Helical gearboxes E						
39	71 ... 90	17/19		G1/8A	49	194
	100 ... 112				71	172
49	71 ... 112	19/19		G1/4A	49	194
	132				71	172
69	71 ... 90	19/19		G1/4A	49	194
	100 ... 112				71	172
	132				99	194
89	100 ... 132	22/19		G3/8A	49	194
Parallel shaft gearboxes F						
39	71 ... 90	17/19		G1/8A	49	194
	100 ... 112				71	172
49 ... 69	71 ... 112	19/19		G1/4A	49	194
	132				71	172
79	80 ... 90	19/19		G1/4A	49	194
	100 ... 132				71	172
89	100 ... 132	22/19		G3/8A	49	194
Bevel gearboxes B						
29	71 ... 90	17/19		G1/8A	49	194
	100				71	172
39	71 ... 90	17/19		G1/8A	49	194
	100 ... 112				71	172
49	71 ... 112	19/19		G1/4A	49	194
	132				71	172
Bevel gearboxes K						
39	71 ... 90	17/19		G1/8A	49	194
	100 ... 112				71	172
49	71 ... 112	19/19		G1/4A	49	194
					71	172
69	71 ... 112	19/19		G1/4A	49	194
	132				71	172
79	71 ... 90	19/19		G1/4A	49	194
	100 ... 132				71	172
89	80 ... 90	19/19		G1/4A	49	194
	100 ... 132				71	172
109	100 ... 132	22/19		G 3/8A	49	194
	160				71	172
	180				71	172
Helical worm gearboxes C						
39	71 ... 90	17/19		G1/8A	49	194
	100				71	172
49 ... 69	71 ... 112	19/19		G1/4A	49	194
	132				71	172
89	80 ... 112	19/19		G1/4A	49	194
	132				71	172

Options

Special versions

Reduced-backlash version

Gearboxes with reduced backlash are required to perform high-precision positioning tasks and to achieve a high level of control quality. A minimal torsional backlash also has a favorable effect on torque spikes during startup and on load switching in the drive train. With this version, all machine elements in the gearbox that are in the power flow are designed with reduced backlash. As a result, this version also has the option "Shrink-glued output gearwheel".

To ensure that the entire driven machine can be designed with minimum possible backlash, it is advisable to select the solution with integral motor mounting (without adapter), output shafts with shrink disk connection or with smooth shafts (without feather key). In this case, only backlash-free power transmission elements should be used.

The specified torsional backlash in minutes of the angle ['] is based on the maximum rotation angle of the output shaft (no load, max. 1 % of rated output torque) with stationary input shaft.

For the exact values, refer to the torque tables. If no values are specified in the tables, this means that a reduced-backlash version is not available for the specific version.

The dimensions of the reduced-backlash gearboxes are identical to those of the standard versions.

Special version	Additional identification code -Z with order code	
	2KJ8. -Z	Order code
Reduced-backlash version ¹⁾		G99

Shrink-glued output gearwheel

The gearbox output stage is subjected to particular high levels of mechanical stress during rigorous reversing duty or acceleration of high mass moments of inertia. The shrink-glued output gearwheel option ensures the load-bearing capacity of the shaft/hub connection in the event of dynamic load.

Special version	Additional identification code -Z with order code	
	2KJ8. -Z	Order code
Shrink-glued output gearwheel ¹⁾		G97

¹⁾ Cannot be selected for helical worm gearboxes.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • General options

Options

Surface treatment and preservation

To protect the geared motors against corrosion and external influences, five high-quality paint systems are available in various colors.

The corrosion protection system is designed in accordance with the corrosivity categories of EN ISO 12944-2.

Geared motors, frame size 49 and higher, are painted in RAL 7016 (anthracite gray) to corrosivity category C1 as standard. This ensures that they are protected against corrosion for indoor use.

Geared motors, frame sizes 19 to 39 with an aluminum housing are supplied unpainted as standard.

The shaft extensions and bare surfaces are treated with corrosion protection for 6 months.

The converters of the SINAMICS G115D system are made of high quality aluminum (EN AC 44300) with good corrosion resistance and are not painted.

Note:

Corrosivity category C1 is not suitable for ambient temperatures under -20 °C.

Surface pretreatment

For especially demanding applications, the drives can also be pretreated in order to ensure an optimum paint finish even in areas that are hidden or difficult to access.

Surface pretreatment	Additional identification code -Z with order code	
	2KJ8. -Z	Order code
Special pretreatment		L19

Corrosivity category	Paint system			Description	Additional identification code -Z with order code	Order code
	Base coat	Intermediate coat	Top coat			
Surface protection						
Aluminum gearbox housing¹⁾						
Unpainted (standard)	-	-	-	<ul style="list-style-type: none"> Indoor installation Heated buildings with neutral atmospheres 		L00
C1 Normal environmental stress	-	-	1-component hydro paint	<ul style="list-style-type: none"> Resistant to greases, conditionally resistant to mineral oils, aliphatic solvents Standard paint 		L02
Cast iron gearbox housing²⁾						
C1 Normal environmental stress	-	-	1-component hydro paint	<ul style="list-style-type: none"> Indoor installation Heated buildings with neutral atmospheres Resistant to greases, conditionally resistant to mineral oils, aliphatic solvents Standard paint 		L02
All geared motors						
C2 Low environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Unheated buildings with condensation, production areas with low humidity, e.g. warehouses and sports facilities Atmospheres with little pollution, rural areas 		L03
C3 Average environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Production areas with high humidity and some air pollution, e.g. food production areas, dairies, laundries and breweries Urban and industrial atmospheres, moderate contamination from sulfur dioxide, coastal areas with low salt levels 		L04
C4 High environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Chemical plants, swimming pools, wastewater treatment plants, electroplating shops, and boathouses above seawater Industrial areas and coastal areas with moderate salt levels 		L20

¹⁾ Helical gearboxes D/Z19 to D/Z39, parallel shaft gearboxes F29 and bevel gearboxes B29 and B39

²⁾ The bevel gearbox B49 is supplied painted.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

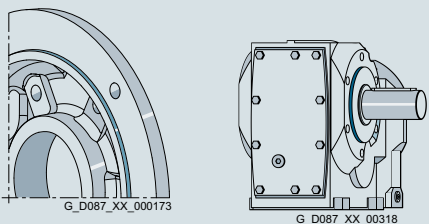
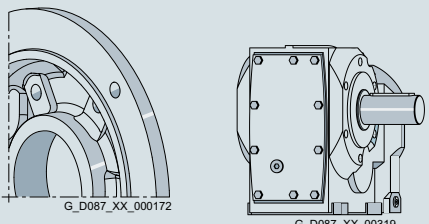
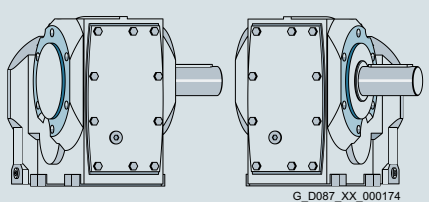
SIMOGEAR geared motors for SINAMICS G115D wall-mounted • General options

Options

Corrosivity category	Paint system			Description	Additional identification code -Z with order code 2KJ8. -Z	Order code
	Base coat	Intermediate coat	Top coat			
Surface protection						
C5 Very high environmental stress	2-component epoxy zinc phosphate	2-component epoxy zinc phosphate	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Buildings/areas with almost constant condensation and high degrees of pollution, e.g. malt factories and aseptic areas Industrial areas with high humidity and aggressive atmosphere, coastal areas and offshore environments with high salt levels 		L05
Primer						
Ability to be painted						
C2 G	2-component polyurethane	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 		L01
C4 G	2-component epoxy zinc phosphate	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 		L09
Unpainted	-	-	-	<ul style="list-style-type: none"> Plastic paint, synthetic resin paint, oil paint, 2-component polyurethane paint, 2-component epoxy paint 		L00

Painting flange surfaces

For flange-mounted or housing flange designs, the flange surface and centering are not painted at the selected output end. The versions listed in the table can be optionally selected.






Design	Figure	Possible for	Additional identification code -Z with order code 2KJ8. -Z	Order code
Centering not painted	Surfaces marked blue are not painted  G_D087_XX_000173 G_D087_XX_00318	<ul style="list-style-type: none"> Flange-mounted design Housing flange design 		L11
Flange completely painted	 G_D087_XX_000172 G_D087_XX_00319	<ul style="list-style-type: none"> Flange-mounted design Housing flange design 		L12
Centering flange not painted on both sides	 G_D087_XX_000174	<ul style="list-style-type: none"> Housing flange design for bevel gearbox and helical worm gearbox 		L27

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • General options**Options**Colors

In addition to anthracite gray (RAL 7016), you can select from other standard colors.

RAL color	Designation	Color, example	Additional identification code -Z with order code 2KJ8. . . - -Z	Order code
RAL 7016	Anthracite gray (standard)			L75
RAL 5015	Sky blue			L50
RAL 7030	Stone gray			L55
RAL 7031	Blue gray			L53
RAL 7012	Basalt gray			L83

You can find additional colors in the DT Configurator.

Note

For light colors in corrosivity category C1 we recommend selection of surface treatment in the corrosivity category one level higher to ensure adequate and uniform coloring for the geared motor.

Preservation

All gearboxes and geared motors are preserved as standard for 6 months.

Long-term preservation up to 36 months

If the gearboxes are stored for longer than 6 months, then we recommend the "Long-term preservation" option. A VCI corrosion inhibitor (volatile corrosion inhibitor) is added to the gearbox oil.

Until commissioning, it is not permissible that the gearbox is opened, as otherwise the VCI corrosion inhibitor will vaporize. The oil level must be checked before commissioning. Corrosion protection is also applied to the flange contact surfaces and shaft extensions. We recommend that the gearbox is stored in the appropriate mounting position.

Storage conditions

Geared motors, stored in dry, dust-free and evenly tempered rooms do not require any special packaging.

In all other areas, the units must be packaged in foil with desiccant and moisture indicator. If required, protection must be provided against mold and insects. The storage location must be vibration- and shock-free. The storage conditions must be regularly checked.

Preservation	Additional identification code -Z with order code 2KJ8. . . - -Z	Order code
Long-term preservation up to 36 months		K17

For information about storage and commissioning please refer to the operating instructions.

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • General options

Options

Rating plate

The rating plates on the gearboxes and geared motors are normally manufactured out of coated aluminum foil. They are covered with a special masking film which ensures permanent resistance to UV radiation and media of all kinds (oils, greases, salt water, cleaning agents, etc.).

The adhesive and the material ensure firm adhesion and long-term legibility within the operating temperature range from -40 to +155 °C.

For geared motors, the rating plate is attached to a stainless steel plate on the motor.

For specific designs, additional rating plates are attached to the motor.

Geared motors

SIEMENS		IE4	
1P 2KJ8102-4EC10-0AB1-Z+D01		IEC TS 60034-30-2	
S FDUMN/253146201		-15°<=TAMB<=40°C	
Z29-LE80MA4S-GW		Refer to user manual	
K.ID:xxxxxxxxxxxxxxxxxxxxxxxxxxxx		EAC CE	
i:4	0.2L OIL CLP VG220		
SR1:5 (Y)	Br:4.0Nm(M4)		
G:75-375r/min	M1 TP-PT1000	UK Importer UK: Siemens plc	
G:14.0Nm	16kg IP55	CA Manchester M20 2UR	
3AC 385V 50Hz		INVERTER DUTY ONLY VPWM	
1.44A		I0:2.88A	
Mot:300-1500r/min	Mot:0.55kW	Th.Cl.155(F)	
	Mot:3.50Nm	TEFC	
Siemens AG, Frauenaucherstr. 80, DE-91056 Erlangen		Made in Germany	

SIEMENS			
1			5
2			6
3	4		7
8		19	20
9	13		
10	14		
11	15	17	21
12	16	18	
23			24
25			29
26			30
	27	28	31
			32
			33

G_D087_XX_00333e

Example, rating plate on helical geared motor

General data

- | | | | |
|----|---------------------------------------------------------------------------------------------|----|----------------------------------------------|
| 1 | Article No.,
Dxx - Order code for mounting position
(Required identification code) | 23 | Input phase number and motor rated voltage |
| 2 | Factory ID (FID) | 24 | Duty type |
| 3 | Type designation | 25 | Motor rated current [A] |
| 4 | Data matrix code | 26 | Motor rated speed range [rpm] |
| 5 | IE class (in accordance with IEC TS 60034-30-2) | 27 | Motor rated power [kW] |
| 6 | Ambient temperature | 28 | Motor rated torque [Nm] |
| 7 | Reference to operating instructions | 29 | Motor stall current I0 |
| 8 | Customer ID | 30 | Temperature class Th. Cl. |
| 9 | Transmission ratio i | 31 | Ventilation type |
| 10 | Speed range SR | 32 | cURus approval |
| 11 | Gearbox output speed range [rpm] | 33 | Manufacturer's address and country of origin |
| 12 | Rated output torque of the geared motor [Nm] | | |
| 13 | Oil quantity [l], oil type,
oil viscosity ISO VG class according to DIN 51519 / ISO 3448 | | |
| 14 | M4 braking torque [nm], cyclic duration factor | | |
| 15 | Mounting position | | |
| 16 | Weight m [kg] | | |
| 17 | Thermal motor protection | | |
| 18 | Degree of protection acc. to IEC 60034-5 | | |
| 19 | EAC approval logo | | |
| 20 | CE approval logo | | |
| 21 | UKCA approval logo | | |
| 22 | Importer's address | | |

When ordering a replacement/spare part, always specify the factory ID (serial No.)

1) The customer-specific data are used to specify the customer ID/ serial number. The following data are not permissible:

- Technical specifications for the geared motor (e.g. ambient temperature, voltage data, etc.)
- Details of Siemens Article No. (MLFB)
- Unlawful texts

SINAMICS G115D distributed drive system • Wall-mounted

0.37 kW to 7.5 kW (0.5 to 10 hp)

SIMOGEAR geared motors for SINAMICS G115D wall-mounted • General options

Options

Second rating plate

For the geared motors, an additional rating plate can be supplied loose.

When requested, the second rating plate can be attached to the motor.

Second rating plate	Additional identification code -Z with order code	Order code
	2KJ8. -Z	
Second rating plate, supplied loose		K41
Second rating plate, attached		K68

Safety instruction sheet and operating instructions

The geared motors are shipped with a multi-language safety instruction sheet for each delivery batch.

One set of operating instructions is enclosed for each geared motor using the following ordering option.

Enclosed operating instructions in the following language	Additional identification code -Z with order code	Order code
	2KJ8. -Z	
German		W21
English		W22
Chinese		W23

The operating instructions include the following documents:

- Replacement part drawings and lists
- Installation instructions
- Declaration of incorporation of partly completed machinery according to the EC Machinery Directive 2006/42/EC (gearboxes)
- EC Declaration of Conformity according to Directive 2014/35/EU (motors)

The latest versions of the operating instructions, the declaration of incorporation and the declarations of conformity are available in the Industry Online Support:

<https://support.industry.siemens.com/cs/ww/en/ps/13424/man>

Test certificates

On request, the following documents are available by email:

Additional documentation	The following is checked:	Additional identification code -Z with order code	Order code
Declaration of compliance with the order EN 10024-2.1 and factory test report EN 10204-2.2, geared motor	-	2KJ8. -Z	On request
Factory test report EN 10204-2.2 for material	-		On request
Acceptance test certificate EN 10204-3.1 for the motor	<ul style="list-style-type: none"> • Winding resistance • No-load current of the 3 phases • Power loss for no-load operation • High-voltage test • No-load speed 		W10
Acceptance test certificate EN 10204-3.1 for gearboxes	<ul style="list-style-type: none"> • Output shaft diameter • Input shaft diameter (for gearboxes with adapter A only) • No-load speed • Noise (subjective assessment) 		W11
Acceptance test certificate EN 10204-3.1 for paint finish	<ul style="list-style-type: none"> • Paint film thickness 		W12

Extension of the liability for defects

For our SIMOGEAR geared motors, we give you the option of extending existing liabilities for defects beyond the standard period of liability.

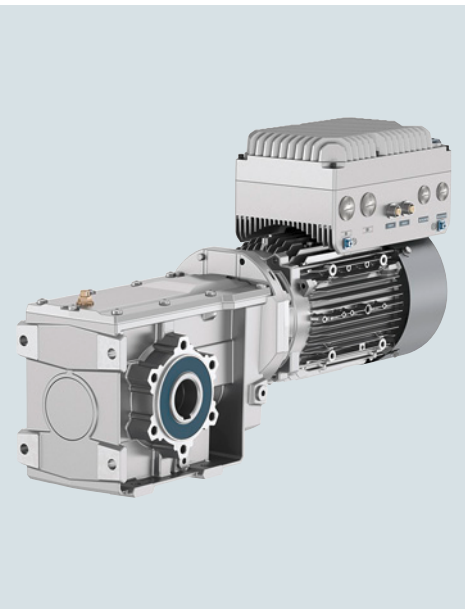
The standard liability for defects period, as listed in our standard conditions for the supply of services and products, is 18 months.

It is possible to select the extended period of liability for defects in connection with all of the geared motors and their options listed here in the catalog.

Extension of the liability for defects	Additional identification code -Z with order code	Order code
	2KJ8. -Z	
Extension of the liability for defects period by 12 months		W80
Extension of the liability for defects period by 24 months		W82

SINAMICS G115D distributed drive system • Motor-mounted 0.37 kW to 4 kW (0.5 hp to 5 hp)

7.3



7.3/2 **Distributed drive system SINAMICS G115D motor-mounted**

- 7.3/2 Overview
- 7.3/3 Benefits
- 7.3/4 Application
- 7.3/5 Design
- 7.3/6 Function
- 7.3/7 Integration
- 7.3/8 Configuration
- 7.3/9 Technical specifications
- 7.3/13 Characteristic curves
- 7.3/15 More information

7.3/16 **SIMOGEAR geared motors with SINAMICS G115D motor-mounted**

- Selection and ordering data
- 7.3/16 Structure of the Article No.
- 7.3/18 Orientation
- 7.3/20 Motor type asynchronous motors IE2/IE3
- 7.3/21 Motor type synchronous reluctance motors IE4
- 7.3/22 Additional information for the basic configuration
- 7.3/24 Supplementary system components and spare parts for SINAMICS G115D motor-mounted
- Options
- 7.3/25 Converter options
- 7.3/27 Motor options
- 7.3/33 Gearbox options
- 7.3/45 General options

To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gearbox selection" or "Dimensional drawings" in the Industry Mall at:

www.siemens.com/sinamics-g115d/gear-selection-motor-mounted

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Overview

The SINAMICS G115D distributed drive system provides fully preconfigured and ready-to-connect solutions in a modular concept that includes the converter, motor and gearbox.

The motor-mounted converter with different unit versions (frame sizes FSA and FSB) in a performance range from 0.37 kW to 4 kW is suitable for a large number of different applications. This converter supports SIMOGEAR 2KJ8 geared motors with three-phase asynchronous motors with efficiency class up to IE3 or high-efficiency synchronous reluctance motors with efficiency class IE4.

It meets all requirements for horizontal conveyor system applications – from simple speed control to sophisticated encoderless vector control. Thanks to its compact design with degree of protection IP65, it can be seamlessly integrated into the system.

The integrated conveyor technology functions make the SINAMICS G115D particularly suitable for applications in conveyor systems.

For applications that require safety technology, the SINAMICS G115D offers the integrated STO (Safe Torque Off) function, which can be implemented without additional external components.

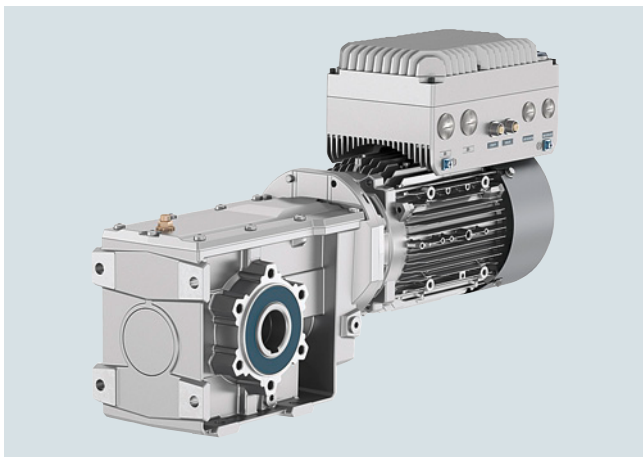
Perfect combination with SIMATIC controllers and PROFINET

Integration via PROFINET communication with PROFIsafe, AS-Interface, EtherNet/IP into a higher-level control system is very easy thanks to full TIA Portal integration, which provides a tool as well as an operating and data management concept. In addition, an optional web server module is available with the web server module SINAMICS G120 Smart Access (SAM) – a WLAN-based web server solution for simple and fast wireless setup with smartphone, tablet or laptop during commissioning and for diagnostics.

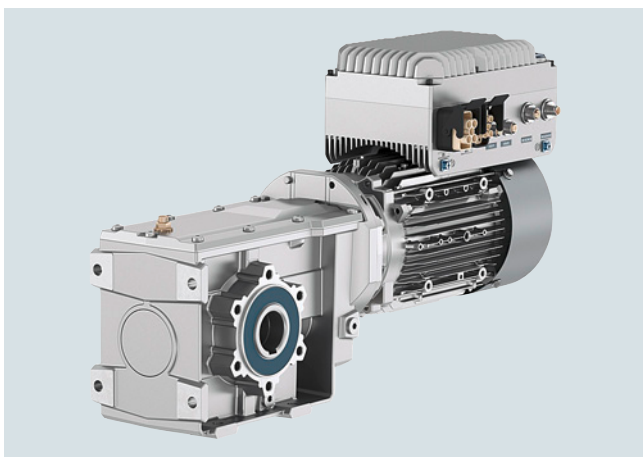
The SINAMICS G115D distributed drive system is ready for digitalization. All operating data can be transferred to the MindSphere cloud solution. The MindSphere application "Analyze MyDrives" facilitates the process evaluation of operating data, with the possibility of adaptation to individual customer requirements. This simplifies the recording and evaluation of the operating conditions of the drive system.

Reasons for using the SINAMICS G115D distributed drive system

- User-friendly modular solution – pre-configured and ready for connection
- Versatile, robust and reliable system
- New design for quick and easy installation, cabling and commissioning
- The wall-mounted and motor-mounted variants use the same platform
- No control cabinet required, thanks to the installation on the machine less space required and lower cooling requirements
- Long cables between the converters and the motors can be avoided (thus less power loss, reduced interference emissions, and lower costs for shielded cables and additional filters)
- Supports SIMOGEAR 2KJ8 geared motors with asynchronous motors and high-efficiency synchronous reluctance motors according to efficiency class IE4
- Worldwide use of the SIMOGEAR 2KJ8 geared motors independent of the line voltage
- Temperature range from -30 °C to 55 °C (suitable for installation in deep-freeze applications)
- Integrated safety, STO (Safe Torque Off) via fail-safe digital input F-DI or PROFIsafe
- Perfectly prepared for digitalization thanks to various communications interfaces and integration of the AMD (Analyze MyDrives) application into the MindSphere cloud solution
- Special properties for the intralogistics market (e.g. Safety Integrated, conveyor technology functions)



Example: SINAMICS G115D distributed drive system, motor-mounted, PROFINET, version with cable gland, FSA, 1.5 kW, SIMOGEAR motor LE 90, gearbox B49, hollow shaft



Example: SINAMICS G115D distributed drive system, motor-mounted, PROFINET, version with plug-in connection, FSA, 1.5 kW, SIMOGEAR motor LE 90, gearbox B49, hollow shaft

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Overview

The family of distributed drive systems at Siemens

Siemens offers an innovative portfolio of frequency converters for optimal implementation in distributed drive solutions. The strengths of the individual members of the converter family allow easy adaptation to the most diverse application requirements:

- Identical connection systems
- User-friendly commissioning and configuration tools

Products from the family of distributed drives:

- SINAMICS G115D distributed drive system (wall and motor-mounted)
- SINAMICS G120D frequency converters
- SIMATIC ET 200pro FC-2 frequency converters
- SIRIUS M200D motor starters

Hardware configuration

The SINAMICS G115D distributed drive system is available as a wall-mounted and motor-mounted version, with degree of protection IP65/66.

The performance range for the wall-mounted version, for ranges from 0.37 kW to 7.5 kW and in the motor-mounted version, for ranges from 0.37 kW to 4 kW.

The converter is configurable regarding fieldbus communication (without, AS-Interface or PROFINET / EtherNet/IP) and connection method (cable gland or plug-in connection). Furthermore, the wall-mounted version can be configured with a repair switch, local remote control and the control voltage of the motor holding brake.

State-of-the-art IGBT technology with pulse width modulation (PWM) is used for extremely reliable and flexible motor operation. The closed-loop control electronics control and monitor the power electronics and the connected motor in several different control modes that can be selected.

The sensors of the conveyor element can be connected to the digital inputs of the converter. These signals can be transmitted to the higher-level control for further processing via PROFINET, EtherNet/IP or AS-Interface.

Safety Integrated

The SINAMICS G115D distributed drive systems are already equipped with the Safety Integrated Function STO (Safe Torque Off), with certification according to IEC 61508 SIL 2 as well as EN ISO 13849-1 PL d and Category 3. This can be activated either via the PROFINET safe communication protocol or via the fail-safe digital input F-DI.

Benefits

Easy commissioning

- Pre-assembled and pre-commissioned system with SIMOGEAR
- Connection from three sides possible (version with cable gland)
- Loop-through of 24 V DC and 380 V to 480 V 3 AC and communication – no T distributors necessary
- Internal braking resistor – typical applications can be implemented without external braking resistor; optional external braking resistors are available for higher regenerative energy.
- Robust with degree of protection IP65, ambient temperature from -30 °C to 55 °C
- Quick and easy commissioning options:
 - via local DIP switches and potentiometers
 - via web server module SINAMICS G120 Smart Access (SAM) with web server and WLAN connection for using a smartphone, tablet or laptop in just a few steps
 - via TIA Portal with SINAMICS Startdrive for the use of a PC
- Wiring of the drive system either via screw connections or via plug connectors. Communication (PROFINET, EtherNet/IP or AS-Interface) generally via plug connectors
- Local diagnostics with LEDs
- Uploading, backup and cloning of the parameters with SINAMICS SD memory card

Full functionality

- Integrated communication: PROFINET / EtherNet/IP and AS-Interface
- Integrated Safety Functions (STO locally via fail-safe digital input F-DI or via PROFINET safe communication protocol)
- Basic PLC functions and additional functions for conveyor technology:
 - Horizontal conveyors: fast/slow, Quick Stop, 1 or 2 directions
 - Rotary table: fast/slow, Quick Stop, 2 or 3 positions and limit trip
 - Corner transfer conveyors lift drive: fast/slow, Quick Stop and limit trip
 - Traversing carriage: fast/slow, Quick Stop and limit trip
- Inputs/outputs can be used as distributed I/O for PLC

Efficient engineering

- Full integration in
 - Totally Integrated Automation
 - Totally Integrated Automation Portal and Integrated Drive System
- Intuitive selection tools
 - Drive Technology Configurator (DTC)
 - TIA Selection Tool (TST)
- SINAMICS Startdrive as part of the TIA Portal offers complete integration for intuitive parameterization
- Automatic diagnostics in combination with SIMATIC control

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Benefits

Flexible commissioning functions

- Integrated conveyor technology functions:
 - Quick Stop function for fast reaction times for the sensors, e.g. roller conveyors, belt conveyors
 - Limit switch function, e.g. for rotary table, corner transfer unit
- Graphical commissioning of the conveyor technology functions in just a few steps
- Integrated inputs/outputs with variable assignment
- Use of the same software tool (SINAMICS Startdrive) as for all SINAMICS drives

Extended warranty

For SINAMICS G115D, Siemens offers an extended warranty of up to 4 years:

- 18-month standard warranty
- Optional extension via **Service Protect**
 - Free for the first 6 months after registering the product at: <https://myregistration.siemens.com>
 - With costs for 1 or 2 additional years for wall-mounted and motor-mounted versions (complete system with converter and geared motor)

You can find more information at:

<https://support.industry.siemens.com/cs/ww/en/sc/4842>

Application

The SINAMICS G115D distributed drive system is ideally suited for horizontal conveyor applications, e.g.:

- Roller, belt and chain conveyors
- Simple rotary tables
- Simple transverse shuttles

Reliable operation in harsh environments

The SINAMICS G115D distributed drive system is suitable for use in harsh environments

- Degree of protection up to IP65
- Use in ambient temperatures from -30 °C to 55 °C
- Coated PCBs for increased resistance to humidity and dust (Class 3C2), operation according to EN 60721-3-3

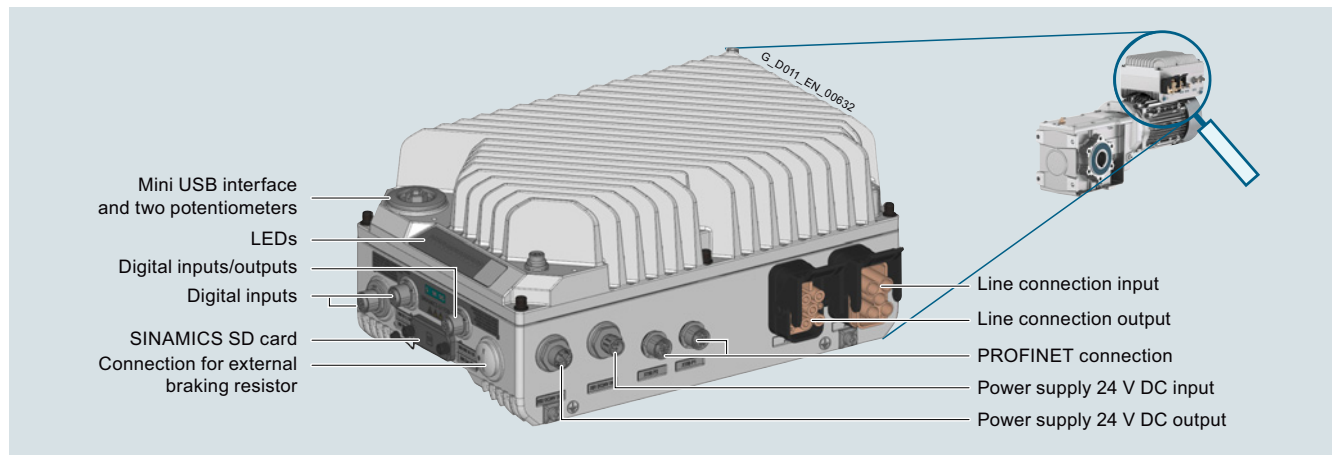
SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Design

The converter is configurable regarding fieldbus communication (without, AS-Interface or PROFINET / EtherNet/IP) and connection system (cable gland or plug-in connection) as well as regarding the connection side.



Example: SINAMICS G115D, motor-mounted, version with plug-in connection

24 V DC power supply

The SINAMICS G115D converter is available as a version with an integrated 24 V DC power supply.

SINAMICS SD memory card

The parameter settings of the converter and the firmware can be stored on the optional SINAMICS SD memory card. When service is required, the data are automatically downloaded from the memory card in the converter and the system is ready for use again without further interventions.

Supplementary system components

External braking resistors

Regenerative energy is converted to heat via the internal braking resistor integrated as standard. Optional external braking resistors are available for higher regenerative energy.

Installation kit

An installation kit with cable glands for the line supply (X1/X3), the 24 V DC power supply (X01/X02) and the digital inputs/digital outputs (X07/X08/X05) can be ordered for the connection.

Cover kit

The cover kit is used to protect the unused connector plugs for line supply, loop-through (X3) and 24 V DC loop-through (X02).

Connecting cables for communication

Flexible plug-in cables to transfer data between the PROFINET/Industrial Ethernet stations or AS-Interface stations, as well as for 24 V DC power supply.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Design

Connecting cables for line supply, power loop-through and power bus distribution

Connector sets as well as pre-assembled cables for the line supply can be ordered as accessories.

PC converter connection kit 2 (mini USB interface cable) for communication with a PC

For controlling and commissioning a converter directly from a PC if the appropriate software (commissioning tool SINAMICS Startdrive V16 update 4 and higher) is installed.

SINAMICS G120 Smart Access (SAM) web server module

Smart Access for the SINAMICS G115D distributed drive system with web server for easy commissioning and diagnostics via WLAN with a smartphone, tablet or laptop in just a few steps.

Interface kit for SINAMICS G120 Smart Access (SAM) web server module

With the interface kit, the SINAMICS G120 Smart Access web server module can be connected to the SINAMICS G115D converter.

SINAMICS G115D training case

The SINAMICS G115D training case is a convincing demonstration system thanks to its compact design. It is suitable for direct customer presentations as well as for testing in the technical department. The functions of SINAMICS G115D in combination with a SIMOGEAR geared motor can be demonstrated and tested quickly and easily with this case.

Spare parts

Electronic Modules

The entire drive electronics is located in the Electronic Module. Thus, in most service cases only this module must be replaced. If a converter fails, this replacement can be performed easily and quickly.

Spare parts kit

A spare parts kit is available, which contains small parts such as seals, cover caps and screws.

Function

Technology functions

Specific functions for conveyor technology:

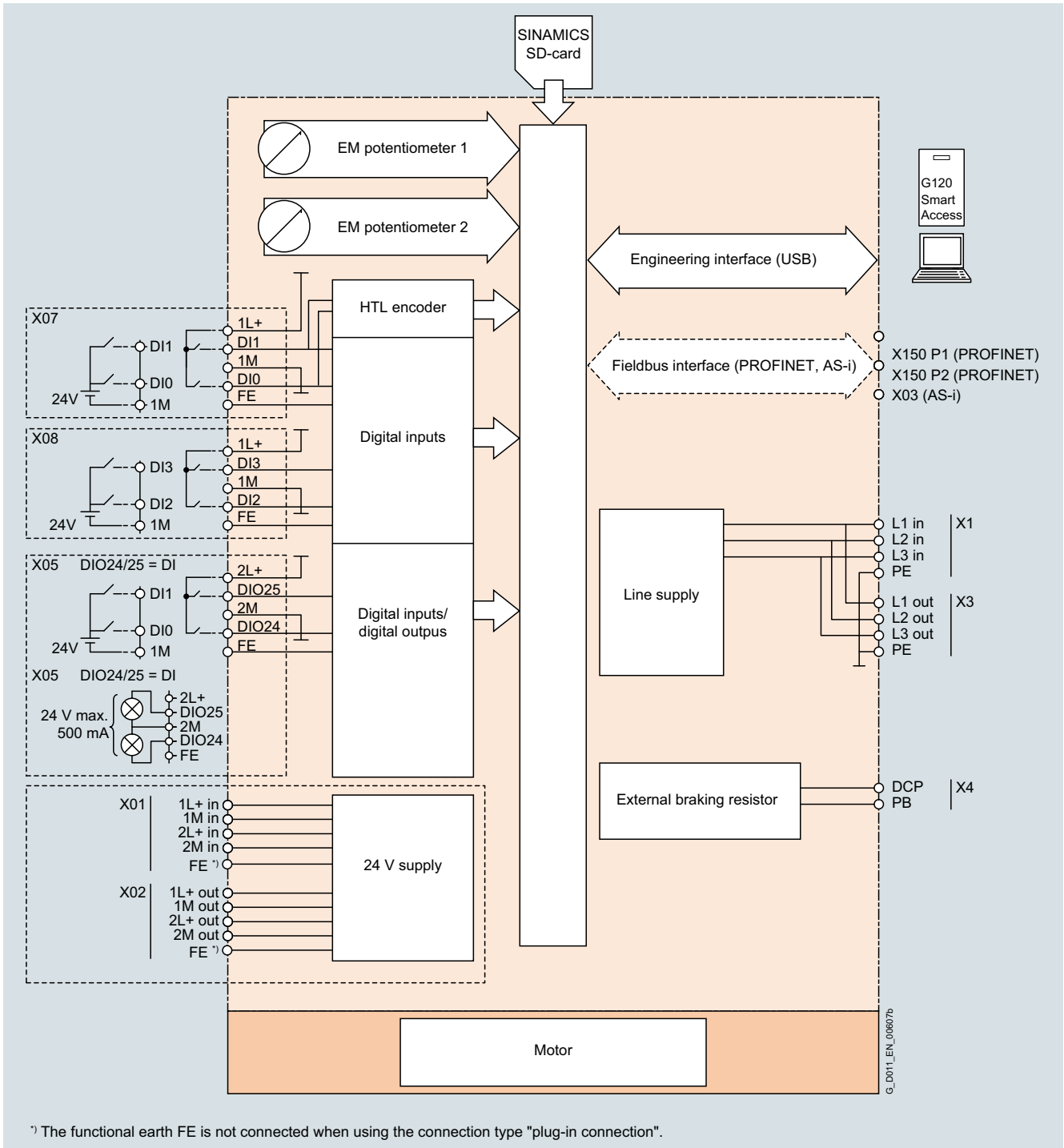
- Integrated communication: PROFINET / EtherNet/IP or AS-Interface
Furthermore, the “Without fieldbus communication (I/O Control)” version is available.
- Integrated Safety Functions (STO locally via fail-safe digital input F-DI or via PROFIsafe communication protocol)
- Inputs/outputs can be used as distributed I/O of the PLC
- Basic PLC functions and additional functions for conveyor technology:
 - Chain and belt conveyors: fast/slow, Quick Stop, 1 or 2 directions
 - Rotary table: fast/slow, Quick Stop, 2 or 3 positions and limit trip
 - Corner transfer conveyors lift drive: fast/slow, Quick Stop and limit trip
 - Traversing carriage: fast/slow, Quick Stop and limit trip

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Integration



Connection example for SINAMICS G115D, motor-mounted

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Configuration

The following configuring tools and engineering tools are available for the SINAMICS G115D:

Drive Technology Configurator (DT Configurator)

The Drive Technology Configurator (DT Configurator) helps you configure the optimum drive technology products for a number of applications – starting with gearboxes, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems. The DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SINAMICS Startdrive commissioning tool (V16 update 4 and higher)

SINAMICS Startdrive is a tool integrated into the TIA Portal for configuring, commissioning and diagnostics of the SINAMICS converter family. SINAMICS Startdrive (V16 update 4 and higher) can be used for implementing drive tasks with most of the SINAMICS G and SINAMICS S converter series. The commissioning tool has been optimized in terms of simplicity, ease of use, and consistent use of the benefits of the TIA Portal to provide a uniform working environment for PLC, HMI and drives.

The SINAMICS Startdrive commissioning tool is available for free on the internet at:

www.siemens.com/startdrive

Drive dimensioning of the SINAMICS G115D distributed drive system with the TIA Selection Tool

The SINAMICS G115D distributed drive system is easily configured with the TIA Selection Tool under the Drive Dimensioning plug-in. It provides support when selecting the hardware and firmware components necessary to implement a drive task. The plug-in encompasses the configuration of the entire drive system and allows the handling of individual drives.

- Intuitive user interface, menu-based operation and help
- Configuration of the SINAMICS G115D distributed drive system
- Adjustable load cycles and various mechanical systems integrated
- Interface to the TIA Portal and Industry Mall

The TIA Selection Tool is available for free on the internet at www.siemens.com/tia-selection-tool-standalone

SIMARIS planning tools for plants with SINAMICS drives (available soon)

Electrical planning: Even easier with software!

Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools:

- SIMARIS design for dimensioning
- SIMARIS project for calculating the space requirements of the distribution boards

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Technical specifications

SIMOGEAR geared motors with SINAMICS G115D motor-mounted - General technical specifications	
Mechanical specifications	
Maximum permissible vibration and shock load	ISO 20816-1 Zone A
Ambient conditions	
External 24 V supply According to IEC 60204-1	Touch-proof SELV or PELV power supply. The supply voltage must not exceed 60 V DC under single-fault conditions.
Protection class According to EN 61800-5-1	Class I (with protective grounding conductor)
Degree of protection The degree of protection according to IEC 60034-5 (EN 60034-5) only refers to the motor.	IP55 IP65, when selecting this higher degree of protection, the gearbox side should be taken into account (seals, vents) UL TEFC
Permissible ambient or coolant temperature (air) during operation	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Air humidity	<95 %, condensation, icing and salt mist not permissible
Environmental class/harmful chemical substances Operation acc. to EN 60721-3-3	Class 3C2
Degree of pollution According to EN 61800-5-1	2
Permissible noise limits According to EN 60034-9: 2008-01	Limit values for the motors on the converter are undershot. By increasing the clock frequency on the converter, the motor noises can also be reduced.
Standards	
Compliance with standards ¹⁾	UL 1004-1 and UL 1004-6 CSA-C22.2 No. 100 (E224884) The converters supplied with the motors in accordance with UL 61800-5-1 and CSA C22.2 No. 274 CE, UKCA, EAC, KC
CE marking, according to	Machinery Directive 2006/42/EC Eco-design requirements of EU Directive 2019/1781 ³⁾ EMC Directive 2014/30/EU RoHS Directive 2011/65/EU

¹⁾ The SINAMICS G115D drive system does not fall in the area of validity of the China Compulsory Certification (CCC). The SIMOGEAR 2KJ8 geared motors are designed exclusively for converter operation and the rated frequency of the asynchronous motors is not 50 Hz; therefore they do not fall in the area of validity of the China national standards GB 18613-2020 and CEL 007-2021 (China Energy Label).

²⁾ Applies to industrial control cabinet installations to NEC Article 409 or UL 508A.

³⁾ The distributed drive system SINAMICS G115D motor-mounted is covered by the eco-design requirements of EU Directive 2019/1781; however, in this case the converter is regarded as a motor-integrated drive and the geared motor as a motor with an integrated frequency converter. Therefore, no efficiency requirements apply in this case.

Converters - General technical specifications	
Line voltage	380 V (-10 %) ... 480 V (+10 %) 3 AC
Line supply requirements Short-circuit power ratio R_{SC}	$u_K < 4 \% (R_{SC} > 25)$
Input frequency	45 ... 66 Hz
Output frequency	<ul style="list-style-type: none"> Control mode V/f 0 ... 550 Hz Control mode Vector 0 ... 240 Hz
Pulse frequency	4 kHz (standard); 4 ... 16 Hz (in steps of 2 kHz) see derating data
Power factor	0.73 ... 0.90
Converter efficiency acc. to IEC 61800-9-2	96 ... 98 %
Efficiency class acc. to IEC 61800-9-2	IE2
Output voltage, max. as % of input voltage	87 ... 95 %
Overload capability	<ul style="list-style-type: none"> High overload (HO) 2 × rated output current for 3 s, followed by 1.5 × rated output current for 57 s, over a cycle time of 300 s
Electromagnetic compatibility	Integrated line filter category C2 according to EN 61800-3 (corresponds to class A according to EN 55011)
Possible braking methods	Dynamic brake with internal braking resistor Dynamic brake with external braking resistors $R_{min} = 200 \Omega$ (for FSA), $R_{min} = 80 \Omega$ (for FSB) DC brake Integrated brake control supplies the DC supply voltage of the brake Disconnection on the DC side permits short brake application time (max. output current 0.8 A)
Degree of protection	IP65
Operating temperature	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Permissible mounting positions	All
Relative air humidity	<95 %, condensation, icing and salt mist not permissible
Cooling	External cooling with motor fan
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating Over 1000 m (3281 ft) see derating data
Short Circuit Current Rating (SCCR) ²⁾	65 kA
Protection functions	<ul style="list-style-type: none"> Undervoltage Phase failure detection Overvoltage Overload Ground fault Short-circuit Stall protection Motor blocking protection Motor overtemperature Converter overtemperature Parameter locking
Compliance with standards	UL 61800-5-1 (UL list number E355661), CE, UKCA, EAC, KC
CE marking, according to	Low-Voltage Directive 2014/35/EU Eco-design requirements of EU Directive 2019/1781 ³⁾ Filtered variants also: EMC Directive 2014/30/EU

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Technical specifications

Converter	I/O	AS-Interface	PROFINET, EtherNet/IP
Electrical specifications			
Operating voltage	External 24 V DC		
Current consumption (from the 24 V DC supply)			
• With Power Module frame size FSA	250 mA	290 mA	290 mA
• With Power Module frame size FSB	250 mA	290 mA	290 mA
Interfaces			
Digital inputs (not isolated)	4 programmable, PNP, SIMATIC compatible		
• Optional for safe inputs, parameterizable	2 DI = 1F-DI		
• Optionally usable as encoder inputs	2, for connection of an HTL encoder (A and B track)		
• Conductor cross-section (only for version with cable gland)	0.25 ... 0.34 mm ² (24 ... 22 AWG) with end sleeves		
Digital outputs	2, switchable DI/DO		
• Optional for safe inputs, parameterizable	–		
• Conductor cross-section (only for version with cable gland)	0.25 ... 0.34 mm ² (24 ... 22 AWG) with end sleeves		
Bus interface			
Motor temperature sensor	1 input, sensors that can be connected: Pt1000	1 input, sensors that can be connected: Pt1000	1 input, sensors that can be connected: Pt1000
Control of a mechanical motor brake	✓	✓	✓
Slot for SINAMICS SD memory card	✓	✓	✓
Commissioning interface			
• PROFINET	–	–	✓
• Mini-USB	✓	✓	✓
Safety functions			
Integrated safety functions acc. to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3	Safe Torque Off (STO)		
• F-DI	✓	✓	✓
• PROFIsafe	–	–	✓ (not with EtherNet/IP)
Open-loop/closed-loop control methods			
V/f linear/quadratic/parameterizable	✓		
V/f with flux current control (FCC)	✓		
Vector control, sensorless	✓		
Torque control, sensorless	✓		
Software functions			
Fixed frequencies	✓		
Signal interconnection with BICO technology	✓		
Automatic restart after line supply failure or operating fault	✓		
Slip compensation	✓		
Free function blocks (FFB) for logical and arithmetic operations	✓		
Ramp smoothing	✓		
4 selectable drive data sets	✓		
4 selectable command data sets (CDS) (manual/auto)	✓		
Flying restart	✓		
JOG	✓		
Cyclic recording of ramp-up and ramp-down	–	✓	✓
Technology controller (PID)	✓		
Conveyor technology functions	–	✓	✓

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted

Technical specifications

Converter	I/O	AS-Interface	PROFINET, EtherNet/IP
Software functions			
Thermal motor protection	✓		
Thermal converter protection	✓		
Setpoint input	✓		
Motor identification	✓		
Motor holding brake	✓		
Mechanical specifications and ambient conditions			
Degree of protection	IP65/IP66/UL type 4X		
Operating temperature	-30 ... +40 °C (-22 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics		
Storage temperature	-40 ... +70 °C (-40 ... 158 °F)		
Relative air humidity	<95 %, condensation, icing and salt mist not permissible		

Line voltage 380 ... 480 V 3 AC		SIMOGEAR geared motors with SINAMICS G115D motor-mounted				
2KJ8 ... -		2CF ... -3 ...	2EA ... -3 ...	2EG ... -3 ...	2GB ... -3 ...	2GG ... -3 ...
Rated power for control range 1:5	kW	0.37	0.55	0.75	1.1	1.5
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η according to IEC 61800-9-2		96.31	96.81	97.23	97.42	97.49
Power loss ¹⁾ according to IEC 61800-9-2 at rated output current	kW	0.020	0.024	0.029	0.038	0.049
Internal braking resistor						
• Continuous braking power P_{DB} (ambient temperature ≤ 40 °C (104 °F))	W	10	10	10	10	10
• Peak power P_{max} (cycle time 12 s within 120 s (corresponds to 10 % on-load factor)) (ambient temperature ≤ 40 °C (104 °F))	W	100	100	100	100	100
Rated input current ²⁾	A	1.08	1.47	1.79	2.43	3.18
Line supply connection U1/L1, V1/L2, W1/L3, PE						
• Conductor cross-section	mm ²	1.5 ... 4 14 ... 12 AWG	1.5 ... 4 14 ... 12 AWG	1.5 ... 4 14 ... 12 AWG	1.5 ... 4 14 ... 12 AWG	1.5 ... 4 14 ... 12 AWG
PE connection (external connection)						
• Conductor cross-section (recommended)	mm ²	10	10	10	10	10
Degree of protection		up to IP65	up to IP65	up to IP65	up to IP65	up to IP65
Converter frame size		FSA	FSA	FSA	FSA	FSA
Dimensions and weight		See "Gearbox selection" or "Dimensional drawings" of the helical geared motors, parallel shaft geared motors, bevel geared motors and helical worm geared motors in the Industry Mall at: www.siemens.com/sinamics-g115d/gear-selection-motor-mounted				

¹⁾ Typical values. More information can be found on the internet at <https://support.industry.siemens.com/cs/document/94059311>

²⁾ The input current depends on the motor load and line impedance. The input currents apply for load at rated power for a line impedance corresponding to $u_K = 4\%$.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SINAMICS G115D distributed drive system motor-mounted**Technical specifications**

Line voltage 380 ... 480 V 3 AC 2KJ8 ... -		SIMOGEAR geared motors with SINAMICS G115D motor-mounted		
		2JB ... -3 ...	2JG ... -3 ...	2LB ... -3 ...
Rated power for control range 1:5	kW	2.2	3	4
Rated pulse frequency	kHz	4	4	4
Efficiency η according to IEC 61800-9-2		97.66	97.67	97.62
Power loss ¹⁾ according to IEC 61800-9-2 at rated output current	kW	0.064	0.086	0.115
Internal braking resistor				
• Continuous braking power P_{DB} (ambient temperature ≤ 40 °C (104 °F))	W	10	10	10
• Peak power P_{max} (cycle time 12 s within 120 s (corresponds to 10 % on-load factor)) (ambient temperature ≤ 40 °C (104 °F))	W	100	100	100
Rated input current ²⁾	A	4.65	6.23	8.16
Line supply connection U1/L1, V1/L2, W1/L3, PE				
• Conductor cross-section	mm ²	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG	2.5 ... 4 13 ... 12 AWG
PE connection (external connection)				
• Conductor cross-section (recommended)	mm ²	10	10	10
Degree of protection		up to IP65	up to IP65	up to IP65
Converter frame size		FSB	FSB	FSB
Dimensions and weight		See "Gearbox selection" or "Dimensional drawings" of the helical geared motors, parallel shaft geared motors, bevel geared motors and helical worm geared motors in the Industry Mall at: www.siemens.com/sinamics-g115d/gear-selection-motor-mounted		

¹⁾ Typical values. More information can be found on the internet at
<https://support.industry.siemens.com/cs/document/94059311>

²⁾ The input current depends on the motor load and line impedance.
The input currents apply for load at rated power for a line impedance corresponding to $u_K = 4\%$.

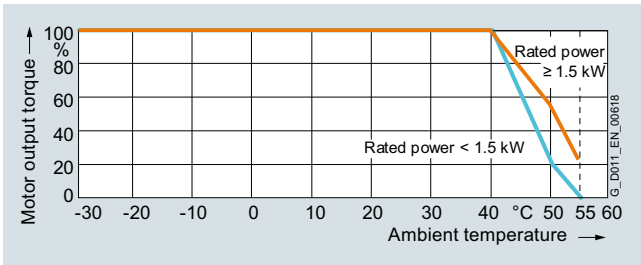
SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

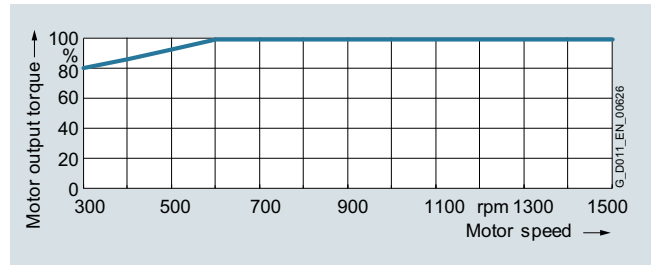
SINAMICS G115D distributed drive system motor-mounted

Characteristic curves

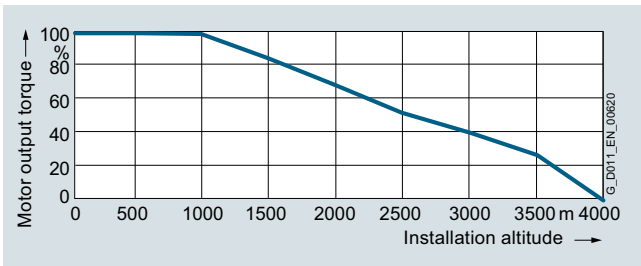
Derating SIMOGEAR geared motors with asynchronous motors IE2/IE3



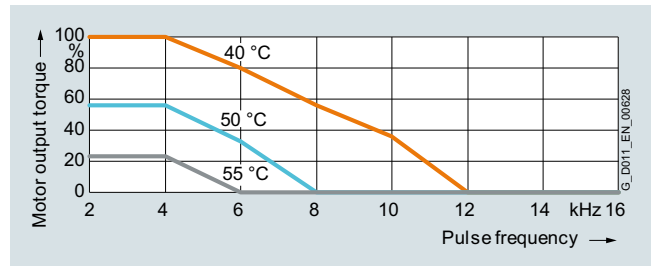
Derating of the torque as a function of the ambient temperature



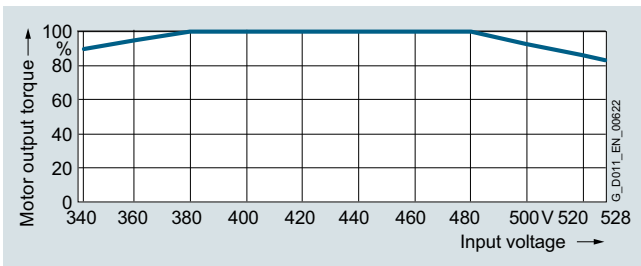
Derating of the torque as a function of the motor speed, without daisy chain



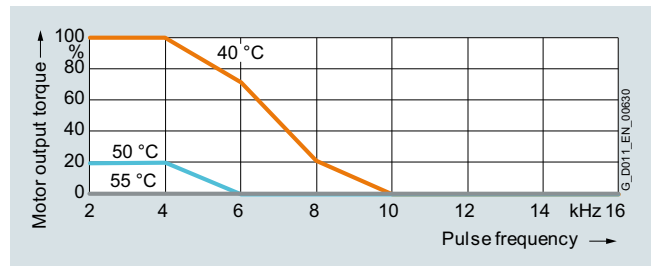
Derating of the torque as a function of the installation altitude



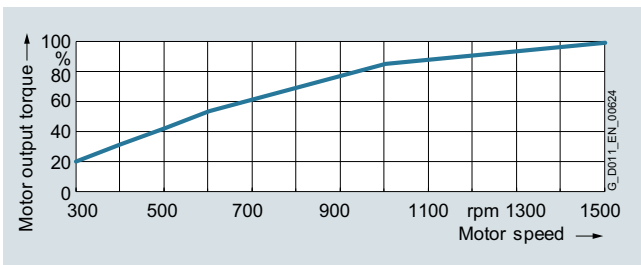
Derating of the torque as a function of the pulse frequency (rated power ≥ 1.5 kW)



Derating of the torque as a function of the input voltage



Derating of the torque as a function of the pulse frequency (rated power < 1.5 kW)



Derating of the torque as a function of the motor speed, with daisy chain

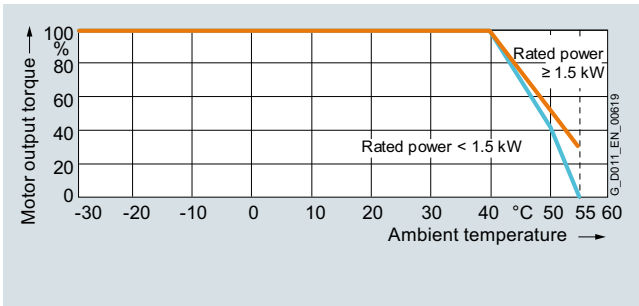
SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

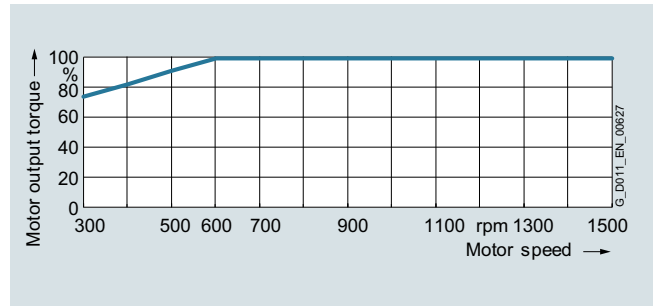
SINAMICS G115D distributed drive system motor-mounted

Characteristic curves

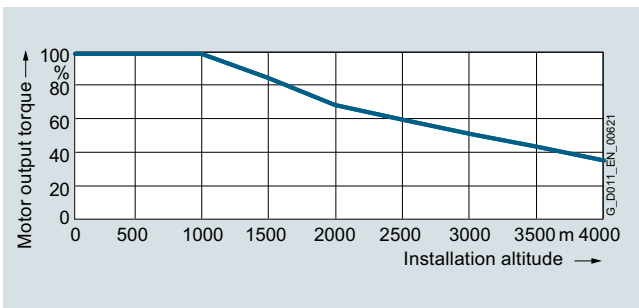
Derating SIMOGEAR geared motors with synchronous reluctance motors IE4



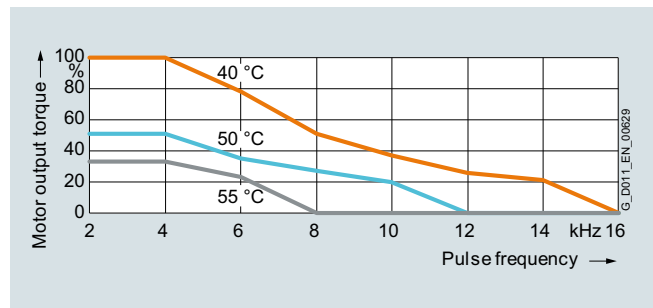
Derating of the torque as a function of the ambient temperature



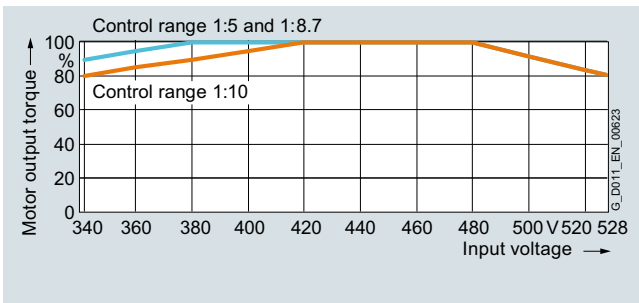
Derating of the torque as a function of the motor speed, without daisy chain



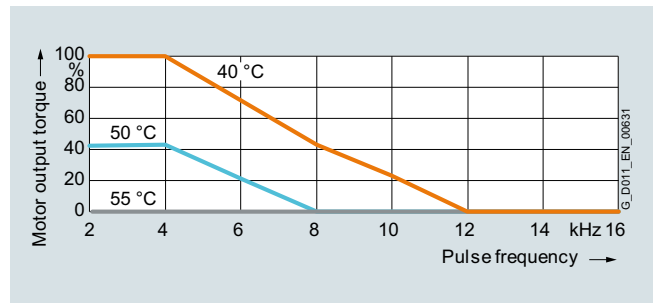
Derating of the torque as a function of the installation altitude



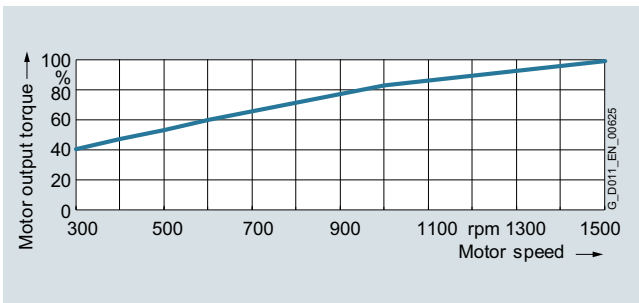
Derating of the torque as a function of the pulse frequency (rated power ≥ 1.5 kW)



Derating of the torque as a function of the input voltage



Derating of the torque as a function of the pulse frequency (rated power < 1.5 kW)



Derating of the torque as a function of the motor speed, with daisy chain

7
3

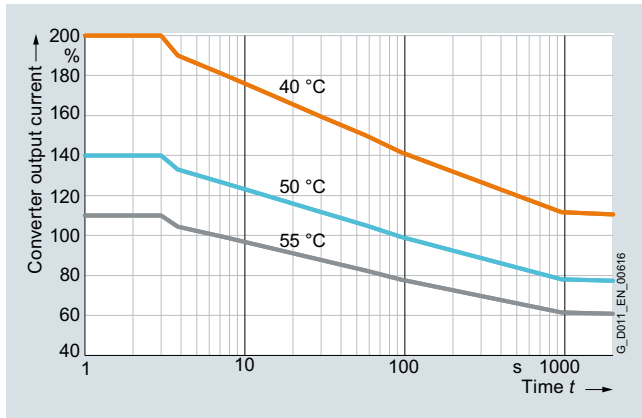
SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

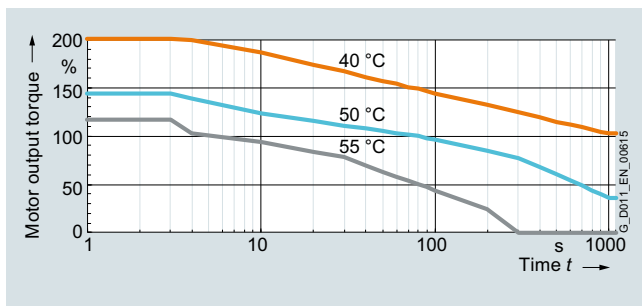
SINAMICS G115D distributed drive system motor-mounted

Characteristic curves

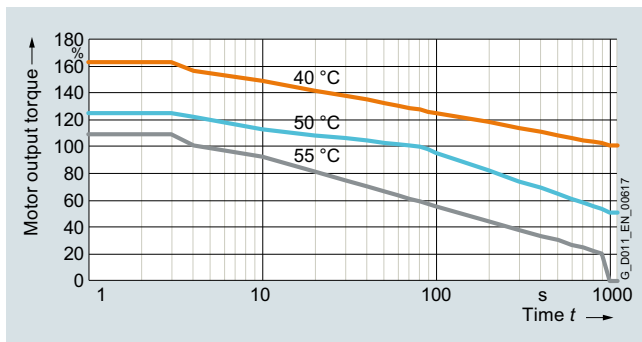
Permissible converter overload



\hat{I}_t overload capacity converter output current



\hat{T}_t overload capacity torque SIMOGEAR geared motors with asynchronous motors IE2/IE3



\hat{T}_t overload capacity torque SIMOGEAR geared motors with synchronous reluctance motors IE4

More information

Compact Operating Instructions are supplied in hard copy form in German, English and Chinese with every SINAMICS G115D.

To select the helical geared motor, parallel shaft geared motor, bevel geared motor and helical worm geared motor, see "Gearbox selection" or "Dimensional drawings" in the Industry Mall at:

www.siemens.com/sinamics-g115d/gear-selection-motor-mounted

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions) as well as further technical specifications are available on the internet at:

www.siemens.com/sinamics-g115d/documentation

and in the Drive Technology Configurator (DT Configurator):

www.siemens.com/sinamics-g115d/configuration

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Structure of the Article No.

Selection and ordering data

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Structure of the Article No.

SIMOGEAR 2KJ8 geared motors

Data position in Article No.

1 2 3 4 5 6 7 - 8 9 10 11 12 - 13 14 15 16 - Z

2 K J 8 . . . - - - Z

Options with -Z and order code

Mounting position

Standard

M1	D 0 1
M2	D 0 2
M3	D 0 3
M4	D 0 4
M5	D 0 5
M6	D 0 6
Permitted deviation from the mounting position	D 0 9

Universal mounting position output side A (DE)

M1-A	D 1 1
M2-A	D 1 2
M3-A	D 1 3
M4-A	D 1 4
M5-A	D 1 5
M6-A	D 1 6

Universal mounting position output side B (NDE)

M1-B	D 2 1
M2-B	D 2 2
M3-B	D 2 3
M4-B	D 2 4
M5-B	D 2 5
M6-B	D 2 6

Standard options for mandatory selection (e.g. the shaft designs) are displayed in the DT Configurator.

For commissioning in the TIA Portal, the selection of the mounting position (e.g. order code **D01**) is important for the specification of the direction of rotation of the output shaft.

For more information and order codes [see section Options](#).

SINAMICS G115D distributed drive system • Motor-mounted

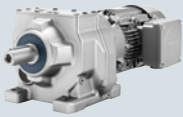


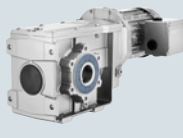
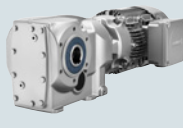
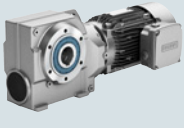
0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Orientation

Selection and ordering data

SIMOGEAR is the generation of geared motors from Siemens. The SIMOGEAR gearboxes are available as helical, parallel shaft, bevel, and helical worm geared motors.

SIMOGEAR geared motors

Helical gearbox Z and D	Helical gearbox E	Parallel shaft gearbox FZ and FD	Bevel gearbox B	Bevel gearbox K	Helical worm gearbox C
					
Sizes					
Z19 ... Z89 (2-stage) D19 ... D89 (3-stage)	E39 ... E89 (1-stage)	FZ29 ... FZ89 (2-stage) FD29 ... FD89 (3-stage)	B19 ... B49 (2-stage)	K39 ... K109 (3-stage)	C29 ... C89 (2-stage)
Maximum input torque					
12 Nm ... 2 110 Nm	9.8 Nm ... 245 Nm	25 Nm ... 2 270 Nm	7.7 Nm ... 560 Nm	40 Nm ... 2 900 Nm	14 Nm ... 1 680 Nm
Gearbox ratio					
3.4 ... 60.97 (2-stage) 39.34 ... 330.23 (3-stage)	1.29 ... 9.7	3.57... 65.21 (2-stage) 46.36 ... 357 (3-stage)	3.47 ... 59.28	5.17 ... 244.25	6.2 ... 363
Maximum motor power for the SINAMICS G115D distributed drive system motor-mounted					
4 kW	4 kW	4 kW	4 kW	4 kW	4 kW

Type designation of the SIMOGEAR gearboxes

The type designation is a meaningful name for SIMOGEAR geared motors. It provides information about the fundamental design of the geared motor and about its main technical features.

Example of gearbox type designation:		F	D	A	F	S	89
Gearbox type	Helical gearbox	-					
	Parallel shaft gearbox	F					
	Bevel gearbox, 2-stage	B					
	Bevel gearbox, 3-stage	K					
	Helical worm gearbox	C					
Stage	1-stage (for helical gearbox only)		E				
	2-stage		Z				
	3-stage		D				
Type							
Shaft	Solid shaft			-			
	Hollow shaft			A			
Mounting	Foot-mounted design				-		
	Foot/flange-mounted design				B		
	Flange-mounted design				F		
	Housing flange design				Z		
	Torque arm				D		
Connection	Feather key / without feather key					-	
	Shrink disk					S	
	Splined shaft					T	
Gearbox size	Helical gearbox, 1-stage						39 ... 89
	Helical gearbox, 2/3-stage						19 ... 89
	Parallel shaft gearbox, 2/3-stage						29 ... 89
	Bevel gearbox, 2-stage						19 ... 49
	Bevel gearbox, 3-stage						39 ... 109
	Helical worm gearbox, 2-stage						29 ... 89

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Orientation

Selection and ordering data

Type designation of the motors for the SINAMICS G115D distributed drive system motor-mounted

Example of motor type designation with the SINAMICS G115D distributed drive system motor-mounted:		LE 80 M A 4 S - G 007 M - IO - HA									
Motor											
Motor type	Three-phase motor	Aluminum housing	LE								
Motor frame size	Specified acc. to EN 50347			71...132							
Overall length	Overall length specified acc. to EN 50347			S, L, M							
	Packet length / power value				A, B, C						
Number of poles	4-pole					4					
Efficiency class	IE2 (High Efficiency)							E			
	IE3 (Premium Efficiency)							P			
	IE4 (Super Premium Efficiency) synchronous reluctance motors							S			
SINAMICS G115D distributed drive system											
SINAMICS G115D	Distributed converter							G			
	Converter rated power	0.37 kW							003		
		0.55 kW							005		
		0.75 kW							007		
		1.1 kW							011		
		1.5 kW							015		
		2.2 kW							022		
		3 kW							030		
		4 kW							040		
Converter mounting type	Motor-mounted								M		
Fieldbus communication	Without fieldbus communication									IO	
	AS-Interface									ASi	
	PROFINET, EtherNet/IP									PN	
Options											
Motor brake	DC brake										L
	Enclosed brake										G
	Manual brake release										H
	Manual brake release with locking mechanism										HA
Canopy	With canopy										W

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor type asynchronous motors IE2/IE3

Selection and ordering data

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor type asynchronous motors IE2/IE3

-> Configuration motor type synchronous reluctance motors (see right page)

System rated power P_N kW	Drive rated torque T_N Nm	System input rated current I_N A	$\cos \varphi$ Nm	λ	Motor size		Converter size (frame size)	Article No. (Article No. supplements → see below)
					Asynchronous motor	Efficiency class		
Control range 1:5 / Motor speed range 300 ... 1 500 rpm								
0.37	2.36	0.97	0.74	0.58	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -3 ■■■ -Z
0.55	3.50	1.29	0.76	0.64	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -3 ■■■ -Z
0.75	4.77	1.64	0.76	0.61	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -3 ■■■ -Z
1.1	7.00	2.30	0.79	0.65	LE90S4P	IE3	FSA	2KJ8 ■■■ -2GB ■■ -3 ■■■ -Z
1.5	9.55	2.98	0.82	0.69	LE90L4P	IE3	FSA	2KJ8 ■■■ -2GG ■■ -3 ■■■ -Z
2.2	14.00	4.66	0.82	0.70	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -3 ■■■ -Z
3.0	19.10	6.31	0.83	0.70	LE100LB4P	IE3	FSB	2KJ8 ■■■ -2JG ■■ -3 ■■■ -Z
4.0	25.00	8.09	0.83	0.70	LE112MC4P	IE3	FSB	2KJ8 ■■■ -2LB ■■ -3 ■■■ -Z

Control range 1:10 / Motor speed range 300 ... 3 000 rpm

0.55	1.75	1.29	0.68	0.54	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -4 ■■■ -Z
0.75	2.36	1.67	0.70	0.57	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -4 ■■■ -Z
1.1	3.50	2.34	0.73	0.57	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -4 ■■■ -Z
1.5	4.77	2.93	0.75	0.62	LE90S4P	IE3	FSA	2KJ8 ■■■ -2GB ■■ -4 ■■■ -Z
2.2	7.00	4.09	0.80	0.68	LE90L4P	IE3	FSB	2KJ8 ■■■ -2GG ■■ -4 ■■■ -Z
3.0	9.55	6.47	0.80	0.69	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -4 ■■■ -Z
4.0	12.73	8.29	0.80	0.69	LE100LB4P	IE3	FSB	2KJ8 ■■■ -2JG ■■ -4 ■■■ -Z

Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm

0.64	2.36	1.49	0.67	0.54	LE71MB4E	IE2	FSA	2KJ8 ■■■ -2CF ■■ -5 ■■■ -Z
0.95	3.50	2.08	0.70	0.58	LE80MA4E	IE2	FSA	2KJ8 ■■■ -2EA ■■ -5 ■■■ -Z
1.30	4.77	2.73	0.73	0.60	LE80MB4P	IE3	FSA	2KJ8 ■■■ -2EG ■■ -5 ■■■ -Z
1.90	7.00	3.62	0.76	0.63	LE90S4P	IE3	FSB	2KJ8 ■■■ -2GB ■■ -5 ■■■ -Z
2.60	9.55	4.82	0.80	0.68	LE90L4P	IE3	FSB	2KJ8 ■■■ -2GG ■■ -5 ■■■ -Z
3.81	14.00	8.14	0.82	0.70	LE100LA4P	IE3	FSB	2KJ8 ■■■ -2JB ■■ -5 ■■■ -Z

Article No. supplements

Gearbox type

Helical gearbox E, 1-stage
Helical gearbox Z, 2-stage
Helical gearbox D, 3-stage
Parallel shaft gearbox FZ, 2-stage
Parallel shaft gearbox FD, 3-stage
Bevel gearbox B/K, 2/3-stage
Helical worm gearbox C, 2-stage

0
1
2
3
4
5
6

Gearbox size

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-motor-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

0 0
1 ...
4 8

Motor temperature sensor

without
Pt1000

0
1

Motor brake

without
with (brake voltage 180 V DC)

0
1

Converter fieldbus communication

Without fieldbus communication, cable gland
Without fieldbus communication, plug-in connection
AS-Interface, cable gland
AS-Interface, plug-in connection
PROFINET, EtherNet/IP, cable gland
PROFINET, EtherNet/IP, plug-in connection

B
C
D
E
F
G

Geared motor transmission ratio

See „Gearbox selection“ in the Ordering data section in the Industry Mall
www.siemens.com/sinamics-g115d/gear-selection-motor-mounted
and in the Drive Technology Configurator (DT Configurator):
www.siemens.com/sinamics-g115d/configuration

A1
...
X2

Special versions

Necessary ordering data:

- Mounting position (order codes **D01... D26**) for the specification of the direction of rotation of the output shaft
- Configuration of the output shaft (order codes **H31... H67**)
- Configuration of the mounting type (order codes **H71... H76**)
- Configuration of the connection type of the converter (order codes **V01... V81**).

Selection of the special versions, see the Drive Technology Configurator (DT Configurator): www.siemens.com/sinamics-g115d/configuration

Order codes

...+...+...+...

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Additional information for the basic configuration

Selection and ordering data

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Additional information for the basic configuration

Type	Motor	Rated power	Rated torque	Maximum short-time torque T_{max}	Efficiency η	Efficiency class	Relative starting torque		
		P_N kW	T_N Nm	Nm	4/4 load %	acc. to IEC TS60034-30-2	T_{St}/T_N Standard	Maximum	
Control range 1:5 / Motor speed range 300 ... 1 500 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8 ■■■ -2CF ■■ -3 ■■■ -Z	LE71MB4E	0.37	2.36	4.72	71.70	IE2	1.3	2.0	
2KJ8 ■■■ -2EA ■■ -3 ■■■ -Z	LE80MA4E	0.55	3.50	7.00	77.90	IE2	1.3	2.0	
2KJ8 ■■■ -2EG ■■ -3 ■■■ -Z	LE80MB4P	0.75	4.77	9.54	82.10	IE3	1.3	2.0	
2KJ8 ■■■ -2GB ■■ -3 ■■■ -Z	LE90S4P	1.1	7.00	14.00	82.40	IE3	1.3	2.0	
2KJ8 ■■■ -2GG ■■ -3 ■■■ -Z	LE90L4P	1.5	9.55	19.10	84.20	IE3	1.3	2.0	
2KJ8 ■■■ -2JB ■■ -3 ■■■ -Z	LE100LA4P	2.2	14.00	28.00	87.10	IE3	1.3	2.0	
2KJ8 ■■■ -2JG ■■ -3 ■■■ -Z	LE100LB4P	3.0	19.10	38.20	86.70	IE3	1.3	2.0	
2KJ8 ■■■ -2LB ■■ -3 ■■■ -Z	LE112MC4P	4.0	25.00	50.00	88.20	IE3	1.3	2.0	
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8 ■■■ -4EC ■■ -3 ■■■ -Z	LE80MA4S	0.55	3.50	7.00	81.90	IE4	1.3	2.0	
2KJ8 ■■■ -4EH ■■ -3 ■■■ -Z	LE80MB4S	0.75	4.77	9.54	84.90	IE4	1.3	2.0	
2KJ8 ■■■ -4GC ■■ -3 ■■■ -Z	LE90S4S	1.10	7.00	14.00	85.60	IE4	1.3	2.0	
2KJ8 ■■■ -4GH ■■ -3 ■■■ -Z	LE90L4S	1.50	9.55	19.10	86.70	IE4	1.3	2.0	
2KJ8 ■■■ -4LC ■■ -3 ■■■ -Z	LE112MA4S	2.20	14.00	28.00	90.00	IE4	1.3	2.0	
2KJ8 ■■■ -4LH ■■ -3 ■■■ -Z	LE112MB4S	3.00	19.10	38.20	89.70	IE4	1.3	2.0	
2KJ8 ■■■ -4LN ■■ -3 ■■■ -Z	LE112MC4S	4.00	25.46	50.92	90.60	IE4	1.3	2.0	
Control range 1:10 / Motor speed range 300 ... 3 000 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8 ■■■ -2CF ■■ -4 ■■■ -Z	LE71MB4E	0.55	1.75	3.50	78.50	IE2	1.3	2.0	
2KJ8 ■■■ -2EA ■■ -4 ■■■ -Z	LE80MA4E	0.75	2.36	4.72	81.30	IE2	1.3	2.0	
2KJ8 ■■■ -2EG ■■ -4 ■■■ -Z	LE80MB4P	1.10	3.50	7.00	84.00	IE3	1.3	2.0	
2KJ8 ■■■ -2GB ■■ -4 ■■■ -Z	LE90S4P	1.50	4.77	9.54	84.20	IE3	1.3	2.0	
2KJ8 ■■■ -2GG ■■ -4 ■■■ -Z	LE90L4P	2.20	7.00	14.00	86.90	IE3	1.3	2.0	
2KJ8 ■■■ -2JB ■■ -4 ■■■ -Z	LE100LA4P	3.00	9.55	19.10	87.10	IE3	1.3	2.0	
2KJ8 ■■■ -2JG ■■ -4 ■■■ -Z	LE100LB4P	4.00	12.73	25.46	88.70	IE3	1.3	2.0	
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8 ■■■ -4EC ■■ -4 ■■■ -Z	LE80MA4S	0.75	2.36	4.72	84.30	IE4	1.3	2.0	
2KJ8 ■■■ -4EH ■■ -4 ■■■ -Z	LE80MB4S	1.10	3.50	7.00	87.30	IE4	1.3	2.0	
2KJ8 ■■■ -4GC ■■ -4 ■■■ -Z	LE90S4S	1.50	4.77	9.54	87.00	IE4	1.3	2.0	
2KJ8 ■■■ -4GH ■■ -4 ■■■ -Z	LE90L4S	2.20	7.00	14.00	89.00	IE4	1.3	2.0	
2KJ8 ■■■ -4LC ■■ -4 ■■■ -Z	LE112MA4S	3.00	9.55	19.10	89.40	IE4	1.3	2.0	
2KJ8 ■■■ -4LH ■■ -4 ■■■ -Z	LE112MB4S	4.00	12.73	25.46	90.50	IE4	1.3	2.0	
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm									
<i>Motor type asynchronous motors IE2/IE3</i>									
2KJ8 ■■■ -2CF ■■ -5 ■■■ -Z	LE71MB4E	0.64	2.36	4.72	77.70	IE2	1.3	2.0	
2KJ8 ■■■ -2EA ■■ -5 ■■■ -Z	LE80MA4E	0.95	3.50	7.00	81.70	IE2	1.3	2.0	
2KJ8 ■■■ -2EG ■■ -5 ■■■ -Z	LE80MB4P	1.30	4.77	9.54	84.80	IE3	1.3	2.0	
2KJ8 ■■■ -2GB ■■ -5 ■■■ -Z	LE90S4P	1.90	7.00	14.00	85.70	IE3	1.3	2.0	
2KJ8 ■■■ -2GG ■■ -5 ■■■ -Z	LE90L4P	2.60	9.55	19.10	86.30	IE3	1.3	2.0	
2KJ8 ■■■ -2JB ■■ -5 ■■■ -Z	LE100LA4P	3.81	14.00	28.00	88.00	IE3	1.3	2.0	
<i>Motor type synchronous reluctance motors IE4</i>									
2KJ8 ■■■ -4EC ■■ -5 ■■■ -Z	LE80MA4S	0.95	3.50	7.00	85.40	IE4	1.3	2.0	
2KJ8 ■■■ -4EH ■■ -5 ■■■ -Z	LE80MB4S	1.30	4.77	9.54	87.80	IE4	1.3	2.0	
2KJ8 ■■■ -4GC ■■ -5 ■■■ -Z	LE90S4S	1.90	7.00	14.00	88.30	IE4	1.3	2.0	
2KJ8 ■■■ -4GH ■■ -5 ■■■ -Z	LE90L4S	2.60	9.55	19.10	89.00	IE4	1.3	2.0	
2KJ8 ■■■ -4LC ■■ -5 ■■■ -Z	LE112MA4S	3.81	14.00	28.00	90.80	IE4	1.3	2.0	

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Additional information for the basic configuration

Selection and ordering data

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Additional information for the basic configuration

Type	Motor	Holding torque M_{4Br}	Working brake torque M_{2Br}	Maximum switching energy per braking W kJ	Motor moment of inertia J_{mot}		Weight m_{mot}		
		Nm	Nm		with brake 10^{-4} kgm ²	without brake	with brake kg	without brake	
Control range 1:5 / Motor speed range 300 ... 1 500 rpm									
Motor type asynchronous motors IE2/IE3									
2KJ8 ■■■ -2CF ■■ -3 ■■■ -Z	LE71MB4E	3.2	4.0	3.0	9.65	9.50	7.85	7.00	
2KJ8 ■■■ -2EA ■■ -3 ■■■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00	
2KJ8 ■■■ -2EG ■■ -3 ■■■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00	
2KJ8 ■■■ -2GB ■■ -3 ■■■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00	
2KJ8 ■■■ -2GG ■■ -3 ■■■ -Z	LE90L4P	12.8	16.0	12	51.00	49.00	21.60	19.00	
2KJ8 ■■■ -2JB ■■ -3 ■■■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00	
2KJ8 ■■■ -2JG ■■ -3 ■■■ -Z	LE100LB4P	25.6	32.0	24	144.50	140.00	33.90	30.00	
2KJ8 ■■■ -2LB ■■ -3 ■■■ -Z	LE112MC4P	32.0	40.0	24	174.50	170.00	37.90	34.00	
Motor type synchronous reluctance motors IE4									
2KJ8 ■■■ -4EC ■■ -3 ■■■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00	
2KJ8 ■■■ -4EH ■■ -3 ■■■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00	
2KJ8 ■■■ -4GC ■■ -3 ■■■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00	
2KJ8 ■■■ -4GH ■■ -3 ■■■ -Z	LE90L4S	12.8	16.0	12	45.00	43.00	24.60	22.00	
2KJ8 ■■■ -4LC ■■ -3 ■■■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00	
2KJ8 ■■■ -4LH ■■ -3 ■■■ -Z	LE112MB4S	25.6	32.0	24	96.50	92.00	37.90	34.00	
2KJ8 ■■■ -4LN ■■ -3 ■■■ -Z	LE112MC4S	32.0	40.0	24	118.50	114.00	42.90	39.00	
Control range 1:10 / Motor speed range 300 ... 3 000 rpm									
Motor type asynchronous motors IE2/IE3									
2KJ8 ■■■ -2CF ■■ -4 ■■■ -Z	LE71MB4E	3.2	4.0	3.0	9.65	9.50	7.85	7.00	
2KJ8 ■■■ -2EA ■■ -4 ■■■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00	
2KJ8 ■■■ -2EG ■■ -4 ■■■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00	
2KJ8 ■■■ -2GB ■■ -4 ■■■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00	
2KJ8 ■■■ -2GG ■■ -4 ■■■ -Z	LE90L4P	10.4	13.0	12	51.00	49.00	21.60	19.00	
2KJ8 ■■■ -2JB ■■ -4 ■■■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00	
2KJ8 ■■■ -2JG ■■ -4 ■■■ -Z	LE100LB4P	25.6	32.0	24	144.50	140.00	33.90	30.00	
Motor type synchronous reluctance motors IE4									
2KJ8 ■■■ -4EC ■■ -4 ■■■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00	
2KJ8 ■■■ -4EH ■■ -4 ■■■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00	
2KJ8 ■■■ -4GC ■■ -4 ■■■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00	
2KJ8 ■■■ -4GH ■■ -4 ■■■ -Z	LE90L4S	10.4	13.0	12	45.00	43.00	24.60	22.00	
2KJ8 ■■■ -4LC ■■ -4 ■■■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00	
2KJ8 ■■■ -4LH ■■ -4 ■■■ -Z	LE112MB4S	25.6	32.0	24	96.50	92.00	37.90	34.00	
Control range 1:8.7 / Motor speed range 300 ... 2 610 rpm									
Motor type asynchronous motors IE2/IE3									
2KJ8 ■■■ -2CF ■■ -5 ■■■ -Z	LE71MB4E	3.2	4.0	3.0	9.65	9.50	7.85	7.00	
2KJ8 ■■■ -2EA ■■ -5 ■■■ -Z	LE80MA4E	4.0	5.0	7.5	17.61	17.00	11.50	10.00	
2KJ8 ■■■ -2EG ■■ -5 ■■■ -Z	LE80MB4P	6.4	8.0	7.5	29.61	29.00	15.50	14.00	
2KJ8 ■■■ -2GB ■■ -5 ■■■ -Z	LE90S4P	8.0	10.0	12	38.00	36.00	18.60	16.00	
2KJ8 ■■■ -2GG ■■ -5 ■■■ -Z	LE90L4P	12.8	16.0	12	51.00	49.00	21.60	19.00	
2KJ8 ■■■ -2JB ■■ -5 ■■■ -Z	LE100LA4P	16.0	20.0	12	142.00	140.00	32.60	30.00	
Motor type synchronous reluctance motors IE4									
2KJ8 ■■■ -4EC ■■ -5 ■■■ -Z	LE80MA4S	4.0	5.0	7.5	20.61	20.00	13.50	12.00	
2KJ8 ■■■ -4EH ■■ -5 ■■■ -Z	LE80MB4S	6.4	8.0	7.5	26.61	26.00	16.50	15.00	
2KJ8 ■■■ -4GC ■■ -5 ■■■ -Z	LE90S4S	8.0	10.0	12	36.00	34.00	20.60	18.00	
2KJ8 ■■■ -4GH ■■ -5 ■■■ -Z	LE90L4S	12.8	16.0	12	45.00	43.00	24.60	22.00	
2KJ8 ■■■ -4LC ■■ -5 ■■■ -Z	LE112MA4S	18.4	23.0	24	96.50	92.00	37.90	34.00	

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

[Clicking to the Industry Mall](#)
6SL3255-0AA00-5AA0

Supplementary system components and spare parts for SINAMICS G115D motor-mounted

Selection and ordering data

Supplementary system components for SINAMICS G115D motor-mounted

Description	Article No.
Fuses	
• 10 A for FSA	3NA3803
• 16 A for FSB	3NA3805
External braking resistors Continuous braking power	
• 200 W for FSA	6SL3501-1BE32-0AA0
• 240 W for FSA	6SL3501-1BE32-4AA0
• 480 W for FSA	6SL3501-1BE34-8AA0
• 200 W for FSB	6SL3501-1BE32-0BA0
• 240 W for FSB	6SL3501-1BE32-4BA0
• 600 W for FSB	6SL3501-1BE36-0BA0
SINAMICS SD memory card	
• 512 MB, empty For motor-mounted version also available with order code:	6SL3054-4AG00-2AA0 2KJ8 -Z V80
• 512 MB + firmware V4.7 SP13 For motor-mounted version also available with order code:	6SL3054-7TG00-2BA0 2KJ8 -Z V81
SINAMICS G120 Smart Access Web server module for wireless commissioning, operation and diagnostics using a smartphone, tablet, or laptop	6SL3255-0AA00-5AA0
Interface kit for web server module SINAMICS G120 Smart Access	6SL3555-0XA00-0AA0
MindConnect IOT2040 to connect to the Cloud MindSphere via PN with up to 30 data points per second	9AC2112-0AA00-1YA2
MindConnect Nano to connect to the Cloud MindSphere via PN with up to 250 data points per second	9AC2112-8BA12-0KA1
PC converter connection kit 2 USB cable (3 m (9.84 ft) long)	6SL3255-0AA00-2CA0
Installation kit for SINAMICS G115D motor-mounted	6SL3566-2GM00-0GA0
Cover kit for outputs 380 ... 480 V AC (Q4/2) and 24 V DC (7/8" and M12)	6SL3566-2GA00-0GA0

Connecting cables

An overview of all available accessories (e.g. plugs and cables) can be found under the following link:

www.siemens.com/distributeddrives-supplementaryproducts

PROFINET connecting cable IE connecting cable M12-180/M12-180 axial outlet	
• 0.3 m (0.98 ft)	6XV1870-8AE30
• 0.5 m (1.64 ft)	6XV1870-8AE50
• 1 m (3.28 ft)	6XV1870-8AH10
• 1.5 m (4.92 ft)	6XV1870-8AH15
• 2 m (6.56 ft)	6XV1870-8AH20
• 3 m (9.84 ft)	6XV1870-8AH30
• 5 m (16.41 ft)	6XV1870-8AH50
• 10 m (32.81 ft)	6XV1870-8AN10
• 15 m (49 ft)	6XV1870-8AN15
PROFINET connecting cable IE connecting cable M12-180/IE FC RJ45 plug 145 axial outlet	
• 2 m (6.56 ft)	6XV1871-5TH20
• 3 m (9.84 ft)	6XV1871-5TH30
• 5 m (16.41 ft)	6XV1871-5TH50
• 10 m (32.81 ft)	6XV1871-5TN10
• 15 m (49 ft)	6XV1871-5TN15
PROFINET connectors IE M12 plug PRO axial outlet	
• 1 unit	6GK1901-0DB20-6AA0
• 8 units	6GK1901-0DB20-6AA8
AS-Interface M12 branch	3RK1901-2NR20

Description	Article No.
Connecting cables/plug-in connectors for 24 V DC power supply 7/8" plug-in connector axial outlet	
• Pin insert (OUT)	6GK1905-0FA00
• Female contact insert (IN)	6GK1905-0FB00
Connecting cables/plug-in connectors for 24 V DC power supply 7/8" plug-in cable axial outlet	
• 0.3 m (0.98 ft)	6XV1822-5BE30
• 0.5 m (1.64 ft)	6XV1822-5BE50
• 1 m (3.28 ft)	6XV1822-5BH10
• 1.5 m (4.92 ft)	6XV1822-5BH15
• 2 m (6.56 ft)	6XV1822-5BH20
• 3 m (9.84 ft)	6XV1822-5BH30
• 5 m (16.41 ft)	6XV1822-5BH50
• 10 m (32.81 ft)	6XV1822-5BN10
• 15 m (49 ft)	6XV1822-5BN15
Plug-in connectors for digital inputs and digital outputs	6ES7194-6KA00-0XA0
Y cable for distributed I/Os for dual connection of I/Os using single cables, 5-pole, M12, 200 mm (7.87 in)	
Connecting cable pre-assembled at one end to connect to the line supply	
• 1.5 m (4.92 ft)	3RK1911-0DB13
• 5 m (16.41 ft)	3RK1911-0DB33
Connector set Q4/2 (angled) for energy supply	
• 2.5 mm ²	3RK1911-2BE50
• 4 mm ²	3RK1911-2BE10
• 6 mm ²	3RK1911-2BE30
Quickon system connector for connections for 380 ... 480 V AC	
• Quickon nut	6SL3566-4NA00-0GA0
• Quickon connector	6SL3566-4MA00-0GA0
Connector set Q4/2 (angled) for power loop-through	
• 2.5 mm ²	3RK1911-2BF50
• 4 mm ²	3RK1911-2BF10

Training case

SINAMICS G115D training case SINAMICS G115D distributed drive system, motor-mounted, PROFINET, FSA, 0.37 kW, SIMOGear 2KJ8 helical geared motor, incl. SIMATIC S7-1200F and MindConnect IoT 2040	6AG1067-1AA38-0AA0
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Spare parts for SINAMICS G115D motor-mounted

Description	Article No.
Electronic Modules	
• FSA, 0.37 kW	6SL3500-0XE50-3■A0
• FSA, 0.55 kW	6SL3500-0XE50-5■A0
• FSA, 0.75 kW	6SL3500-0XE50-7■A0
• FSA, 1.1 kW	6SL3500-0XE51-1■A0
• FSA, 1.5 kW	6SL3500-0XE51-5■A0
• FSB, 2.2 kW	6SL3500-0XE52-2■A0
• FSB, 3 kW	6SL3500-0XE53-0■A0
• FSB, 4 kW	6SL3500-0XE54-0■A0
Fieldbus communication	
• AS-Interface	A
• Without fieldbus communication	B
• PROFINET, EtherNet/IP	F
Spare parts kit for SINAMICS G115D motor-mounted	6SL3500-0XK50-0AA0



SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

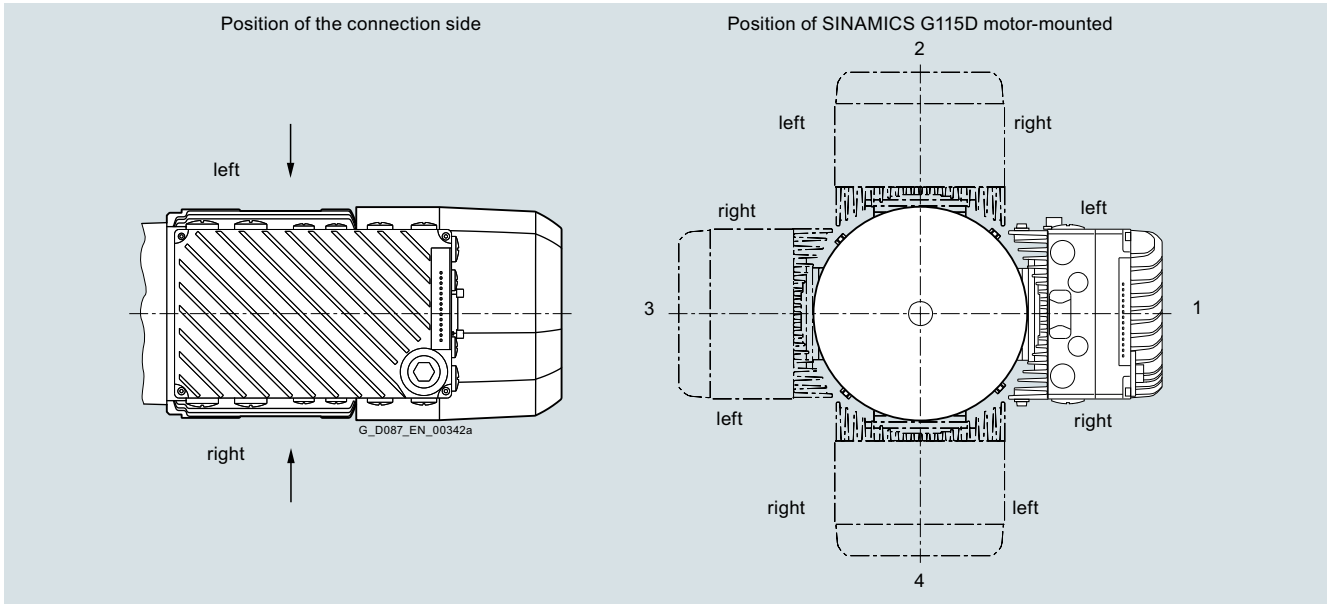
SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Converter options

Options

The SINAMICS G115D distributed drive system, motor-mounted can be attached in four different positions. The connection sides left or right are available for the connection types of the converter. Configuration of the converter connection type (Order codes **V01** to **V81**).

The position of the connection sides left or right must always be viewed from the drive end (DE) of the motor.

Position of the SINAMICS G115D distributed drive system, motor-mounted	Additional identification code -Z with order code	Order code
1	2KJ8 -Z	M55
2		M59
3		M63
4		M67



Location and position of the SINAMICS G115D distributed drive system, motor-mounted

The SINAMICS G115D distributed drive system, motor-mounted, must not be selected in the same position as that of the output side of the gearbox.

The following positions can be selected with the SINAMICS G115D distributed drive system, motor-mounted and the SIMOGEAR geared motors:

Possible position of the SINAMICS G115D distributed drive system, motor-mounted with SIMOGEAR geared motors							
Gearbox type and size	Output side	Motor frame size					
		71	80	90	90	100	112
		Converter size					
		FSA	FSA	FSA	FSB	FSB	FSB
Helical geared motor 2 and 3-stage							
Foot-mounted and housing flange design							
Z./D.19 ... 39	-	No restrictions					
Z./D.49 ... 69	-	1 2 3	1 2 3	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Z./D.79	-	1 2 3	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Z./D.89	-	2		1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Flange-mounted design							
ZF/DF19 ... 89	-	No restrictions					
Helical geared motor 1-stage							
E.39 ... 89	-	No restrictions					
Parallel shaft geared motor 2 and 3-stage							
FZ./FD.29 ... 89	-	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
Bevel geared motor 2-stage							
B.19 ... 49	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4

Possible position of the SINAMICS G115D distributed drive system, motor-mounted with SIMOGEAR geared motors							
Gearbox type and size	Output side	Motor frame size					
		71	80	90	90	100	112
		Converter size					
		FSA	FSA	FSA	FSB	FSB	FSB
Bevel geared motor 3-stage							
Foot-mounted, housing flange and shaft-mounted design							
K.39	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4
K.49	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2	1 2 4
K.69 ... 89	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4
K.109	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4
Flange-mounted design							
K.F39 ... 89	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4
K.F109	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4
Helical worm geared motor 2-stage							
C.29 ... 89	A	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4
	B	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4	1 2 4

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Converter options

Options

Various connection types as well as connection sides can be selected for the respective fieldbus communications of the converter, as shown in the following table.

Connection types	Fieldbus communication	I/O	380 ... 480 V AC	24 V DC	Connection side (from the point of view of the motor shaft)	14th position of the Article No.	Additional identification code -Z with order code			
Without fieldbus communication (I/O Control)										
Cable gland with daisy chain	without	Cable gland			left	2KJ8 ... -	B .. V01			
					right ²⁾	2KJ8 ... -	B .. V06			
					M12	Cable gland	Cable gland	left	2KJ8 ... -	B .. V04
								right	2KJ8 ... -	B .. V05
							Power M12	left	2KJ8 ... -	B .. V07
right	2KJ8 ... -	B .. V08								
Plug-in connection without daisy chain	without	M12	Q4/2	7/8"	left	2KJ8 ... -	C .. V10			
					right	2KJ8 ... -	C .. V11			
					Power M12	left	2KJ8 ... -	C .. V12		
						right	2KJ8 ... -	C .. V13		
					Quickon ¹⁾	Power M12	left	2KJ8 ... -	C .. V14	
			right	2KJ8 ... -			C .. V15			
			MQ15 ¹⁾	Power M12	left	2KJ8 ... -	C .. V16			
					right	2KJ8 ... -	C .. V17			
			Plug-in connection with daisy chain	without	M12	2 x Q4/2	2 x 7/8"	left	2KJ8 ... -	C .. V20
								right	2KJ8 ... -	C .. V21
2 x Power M12	left	2KJ8 ... -						C .. V22		
	right	2KJ8 ... -						C .. V23		
AS-Interface										
Cable gland with daisy chain	M12	Cable gland		- ³⁾	left	2KJ8 ... -	D .. V02			
					right	2KJ8 ... -	D .. V03			
					M12	Cable gland	- ³⁾	left	2KJ8 ... -	D .. V04
								right	2KJ8 ... -	D .. V05
Plug-in connection without daisy chain	M12	M12	Q4/2	- ³⁾	left	2KJ8 ... -	E .. V10			
					right	2KJ8 ... -	E .. V11			
			Quickon ¹⁾	- ³⁾	left	2KJ8 ... -	E .. V14			
					right	2KJ8 ... -	E .. V15			
			MQ15 ¹⁾	- ³⁾	left	2KJ8 ... -	E .. V16			
					right	2KJ8 ... -	E .. V17			
Plug-in connection with daisy chain	M12	M12	2 x Q4/2	- ³⁾	left	2KJ8 ... -	E .. V20			
					right	2KJ8 ... -	E .. V21			
PROFINET, EtherNet/IP										
Cable gland with daisy chain	M12	Cable gland			left	2KJ8 ... -	F .. V02			
					right	2KJ8 ... -	F .. V03			
					M12	Cable gland		left	2KJ8 ... -	F .. V04
								right	2KJ8 ... -	F .. V05
					Cable gland	Power M12	left	2KJ8 ... -	F .. V07	
							right	2KJ8 ... -	F .. V08	
Plug-in connection without daisy chain	M12	M12	Q4/2	7/8"	left	2KJ8 ... -	G .. V10			
					right	2KJ8 ... -	G .. V11			
					Power M12	left	2KJ8 ... -	G .. V12		
						right	2KJ8 ... -	G .. V13		
					Quickon ¹⁾	Power M12	left	2KJ8 ... -	G .. V14	
			right	2KJ8 ... -			G .. V15			
			MQ15 ¹⁾	Power M12	left	2KJ8 ... -	G .. V16			
					right	2KJ8 ... -	G .. V17			
			Plug-in connection with daisy chain	M12	M12	2 x Q4/2	2 x 7/8"	left	2KJ8 ... -	G .. V20
								right	2KJ8 ... -	G .. V21
2 x Power M12	left	2KJ8 ... -						G .. V22		
	right	2KJ8 ... -						G .. V23		
Power supply										
Integrated power supply unit for 24 V DC power supply						2KJ8 ... -	V70			

¹⁾ Not suitable for UL applications.

²⁾ The cable gland with daisy chain with the connection side to the right (order code **V06**) can only be selected with an integrated power supply unit for a 24 V DC power supply (order code **V70**).

³⁾ The 24 V DC power supply is established via the M12 plug-in connector for the fieldbus communication.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options

Options

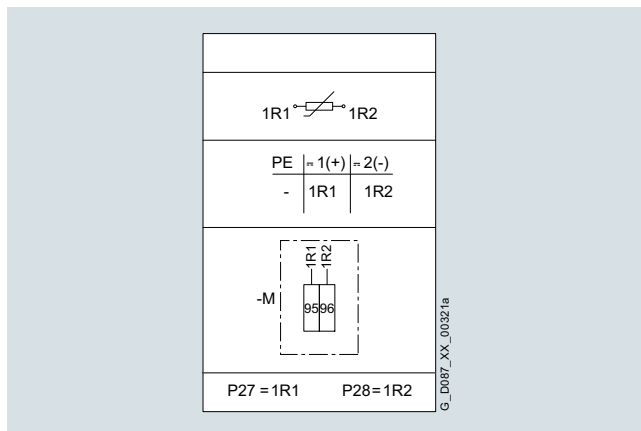
Pt1000 resistance thermometer

The resistance thermometer has a chip for a temperature sensor, the resistance of which changes in relation to temperature according to a series of reproducible basic values. The changes in resistance are transferred as changes in current. At 0 °C, the measurement resistances are adjusted to 1000 Ω for the Pt1000, and correspond to the accuracy class B (i.e. the relationship between resistance and temperature). The limit deviation is ±0.3 °C, and the admissible deviations are defined in EN 60751.

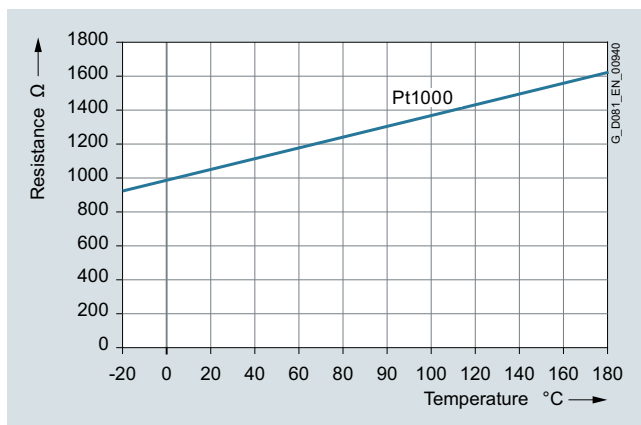
Pure metals undergo larger changes in resistance than alloys and have relatively constant temperature coefficients.

Temperatures for alarm and tripping can be set as required when using converters from Siemens that determine the motor temperature in accordance with the measuring principle described above. With these devices, the measured signal is evaluated directly in the converter. [For further details, see Catalog IC 10.](#)

Motor protection	11th position of the Article No.
Without motor protection	0
Pt1000 resistance thermometer	1



Connection circuit diagram



Pt1000 resistance thermometer characteristic

Degrees of protection

Note:

The degree of protection only applies to the electrical equipment (motor, brake). Depending on the application area, the applicable measures must be applied to the gearbox.

Available degrees of protection

Degree of protection	Additional identification code -Z with order code	Order code
IP55	2KJ8 -Z	K01
IP65 (No restrictions)		K03

Ventilation

The motors have radial-flow fans, which cool regardless of the direction of rotation of the motor (cooling method IC 411, IEC 60034-6). The air flows from the non-drive end (NDE) to the drive end (DE).

The motor fan can either be a standard fan or metal fan.

Note:

Standard fans made of plastic are not suitable for ambient temperatures under -25 °C. At lower temperatures, a metal fan (option M21) must be used.

Standard fan

As standard, the motors are equipped with a plastic fan. This can be used for the entire standard ambient temperature range.

Metal fan

As an alternative to the standard plastic fans, aluminum fans are available for the motors.

Metal fans are used for specific environmental conditions, e.g.:

- If there are solid or dirt particles, such as wood chips, textile fibers in the cooling air
- Special motor designs for increased ambient temperatures exceeding +60 °C
- At temperatures below -25 °C

Ventilation	Additional identification code -Z with order code	Order code
Metal fan	2KJ8 -Z	M21

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options**Options****Increased air humidity/temperature with 30 to 60 g water per m³ of air**

The motors in the standard range are designed for up to 30 g water per m³. A design for increased air humidity in the range between 30 and 60 g water per m³ air as a function of the temperature is possible, as shown in the following table.

Relative humidity	Temperature						
	+20 °C	+30 °C	+40 °C	+50 °C	+60 °C	+70 °C	+80 °C
10 %	2	3	5	8	13	20	29
15 %	3	5	8	12	19	30	44
20 %	3	6	10	17	26	39	58
25 %	4	8	13	21	32	49	
30 %	5	9	15	25	39	59	
35 %	6	11	18	29	45		
40 %	7	12	20	33	52		
45 %	8	14	23	38	58		
50 %	9	15	26	41			
55 %	10	17	28	46			
60 %	10	19	31	50			
65 %	11	20	33	54			
70 %	12	21	36	58			
75 %	13	23	38				
80 %	14	24	41				
85 %	15	26	43				
90 %	16	27	46				
95 %	16	29	49				

Increased air humidity/temperature with 30 to 60 g water per m³ of air

Winding and insulation	Additional identification code -Z with order code	Order code
	2KJ8 . . . - -Z	
Increased air humidity/temperature with 30 to 60 g water per m ³ of air		

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options

Options

Brake

Design and principle of operation

Single-disk, spring-operated brakes have two friction surfaces. When the brake is in a zero current state, a braking torque is generated using several springs.

The brake is released electromagnetically. When the motor brakes, the rotor which can be axially shifted on the hub or the shaft is pressed via the armature disk against the friction surface by means of the springs. In the braked state, there is a gap between the armature disk and the solenoid assembly.

To release the brake, the solenoid is energized with DC voltage. The resulting magnetic force pulls the armature disk against the spring force on to the solenoid component.

The spring force is then no longer applied to the rotor, which can rotate freely.

Note:

The standard design brakes are not suitable for ambient temperatures below -20 °C. Increased corrosion protection is used, when the motor is used at ambient temperatures of below -20 °C.

For ambient temperatures higher than 45 °C, the brakes must be considered in detail.

The following reduction of the max. permissible duty cycle must be observed during increased ambient temperatures:

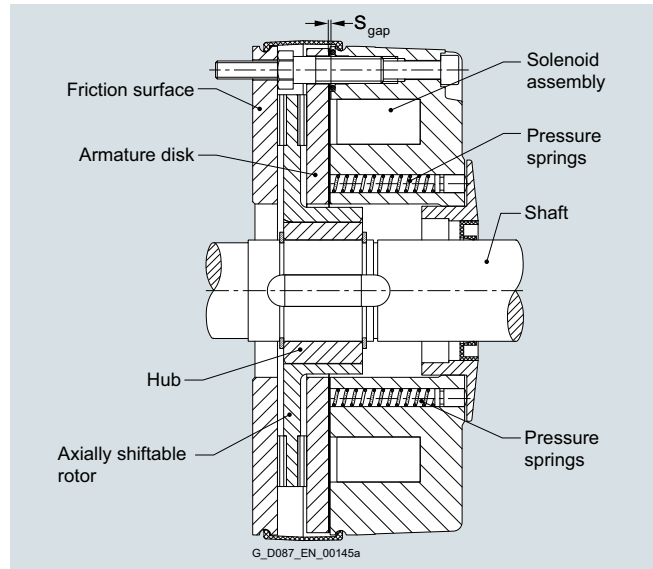
Ambient temperature	Max. permissible duty cycle based on 10 min.
-30 °C ... +40 °C	100 %
+55° C	75 %

You will find the configuring notes for the permissible duty cycle on [page 7.1/30](#).

Selecting the brake

- Brake assignment

Motor frame size	Motor type	Rated motor power [kW]			Brakes											Article No.	
		Control range	Braking torque [Nm]														
		1:5	1:10	1:8,7	L4	L8	L8	L16	L16	L16	L16	L32	L32	L32	L80	L80	
Asynchronous motor																	
71	LE71MB4E	0,37	0,55	0,64	✓												2KJ8...-2CF.1-....-Z
80	LE80MA4E	0,55	0,75	0,95		✓											2KJ8...-2EA.1-....-Z
	LE80MB4P	0,75	1,1	1,3			✓										2KJ8...-2EG.1-....-Z
90	LE90S4P	1,1	1,5	1,9				✓									2KJ8...-2GB.1-....-Z
	LE90L4P	1,5	-	2,6					✓								2KJ8...-2GG.1-....-Z
		-	2,2	-					✓								2KJ8...-2GG.1-....-Z
100	LE100LA4P	2,2	3	3,81						✓							2KJ8...-2JB.1-....-Z
	LE100LB4P	3	4	5,2								✓					2KJ8...-2JG.1-....-Z
112	LE112MC4P	4	5,5	6,93									✓				2KJ8...-2LB.1-....-Z
132	LE132S4P	5,5	7,5	-											✓		2KJ8...-2NB.1-....-Z
	LE132M4P	7,5	-	-												✓	2KJ8...-2NG.1-....-Z
Synchronous reluctance motor																	
80	LE80MA4S	0,55	0,75	0,95		✓											2KJ8...-4EC.1-....-Z
	LE80MB4S	0,75	1,1	1,3			✓										2KJ8...-4EH.1-....-Z
90	LE90S4S	1,1	1,5	1,9				✓									2KJ8...-4GC.1-....-Z
	LE90L4P	1,5	-	2,6					✓								2KJ8...-4GH.1-....-Z
		-	2,2	-					✓								2KJ8...-4GH.1-....-Z
112	LE112MA4S	2,2	3	3,81							✓						2KJ8...-4LC.1-....-Z
	LE112MB4S	3	4	5,2								✓					2KJ8...-4LH.1-....-Z
	LE112MC4S	4	5,5	6,93									✓				2KJ8...-4LN.1-....-Z



Brake

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options

Options

Brake options

Manual brake release

Brakes can be supplied with a manual brake release lever. The manual brake release lever can be used to release the brake at zero current. When the brake has been released, the motor shaft can rotate freely in order to bring the output shaft to a certain position or for use as an emergency release in the event of a power failure, for example.

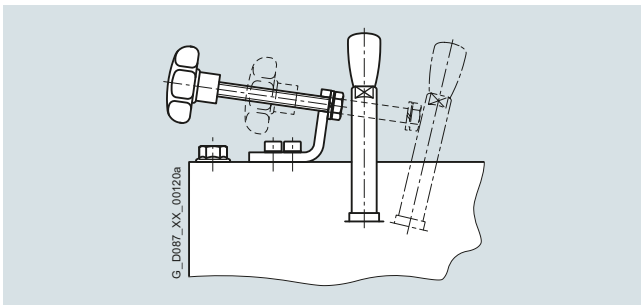
The manual brake release lever can be fixed in the released position using an additional locking mechanism mounted on the brake.

The manual brake release lever can be mounted in various different positions. The position of the manual brake release lever relates to the standard design of the motor. The standard position is "2".

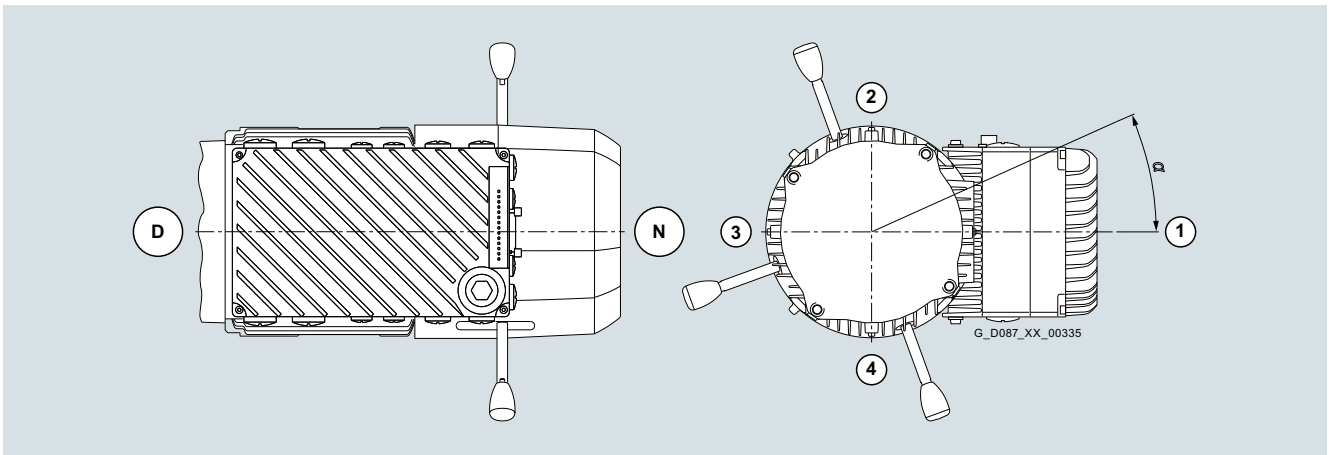
Brake options	Additional identification code -Z with order code	Order code
	2KJ8 . . . - - Z	
Manual brake release lever		C02
Manual brake release lever with locking mechanism		C03

Note:

Assembled SINAMICS G115D and manual brake release lever with/without locking mechanism must not be in the same position.



Example of manual brake release lever with locking mechanism for brake



Manual brake release lever position

Manual brake release lever position	Motor frame size							Additional identification code -Z with order code	Order code
	71	63	71	80	90	100	112		
	Angle α							2KJ8 . . . - - Z	
1	0°	0°	10°	0°	0°	0°	0°		C26
2	90°	90°	100°	90°	90°	90°	90°		C27
3	180°	180°	190°	180°	180°	180°	180°		C28
4	-	270°	280°	270°	270°	270°	270°		C29

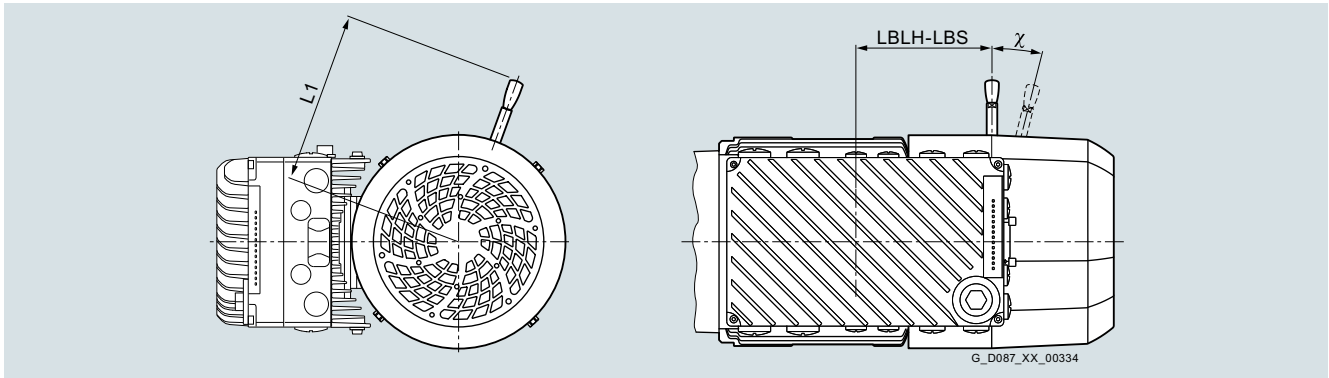
SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options

Options

The dimensions of the manual brake release lever depend on the size.



Dimensions, manual brake release lever

Motor frame size	Brake type	Terminal box position	Distance			Angle, manual brake release lever With the brake released Tolerance +3°
			Centerline of the motor up to the outermost position of the manual brake release lever Without locking mechanism mm	Centerline of the motor up to the outermost position of the manual brake release lever With locking mechanism mm	Center of the terminal box up to the center of the manual brake release lever mm	
			L1	L1	LBLH-LBS	χ
71	L4	1A, 2A, 3A, 4A	107	127	71.8	12°
80	L8	1A, 2A, 3A, 4A	116	136	97.8	10°
90	L16	1A, 2A, 3A, 4A	132	151	113.9	9°
100	L16	1A, 2A, 3A, 4A	132	151	126.9	9°
	L32	1A, 2A, 3A, 4A	161	161	128.9	10°
112	L32	1A, 2A, 3A, 4A	161	161	128.9	10°

7
3

Enclosed brake

The brakes can be supplied as enclosed brakes.

Enclosed brakes include a dust protection ring around the circumference and an integrated shaft sealing ring at the shaft outlet. This prevents the release and penetration of dust, moisture, and other pollution. Other advantages are reduced noise when applying the brake as well as a reduced risk of the rotor freezing on the friction surfaces.

In addition, a condensation drain hole can be incorporated in the dust protection ring for brakes.

The enclosed brake can also be shipped in combination with a manual brake release lever and a manual brake release lever with locking mechanism.

Reduced-noise rotor-hub connection

The brakes are supplied with a reduced-noise rotor-hub connection. This reduces rattling noise of the rotor, particularly at low speeds and in converter operation.

Brake options	Additional identification code -Z with order code
Enclosed brake	2KJ8 -Z Order code C01

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Motor options

Options

Technical data of the brake¹⁾

The opening and closing times are calculated on the basis of the life cycle and total wear of the brake and should be taken into account when the system is configured.

The values stated in parentheses are the values for new brakes calculated according to DIN VDE 0580.

Brake type	Rated holding torque T_{4br} +40 % Nm	Rated braking torque T_{2br} -20 %/+20 % (at 100 rpm) Nm	Power consumption at +20 °C W	Current consumption $I_{br(DC)}$ at 180 V DC	Disconnection time t_2 Standard excitation ms	Application time ($t_1 = t_{11} + t_{12}$)			Maximum operating energy per brake operation W_{1max}	Entire operating energy until the maximum air gap is reached W_V	Weight m kg	Moment of inertia J_{Br} 10^{-4} kgm ²
						t_1 ms	Response time t_{11} ms	Rise time t_{12} ms				
L4	3.2	4	20	0.112	53 (45)	28 (28)	(15)	(13)	3	36	0.85	0.15
L8/5	4	5	25	0.139	51 (35)	39 (40)	(24)	(16)	7.5	75.6	1.5	0.61
L8	6.4	8	25	0.139	71 (57)	39 (31)	(15)	(16)	7.5	64.8	1.5	0.61
L16/10	8	10	30	0.167	90 (48)	59 (58)	(35)	(23)	12	108	2.6	2
L16/13	10.4	13	30	0.167	97 (60)	53 (50)	(30)	(20)	12	108	2.6	2
L16	12.8	16	30	0.167	118 (76)	45 (47)	(28)	(19)	12	108	2.6	2
L16/20	16	20	30	0.167	123 (93)	42 (38)	(23)	(15)	12	80	2.6	2
L32/23	18.4	23	40	0.223	126 (82)	80 (75)	(40)	(35)	24	260	3.9	4.5
L32	25.6	32	40	0.223	186 (115)	66 (53)	(28)	(25)	24	212	3.9	4.5
L32/40	32	40	40	0.223	189 (140)	60 (45)	(24)	(21)	24	165	3.9	4.5
L80/50	40	50	55	0.306	178 (160)	149 (90)	(42)	(48)	36	396	8.4	15
L80/63	50.4	63	55	0.306	233 (170)	125 (72)	(34)	(38)	36	396	8.4	15

Canopy

Geared motors with a vertical mounting position (motor at the top) can also be fitted with a canopy. The canopy prevents small items from falling into the geared motor; in the case of outdoors installation, its primary function is to serve as a rain canopy.

If the motor is to be used or stored in the open air, we recommend that it is kept under additional cover to protect it from prolonged exposure to direct sunlight, rain, snow, ice, or dust.

Mounted parts and components	Additional identification code -Z with order code	Order code
	2KJ8 . . . - - . . . -Z	
Canopy		

Internal motor corrosion protection

The outer surfaces of the geared motors have a high quality paint finish.

For special applications, it may be necessary to apply a protective coating to the inner surfaces of the motor as well.

Designs for special environmental conditions	Additional identification code -Z with order code	Order code
	2KJ8 . . . - - . . . -Z	
Internal motor corrosion protection		

¹⁾ Values refer to brake in its delivery state.

SINAMICS G115D distributed drive system • Motor-mounted

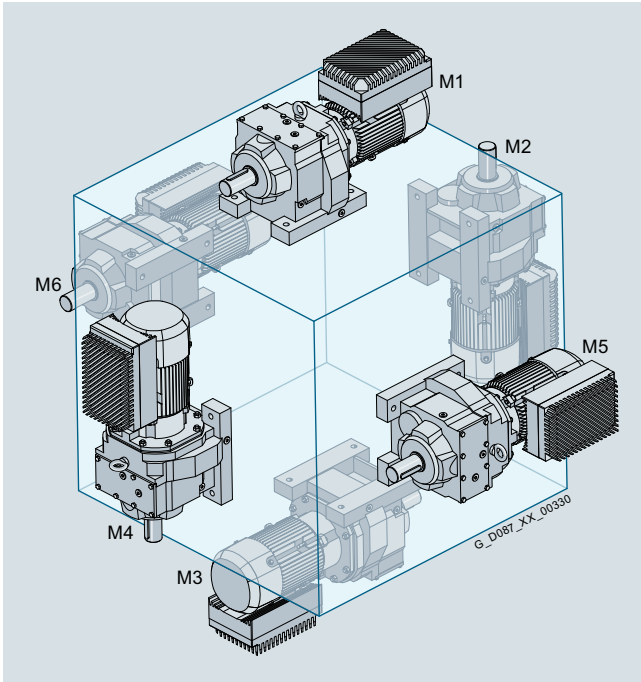
0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

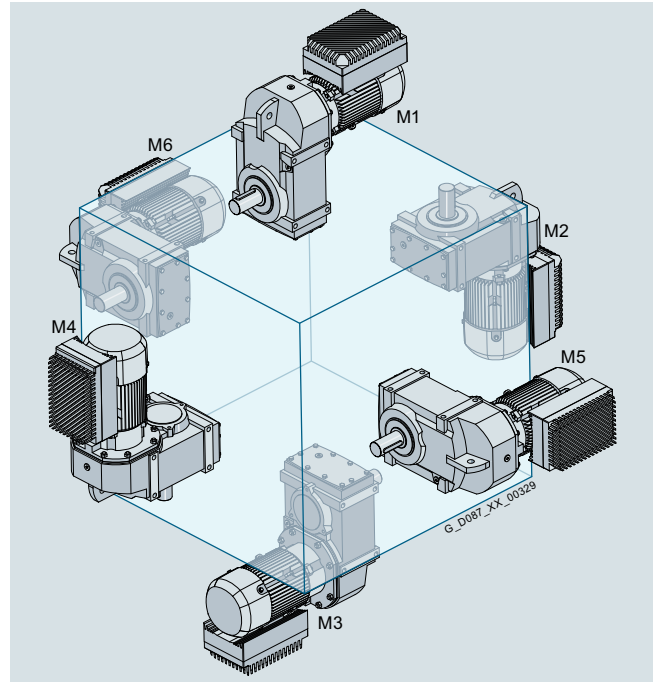
Options

Mounting positions

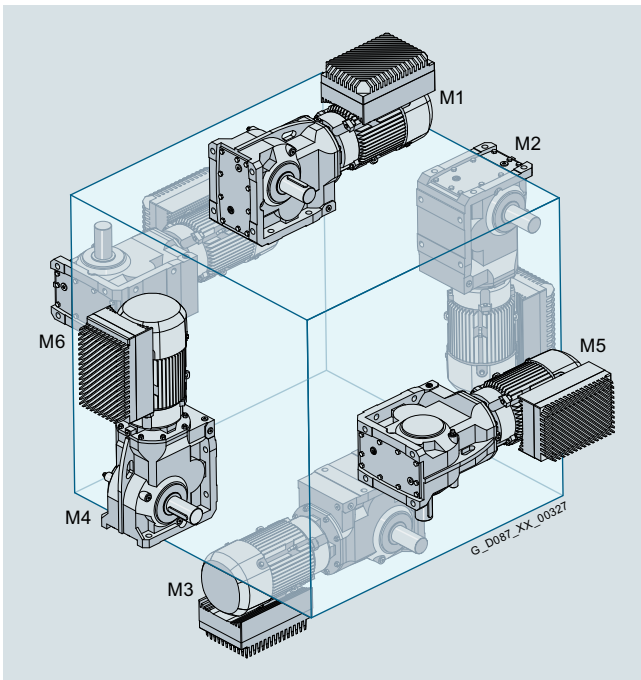
The mounting position must be specified when you place your order to ensure that the gearbox is supplied with the correct quantity of oil.



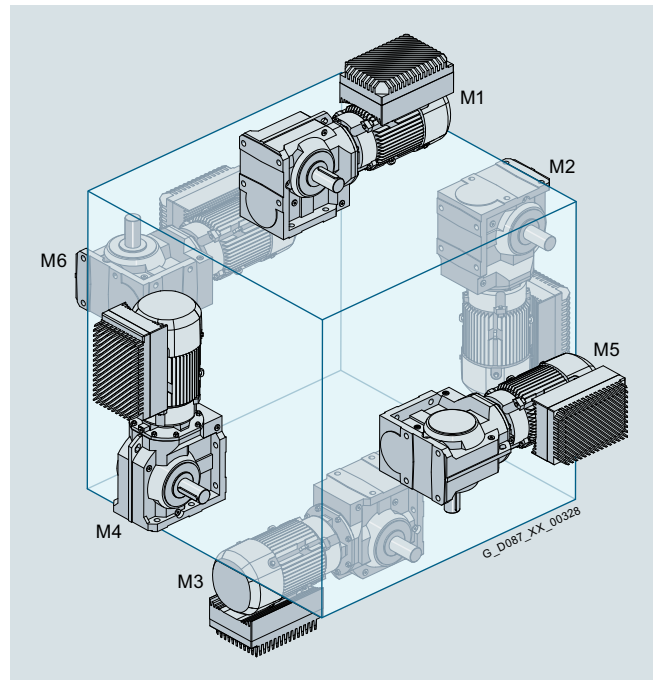
Helical geared motors



Parallel shaft geared motors



Bevel geared motors



Helical worm geared motors

SINAMICS G115D distributed drive system • Motor-mounted




0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Mounting type	Mounting position	Additional identification code -Z with order code	
		2KJ8 . . . - - . . . -Z	Order code
Helical gearboxes and parallel shaft gearboxes			
Foot-mounted design	M1		D01
Flange-mounted design	M2		D02
Housing flange design	M3		D03
	M4		D04
	M5		D05
	M6		D06
Bevel gearboxes and helical worm gearboxes			
Output side A			
Foot-mounted design	M1-A		D11
Flange-mounted design	M2-A		D12
Housing flange design	M3-A		D13
	M4-A		D14
	M5-A		D15
	M6-A		D16
Output side B			
Foot-mounted design	M1-B		D21
Flange-mounted design	M2-B		D22
Housing flange design	M3-B		D23
	M4-B		D24
	M5-B		D25
	M6-B		D26

Explanation of the symbols used to represent mounting positions

Symbol	
Oil valves	
	Venting
	Oil drain
	Oil level checking screw

Note:

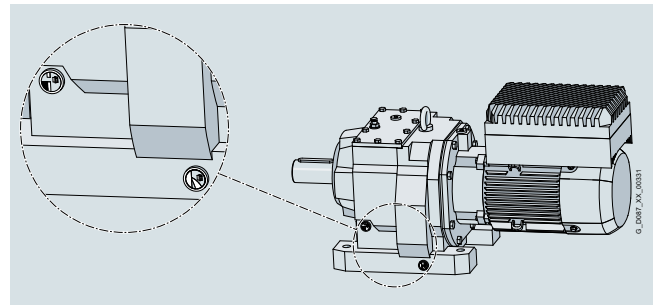
The [Drive Technology Configurator \(DT Configurator\)](#) can be used to configure SIMOGEAR geared motors.

The DT Configurator can be used on the internet without requiring any installation.

The DT Configurator can be found in the Industry Mall at the following address:

www.siemens.com/dt-configurator

For the selected mounting position, the 3D images show the exact position of the oil valves.



Dimensional drawing from DT Configurator with details

Mounting types

Design	Possible for						Additional identification code -Z with order code	
	D, Z	E	F	B	K	C	2KJ8 . . . - - . . . -Z	Order code
Foot-mounted design	✓	✓	✓	✓	✓	✓		-
Foot/flange-mounted design	✓ ¹⁾	-	-	-	-	-		H71
Flange-mounted design (A type)	✓	✓	✓	✓	✓	✓		H74
Housing flange (C type)	✓	✓	✓	✓	✓	✓		H76
Shaft-mounted design (torque arm)	-	-	✓	✓	✓	✓		H72

¹⁾ Only for sizes 29 to 89.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Parallel shaft gearboxes F.AD. in a shaft-mounted design

The rubber buffers (supplied loose) are used to flexibly support the gearbox on the housing plate provided.

When mounting, the rubber buffers must be pretensioned to the dimension specified in the dimensional drawing.

The elastomer used for support is manufactured out of natural rubber $70^\circ \pm 5$ Shore A. The rubber buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.

The dimensions of the torque arm can be seen in the dimensional drawings.

Mounting type	Additional identification code -Z with order code	Order code
Shaft-mounted design	2KJ83 -Z	H72
	2KJ84 -Z	

Bevel gearboxes KAD. in a shaft-mounted design

The torque arm of bevel gearboxes K is mounted on the underside of the housing. The rubber buffers are used to flexibly support the gearbox on the torque arm.

The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.

The dimensions of the torque arm can be seen in the dimensional drawings.

Mounting type	Additional identification code -Z with order code	Order code
Shaft-mounted design	2KJ85 -Z	H72

Bevel gearboxes BAD. in a shaft-mounted design

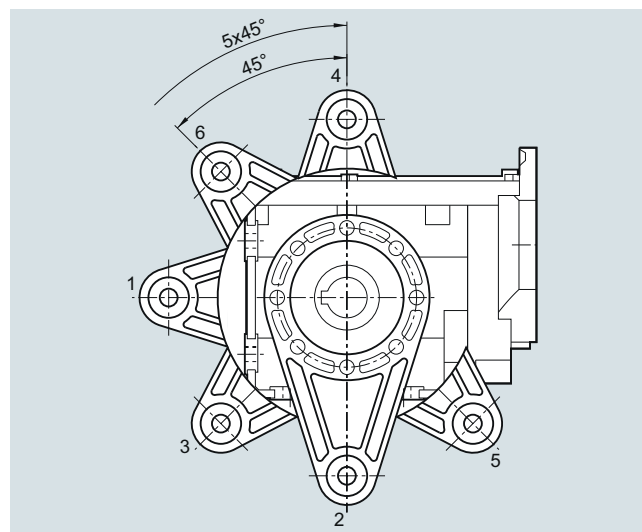
The torque arm can be screwed to the gearbox housing at various positions.

When ordered, the torque arm is supplied loose.

Mounting type	Additional identification code -Z with order code	Order code
Shaft-mounted design	2KJ85 -Z	H72

• Shaft-mounted design for sizes 19 and 29

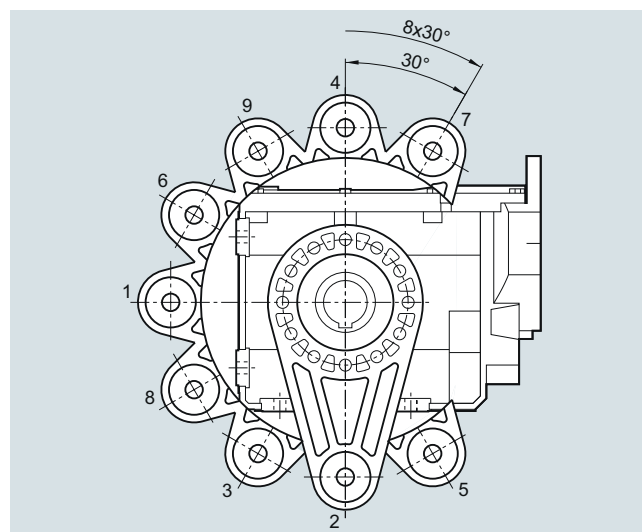
The elastomer used for support is manufactured out of natural rubber 90° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -30 and $+60$ °C.



Bevel gearboxes BAD, sizes 19 and 29

• Shaft-mounted design for sizes 39 and 49

The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and $+60$ °C.



Bevel gearboxes BAD, sizes 39 and 49

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Helical worm gearboxes CAD. in a shaft-mounted design

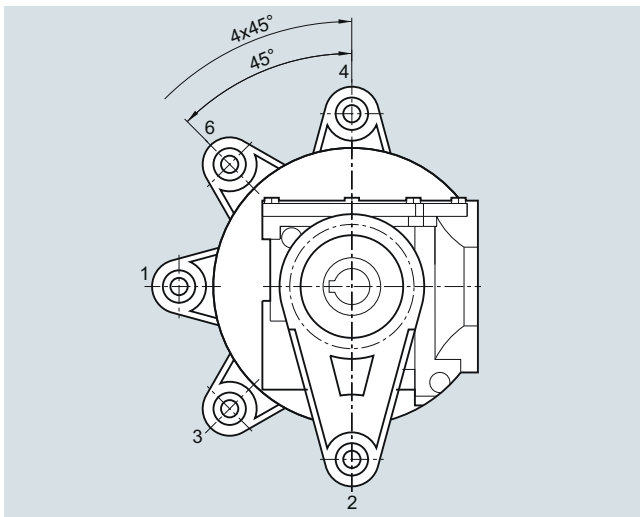
The torque arm can be screwed to the gearbox housing at various positions.

When ordered, the torque arm is supplied loose.

Mounting type	Additional identification code -Z with order code	Order code
	2KJ86 -Z	
Shaft-mounted design		H72

- Shaft-mounted design for size 29

The elastomer used for support is manufactured out of natural rubber 90° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -30 and +60 °C.

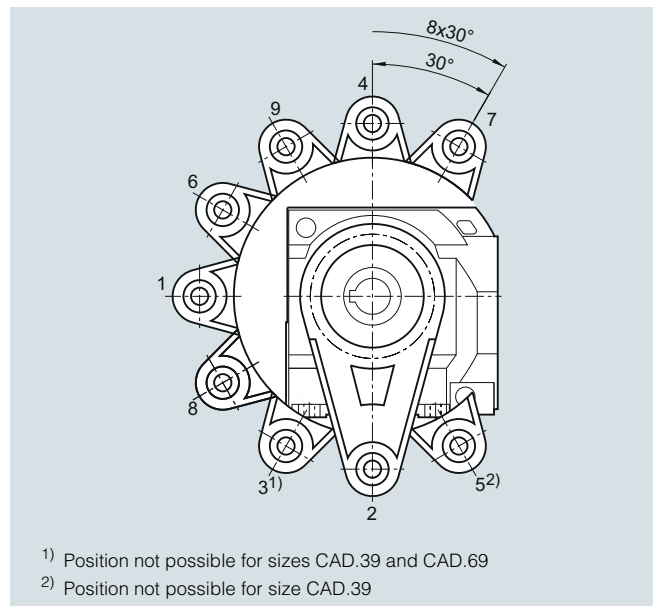


Helical worm gearboxes CAD, size 29

- Shaft-mounted design for sizes 39 to 89

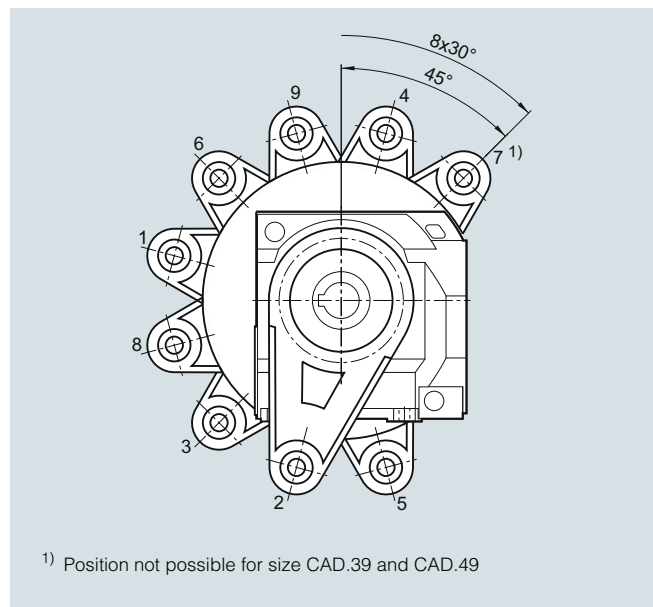
The elastomer used for support is manufactured out of natural rubber 60° Shore A. The rubber elastic buffers are suitable for all mounting positions and can withstand temperatures of between -40 and +60 °C.

Shaft-mounted design	Additional identification code -Z with order code	Order code
	2KJ86 -Z	
Figure 1		G09
Figure 2		G10



- 1) Position not possible for sizes CAD.39 and CAD.69
- 2) Position not possible for size CAD.39

Helical worm gearboxes CAD, Figure 1, sizes 39 to 89



- 1) Position not possible for size CAD.39 and CAD.49

Helical worm gearboxes CAD, Figure 2, sizes 39 to 89

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Shaft design

Shaft design	Dimensions mm						Ambient temperature range	Additional identification code -Z with order code
Helical gearboxes Z and D								
Gearbox size	19	29	39	49	59	69		2KJ81...-Z 2KJ82...-Z
Solid shaft	V20 x 40 V16 x 28 V16 x 40	V25 x 50	V25 x 50 V30 x 60	V30 x 60	V35 x 70 V30 x 60 V40 x 80	V35 x 70	-40 ... +60 °C	H31 H32 H33
Solid shaft without feather key	VG20 x 40	VG25 x 50	VG25 x 50	VG30 x 60	VG35 x 70	VG35 x 70		H40
Solid shaft, inches	V0.75" x 1.57" V1" x 1.97"	V1" x 1.97"	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76" V1.375" x 2.76"	V1.375" x 2.76"		H66
Gearbox size	79	89						2KJ81...-Z 2KJ82...-Z
Solid shaft	V40 x 80 V35 x 70 V50 x 100	V50 x 100 V60 x 120					-40 ... +60 °C	H31 H32 H33
Solid shaft without feather key ¹⁾	VG40 x 80	VG50 x 100						H40
Solid shaft, inches	V1.625" x 3.15" V2.125" x 3.94"	V2.125" x 3.94"						H66
Helical gearboxes E								
Gearbox size	39	49	69	89				2KJ80...-Z
Solid shaft	V20 x 40	V25 x 50	V30 x 60	V40 x 80			-40 ... +60 °C	H31
Solid shaft, inches	V0.75" x 1.57"	V1" x 1.97"	V1.25" x 2.36"	V1.625" x 3.15"				H66
Parallel shaft gearboxes F								
Gearbox size	29	39	49	69	79	89		2KJ83...-Z 2KJ84...-Z
Solid shaft	V25 x 50	V25 x 50 V35 x 70	V30 x 60 V40 x 80	V35 x 70	V40 x 80 V50 x 100	V50 x 100	-40 ... +60 °C	H31 H33
Solid shaft without feather key ¹⁾	VG25 x 50	VG25 x 50	VG30 x 60	VG35 x 70	VG40 x 80	VG50 x 100		H40
Solid shaft, both ends ¹⁾³⁾		VD25 x 50	VD30 x 60	VD35 x 70	VD40 x 80	VD50 x 100		H64
Solid shaft, both ends without feather key ¹⁾³⁾			VDG30 x 60	VDG35 x 70	VDG40 x 80	VDG50 x 100		H65
Solid shaft, inches	V1" x 1.97"	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.625" x 3.15"	V2" x 3.94"		H66
Hollow shaft	H25	H30 H25	H35 H30	H40	H40	H50		H35 H36
Hollow shaft, inches	H1"	H1.25"	H1.375"	H1.5"	H1.5"	H2"		H67
Hollow shaft with shrink disk	HS25	HS30	HS35	HS40	HS40	HS50		H50
SIMOLOC assembly system, metric	HF25 HF20	HF30 HF25	HF35 HF30	HF40 HF35	HF40 HF35	HF50 HF40	-20 ... +60 °C	H53 H54
SIMOLOC assembly system, imperial dimensions	HF1.0" HF0.75"	HF1.25" HF1.1875"	HF1.375" HF1.4375"	HF1.5" HF1.625"	HF1.5" HF1.625"	HF2.0" HF1.9375"		H55 H56
		HF1.0"	HF1.25"	HF1.4375"	HF1.4375"	HF1.75"		H57
		-	HF1.1875"	HF1.375"	HF1.375"	HF1.625"		H58
Splined hollow shaft		N30	N35	N35	N45	N50	-40 ... +60 °C	H61
Bevel gearbox B								
Gearbox size	19	29	39	49				2KJ85...-Z
Solid shaft	V20 x 40	V20 x 40	V30 x 60	V35 x 70			-40 ... +60 °C	H31
Solid shaft without feather key	VG20 x 40	VG20 x 40	VG30 x 60	VG35 x 70				H40
Solid shaft, both ends ²⁾	VD20 x 40	VD20 x 40	VD30 x 60	VD35 x 70				H64
Solid shaft, inches	V0.75" x 1.57"	V0.75" x 1.57"	V1" x 1.97"	V1.375" x 2.76"				H66
Hollow shaft	H20	H20 H25	H30 H35	H40 H35				H35 H36 H37
Hollow shaft, inches	H0.75"	H0.75"	H1.25"	H1.5"				H67

¹⁾ Can only be selected in conjunction with foot-mounted or housing flange design.

²⁾ Can only be selected in conjunction with foot-mounted design.

³⁾ Restricted motor frame sizes in conjunction with shaft extensions at both ends; for precise dimensioning, use the functionality of the DT Configurator.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Shaft design	Dimensions mm						Ambient temperature range	Additional identification code -Z with order code	Order code
Bevel gearboxes B									
Gearbox size	19	29	39	49				2KJ85...-Z	
Hollow shaft with shrink disk	HS20	HS20	HS35	HS40			-40 ... +60 °C		H50
SIMOLOC assembly system, metric		HF25	HF30	HF35			-20 ... +60 °C		H53
		HF20	HF25	HF30				H54	
				HF40				H60	
SIMOLOC assembly system, imperial dimensions		HF1.0"	HF1.25"	HF1.375"					H55
		HF0.75"	HF1.1875"	HF1.4375"				H56	
			HF1.0"	HF1.25"				H57	
				HF1.1875"				H58	
				HF1.625"				H59	
Bevel gearboxes K									
Gearbox size	39	49	69	79	89	109		2KJ85...-Z	
Solid shaft	V25 x 50	V30 x 60	V35 x 70	V40 x 80	V50 x 100	V60 x 120	-40 ... +60 °C		H31
	V35 x 70	V40 x 80		V50 x 100		V80 x 170		H33	
Solid shaft without feather key	VG25 x 50	VG30 x 60	VG35 x 70	VG40 x 80	VG50 x 100	VG60 x 120			H40
Solid shaft, both ends ¹⁾	VD25 x 50	VD30 x 60	VD35 x 70	VD40 x 80	VD50 x 100	VD60 x 120			H64
Solid shaft, both ends without feather key ¹⁾		VDG30 x 60	VDG35 x 70	VDG40 x 80	VDG50 x 100	VDG60 x 120			H65
Solid shaft, inches	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.625" x 3.15"	V2" x 3.94"	V2.375" x 4.72"			H66
Hollow shaft	H30	H35	H40	H40	H50	H60			H35
	H25	H30							H36
						H70			H37
Hollow shaft, inches	H1.25"	H1.375"	H1.5"	H1.5"	H2"	H2.375"			H67
Hollow shaft with shrink disk	HS30	HS35	HS40	HS40	HS50	HS65			H50
SIMOLOC assembly system, metric	HF30	HF35	HF40	HF40	HF50	HF65	-20 ... +60 °C		H53
	HF25	HF30	HF35	HF35	HF40	HF60		H54	
SIMOLOC assembly system, imperial dimensions	HF1.25"	HF1.375"	HF1.5"	HF1.5"	HF2.0"				H55
	HF1.1875"	HF1.4375"	HF1.625"	HF1.625"	HF1.9375"			H56	
	HF1.0"	HF1.25"	HF1.4375"	HF1.4375"	HF1.75"			H57	
		HF1.1875"	HF1.375"	HF1.375"	HF1.625"			H58	
Splined hollow shaft	N30	N35	N35	N45	N50	N65	-40 ... +60 °C		H61
Helical worm gearboxes C									
Gearbox size	29	39	49	69	89			2KJ86...-Z	
Solid shaft	V20 x 40	V25 x 50	V30 x 60	V35 x 70	V45 x 90		-40 ... +60 °C		H31
				V40 x 80 ¹⁾	V50 x 100 ¹⁾			H32	
		V35 x 70 ¹⁾	V40 x 80 ¹⁾	V50 x 100 ¹⁾	V70 x 140 ¹⁾			H33	
Solid shaft without feather key	VG20 x 40	VG25 x 50	VG30 x 60	VG35 x 70	VG45 x 90				H40
Solid shaft, both ends ²⁾	VD20 x 40	VD25 x 50	VD30 x 60	VD35 x 70	VD45 x 90				H64
Solid shaft, inches	V0.75" x 1.57"	V1" x 1.97"	V1.25" x 2.36"	V1.375" x 2.76"	V1.75" x 3.54"				H66
Hollow shaft	H20	H25	H30	H40	H50				H35
		H30	H35	H45	H60			H36	
Hollow shaft, inches	H0.75"	H1.25"	H1.375"	H1.5"	H2"				H67
Hollow shaft with shrink disk	HS20	HS30	HS35	HS40	HS50				H50
				HS50	HS60			H52	
SIMOLOC assembly system, metric	HF25	HF30	HF35	HF40	HF50		-20 ... +60 °C		H53
	HF20	HF25	HF30	HF35	HF40			H54	
SIMOLOC assembly system, imperial dimensions	HF1.0"	HF1.25"	HF1.375"	HF1.5"	HF2.0"				H55
	HF0.75"	HF1.1875"	HF1.4375"	HF1.625"	HF1.9375"			H56	
		HF1.0"	HF1.25"	HF1.4375"	HF1.75"			H57	
			HF1.1875"	HF1.375"	HF1.625"			H58	

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Hollow shaft cover

- Sealing cap

The bore of the hollow shaft is sealed using a plastic sealing cap.

Gearboxes in size 39 and larger with hollow shaft and shrink disk have a rotating protective cap.

The dimensions of the rotating protective cap can be seen in the dimensional drawings provided in the gearbox chapters.

For safety reasons, stationary protective covers may be required.

- Protective cover

For sizes 19 to 89, a stationary protective cover for the hollow shaft or hollow shaft with shrink disk versions can be selected.

The dimensions of the protective cover can be seen in the separate dimensional drawing provided in the gearbox chapters.

Hollow shaft cover	Additional identification code -Z with order code	
	2KJ8. -Z	Order code
Protective cover		G60

Reinforced output shaft bearings

The gearboxes can be supplied with the standard design or with a reinforced output shaft bearing design. The reinforced bearings allow higher radial and combined forces (radial and axial) to be absorbed.

Design	Possible for								Additional identification code -Z with order code	Order code
Helical gearboxes Z and D										
Gearbox size	19	29	39	49	59	69	79	89	2KJ81 -Z 2KJ82 -Z	
Radially reinforced output shaft bearings						✓	✓	✓		G20
Parallel shaft gearboxes F										
Gearbox size	29	39	49	69	79	89			2KJ83 -Z 2KJ84 -Z	
Radially reinforced output shaft bearings			✓ ¹⁾	✓	✓	✓				G20
Bevel gearboxes K										
Gearbox size	39	49	69	79	89	109			2KJ85 -Z	
Radially reinforced output shaft bearings		✓ ¹⁾	✓	✓	✓	✓				G20

¹⁾ Not possible for flange-mounted design with solid shaft (gearbox type FZF, FDF, KF).

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Lubrication and sealing

Gearboxes can be used for different applications. The following lubricants and sealing systems can be selected to ensure an optimum configuration.

The temperature rise of the gearbox during operation increases the oil sump temperature. In selecting the oil, pay attention to the upper limit of the recommended oil sump temperature.

Note:

- For ambient conditions with a high air humidity and salt-laden air, we recommend that only mineral or PAO oils are used.
- For gearboxes with CLP ISO PG oils for applications in the USA, the approval must be checked. Alternatively, a different type of oil must be used (e.g. CLP ISO PAO oil).

Lubrication

The gearboxes are initially filled at the factory with a high-quality lubricant. Lubricants permitted for the various gearbox types and applications are listed in the lubricant table.

Other oils from various lubricant manufacturers that have been approved by Siemens AG can be found on the internet in the Service and Support pages in the List of approved and recommended gear lubricants T 7300:

<https://support.industry.siemens.com/cs/document/44231658>

Oil quantities

The lubricant quantity depends on the gearbox type, size and mounting position. The corresponding oil quantities are specified in the operating instructions and on the rating plate of the geared motor.

Sealing

The standard models of gearbox are supplied with high-quality radial shaft sealing rings with dust protection lips. This sealing design is reliable for a wide range of applications.

Special application areas and environmental conditions require special radial shaft sealing rings and materials, which are coordinated with the particular gearbox oil and environment. This coordinated sealing system results in a high reliability and availability of the plant.

When compared to standard sealing systems, the maintenance intervals can be extended. This therefore reduces maintenance costs.

Selection of lubricant

Application	Oil type Designation acc. to DIN 51502	Permissible oil sump temperature range in operation [°C]	Additional identification code -Z with order code 2KJ8...-...-Z Order code	Ambient temperature range		
				Standard [°C]	Extended [°C]	[°C]
Helical gearboxes Z, D and E, parallel shaft gearboxes F and bevel gearboxes K				-15 ... +40	-30 ... +40	-20 ... +55
Standard	CLP ISO VG220	-15 ... +80	K06	✓		
	CLP ISO PAO VG220	-30 ... +100	K12	✓	✓	✓ ¹⁾
	CLP ISO PAO VG68	-40 ... +60	K13		✓	
	CLP ISO PG VG460	-25 ... +110	K08	✓		✓
	CLP ISO PG VG220	-25 ... +110	K07	✓		✓
Foodstuff area	CLP ISO H1 VG460	-25 ... +100	K11	✓		✓ ¹⁾
	CLP ISO H1 VG100	-30 ... +90	K14	✓	✓	✓ ¹⁾
Biodegradable oil	CLP ISO E VG220	-20 ... +100	K10	✓		✓ ¹⁾
Bevel gearboxes B and helical worm gearboxes C				-15 ... +40	-30 ... +40	-20 ... +55
Standard	CLP ISO PG VG220	-25 ... +110	K07	✓		✓
	CLP ISO PAO VG220	-30 ... +100	K12	✓	✓	✓ ¹⁾
	CLP ISO PAO VG460	-25 ... +110	K16	✓		✓
	CLP ISO PAO VG68	-40 ... +60	K13		✓	
	CLP ISO PG VG460	-25 ... +110	K08	✓		✓
Foodstuff area	CLP ISO H1 VG460	-25 ... +100	K11	✓		✓ ¹⁾
	CLP ISO H1 VG100	-30 ... +90	K14	✓		✓ ¹⁾

CLP = mineral oil
 CLP PG = polyglycol oil
 E = Ester oil, organic oil (bio oil / risk of water pollution, class WGK1)
 PAO = Poly-alpha-olefin oil
 CLP H1 = physiologically safe oil (USDA-H1 approval)

¹⁾ Observe the thermal load.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Rolling bearing greases for gearboxes and motors

The rolling bearings of gearboxes and motors are lubricated in the factory with a rolling bearing grease that is coordinated with the selected application area. The quantity of grease between the rolling elements and the space in front of the bearing depends on the operating conditions and the gearbox mounting position. For operation in the selected application areas, it is not necessary to relubricate the rolling bearings.

We recommend that the grease filling of the rolling bearings is also changed when the oil or shaft sealing rings are replaced.

Other greases supplied by different lubricant manufacturers that have been approved by Siemens AG are specified in the List of approved and recommended gearbox lubricants T 7300.

Sealing system

• Overview

Output shaft sealing	Description	Ambient condition	Additional identification code -Z with order code	Order code
Normal environmental stress				
Standard seal	High-quality NBR radial shaft sealing ring with dust protection lip.	Environment with low dust and pollution levels with low moisture.	2KJ8 . . . - -Z	-
Longer service life				
Seal with longer service life	The radial shaft sealing ring with protective lip is designed with an additional seal on the internal gearbox side. The sealing system has a high degree of reliability due to its resistance to impurities in the oil.	Environment with low dust and pollution levels with low moisture.		G23
Longer service life and increased environmental stress				
Seal for increased environmental stress	This seal is equipped with an additional fiber disk. In addition to the longer service life, it also provides increased protection against higher environmental stress as a result of dust and dirt deposits. As a consequence, the sealing system has a high degree of reliability. For additional environmental stress, e.g. water jets or significant levels of pollution as a result of production materials, upon request.	Environments with increased pollution and dust levels as well as low moisture. Typical applications: Production areas with increased pollution and dust, such as wood chips, dusts or granulate as well as occasional spray water.		G24
High temperature-resistant				
Seal for high temperatures	High-quality FKM radial shaft sealing ring with dust protection lip.	Environment with low dust and pollution levels with low moisture.		G25

• Selection of seal

Seal	Permissible oil sump temperature range in operation [°C]	Additional identification code -Z with order code	Ambient temperature range		
			Standard [°C]	Extended [°C]	[°C]
		2KJ8 . . . - -Z	-	K97	K94
Helical gearboxes Z, D and E, parallel shaft gearboxes F and bevel gearboxes K					
			-15 ... +40	-30 ... +40	-20 ... +55
Standard seal	-40 ... +80	-	✓	✓	✓
Seal for a longer service life	-40 ... +100	G23	✓	✓	✓
Seal for increased environmental stress	-40 ... +80	G24 ¹⁾	✓	✓	✓
Seal, high temperature-resistant	-25 ... +110	G25	✓	-	✓
Bevel gearboxes B and helical worm gearboxes C					
			-15 ... +40	-30 ... +40	-20 ... +55
Standard	-40 ... +80	-	✓	✓	✓
Seal for a longer service life	-40 ... +100	G23 ²⁾	✓	✓	✓
Seal for increased environmental stress	-40 ... +80	G24 ¹⁾²⁾	✓	-	✓
Seal, high temperature-resistant	-25 ... +110	G25	✓	-	✓

¹⁾ Not admissible in conjunction with food oils and biodegradable oils.

²⁾ Not possible with bevel gearbox B19.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

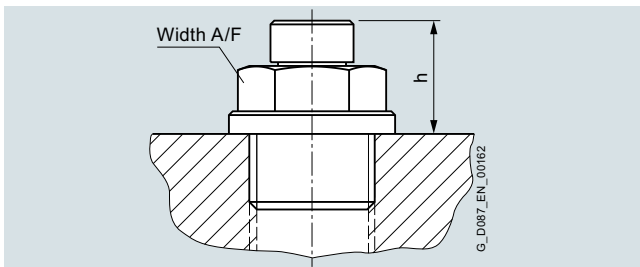
Options

Venting and oil level control

Pressure breather valve

Gearboxes from size 39 are supplied with an installed pressure breather valve; this is suitable for both indoor and outdoor use. Gearbox sizes 19 and 29 can be operated in mounting positions M1, M3, M5, and M6 without requiring a pressure breather valve. For mounting positions M2 and M4, they are equipped with a pressure breather valve. A stainless-steel version of the pressure breather valve is also available for use in special ambient conditions.

Venting	Additional identification code -Z with order code	Order code
Pressure breather valve	2KJ8 -Z	G45
Pressure breather valve stainless steel		G49



Pressure breather valve

• Technical data

Size	Width across flats Width A/F	Thread	Dimension h mm
Helical gearboxes Z and D			
19 ... 39	12	G 1/8 A	15
49 ... 79	13	G 1/4 A	15
89	17	G 3/8 A	15
Helical gearboxes E			
39	12	G 1/8 A	15
49 ... 69	13	G 1/4 A	15
89	17	G 3/8 A	15
Parallel shaft gearboxes F			
29, 39	12	G 1/8 A	15
49 ... 79	13	G 1/4 A	15
89	17	G 3/8 A	15
Bevel gearboxes B			
19 ... 39	12	G 1/8 A	15
49	13	G 1/4 A	15
Bevel gearboxes K			
39	12	G 1/8 A	15
49 ... 89	13	G 1/4 A	15
109	17	G 3/8 A	15
Helical worm gearboxes C			
29, 39	12	G 1/8 A	15
49 ... 89	13	G 1/4 A	15

Oil drain

• Magnetic oil drain screw

For gearboxes from size 39, a magnetic oil drain screw is available that is inserted in the oil drain hole. This serves to collect any metal particles in the gearbox oil.

Oil drain	Additional identification code -Z with order code	Order code
Magnetic oil drain screw	2KJ8 -Z	G53

• Oil drain valve

For gearboxes from size 39, an oil drain valve is available in either a straight or angled design. The oil drain valve is supplied complete with screw plug as a kit.

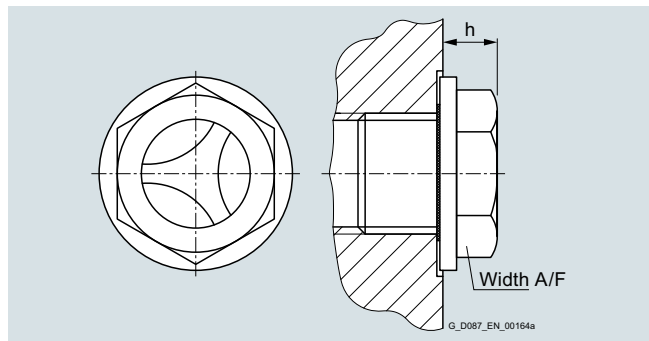
Oil drain	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
Oil drain valve, straight		G53
Oil drain valve, angled		G55

Oil level checking screw

For gearboxes from size 49, the oil level is checked using the oil level checking screw. The oil sight glass is available with a reflector for visual monitoring.

The oil sight glass on both sides is also available for the bevel gearbox and helical worm gearbox in mounting position M2 and M4.

Oil level checking screw	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
Oil sight glass with reflector		G34
Oil sight glass with reflector on both sides		G35



Oil sight glass with reflector

• Technical data

Size	Width across flats Width A/F	Thread	Dimension h mm
Helical gearboxes Z and D			
49 ... 79	16	G 1/4 A	10
89	19	G 3/8 A	9
Helical gearboxes E			
49 ... 69	16	G 1/4 A	10
89	19	G 3/8 A	9
Parallel shaft gearboxes F			
49 ... 79	16	G 1/4 A	10
89	19	G 3/8 A	9
Bevel gearboxes B			
49	16	G 1/4 A	10
Bevel gearboxes K			
49 ... 89	16	G 1/4 A	10
109	19	G 3/8 A	9
Helical worm gearboxes C			
49 ... 89	16	G 1/4 A	10

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • Gearbox options

Options

Oil expansion unit

The oil expansion unit increases the expansion space for the lubricant. For certain types of construction and at high operating temperatures, this avoids that lubricant escapes.

The expansion unit is supplied as a mounting kit, and can be mounted onto the geared motor vertically or at an angle.

• Technical data

Size	Motor frame size	Width across flats Width A/F	Thread	Dimension L1 mm	Dimension L2 mm
Helical gearboxes Z and D					
39	71 ... 90	17/19	G1/8A	49	194
	100			71	172
49 ... 69	71 ... 112	19/19	G1/4A	49	194
79	80 ... 90	19/19	G1/4A	49	194
	100 ... 112			71	172
89	100 ... 112	22/19	G3/8A	49	194
Helical gearboxes E					
39	71 ... 90	17/19	G1/8A	49	194
	100 ... 112			71	172
49	71 ... 112	19/19	G1/4A	49	194
69	71 ... 90	19/19	G1/4A	49	194
	100 ... 112			71	172
89	100 ... 112	22/19	G3/8A	49	194
Parallel shaft gearboxes F					
39	71 ... 90	17/19	G1/8A	49	194
	100 ... 112			71	172
49 ... 69	71 ... 112	19/19	G1/4A	49	194
79	80 ... 90	19/19	G1/4A	49	194
	100 ... 112			71	172
89	100 ... 112	22/19	G3/8A	49	194
Bevel gearboxes B					
29	71 ... 90	17/19	G1/8A	49	194
	100			71	172
39	71 ... 90	17/19	G1/8A	49	194
	100 ... 112			71	172
49	71 ... 112	19/19	G1/4A	49	194
Bevel gearboxes K					
39	71 ... 90	17/19	G1/8A	49	194
	100 ... 112			71	172
49 ... 69	71 ... 112	19/19	G1/4A	49	194
79	71 ... 90	19/19	G1/4A	49	194
	100 ... 112			71	172
89	80 ... 90	19/19	G1/4A	49	194
	100 ... 112			71	172
109	100 ... 132	22/19	G3/8A	49	194
	160			71	172
	180			71	172
Helical worm gearboxes C					
39	71 ... 90	17/19	G1/8A	49	194
	100			71	172
49 ... 69	71 ... 112	19/19	G1/4A	49	194
89	80 ... 112	19/19	G1/4A	49	194

Special versions

Reduced-backlash version

Gearboxes with reduced backlash are required to perform high-precision positioning tasks and to achieve a high level of control quality. A minimal torsional backlash also has a favorable effect on torque spikes during startup and on load switching in the drive train. With this version, all machine elements in the gearbox that are in the power flow are designed with reduced backlash. As a result, this version also has the option "Shrink-glued output gearwheel".

To ensure that the entire driven machine can be designed with minimum possible backlash, it is advisable to select the solution with integral motor mounting (without adapter), output shafts with shrink disk connection or with smooth shafts (without feather key). In this case, only backlash-free power transmission elements should be used.

The specified torsional backlash in minutes of the angle ['] is based on the maximum rotation angle of the output shaft (no load, max. 1 % of rated output torque) with stationary input shaft.

For the exact values, refer to the torque tables. If no values are specified in the tables, this means that a reduced-backlash version is not available for the specific version.

The dimensions of the reduced-backlash gearboxes are identical to those of the standard versions.

Special version	Additional identification code -Z with order code	Order code
Reduced-backlash version ¹⁾	2KJ8. -Z	G99

Shrink-glued output gearwheel

The gearbox output stage is subjected to particular high levels of mechanical stress during rigorous reversing duty or acceleration of high mass moments of inertia. The shrink-glued output gearwheel option ensures the load-bearing capacity of the shaft/hub connection in the event of dynamic load.

Special version	Additional identification code -Z with order code	Order code
Shrink-glued output gearwheel ¹⁾	2KJ8. -Z	G97

¹⁾ Cannot be selected for helical worm gearboxes.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • General options

Options

Surface treatment and preservation

To protect the geared motors against corrosion and external influences, five high-quality paint systems are available in various colors.

The corrosion protection system is designed in accordance with the corrosivity categories of EN ISO 12944-2.

Geared motors, frame size 49 and higher, are painted in RAL 7016 (anthracite gray) to corrosivity category C1 as standard. This ensures that they are protected against corrosion for indoor use.

Geared motors, frame sizes 19 to 39 with an aluminum housing are supplied unpainted as standard.

The shaft extensions and bare surfaces are treated with corrosion protection for 6 months.

The converters of the SINAMICS G115D system are made of high quality aluminum (EN AC 44300) with good corrosion resistance and are not painted.

Note:

Corrosivity category C1 is not suitable for ambient temperatures under -20 °C.

Surface pretreatment

For especially demanding applications, the drives can also be pretreated in order to ensure an optimum paint finish even in areas that are hidden or difficult to access.

Surface pretreatment	Additional identification code -Z with order code	
	2KJ8. -Z	Order code
Special pretreatment		L19

Corrosivity category	Paint system			Description	Additional identification code -Z with order code	Order code
	Base coat	Intermediate coat	Top coat			
Surface protection						
Aluminum gearbox housing¹⁾						
Unpainted (standard)	-	-	-	<ul style="list-style-type: none"> Indoor installation Heated buildings with neutral atmospheres 		L00
C1 Normal environmental stress	-	-	1-component hydro paint	<ul style="list-style-type: none"> Resistant to greases, conditionally resistant to mineral oils, aliphatic solvents Standard paint 		L02
Cast iron gearbox housing²⁾						
C1 Normal environmental stress	-	-	1-component hydro paint	<ul style="list-style-type: none"> Indoor installation Heated buildings with neutral atmospheres Resistant to greases, conditionally resistant to mineral oils, aliphatic solvents Standard paint 		L02
All geared motors						
C2 Low environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Unheated buildings with condensation, production areas with low humidity, e.g. warehouses and sports facilities Atmospheres with little pollution, rural areas 		L03
C3 Average environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Production areas with high humidity and some air pollution, e.g. food production areas, dairies, laundries and breweries Urban and industrial atmospheres, moderate contamination from sulfur dioxide, coastal areas with low salt levels 		L04
Primer						
C2 G	2-component polyurethane	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 		L01
C4 G	2-component epoxy zinc phosphate	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 		L09
Unpainted	-	-	-	<ul style="list-style-type: none"> Plastic paint, synthetic resin paint, oil paint, 2-component polyurethane paint, 2-component epoxy paint 		L00

¹⁾ Helical gearboxes D/Z19 to D/Z39, parallel shaft gearboxes F29 and bevel gearboxes B29 and B39

²⁾ The bevel gearbox B49 is supplied painted.

SINAMICS G115D distributed drive system • Motor-mounted






0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • General options

Options

Colors

In addition to anthracite gray (RAL 7016), you can select from other standard colors.

RAL color	Designation	Color, example	Additional identification code -Z with order code	Order code
RAL 7016	Anthracite gray (standard)		2KJ8 -Z	L75
RAL 5015	Sky blue			L50
RAL 7030	Stone gray			L55
RAL 7031	Blue gray			L53
RAL 7012	Basalt gray			L83

You can find additional colors in the DT Configurator.

Note

For light colors in corrosivity category C1 we recommend selection of surface treatment in the corrosivity category one level higher to ensure adequate and uniform coloring for the geared motor.

Preservation

All gearboxes and geared motors are preserved as standard for 6 months.

Long-term preservation up to 36 months

If the gearboxes are stored for longer than 6 months, then we recommend the "Long-term preservation" option. A VCI corrosion inhibitor (volatile corrosion inhibitor) is added to the gearbox oil.

Until commissioning, it is not permissible that the gearbox is opened, as otherwise the VCI corrosion inhibitor will vaporize. The oil level must be checked before commissioning. Corrosion protection is also applied to the flange contact surfaces and shaft extensions. We recommend that the gearbox is stored in the appropriate mounting position.

Storage conditions

Geared motors, stored in dry, dust-free and evenly tempered rooms do not require any special packaging.

In all other areas, the units must be packaged in foil with desiccant and moisture indicator. If required, protection must be provided against mold and insects. The storage location must be vibration- and shock-free. The storage conditions must be regularly checked.

Preservation	Additional identification code -Z with order code	Order code
Long-term preservation up to 36 months	2KJ8 -Z	K17

For information about storage and commissioning please refer to the operating instructions.

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • General options

Options

Rating plate

The rating plates on the gearboxes and geared motors are normally manufactured out of coated aluminum foil. They are covered with a special masking film which ensures permanent resistance to UV radiation and media of all kinds (oils, greases, salt water, cleaning agents, etc.).

The adhesive and the material ensure firm adhesion and long-term legibility within the operating temperature range from -40 to +155 °C.

For geared motors, the rating plate is attached to a stainless steel plate on the motor.

For specific designs, additional rating plates are attached to the motor.

Geared motors

SIEMENS		IE4	
SINAMICS G115D 400V FSA MM		IEC TS 60034-30-2	
1P 2KJ8102-4EC11-4GA1-Z+D01+V14		-15°<=TAMB<=40°C	
S FDUMN/253146201		Refer to user manual	
Z29-LE80MA4S-G007M-PN-L8			
K.ID:xxxxxxxxxxxxxxxxxxxxxxxxxxxx		Importer UK: Siemens plc	
i:3.47	0.2L OIL CLP VG220	Manchester M20 2UR	
SR1:10 (D)	Br:4.0Nm(M4)	CE KC	
G:86-865r/min	M1 TP-PT1000	R-R-S49-G115DA4M	
G:8.3Nm	32kg IP55		
3AC380Y/220V-480Y/277V-+10% 45-66Hz INVERTER DUTY ONLY VPWM			
For use on industrial machinery		IO:0.59A	
1.98-1.57A	Use in PD2 and OVCIII env. only	Th.Cl.155(F)	
Mot:300-3000r/min	Mot:0.75kW	TEFC	
Siemens AG, Frauenaucherstr. 80, DE-91056 Erlangen		Made in Germany	

SIEMENS			
1			6
2			
3			7
4	5		8
9		20	21
10	14		22
11	15		
12	16	18	23
13	17	19	24
26		27	28
29			35
30	32		36
31	33	34	37
Siemens AG, Frauenaucherstr. 80, DE-91056 Erlangen		39	

G_D087_XX_00332d

Example, rating plate on helical geared motor

General data

- | | | | |
|----|------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------|
| 1 | Equipment name | 24 | KC approval logo |
| 2 | Article No.,
Dxx - Order code for mounting position
Vxx - Order code for converter options
(Required identification code) | 25 | KC registration number |
| 3 | Factory ID (FID) | 26 | Input phase number and input voltage range of converter |
| 4 | Type designation | 27 | Input frequency range of converter f [Hz] |
| 5 | Data matrix code | 28 | Duty type |
| 6 | IE class (in accordance with IEC TS 60034-30-2) | 29 | Specification of rated conditions |
| 7 | Permissible ambient temperature | 30 | Rated input current of converter [A] |
| 8 | Reference to operating instructions | 31 | Rated speed range of motor [rpm] |
| 9 | Customer ID | 32 | Pollution degree and overvoltage category |
| 10 | Transmission ratio i | 33 | Rated power Mot [kW] |
| 11 | Speed range SR | 34 | Rated torque Mot [Nm] |
| 12 | Gearbox output speed range [rpm] | 35 | Stall current of converter I0 |
| 13 | Rated output torque of the geared motor [Nm] | 36 | Temperature class Th. Cl. |
| 14 | Oil quantity [l], oil type,
oil viscosity ISO VG class according to DIN 51519 / ISO 3448 | 37 | Ventilation type |
| 15 | M4 braking torque [nm], cyclic duration factor | 38 | cURus approval logo |
| 16 | Mounting position | 39 | Manufacturer's address and country of origin |
| 17 | Weight m [kg] | | |
| 18 | Thermal motor protection | | |
| 19 | Degree of protection acc. to IEC 60034-5 | | |
| 20 | EAC approval logo | | |
| 21 | UKCA approval logo | | |
| 22 | Importer's address | | |
| 23 | CE approval logo | | |

When ordering a replacement/spare part, always specify the factory ID (serial No.)

1) The customer-specific data are used to specify the customer ID/ serial number. The following data are not permissible:
 - Technical specifications for the geared motor (e.g. ambient temperature, voltage data, etc.)
 - Details of Siemens Article No. (MLFB)
 - Unlawful texts

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • General options

Options

Second rating plate

For the geared motors, an additional rating plate can be supplied loose.

When requested, the second rating plate can be attached to the motor.

Second rating plate	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
Second rating plate, supplied loose		K41
Second rating plate, attached		K68

Safety instruction sheet and operating instructions

The geared motors are shipped with a multi-language safety instruction sheet for each delivery batch.

One set of operating instructions is enclosed for each geared motor using the following ordering option.

Enclosed operating instructions in the following language	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
German		W21
English		W22
Chinese		W23

The operating instructions include the following documents:

- Replacement part drawings and lists
- Installation instructions
- Declaration of incorporation of partly completed machinery according to the EC Machinery Directive 2006/42/EC (gearboxes)
- EC Declaration of Conformity according to Directive 2014/35/EU (motors)

The latest versions of the operating instructions, the declaration of incorporation and the declarations of conformity are available in the Industry Online Support:

<https://support.industry.siemens.com/cs/ww/en/ps/13424/man>

Test certificates

On request, the following documents are available by email:

Additional documentation	The following is checked:	Additional identification code -Z with order code	Order code
		2KJ8 -Z	
Declaration of compliance with the order EN 10204-2.1 and factory test report EN 10204-2.2, geared motor	-		On request
Factory test report EN 10204-2.2 for material	-		On request
Acceptance test certificate EN 10204-3.1 for the motor	<ul style="list-style-type: none"> • Winding resistance • No-load current of the 3 phases • Power loss for no-load operation • High-voltage test • No-load speed 		W10
Acceptance test certificate EN 10204-3.1 for gearboxes	<ul style="list-style-type: none"> • Output shaft diameter • Input shaft diameter (for gearboxes with adapter A only) • No-load speed • Noise (subjective assessment) 		W11
Acceptance test certificate EN 10204-3.1 for paint finish	<ul style="list-style-type: none"> • Paint film thickness 		W12

Extension of the liability for defects

For our SIMOGEAR geared motors, we give you the option of extending existing liabilities for defects beyond the standard period of liability.

The standard liability for defects period, as listed in our standard conditions for the supply of services and products, is 18 months.

It is possible to select the extended period of liability for defects in connection with all of the geared motors and their options listed here in the catalog.

Extension of the liability for defects	Additional identification code -Z with order code	Order code
	2KJ8 -Z	
Extension of the liability for defects period by 12 months		W80
Extension of the liability for defects period by 24 months		W82

SINAMICS G115D distributed drive system • Motor-mounted

0.37 kW to 4 kW (0.5 hp to 5 hp)

SIMOGEAR geared motors with SINAMICS G115D motor-mounted • General options**Options****Packaging options**

The geared motors are sent in a box as standard.

For countries that cannot be supplied by truck, geared motors up to frame size 89 are shipped in a carton suitable for sea and air freight.

Optionally, the following packaging options can be selected.

Packaging option	Gearbox size	Countries	Minimum order quantity	Additional identification code -Z with order code	
				2KJ8 -Z	Order code
Individual packaging					
Box	19 ... 89	Albania, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Kosovo, Malta, the Netherlands, Poland, Portugal, Romania, Serbia, Republic of Srpska, Sweden, Switzerland, Slovenia, Spain	-		W40
Overseas	19 ... 89	Global	-		W42
VCI corrosion inhibiting film	19 ... 89	Albania, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Kosovo, Malta, the Netherlands, Poland, Portugal, Romania, Serbia, Republic of Srpska, Sweden, Switzerland, Slovenia, Spain	-		W47
Standing open wooden pallet					W53
Collective packaging					
Wire-mesh box	19 ... 89	Germany	Gearbox size 19: 20 units Gearbox size 29: 20 units Gearbox size 39: 10 units Gearbox size 49: 6 units Gearbox size 59: 5 units Gearbox size 69: 3 units Gearbox size 79: 3 units Gearbox size 89: 2 units		W45
Overseas	19 ... 89	Global	-		W46
VCI corrosion inhibiting film	19 ... 89	Albania, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Kosovo, Malta, the Netherlands, Poland, Portugal, Romania, Serbia, Republic of Srpska, Sweden, Switzerland, Slovenia, Spain.	-		W52
Neutral Packaging Land Freight	19 ... 89	Albania, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Kosovo, Malta, the Netherlands, Poland, Portugal, Romania, Serbia, Republic of Srpska, Sweden, Switzerland, Slovenia, Spain	-		W48
Neutral Packaging Overseas	19 ... 89	Global	-		W49

SINAMICS G115D distributed drive system • Supplementary components 0.37 kW to 7.5 kW (0.5 to 10 hp)



7.4/2 Line-side components
7.4/2 Recommended line-side components

7.4/3 DC link components
7.4/3 External braking resistors

7.4/5 Supplementary system components
7.4/5 Memory cards
7.4/6 SINAMICS G120 Smart Access
7.4/7 Interface kit for
SINAMICS G120 Smart Access
7.4/7 PC converter connection kit 2

Installation kits for
7.4/8 • SINAMICS G115D wall-mounted
7.4/8 • SINAMICS G115D motor-mounted
7.4/8 Cover kit
7.4/9 Connection cables

7.4/11 Spare parts
7.4/11 Electronic Modules

Spare parts kits for
7.4/11 • SINAMICS G115D wall-mounted
7.4/11 • SINAMICS G115D motor-mounted
7.4/12 Replacement fans for SINAMICS G115D
wall-mounted

SINAMICS G115D distributed drive system • Supplementary components

Line-side components

Recommended line-side power components

Overview

The following table lists recommendations for additional line-side components such as fuses.

Note for use according to IEC standards:

3NA3 fuses are recommended for European countries. The values in the table take into account the overload capability of the converter.

Note for use according to UL regulations:

Fuses for use in North America must be UL-certified, Class CC, G, J, CF or T (JDDZ7) fuses with a rated voltage of 480 V AC.

Short Circuit Current Rating (SCCR)

according to UL

Applies to industrial control cabinet installations according to NEC Article 409 or UL 508A.

- SINAMICS G115D: 65 kA

Recommendations on further overcurrent protection devices are available at:

<https://support.industry.siemens.com/cs/document/109784481>

More information about the listed fuses is available in Catalog LV 10 as well as in the Industry Mall.

SINAMICS G115D wall and motor-mounted	IEC-compliant		UL/CSA-compliant	
	Fuse		Fuse type	
Frame size	Current	Article No.	Rated voltage 480 V AC	Current
Converter	A		Class	A
380 ... 480 V 3 AC				
FSA	10	3NA3803	CC, G, J, CF, T (JDDZ7)	10
FSB	16	3NA3805	CC, G, J, CF, T (JDDZ7)	15
FSC	32	3NA3812	CC, G, J, CF, T (JDDZ7)	35
Group protection	32	3NA3812	CC, G, J, CF, T (JDDZ7)	35

SINAMICS G115D distributed drive system • Supplementary components

DC link components

External braking resistors

Overview

Regenerative energy is converted to heat via the internal braking resistor integrated as standard. Optional external braking resistors are available for higher regenerative energy.

Selection and ordering data

Description	Suitable for SINAMICS G115D Converter frame size	Continuous braking power P_{DB} W	Article No.
External braking resistor	FSA	200	6SL3501-1BE32-0AA0
		240	6SL3501-1BE32-4AA0
		480	6SL3501-1BE34-8AA0
	FSB	200	6SL3501-1BE32-0BA0
		240	6SL3501-1BE32-4BA0
		600	6SL3501-1BE36-0BA0
	FSC	600	6SL3501-1BE36-0CA0
		1200	6SL3501-1BE41-2CA0

Technical specifications

Line voltage 380 ... 480 V 3 AC 6SL3501-		External braking resistor		
		1BE32-0AA0	1BE32-4AA0	1BE34-8AA0
Resistance	Ω	210	220	200
Continuous braking power P_{DB}	W	200	240	480
Peak power P_{max} (load duration $t_a = 12$ s with period $t = 120$ s)	W	1200	1440	2880
Degree of protection		IP65	IP65	IP65
Dimensions				
• Length	mm (in)	320 (12.60)	320 (12.60)	245 (9.65)
• Width	mm (in)	106 (4.17)	106 (4.17)	216 (8.50)
• Depth	mm (in)	64 (2.52)	64 (2.52)	96.5 (3.80)
Weight, approx.	kg (lb)	1.56 (3.44)	2.10 (4.63)	3.89 (8.58)
Suitable for SINAMICS G115D		6SL35...X..0-3A.0 6SL35...X..0-5A.0 6SL35...X..0-7A.0 6SL35...X..1-1A.0 6SL35...X..1-5A.0		
• Converter frame size		FSA		

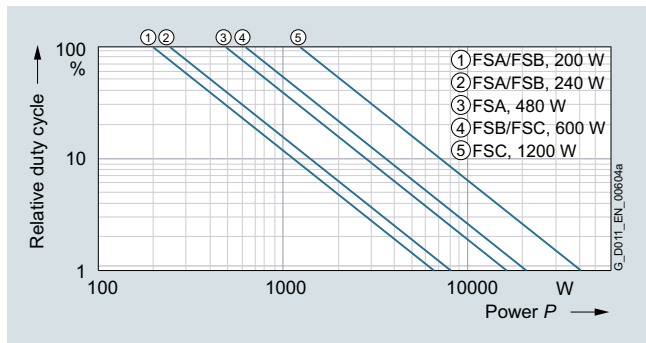
Line voltage 380 ... 480 V 3 AC 6SL3501-		External braking resistor				
		1BE32-0BA0	1BE32-4BA0	1BE36-0BA0	1BE36-0CA0	1BE41-2CA0
Resistance	Ω	160	150	150	81	72
Continuous braking power P_{DB}	W	200	240	600	600	1200
Peak power P_{max} (load duration $t_a = 12$ s with period $t = 120$ s)	W	1200	1440	3600	3600	7200
Degree of protection		IP65	IP65	IP65	IP65	IP65
Dimensions						
• Length	mm (in)	320 (12.60)	320 (12.60)	245 (9.65)	245 (9.65)	245 (9.65)
• Width	mm (in)	106 (4.17)	106 (4.17)	227 (8.94)	227 (8.94)	349 (13.74)
• Depth	mm (in)	64 (2.52)	64 (2.52)	96.5 (3.80)	96.5 (3.80)	96.5 (3.80)
Weight, approx.	kg (lb)	1.56 (3.44)	2.10 (4.63)	3.42 (7.54)	3.42 (7.54)	5.47 (12.06)
Suitable for SINAMICS G115D		6SL35...X..2-2A.0 6SL35...X..3-0A.0 6SL35...X..4-0A.0			6SL35...X..5-5A.0 6SL35...X..7-5A.0	
• Converter frame size		FSB			FSC	

SINAMICS G115D distributed drive system • Supplementary components

DC link components

External braking resistors

Characteristic curves



SINAMICS G115D, external braking resistor, relative duty cycle in relation to a cycle of 120 s (up to 55 °C)

Overview



SINAMICS SD memory card

The parameter settings of the converter and the firmware can be stored on the optional SINAMICS SD memory card. When service is required, the data are automatically downloaded from the memory card in the converter and the system is ready for use again without further interventions.

- Parameter settings can be written from the memory card to the converter or saved from the converter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports series commissioning without the use of the SINAMICS Startdrive commissioning tool.

Note:

The memory card is optional, but it facilitates converter replacement.

Selection and ordering data

Description	Article No.
SINAMICS SD card 512 MB	6SL3054-4AG00-2AA0
Optional firmware memory cards	
SINAMICS SD card 512 MB + firmware V4.7 SP13 (Multicard V4.7 SP13)	6SL3054-7TG00-2BA0

For an overview and more information on all available firmware versions, see <https://support.industry.siemens.com/cs/document/67364620>

SINAMICS G115D distributed drive system • Supplementary components

Supplementary system components

SINAMICS G120 Smart Access

Overview



SINAMICS G120 Smart Access

It is also easy and convenient to commission and operate the SINAMICS G115D, SINAMICS G120, SINAMICS G120C, SINAMICS G120P and SINAMICS G120X frequency converters of firmware V4.7 SP6 and higher using the web server module SINAMICS G120 Smart Access and a connected smartphone, tablet or laptop.

Benefits

- Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional SINAMICS G120 Smart Access
- Intuitive user interface and commissioning wizard
- Free choice of terminal devices as the web server works with all common web browsers, such as iOS, Android, Windows, Linux and Mac OS

Function

- Commissioning using commissioning wizard
- Setting and saving parameters
- Testing motor in JOG mode
- Monitoring of converter data
- Quick diagnostics
- Saving the settings and restoring to factory settings

Integration

The optional SINAMICS G120 Smart Access is simply plugged onto the converter and is available for the following converters of firmware V4.7 SP6 and higher.

- SINAMICS G115D together with the interface kit for SINAMICS G120 Smart Access
- SINAMICS G120C
- SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions)
- SINAMICS G120P together with the CU230P-2 Control Units
- SINAMICS G120X

Selection and ordering data

Description	Article No.
SINAMICS G120 Smart Access For wireless commissioning, operation and diagnostics of the following converters using a smartphone, tablet, or laptop	6SL3255-0AA00-5AA0
<ul style="list-style-type: none"> • SINAMICS G115D together with the interface kit for SINAMICS G120 Smart Access 	
<ul style="list-style-type: none"> • SINAMICS G120C 	
<ul style="list-style-type: none"> • SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions) 	
<ul style="list-style-type: none"> • SINAMICS G120P together with the CU230P-2 Control Units • SINAMICS G120X 	

Technical specifications

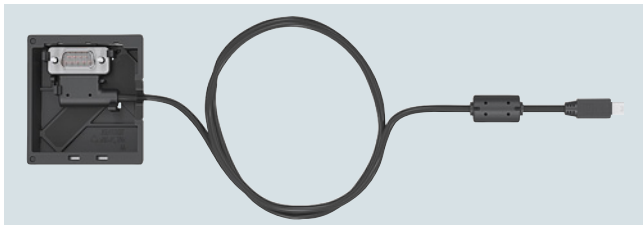
SINAMICS G120 Smart Access 6SL3255-0AA00-5AA0	
Operating system	iOS, Android, Windows, Linux, Mac OS
Languages	Support of six languages: English, French, German, Italian, Spanish, Chinese
Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)
<ul style="list-style-type: none"> • During storage and transport • During operation 	0 ... 50 °C (32 ... 122 °F) if the Smart Access is plugged directly into the converter
Air humidity	< 95 %, non-condensing
Degree of protection	Depending on the degree of protection of the converter, max. IP55/UL Type 12 enclosure
Dimensions	
<ul style="list-style-type: none"> • Width • Height • Depth 	70 mm (2.76 in) 108.9 mm (4.29 in) 17.3 mm (0.68 in)
Weight, approx.	0.08 kg (0.18 lb)
Compliance with standards	CE, UKCA, FCC, SRRC, WPC, ANATEL, BTK

SINAMICS G115D distributed drive system • Supplementary components

Supplementary system components

Interface kit for SINAMICS G120 Smart Access

Overview



Interface kit with SINAMICS G120 Smart Access for connection with SINAMICS G115D converter



SINAMICS G120 Smart Access with interface kit for connection with SINAMICS G115D converter

With the interface kit, the SINAMICS G120 Smart Access web server module can be connected to the SINAMICS G115D converter.

The scope of delivery includes the Interface Module with a connection cable.

For easy mounting, the interface kit can be plugged directly onto the SINAMICS G115D converter using the rubber mount on the back.

Alternatively, the interface kit can be affixed with the magnetic sides on a metallic surface.

Selection and ordering data

Description	Article No.
Interface kit for SINAMICS G120 Smart Access	6SL3555-0XA00-0AA0

Technical specifications

Interface kit for SINAMICS G120 Smart Access	
6SL3555-0XA00-0AA0	
Ambient temperature	
• During operation	-10 ... +60 °C (14 ... +140 °F)
Air humidity	< 95 %, non-condensing
Dimensions	
• Width	70 mm (2.76 in)
• Height	62.5 mm (2.46 in)
• Depth	40 mm (1.57 in)
• Length of the connection cable	1 m (3.28 ft)
Weight, approx.	0.19 kg (0.42 lb)

7
4

PC converter connection kit 2

Overview



PC converter connection kit 2

For controlling and commissioning a converter directly from a PC if a commissioning tool (e.g. SINAMICS Startdrive) has been installed on the PC. With this, the converter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the commissioning tool for test purposes)

A USB cable (3 m/9.84 ft) is included in the scope of delivery.

The PC converter connection kit 2 is compatible with the following Control Units and converters (all communication methods):

- SINAMICS G120C
- SINAMICS G120 Control Units
 - CU230P-2
 - CU240E-2
 - CU250S-2
- SINAMICS G115D
- SINAMICS G120D Control Units
 - CU240D-2
 - CU250D-2

Selection and ordering data

Description	Article No.
PC converter connection kit 2 USB cable (3 m/9.84 ft long) for	6SL3255-0AA00-2CA0
• SINAMICS G120C	
• SINAMICS G120 Control Units	
- CU230P-2	
- CU240E-2	
- CU250S-2	
• SINAMICS G115D	
• SINAMICS G120D Control Units	
- CU240D-2	
- CU250D-2	

SINAMICS G115D distributed drive system • Supplementary components

Supplementary system components

Installation kits for SINAMICS G115D wall-mounted

Overview

An installation kit with cable glands for the line supply (X1/X3), the motor (X2), the 24 V DC power supply (X01/X02) and the digital inputs/digital outputs (X07/X08/X05) can be ordered for the connection.

Selection and ordering data

Description	Article No.
Installation kit for SINAMICS G115D wall-mounted	6SL3566-2GW00-0GA0

Installation kits for SINAMICS G115D motor-mounted

Overview

An installation kit with cable glands for the line supply (X1/X3), the 24 V DC power supply (X01/X02) and the digital inputs/digital outputs (X07/X08/X05) can be ordered for the connection.

Selection and ordering data

Description	Article No.
Installation kit for SINAMICS G115D motor-mounted	6SL3566-2GM00-0GA0

Cover kit

Overview

The cover kit is used to protect the unused connector plugs for line supply, loop-through (X3) and 24 V DC loop-through (X02).

Selection and ordering data

Description	Article No.
Cover kit for outputs 380 ... 480 V AC (Q4/2) and 24 V DC (7/8* and M12)	6SL3566-2GA00-0GA0

SINAMICS G115D distributed drive system • Supplementary components

Supplementary system components

Connecting cables

Overview

An overview of all available accessories (e.g. plugs and cables) can be found under the following link:

www.siemens.com/distributeddrives-supplementaryproducts

Connecting cables for communication

PROFINET connecting cables

Flexible plug-in cables and plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbps) between Industrial Ethernet stations.

Description	Article No.
IE connecting cable M12-180/M12-180 axial outlet Pre-assembled IE FC TP trailing cable GP 2 x 2 PROFINET type C with two 4-pole M12 plugs (4-pole, D-coded), IP65/IP67 degree of protection, UL, plug/plug connector (IN/OUT) Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1 m (3.28 ft) • 1.5 m (4.92 ft) • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49 ft) 	6XV1870-8AE30 6XV1870-8AE50 6XV1870-8AH10 6XV1870-8AH15 6XV1870-8AH20 6XV1870-8AH30 6XV1870-8AH50 6XV1870-8AN10 6XV1870-8AN15
IE connecting cable M12-180/IE FC RJ45 plug 145 axial outlet Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plugs (D-coded) and IE FC RJ45 plug, IP65/IP67 degree of protection Length: <ul style="list-style-type: none"> • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49 ft) 	6XV1871-5TH20 6XV1871-5TH30 6XV1871-5TH50 6XV1871-5TN10 6XV1871-5TN15
IE M12 Plug PRO axial outlet For assembly in the field, M12 plug-in connector (D-coded), metal enclosure, UL, fast connection method, plug connector <ul style="list-style-type: none"> • 1 unit • 8 units 	6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8
AS-Interface connecting cable	
Description	Article No.
AS-Interface M12 branch To connect the AS-Interface and the U _{Aux} cable to an M12 socket, UL	3RK1901-2NR20

Connecting cables/plug-in connectors for 24 V DC power supply

Description	Article No.
7/8" plug-in cable axial outlet For 24 V switched and unswitched, pre-assembled with 2 x 7/8" at both ends (axial), 5 x 1.5 mm ² , 5-pole plug/socket connectors Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1 m (3.28 ft) • 1.5 m (4.92 ft) • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49 ft) 	6XV1822-5BE30 6XV1822-5BE50 6XV1822-5BH10 6XV1822-5BH15 6XV1822-5BH20 6XV1822-5BH30 6XV1822-5BH50 6XV1822-5BN10 6XV1822-5BN15
7/8" plug-in connector axial outlet 5-pole, B-coded, plastic enclosure, 1 package = 5 units <ul style="list-style-type: none"> • Pin insert (OUT) • Female contact insert (IN) 	6GK1905-0FA00 6GK1905-0FB00

Plug-in connectors for digital inputs and outputs

Description	Article No.
M12 plug Y cable for distributed I/Os for dual connection of I/Os using single 5-pole M12 cables, 200 mm (7.87 in) <ul style="list-style-type: none"> • Straight 	6ES7194-6KA00-0XA0

Connecting cables for line supply, power loop-through and power bus distribution

Connecting cables pre-assembled at one end and connector sets to connect to the line supply

Description	Article No.
Connecting cable pre-assembled at one end Power supply cable, open at one end, for Q4/2, angled, 4 x 4 mm ² <ul style="list-style-type: none"> • 1.5 m (4.92 ft) long • 5 m (16.4 ft) long 	3RK1911-0DB13 3RK1911-0DB33
Connector set for the power supply Female contact insert Q4/2, 5 socket contacts, grommet housing, angled outlet including screw connection <ul style="list-style-type: none"> • 2.5 mm² • 4 mm² • 6 mm² 	3RK1911-2BE50 3RK1911-2BE10 3RK1911-2BE30

SINAMICS G115D distributed drive system • Supplementary components

Supplementary system components

Connecting cables

Overview

Quickon system plug connectors

Description	Article No.
Quickon system plug connectors for connections for 380 ... 480 V AC <ul style="list-style-type: none"> Quickon nut Quickon connector 	6SL3566-4NA00-0GA0 6SL3566-4MA00-0GA0

Connector insert for power loop-through

Description	Article No.
Connector set for power loop-through Pin insert HAN Q4/2, 4 male contacts, grommet housing, angled outlet including screw connection <ul style="list-style-type: none"> 2.5 mm² 4 mm² 	3RK1911-2BF50 3RK1911-2BF10

Power bus distribution 400 V in IP65 degree of protection

Not essential (daisy chaining within device); use is optional.

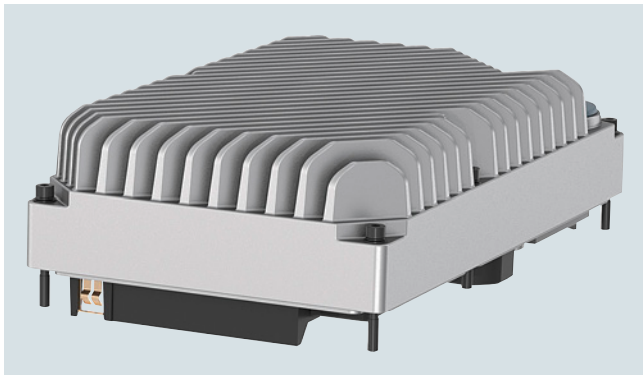
Description	Ordering (see Product Partner)
Power T clamp connector for 2.5 ... 6 mm² With attached 7-pole plug, female contact insert, grommet housing, UL Seals for various cable cross-sections must be ordered separately	Ordered from and supplied by Harting
T clamp connector Completely pre-assembled	Ordered from and supplied by KnorrTec

SINAMICS G115D distributed drive system • Supplementary components

Spare parts

Electronic Modules

Overview



SINAMICS G115D Electronic Module

The Electronic Module must be replaced in case of a permanent malfunction.

For recommissioning, it is advantageous to save the converter settings on the optional SINAMICS SD card or via SINAMICS Startdrive or SINAMICS G120 Smart Access before the replacement.

The Electronic Modules for frame sizes FSB and FSC are supplied without fan. If required, the replacement fan must be ordered in addition.

Selection and ordering data

Description	Article No.
Electronic Modules	
• FSA, 0.37 kW	6SL3500-0XE50-3 ■ A0
• FSA, 0.55 kW	6SL3500-0XE50-5 ■ A0
• FSA, 0.75 kW	6SL3500-0XE50-7 ■ A0
• FSA, 1.1 kW	6SL3500-0XE51-1 ■ A0
• FSA, 1.5 kW	6SL3500-0XE51-5 ■ A0
• FSB, 2.2 kW	6SL3500-0XE52-2 ■ A0
• FSB, 3 kW	6SL3500-0XE53-0 ■ A0
• FSB, 4 kW	6SL3500-0XE54-0 ■ A0
• FSC, 5.5 kW	6SL3500-0XE55-5 ■ A0
• FSC, 7.5 kW	6SL3500-0XE57-5 ■ A0
<u>Fieldbus communication</u>	
• AS-Interface	↑ A
• Without fieldbus communication	B
• PROFINET, EtherNet/IP	F

Spare parts kits for SINAMICS G115D wall-mounted

Overview

A spare parts kit comprising small parts such as replacement seals, cover caps and screws can be ordered.

Selection and ordering data

Description	Article No.
Spare parts kit for SINAMICS G115D wall-mounted comprising replacement seals, cover caps and screws	6SL3500-0XK51-0AA0

Spare parts kits for SINAMICS G115D motor-mounted

Overview

A spare parts kit comprising small parts such as replacement seals, cover caps and screws can be ordered.

Selection and ordering data

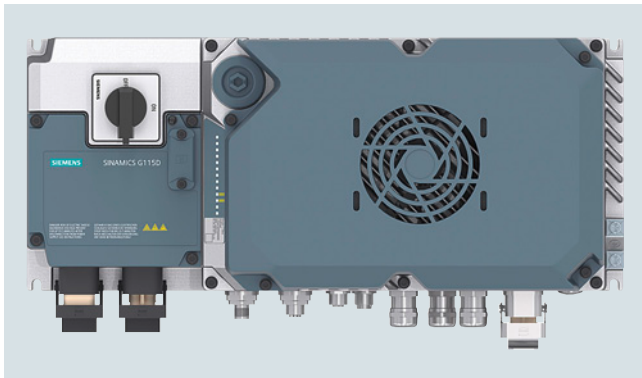
Description	Article No.
Spare parts kit for SINAMICS G115D motor-mounted comprising replacement seals, cover caps and screws	6SL3500-0XK50-0AA0

SINAMICS G115D distributed drive system • Supplementary components

Spare parts

Replacement fans for SINAMICS G115D wall-mounted

Overview



SINAMICS G115D with repair switch and fan

The fans are designed for an extra long service life. In case of exchange, a replacement fan consisting of a pre-mounted unit with cover, fan and screws can be ordered for SINAMICS G115D wall-mounted from 2.2 kW¹⁾.

Selection and ordering data

Description	Article No.
Replacement fan (pre-mounted unit with cover, fan and screws) for SINAMICS G115D wall-mounted as from 2.2 kW ¹⁾ , frame sizes FSB and FSC	6SL3500-0XF51-0AA0

¹⁾ The replacement fan is required for 2.2 kW and 3 kW (frame size FSB) with hardware version up to and including 02. The replacement fan is not required as of hardware version 03 for 2.2 kW and 3 kW (frame size FSB). The hardware version of the converter can be found on the rating plate. More information and documentation can be found on the internet at: www.siemens.com/sinamics-g115d/documentation

SINAMICS G120D distributed converters 0.75 kW to 7.5 kW (1 hp to 10 hp)



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8/8	Technical specifications	8/37	PROFINET connecting cables
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SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Introduction

Application

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
Pumping, ventilating, compressing	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	V20 G120C G120X	G120X G130/G150 G180 ¹⁾ DCM	S120	G120	S110	S120
Moving	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	V20 G115D G120C ET 200pro FC-2 ²⁾	G120 G120D G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120 G120D	S110 S210 DCM	S120 S210 DCM
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	G120 G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120	S110 S210	S120 S210 DCM
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Laser cutting • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

SINAMICS G120D is ideally suited for demanding conveyor system applications in the industrial environment for which a distributed drive with communications capability is required. This applies in particular to the automotive sector, e.g. for assembly lines.

SINAMICS G120D is also suitable for many additional high-performance applications, e.g. in the airport sector, the food and beverage industry (without surfactants) and in distribution logistics (e.g. electric monorail systems).

Practical application examples and descriptions are available on the internet at

www.siemens.com/sinamics-applications
www.siemens.com/conveyor-technology

More information

You may also be interested in these frequency converters:

- Horizontal distributed conveyor-related applications, wall-mounted, degree of protection up to IP66 ⇒ SINAMICS G115D
- Horizontal distributed conveyor-related applications, motor-mounted, degree of protection up to IP65 ⇒ SINAMICS G115D
- More performance for the control cabinet in IP20 degree of protection ⇒ SINAMICS G120, SINAMICS G120C
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110

¹⁾ Industry-specific converters.

²⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter is available at:
www.siemens.com/et200pro-fc

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

SINAMICS G120D distributed converters

Overview

The SINAMICS G120D distributed converters are the solution for demanding drive tasks especially in the field of conveyor systems. SINAMICS G120D converters continuously control the speed of three-phase asynchronous (induction) motors and fulfill all the requirements of conveyor system applications from simple frequency control through to demanding vector control and positioning requirements. With its intelligent modular design with IP65 degree of protection, it can be seamlessly integrated into the plant or system and supports a high plant availability and low stocks of spare parts. The innovative power unit concept capable of energy recovery helps save energy. The patented implementation concept of the Safety Integrated Functions is unique worldwide and has been extended further, without the use of external components. This drive can be optimally integrated into the Siemens TIA world of automation via PROFIBUS or PROFINET / EtherNet/IP.

With different device versions (frame sizes FSA to FSC) in a power range from 0.75 kW to 7.5 kW, it is suitable for a wide variety of drive solutions.



Example: SINAMICS G120D, frame size FSA, comprising PM250D Power Module and fail-safe CU250D-2 PN-F Control Unit

Reasons for using distributed drive systems

- Modular drive solutions – therefore standardized mechatronic elements that can be individually tested
- A control cabinet is not required, resulting in a smaller space requirement and lower cooling requirements
- Long motor cables between converter and motor are not required
 - Less power losses
 - Reduced noise radiation
 - Reduced costs for shielded cables
 - No additional filters
- Distributed configurations offer considerable benefits for conveyor systems with their extensive coverage (e.g. in the automotive and logistics sectors)
- Perfectly prepared for digitalization thanks to various communications interfaces and integration of the AMD (Analyze MyDrives) application into the Totally Integrated Automation (TIA)

Siemens family of distributed drives

Siemens offers an innovative portfolio of frequency converters to optimally implement distributed drive solutions. The strengths of the individual members of the drive family permit simple adaptation to the widest range of application demands:

- Identical connection systems
- User-friendly commissioning and configuration tools

Products from the family of distributed drives:

- SINAMICS G115D distributed drive system (wall and motor-mounted)
- SINAMICS G120D frequency converters
- SIMATIC ET 200pro FC-2 frequency converters
- SIRIUS M200D motor starters

Modularity

SINAMICS G120D is a modular converter system with IP65 degree of protection comprising various function units. The main units are

- Control Unit (CU)
- Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. The digital inputs, analog inputs and digital outputs on the device support the simple wiring of sensors and actuators directly at the drive. The input signals can either be directly linked within the Control Unit and initiate local responses independently or they can be transferred to the central control via PROFIBUS or PROFINET / EtherNet/IP for further processing within the context of the overall plant.

The Power Module supplies the motor in a power range from 0.75 kW to 7.5 kW. The Power Module is controlled by a micro-processor in the Control Unit. State-of-the-art IGBT technology with pulse-width-modulation is used for highly reliable and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor. The unusually low profile mechanical design is optimized so that the device can be directly used in the plant or system. The Power Module also has the same drilling dimensions for all power ratings (standard footprint). Further, the dimensions are identical to those of SINAMICS G110D. This significantly simplifies the mechanical design, installation and retrofit of a system.

The latest technical documentation (catalogs, dimension drawings, certificates, manuals and operating instructions) is available on the internet at the following address:

www.siemens.com/sinamics-g120d/documentation

and offline in the DT Configurator integrated in Catalog CA 01. In addition, the DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

SINAMICS G120D distributed converters

Overview

Safety Integrated

The SINAMICS G120D distributed converters include versions for safety-oriented applications. All Power Modules are already designed for Safety Integrated.

The Safety Integrated function "Safe Torque Off" (STO) (certified according to IEC 61508 SIL 2, EN ISO 13849-1 PL d and Category 3) is already integrated into the standard versions of the CU240D-2 series (CU240D-2 DP and CU240D-2 PN). It can be activated either over PROFIsafe or over the safety input.

With the fail-safe variants of the CU240D-2 series (CU240D-2 DP-F xx and CU240D-2 PN-F xx) and with the entire CU250D-2 series, the fail-safe SINAMICS G120D converter provides five safety functions which are certified according to IEC 61508 SIL 2, EN ISO 13849-1 PL d and Category 3:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely-Limited Speed (SLS)
for protection against dangerous movements on exceeding a speed limit
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive is operating below a specific speed/feed velocity.

These functions can be activated by means of PROFIsafe or via the safety inputs. A safety output is provided in addition.

All safety functions can be implemented without having to use a motor encoder; the implementation costs are minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the converter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Efficient Infeed Technology

The innovative Efficient Infeed Technology is employed in PM250D Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard converters to be fed back into the supply system. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

STARTER commissioning tool

The STARTER commissioning tool (V4.3 and higher) supports the commissioning and maintenance of SINAMICS G120D converters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

SINAMICS Startdrive commissioning tool

SINAMICS Startdrive is a tool integrated into the TIA Portal for configuring, commissioning and diagnostics of the SINAMICS converter family. SINAMICS Startdrive can be used for implementing converter tasks with most of the SINAMICS G and SINAMICS S converter series.

Drive dimensioning of the SINAMICS G115D distributed drive system with the TIA Selection Tool

The SINAMICS G120D distributed drive system is easily configured with the TIA Selection Tool under the Drive Dimensioning plug-in. It provides support when selecting the hardware and firmware components necessary to implement a drive task. The plug-in encompasses the configuration of the entire drive system and allows the handling of individual drives.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

SINAMICS G120D distributed converters

Benefits

- Mechanical design, installation and retrofit of systems are significantly simplified as a result of the compact and space-saving design with an extremely low profile and with the same drilling dimensions for all power ratings.
- Wide power range from 0.75 kW to 7.5 kW
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the line supply system. This feedback capability provides enormous potential for energy saving because generated energy no longer has to be converted into heat in a braking resistor. Braking resistors and reactors are not necessary - this is a particular advantage in terms of the project engineering outlay, space requirement and installation costs for the high IP65 degree of protection
- Easy commissioning and maintenance via a fieldbus or point-to-point via a mini USB parameterization interface and screen-based parameterization software and wizards
- The same, standardized plug-in connections for the bus, power and I/O connections (ISO 23570) for the complete range of power ratings of SINAMICS G115D, SINAMICS G120D and SIRIUS M200D (motor starter)
- Integrated positioning functionality supports process-related implementation of positioning tasks with a high dynamic response. Positioning can be implemented with an incremental (HTL) or absolute encoder (SSI)
- Increased degree of ruggedness and longer service life as the electronic modules are coated
- Flexibility due to modularity for a future-oriented distributed drive concept with a high IP65 degree of protection
 - The modules can be easily replaced, which makes the system extremely service friendly.
- Simple, standard implementation of completely distributed plant and system concepts by using products in a scalable fashion:
 - SIRIUS M200D (motor starter)
 - SIMATIC ET 200pro FC-2 (converter for the distributed SIMATIC ET 200pro I/O system)
 - SINAMICS G115D distributed drive system (wall and motor-mounted)
 - SINAMICS G120D (converter for demanding, conveyor-related applications)
- Communications-capable via PROFINET / EtherNet/IP or PROFIBUS with PROFIdrive profile 4.1:

PROFINET features:

 - Neighbor recognition (LLDP)
 - Ring topology possible (MRP (Media redundancy protocol), MRPD (media redundancy with planned duplication))
 - Isochronous real-time communication (IRT)
 - PROFIenergy
 - PROFIsafe
 - Diagnostics, interrupts
 - Shared Device
 - Attenuation meter (for FO variant)
- Integrated fiber-optic interfaces (with CU240D-2 PN-F FO and CU250D-2 PN-F FO) for use in environments with harsh EMC conditions. These help to maintain stable communication and allow preventive maintenance of the connected PROFINET communication cable by means of an integrated attenuation meter.
- Simple connection, engineering, data management as well as control of the converter in sophisticated plants and systems as a result of the consequential integration in TIA (Totally Integrated Automation)
 - High degree of operator friendliness by using the Intelligent Operator Panel (IOP-2) to parameterize, diagnose, control (open-loop) and copy drive parameters
 - The ability to connect up to 6 sensors and up to 2 actuators to the Control Unit directly ensures that almost all the information relevant to the drive can be managed directly. Fail-safe Control Units can process signals from up to three fail-safe sensors and one fail-safe actuator. The CU240D-2 Control Units are also equipped with two analog inputs, which can also be used as digital inputs. Local pre-processing of the signals relieves the fieldbus of the task and ensures a faster and more reproducible response time
 - Integrated EMC filter class A (acc. to EN 55011)
 - Integrated brake control, supported brake voltage 180 V DC (at line voltage of 400 V AC – otherwise $U_{line} \times 0.45 =$ brake voltage)
 - Integrated motor protection using a thermal motor model and evaluation of PTC, KTY, bimetal or Pt1000 temperature sensors
 - Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
 - Easy replacement of devices and time-saving copying of parameters to optional memory card
 - Engineering and commissioning with standard engineering tools such as SIZER for Siemens Drives (V2.9 and higher), STARTER (V4.3 and higher), SINAMICS Startdrive, TIA Selection Tool and Drive ES: ensure fast engineering and easy commissioning – STARTER is integrated in STEP 7 with Drive ES Basic with all the advantages of central data storage and totally integrated communication
 - Certified worldwide for compliance with CE, UKCA, UL, cUL, RCM and Safety Integrated according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3

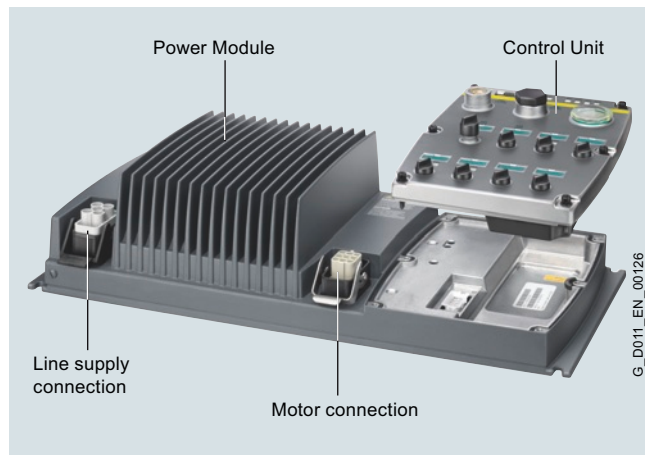
SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

SINAMICS G120D distributed converters

Design

The SINAMICS G120D distributed converters are modular converters for standard drives. Each SINAMICS G120D comprises two operative units – a Power Module and a Control Unit.



PM250D Power Module with line supply and motor connections and CU240D-2 Control Unit

Power Modules

The following PM250D Power Modules are available for the SINAMICS G120D distributed converters:

PM250D Power Modules

PM250D Power Modules (0.75 kW to 7.5 kW) have an innovative circuit design which allows line-commutated energy recovery back into the line supply. This innovative circuit permits generated energy to be fed back into the supply system and therefore saves energy.

Control Units

A Control Unit performs closed-loop control functions for the converter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization.

The following Control Units are available for SINAMICS G120D distributed converters:

CU240D-2 Control Units

The CU240D-2 Control Units can be used to implement applications with speed/torque control. Several Control Units are available in different versions:

- CU240D-2 DP → PROFIBUS
- CU240D-2 DP-F → PROFIBUS fail-safe
- CU240D-2 PN → PROFINET
- CU240D-2 PN-F → PROFINET fail-safe
- CU240D-2 PN-F PP → PROFINET fail-safe Push Pull
- CU240D-2 PN-F FO → PROFINET Fail-safe fiber optic

CU250D-2 Control Units

CU250D-2 Control Units can be used to implement applications with positioning requirements in the drive. Several Control Units are available in different versions:

- CU250D-2 DP-F → PROFIBUS fail-safe
- CU250D-2 PN-F → PROFINET fail-safe
- CU250D-2 PN-F PP → PROFINET fail-safe Push Pull
- CU250D-2 PN-F FO → PROFINET fail-safe fiber optic

Supplementary system components

IOP-2 Handheld Intelligent Operator Panel

The IOP-2 Handheld supports both newcomers and drive experts. Thanks to the large plain text display, the menu-based operation and the application wizards, it is easy to commission, diagnose and locally control standard drives.

Memory card

The parameter settings for a converter can be stored on the SINAMICS SD memory card. When service is required, e.g. after the converter has been replaced and the data have been downloaded from the memory card, the drive system is immediately ready for use again. The associated slot is located on the rear of the Control Unit.

Mini USB interface cable for communication with a PC

For controlling and commissioning a converter directly from a PC if the appropriate software (STARTER commissioning tool V4.3 and higher or SINAMICS Startdrive) has been installed.

Connecting cables for the Control Units

Flexible plug-in cables to transfer data between the Industrial Ethernet stations or PROFIBUS stations, as well as to supply power to the Control Unit.

Connecting cables for the Power Modules

Connector sets to connect to the line supply and the outgoing motor feeder are available as accessories as well as pre-assembled motor cables for connection to the motor.

Spare parts kit

A spare parts kit is available which comprises small parts such as seals, caps, PROFIBUS address windows and screws.

Replacement fan

A replacement fan is available, which comprises a pre-mounted unit with cover, fan and screws.

Configuration

The following electronic configuring aids and engineering tools are available for the SINAMICS G120D distributed converters:

Drive Technology Configurator (DT Configurator)

The DT Configurator can be used on the internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address:
www.siemens.com/dt-configurator

SIMARIS planning tools for plants with SINAMICS drives

Electrical planning: Even easier with software!

Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools: SIMARIS design for dimensioning and SIMARIS project for calculating the space requirements of the distribution boards.

SIZER for Siemens Drives (integrated in the TIA Selection Tool) engineering tool.

The PC-based SIZER for Siemens Drives engineering tool makes it easy to configure the SINAMICS drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives supports the complete configuration of the drive system, from basic single drives to demanding multi-axis applications.

The SIZER for Siemens Drives engineering tool is available free on the internet at:

www.siemens.com/sizer

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics and the TIA functionality. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices.

The CU240D-2 PN-F FO and CU250D-2 PN-F FO Control Units can be commissioned with STARTER V4.4 and higher

More information about the STARTER commissioning tool is available on the internet at:

www.siemens.com/starter

SINAMICS Startdrive commissioning tool

SINAMICS Startdrive is a tool for configuring, commissioning, and diagnosing the SINAMICS family of drives and is integrated into the TIA Portal. SINAMICS Startdrive can be used to implement drive tasks with the SINAMICS G120, SINAMICS G120C, SINAMICS G115D, SINAMICS G120D and SINAMICS G120P converter series. The commissioning tool has been optimized with regard to user friendliness and consistent use of the TIA Portal benefits of a common working environment for PLC, HMI and drives.

The SINAMICS Startdrive commissioning tool is for available for free on the internet at:

www.siemens.com/startdrive

Drive dimensioning of the SINAMICS G120D distributed converter with the TIA Selection Tool

The SINAMICS G120D distributed converter is easily configured with the TIA Selection Tool under the drive dimensioning plug-in. It provides support when selecting the hardware and firmware components necessary to implement a drive task. The plug-in encompasses the configuration of the entire drive system and allows the handling of individual drives.

- Intuitive user interface, menu-based operation and help
- Configuration of the SINAMICS G120D distributed converter
- Adjustable load cycles and various mechanical systems integrated
- Interface to the TIA Portal and Industry Mall

The TIA Selection Tool is available for free on the internet at:

www.siemens.com/tia-selection-tool-standalone

Drive ES engineering system

Drive ES is the engineering system that can be used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively. The Drive ES PCS software package is available for SINAMICS.

More information about the Drive ES engineering system is available on the internet at:

www.siemens.com/drive-es

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

SINAMICS G120D distributed converters

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following SINAMICS G120D distributed converter components listed here.

SINAMICS G120D	
Mechanical specifications	
Vibratory load	
• Transport acc. to EN 60721-3-2 ¹⁾	Class 1M2
• Operation acc. to EN 60721-3-3	Class 3M2
Shock load	
• Transport acc. to EN 60721-3-2 ¹⁾	Class 1M2
• Operation acc. to EN 60721-3-3	Class 3M2
Ambient conditions	
Degree of protection	IP65/UL Type 3
External 24 V supply according to IEC 60204-1	Contact-safe SELV or PELV power supply. The supply voltage must not exceed 60 V DC under single fault conditions
Protection class according to IEC 61800-5-1	Class I (with protective grounding conductor)
Permissible ambient/coolant temperature (air) during operation	-10 ... +40 °C (14 ... 104 °F) without derating >40 ... 55 °C (104 ... 131 °F) see derating characteristics
Humidity, max.	95 % at 40 °C (104 °F)
Ambient temperature	
• Storage ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Transport ¹⁾ acc. to EN 60068-2-1	-40 ... +70 °C (-40 ... +158 °F)
• Operation acc. to EN 60068-2-2	-10 ... +40 °C (14 ... 104 °F) without derating
Environmental class/harmful chemical substances	
• Operation acc. to EN 60721-3-3	Class 3C2
Degree of pollution acc. to EN 61800-5-1	2
Certification for fail-safe versions	
• According to IEC 61508	SIL 2
• According to EN ISO 13849-1	PL d and Category 3
Standards	
Compliance with standards	UL 508C (UL list number E121068), cUL, CE, UKCA, RCM
CE marking, according to	Low-Voltage Directive 2014/35/EU
EMC Directive	
• Frame sizes FSA to FSC with integrated line filter class A	Category C2 ²⁾ according to EN 61800-3
	Note: The EMC product standard EN 61800-3 does not apply directly to a frequency converter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the converter. The frequency converters on their own do not generally require identification according to the EMC Directive.

¹⁾ In product packaging.

²⁾ With shielded motor cable up to 15 m (49 ft).

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Overview

The Control Unit performs closed-loop control functions for the converter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization.

CU250D-2 Control Units can be used to implement applications with positioning requirements in the drive. This expansion opens up their use in lifting, swiveling, traversing or rotating applications. The positioning functionality is comparable to that of SINAMICS S110 servo drives.

Two points must be noted in this context:

- Vector control (VC) and sensorless vector control (SLVC) are possible (but not servo control)
- Positioning using one encoder (HTL/SSI) or using two encoders simultaneously (HTL for speed control and SSI for positioning)

Control Units are available in different versions:

- CU240D-2 DP
- CU240D-2 DP-F
- CU240D-2 PN
- CU240D-2 PN-F
- CU240D-2 PN-F PP (Push Pull)
- CU240D-2 PN-F FO (fibre Optic)
- CU250D-2 DP-F
- CU250D-2 PN-F
- CU250D-2 PN-F PP (Push Pull)
- CU250D-2 PN-F FO (fibre Optic)

The Push Pull version comprises an alternative connection method for the 24 V DC supply voltage and the PN communication.



CU240D-2 DP Control Unit



CU250D-2 DP-F Control Unit



CU240D-2 PN Control Unit



CU250D-2 PN-F Control Unit



CU250D-2 PN-F PP and CU250D-2 PN-F FO Control Units

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Overview

Safety Integrated functions

The Safety Integrated function "Safe Torque Off" (STO) (certified according to IEC 61508 SIL 2, EN ISO 13849-1 PL d and Category 3) is already integrated into the standard versions of the CU240D-2 series (CU240D-2 DP and CU240D-2 PN). It can be activated either over PROFI-safe or over the safety input.

With the fail-safe variants of the CU240D-2 series (CU240D-2 DP-F xx and CU240D-2 PN-F xx) and with the entire CU250D-2 series, the fail-safe SINAMICS G120D converter provides five safety functions which are certified according to IEC 61508 SIL 2, EN ISO 13849-1 PL d and Category 3:

- Safe Torque Off (STO)
to protect against active movement of the drive
- Safe Stop 1 (SS1)
for continuous monitoring of a safe braking ramp
- Safely-Limited Speed (SLS)
for protection against dangerous movements on exceeding a speed limit
- Safe direction (SDI)
This function ensures that the drive can only rotate in the selected direction.
- Safe speed monitoring (SSM)
This function signals if a drive is operating below a specific speed/feed velocity.

These functions can be activated by means of PROFI-safe or via the safety inputs. A safety output is provided in addition.

All safety functions can be implemented without having to use a motor encoder; the implementation costs are minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the converter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Selection and ordering data

Communication	Digital inputs (number which can be parameterized as fail-safe given below)	Analog inputs	Digital outputs (number which can be parameterized as fail-safe given below)	Encoder interfaces HTL/SSI	Safety Integrated functions	Description	Control Unit Article No.
CU240D-2 series – standard							
PROFIBUS DP	6 (1)	2	2	1/-	STO	CU240D-2 DP	6SL3544-0FB20-1PA0
PROFINET, EtherNet/IP	6 (1)	2	2	1/-	STO	CU240D-2 PN	6SL3544-0FB20-1FA0
CU240D-2 series – fail-safe for Safety Integrated							
PROFIBUS DP	6 (3)	2	2 (1)	1/-	STO, SLS, SS1, SSM, SDI	CU240D-2 DP-F	6SL3544-0FB21-1PA0
PROFINET, EtherNet/IP	6 (3)	2	2 (1)	1/-	STO, SLS, SS1, SSM, SDI	CU240D-2 PN-F	6SL3544-0FB21-1FA0
						CU240D-2 PN-F PP	6SL3544-0FB21-1FB0
						CU240D-2 PN-F FO	6SL3544-0FB21-1FC0
CU250D-2 serie – basic positioner (EPos) and fail-safe for Safety Integrated							
PROFIBUS DP	6 (3)	–	2 (1)	1/1	STO, SLS, SS1, SSM, SDI	CU250D-2 DP-F	6SL3546-0FB21-1PA0
PROFINET, EtherNet/IP	6 (3)	–	2 (1)	1/1	STO, SLS, SS1, SSM, SDI	CU250D-2 PN-F	6SL3546-0FB21-1FA0
						CU250D-2 PN-F PP	6SL3546-0FB21-1FB0
						CU250D-2 PN-F FO	6SL3546-0FB21-1FC0

Note:

An external 24 V DC power supply is required in order to operate the Control Unit. For information about suitable connecting cables, refer to section Supplementary system components, Connecting cables/connectors for supplying the Control Unit with 24 V DC power.

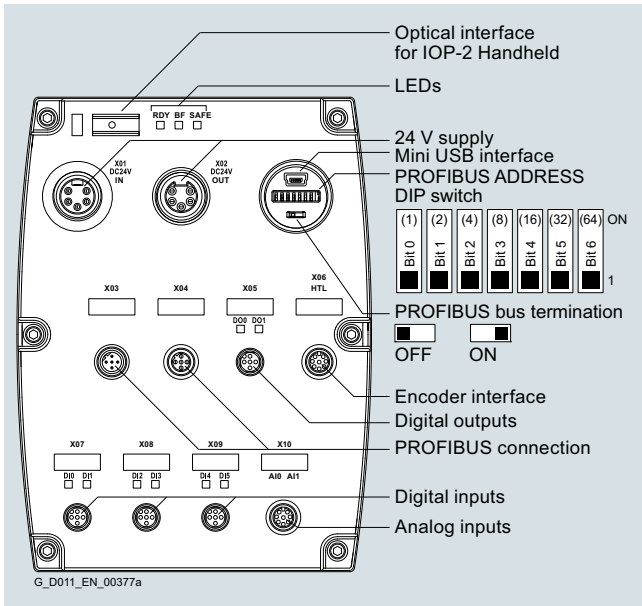
For optional memory cards, see section Supplementary system components.

SINAMICS G120D distributed converters

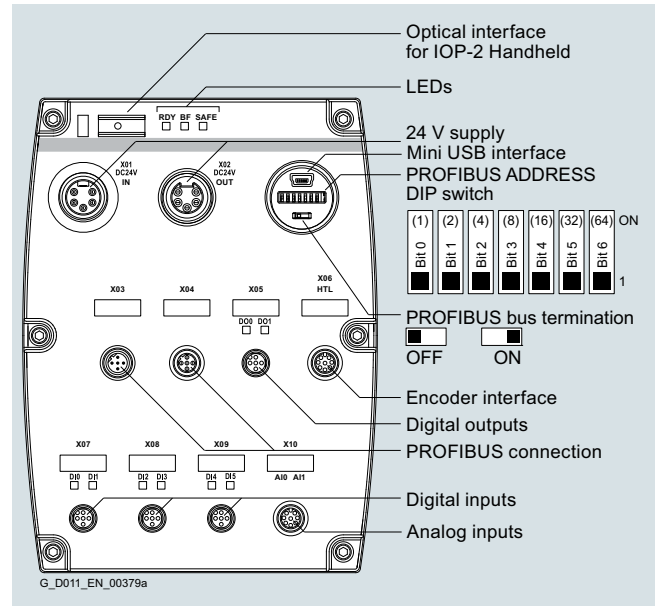
0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU50D-2 Control Units

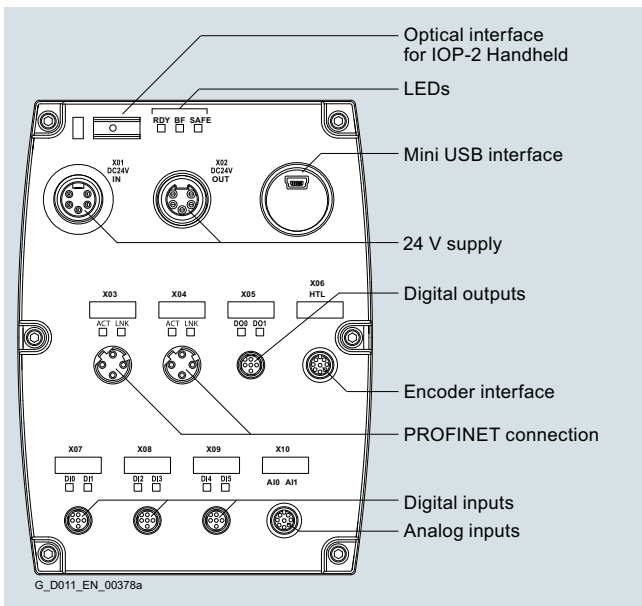
Design



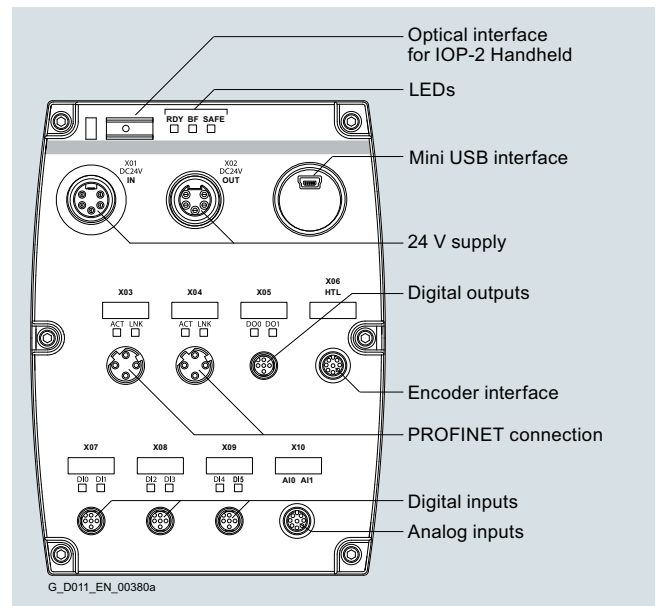
CU240D-2 DP Control Unit



CU240D-2 DP-F Control Unit



CU240D-2 PN Control Unit



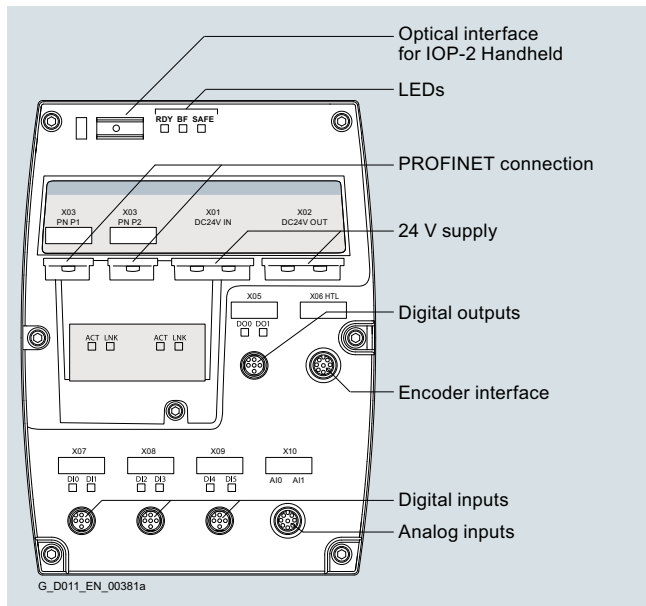
CU240D-2 PN-F Control Unit

SINAMICS G120D distributed converters

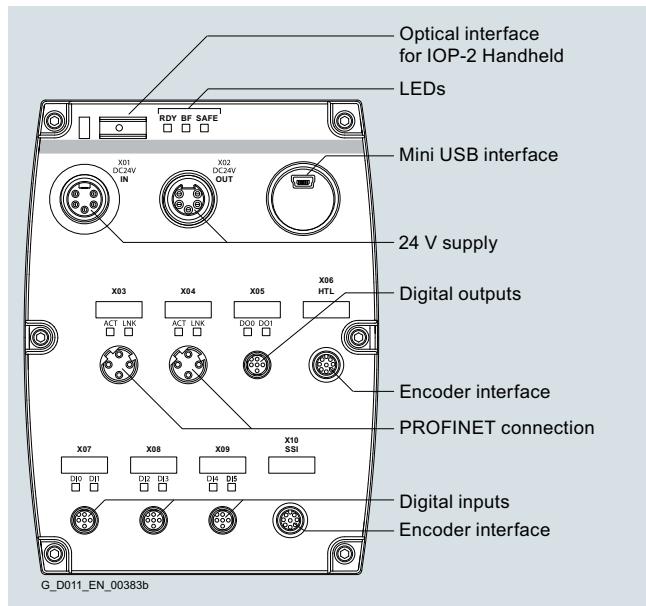
0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

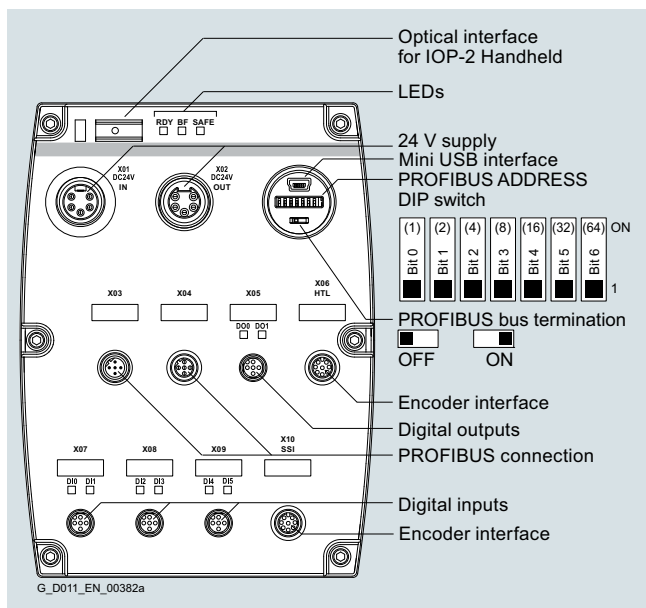
Design



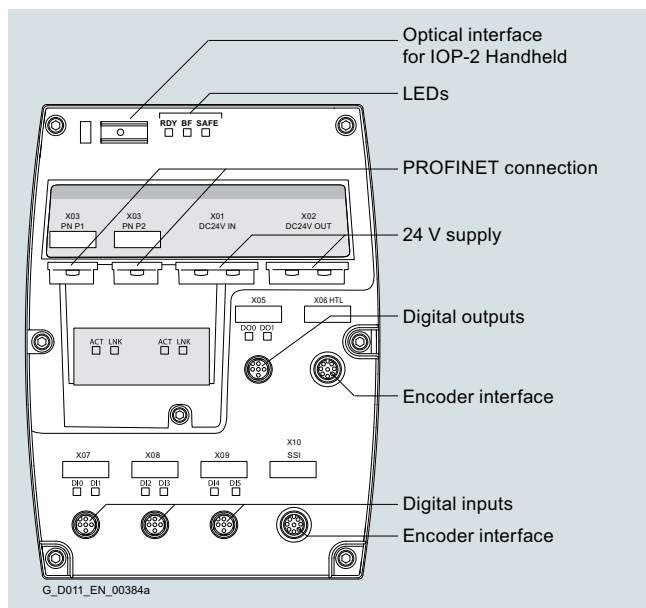
CU240D-2 PN-F PP and CU240D-2 PN-F FO Control Units



CU250D-2 PN-F Control Unit



CU250D-2 DP-F Control Unit



CU250D-2 PN-F PP and CU250D-2 PN-F FO Control Units



Control Unit, view from the rear, memory card slot at the top and PM-IF interface at bottom center

Function

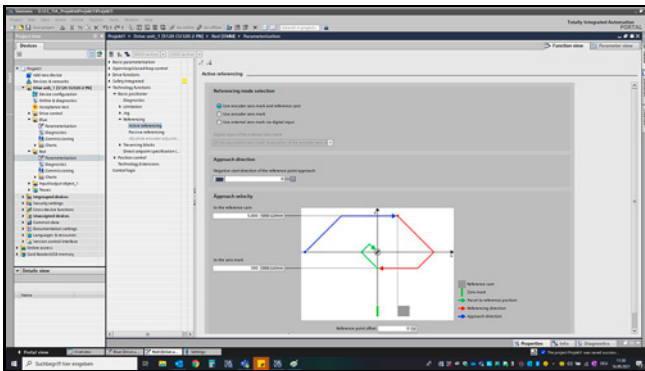
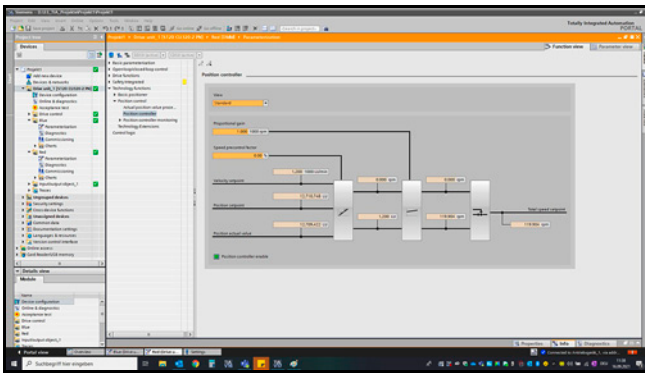
Function module basic positioner EPos

The basic positioner EPos is available as a standard technology function for the following SINAMICS Control Units and can be called as a function module that can be activated additionally.

- SINAMICS S120 CU310-2 and CU320-2 Control Units
- SINAMICS S110 CU305 Control Units
- SINAMICS G120 CU250S-2 Control Units
- SINAMICS G120D CU250D-2 Control Units

The basic positioner can be used to resolve basic motion control tasks without additional external technological outlay from the drive itself.

Integrated functionality for absolute and relative positioning of linear and rotary axes with motor encoders or machine encoders.



The EPos basic positioner in the SINAMICS drive system provides powerful and precise positioning functions. Due to its flexibility and adaptability, the basic positioner can be used for a wide range of positioning tasks.

The functions are easy to handle both during commissioning and during operation, and the comprehensive monitoring functions are outstanding.

Many applications can be carried out without external position controllers.

The EPos basic positioner is used to position linear and rotary axes (modulo) in absolute/relative terms with rotary as well as linear motor encoder or machine encoder (indirect or direct measuring system).

EPos is a function module that can be activated additionally in Servo Control and in Vector Control.

User-friendly configuring and commissioning, including control panel (operation using PC) and diagnostics, are possible with the STARTER and SINAMICS Startdrive commissioning tools.

In addition to extremely flexible positioning functions, EPos offers a high degree of user-friendliness and reliability thanks to integral monitoring and compensation functions.

Different operating modes and their functionality increase flexibility and plant productivity, for example, by means of "on-the-fly" and bumpless correction of the motion control.

Preconfigured PROFIdrive positioning frames are available which, when selected, automatically establish the internal "connection" to the basic positioner.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Function

Functionality of the EPos basic positioner

Lower-level closed-loop position control with the following essential components

- Position actual value sensing (including the lower-level measuring probe evaluation and reference mark search)
- Position controller (including limits, adaptation and pre-control calculation)
- Monitoring functions (standstill, positioning and dynamic following error monitoring, cam signals)

Mechanical system

- Backlash compensation
- Modulo offset

Limitations

- Speed/acceleration/delay/jerk limitation
- Software limit switches (traversing range limitation by means of position setpoint evaluation)
- Stop cams (traversing range limitation using hardware limit switch evaluation)

Referencing or adjustment

- Set reference point (for an axis at standstill)
- Search for reference (separate mode including reversing cam functionality, automatic reversal of direction, homing to "output cam and encoder zero mark" or only "encoder zero mark" or "external zero mark (BERO)")
- Flying referencing (seamless referencing possible during "normal" traversing with the aid of the measuring input evaluation; generally evaluation, e.g. of a BERO. Subordinate function for the modes "jog", "direct setpoint input/MDI" and "traversing blocks")
- Absolute encoder alignment

Traversing block mode

- 64 traversing blocks for
 - SINAMICS S120 CU310-2 and CU320-2 Control Units
- 16 traversing blocks for
 - SINAMICS S110 CU305 Control Units
 - SINAMICS G120 CU250S-2 Control Units
 - SINAMICS G120D CU250D-2 Control Units
- Positioning using traversing blocks that can be stored in the drive unit including continuation conditions and specific jobs for a previously homed axis
- Configuring traversing blocks using the traversing block editor in the relevant commissioning tool of the SINAMICS drive family
- A traversing block contains the following information:
 - Job number and job (e.g. positioning, waiting, GOTO block jump, setting of binary outputs, travel to fixed endstop)
 - Motion parameters (target position, velocity, override for acceleration and deceleration)
 - Mode (e.g.: hide block, continuation conditions such as "Continue_with_stop", "Continue_flying" and "Continue_externally_using_high-speed_measuring_inputs")
 - Job parameters (e.g. wait time, block step conditions)

Direct setpoint specification mode (MDI)

- Positioning (absolute, relative) and setting-up (endless closed-loop position control) using direct setpoint inputs (e.g. via the PLC using process data)
- It is always possible to influence the motion parameters during traversing (on-the-fly setpoint acceptance) as well as for on-the-fly changes between the setup and positioning modes.
- The direct setpoint specification mode (MDI) can also be used in the relative positioning or setup mode if the axis is not referenced. This means that on-the-fly synchronization and re-referencing can be carried out using "flying referencing".

Jog mode

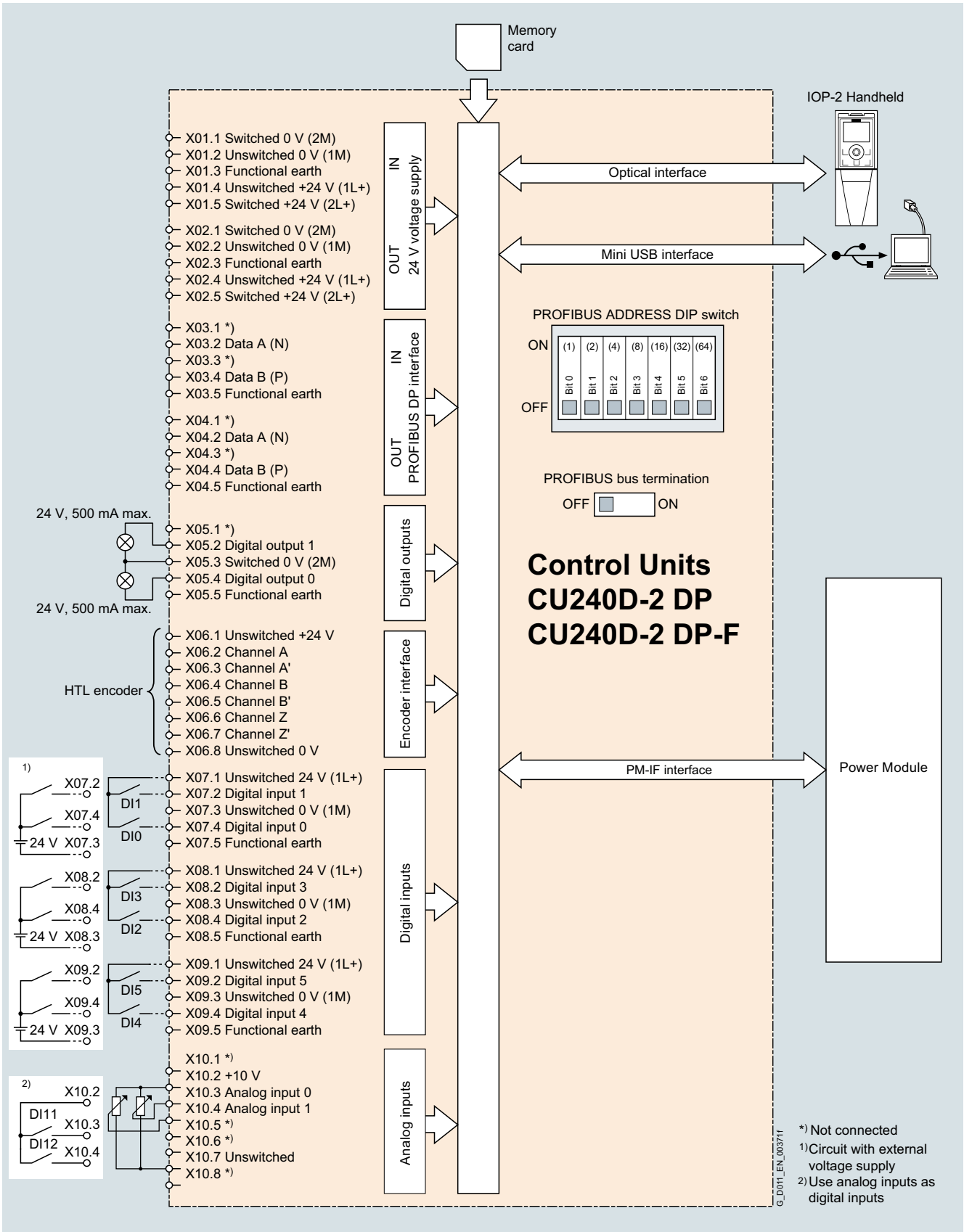
- Closed-loop position controlled traversing of the axis with "endless position controlled" or "jog incremental" modes (traverse through a "step width"), which can be toggled between

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

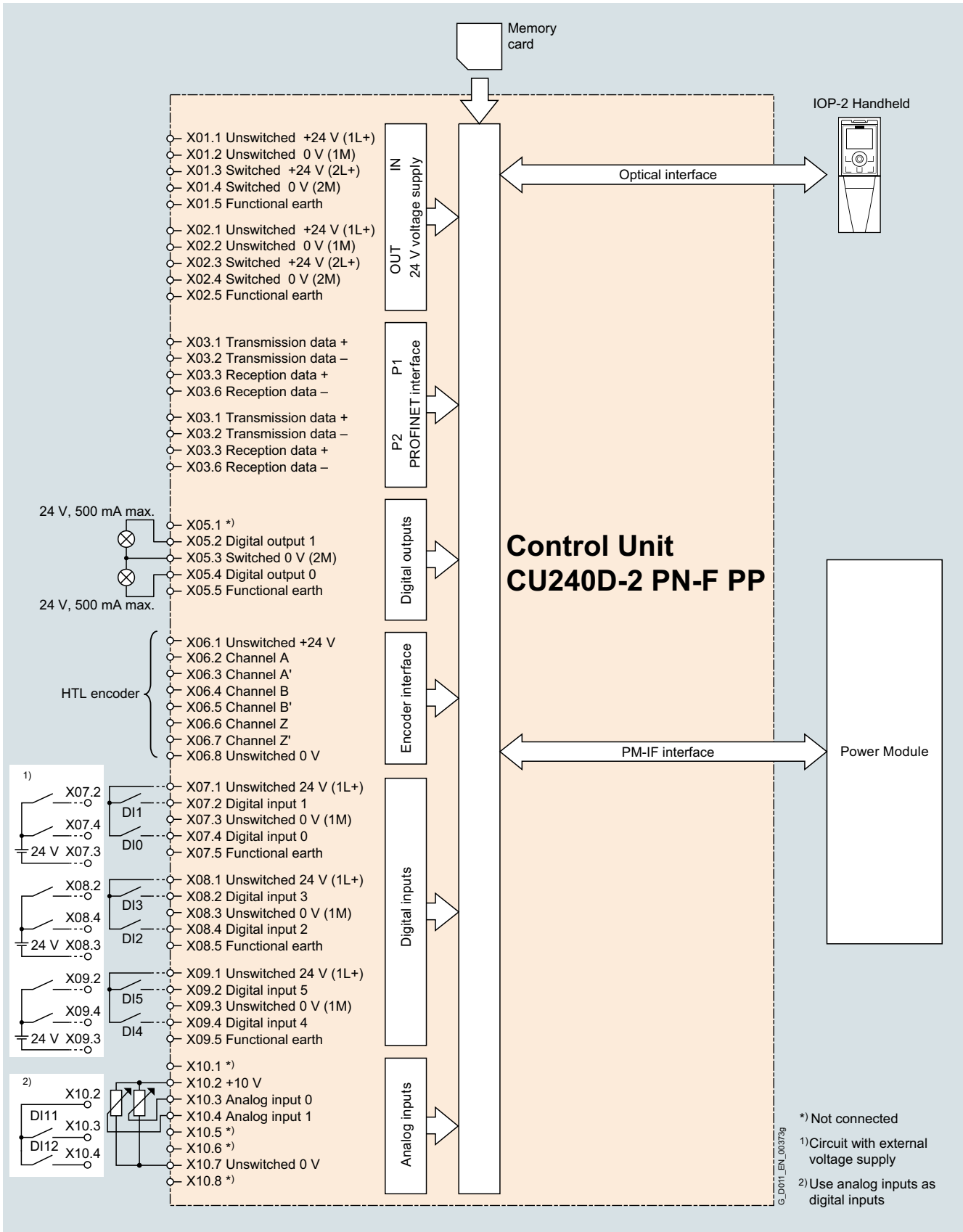
CU240D-2 and CU250D-2 Control Units

Integration



Connection example for CU240D-2 DP and CU240D-2 DP-F Control Units

Integration



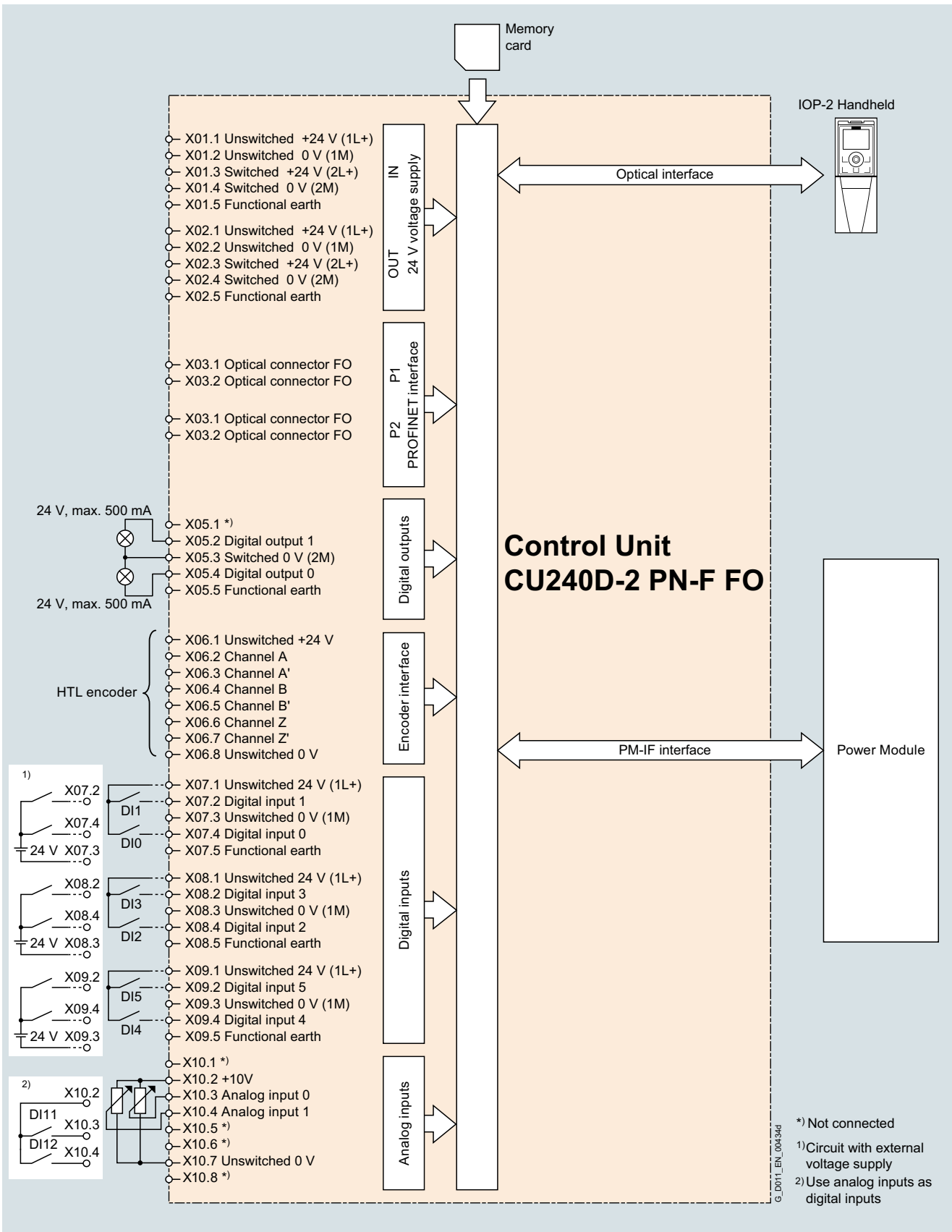
Connection example for CU240D-2 PN-F PP Control Unit

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

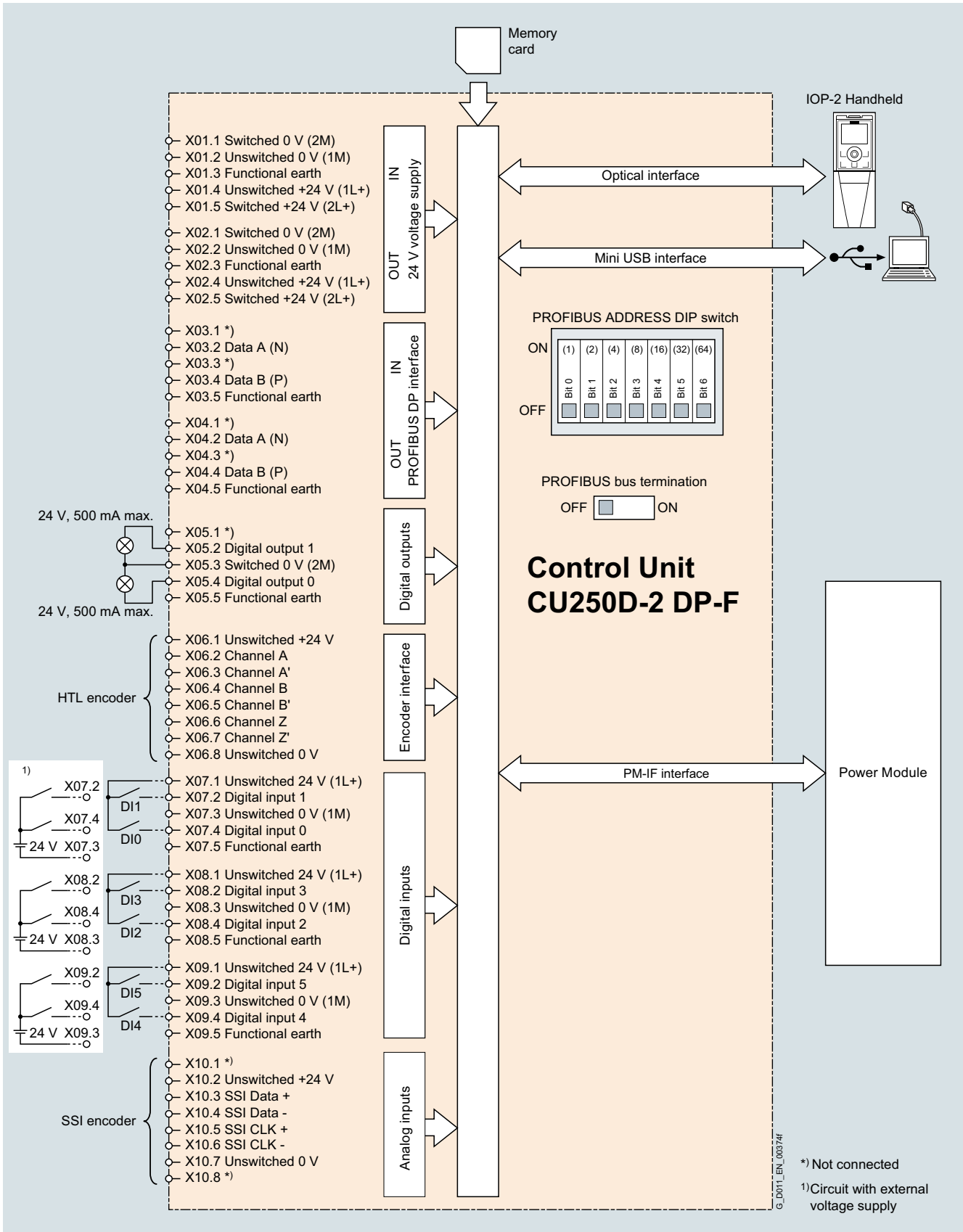
CU240D-2 and CU250D-2 Control Units

Integration



Connection example for CU240D-2 PN-F FO Control Unit

Integration



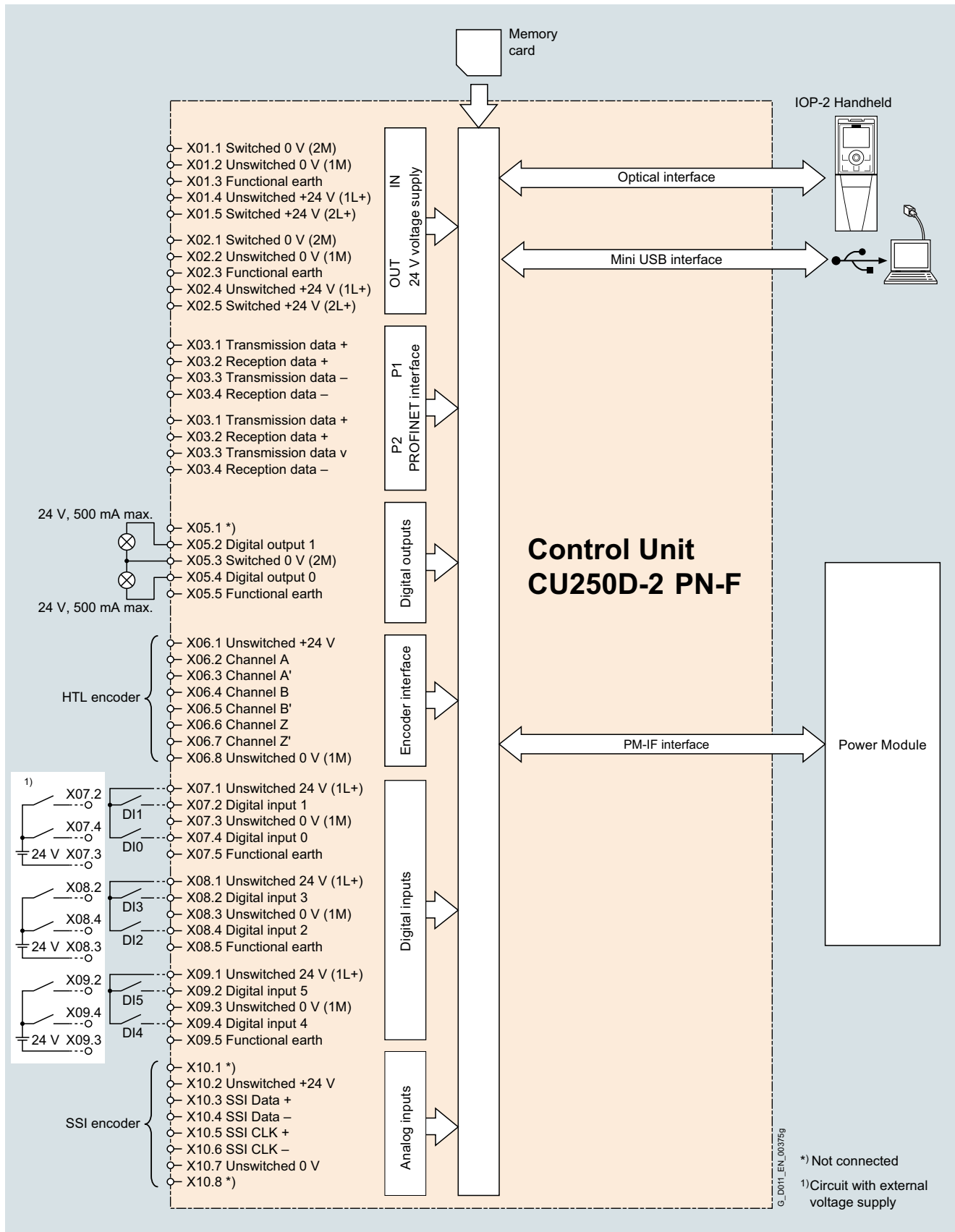
Connection example for CU250D-2 DP-F Control Unit

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

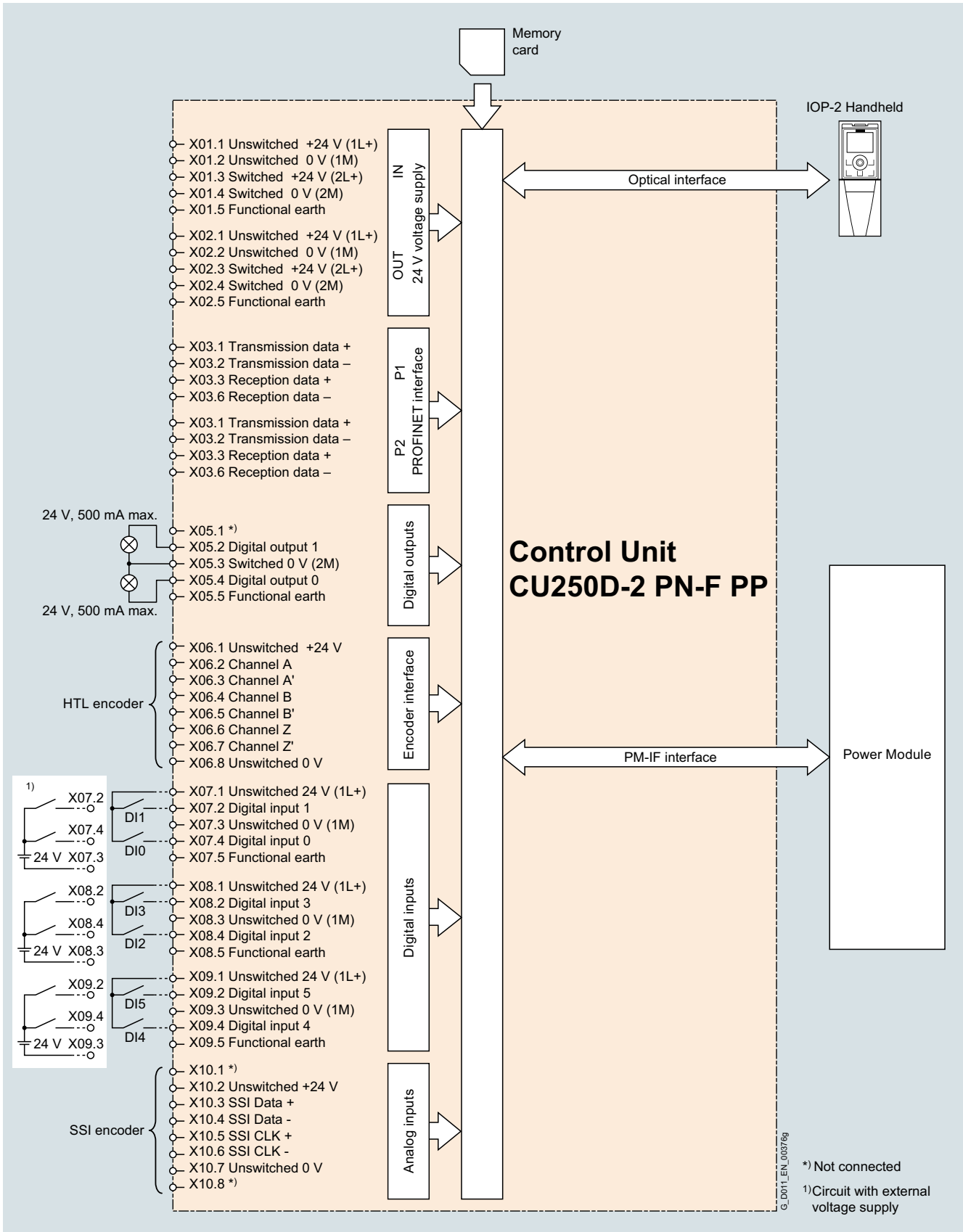
CU240D-2 and CU250D-2 Control Units

Integration



Connection example for CU250D-2 PN-F Control Unit

Integration



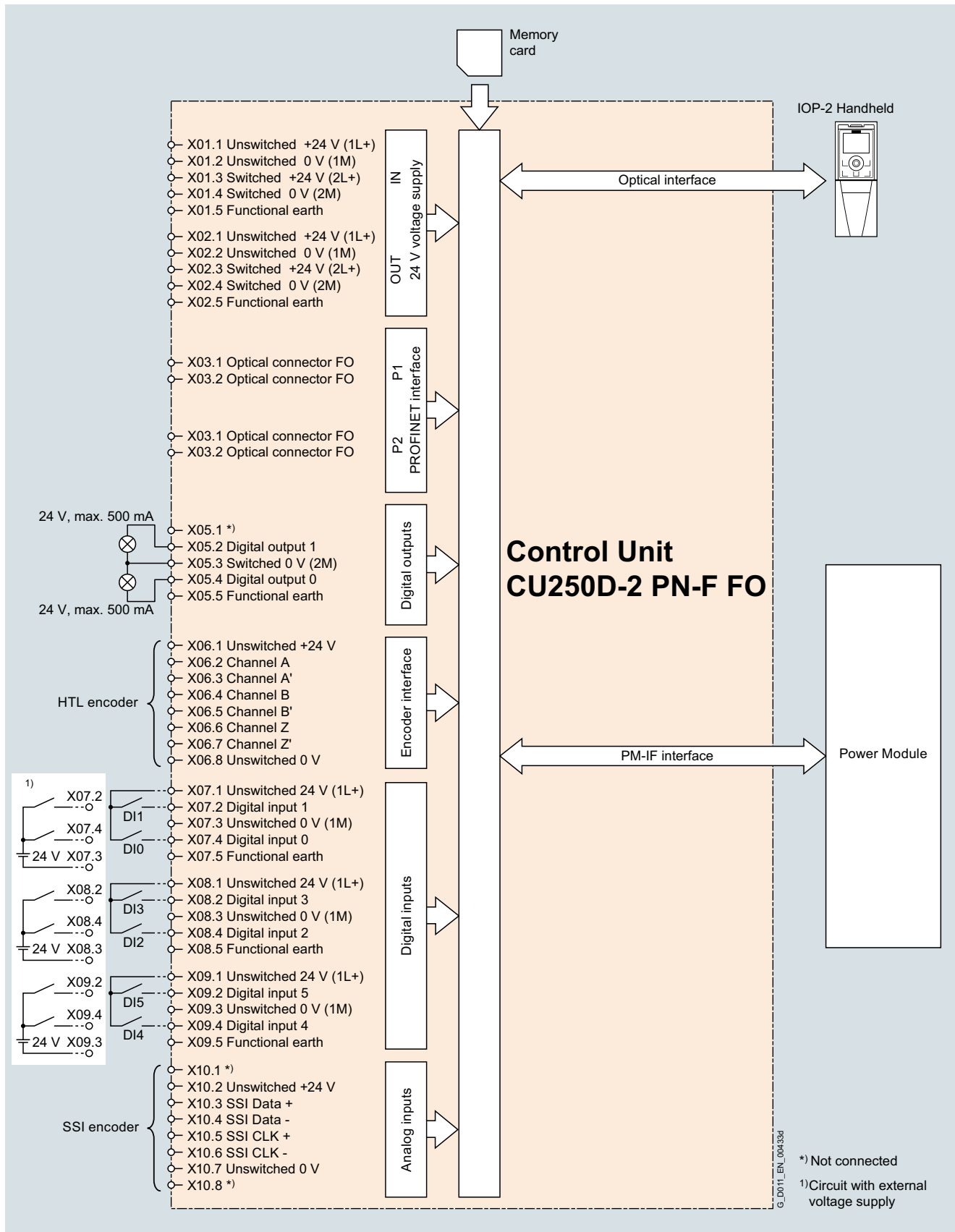
Connection example for CU250D-2 PN-F PP Control Unit

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Integration



Connection example for CU250D-2 PN-F FO Control Unit

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

Control Unit	CU240D-2 DP 6SL3544-0FB20-1PA0	CU240D-2 PN 6SL3544-0FB20-1FA0	CU240D-2 DP-F 6SL3544-0FB21-1PA0	CU240D-2 PN-F 6SL3544-0FB21-1FA0 CU240D-2 PN-F PP 6SL3544-0FB21-1FB0 CU240D-2 PN-F FO 6SL3544-0FB21-1FC0	CU250D-2 DP-F 6SL3546-0FB21-1PA0	CU250D-2 PN-F 6SL3546-0FB21-1FA0 CU250D-2 PN-F PP 6SL3546-0FB21-1FB0 CU250D-2 PN-F FO 6SL3546-0FB21-1FC0
Electrical specifications						
Operating voltage	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary	External 24 V DC necessary
Current consumption ¹⁾ (from the 24 V DC supply)						
• With Power Module frame sizes FSA and FSB	300 mA	400 mA	300 mA	400 mA (FO variant: 520 mA)	300 mA	400 mA (FO variant: 520 mA)
• With Power Module frame size FSC	450 mA	550 mA	450 mA	550 mA (FO variant: 670 mA)	450 mA	550 mA (FO variant: 670 mA)
Interfaces						
Digital inputs (not isolated)	6	6	6	6	6	6
• Optionally parameterizable as safe inputs	1	1	3	3	3	3
Analog inputs (0 ... 10 V)	2	2	2	2	–	–
Digital outputs (0.5 A, fed through switched 24 V DC, isolated)	2	2	2	2	2	2
• Optionally parameterizable as safe digital output	–	–	1	1	1	1
Bus interface						
• Fieldbus protocols	PROFIBUS DP	PROFINET EtherNet/IP	PROFIBUS DP	PROFINET EtherNet/IP	PROFIBUS DP	PROFINET EtherNet/IP
• Profiles	PROFIdrive PROFIsafe	PROFIdrive PROFIsafe PROFInergy	PROFIdrive PROFIsafe	PROFIdrive PROFIsafe PROFInergy	PROFIdrive PROFIsafe	PROFIdrive PROFIsafe PROFInergy
HTL encoder interface (incremental interface, bipolar up to 2048 pulses, max. 150 mA)	1	1	1	1	1	1
SSI encoder interface (absolute encoder, single-turn and multi-turn 4096 pulses, 24 V, max. 250 mA)	–	–	–	–	1	1
PTC/KTY interface (connection via Power Module)	✓	✓	✓	✓	✓	✓
• Motor temperature sensor	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000	1 input, sensors that can be connected: PTC, KTY, bimetal or Pt1000
Control of a mechanical motor brake (connection via Power Module)	✓	✓	✓	✓	✓	✓
Slot for SINAMICS SD memory card	✓	✓	✓	✓	✓	✓
Commissioning interface (mini USB)	✓	✓	✓	✓ Not with PP and FO variants	✓	✓ Not with PP and FO variants

¹⁾ The current consumption of connected encoders (HTL ≤ 100 mA or SSI ≤ 250 mA), sensors (total, max. 300 mA) as well as the current drawn from the digital outputs (total max. 500 mA) must be added, where applicable.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

Control Unit	CU240D-2 DP 6SL3544-0FB20-1PA0	CU240D-2 PN 6SL3544-0FB20-1FA0	CU240D-2 DP-F 6SL3544-0FB21-1PA0	CU240D-2 PN-F 6SL3544-0FB21-1FA0	CU240D-2 PN-F PP 6SL3544-0FB21-1FB0	CU240D-2 PN-F FO 6SL3544-0FB21-1FC0	CU250D-2 DP-F 6SL3546-0FB21-1PA0	CU250D-2 PN-F 6SL3546-0FB21-1FA0	CU250D-2 PN-F PP 6SL3546-0FB21-1FB0	CU250D-2 PN-F FO 6SL3546-0FB21-1FC0
Safety functions										
Integrated safety functions acc. to IEC 61508 SIL 2, EN ISO 13849-1 PL d and Category 3	• Safe Torque Off (STO)	• Safe Torque Off (STO)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)	• Safe Torque Off (STO) • Safe Stop 1 (SS1) • Safely-Limited Speed (SLS) • Safe Direction (SDI) • Safe Speed Monitor (SSM)
Open-loop/closed-loop control techniques										
V/f linear/quadratic/parameterizable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V/f with flux current control (FCC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vector control, sensorless	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vector control, with sensor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Torque control, sensorless	✓	✓	✓	✓	✓	✓	–	–	–	–
Torque control, with sensor	✓	✓	✓	✓	✓	✓	–	–	–	–
Software functions										
Basic positioner (EPos)	–	–	–	–	–	–	✓	✓	✓	✓
Fixed frequencies	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable
Signal interconnection with BICO technology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Automatic restart after line supply failure or operational fault	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Free function blocks (FFB) for logical and arithmetic operations	✓	✓	✓	✓	✓	✓	–	–	–	–
Ramp smoothing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4 selectable drive datasets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4 selectable command data sets (CDS) (manual/auto)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓	✓	✓	–	–	–	–
JOG	✓	✓	✓	✓	✓	✓	–	–	–	–
Cyclic recording of ramp-up and ramp-down	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

CU240D-2 and CU250D-2 Control Units

Technical specifications

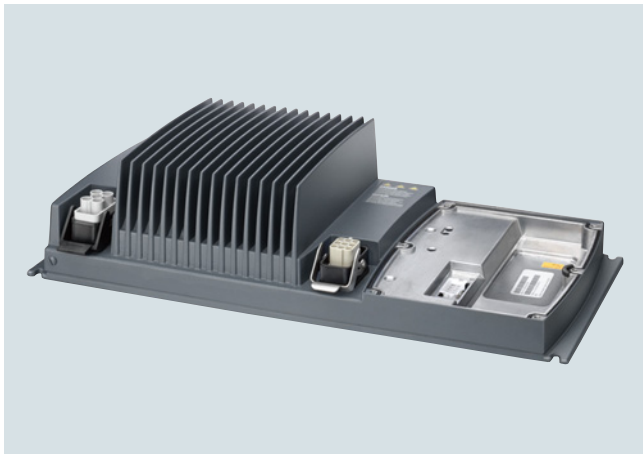
Control Unit	CU240D-2 DP 6SL3544-0FB20-1PA0	CU240D-2 PN 6SL3544-0FB20-1FA0	CU240D-2 DP-F 6SL3544-0FB21-1PA0	CU240D-2 PN-F 6SL3544-0FB21-1FA0	CU250D-2 DP-F 6SL3546-0FB21-1PA0	CU250D-2 PN-F 6SL3546-0FB21-1FA0
				CU240D-2 PN-F PP 6SL3544-0FB21-1FB0		CU250D-2 PN-F PP 6SL3546-0FB21-1FB0
				CU240D-2 PN-F FO 6SL3544-0FB21-1FC0		CU250D-2 PN-F FO 6SL3546-0FB21-1FC0
Software functions						
Technology controller (PID)	✓	✓	✓	✓	–	–
Thermal motor protection	✓	✓	✓	✓	✓	✓
Thermal converter protection	✓	✓	✓	✓	✓	✓
Setpoint input	✓	✓	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓	✓	✓
Mechanical specifications and ambient conditions						
Operating temperature	-10 ... +55 °C (14 ... 131 °F)	-10 ... +50 °C (14 ... 122 °F)	0 ... 55 °C (32 ... 131 °F)	0 ... 50 °C (32 ... 122 °F) (FO variant: 0 ... 45 °C (32 ... 113 °F))	0 ... 55 °C (32 ... 131 °F)	0 ... 50 °C (32 ... 122 °F) (FO variant: 0 ... 45 °C (32 ... 113 °F))
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible	<95 % RH, condensation not permissible
Dimensions						
• Width	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)	153 mm (6.02 in)
• Height	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)	208 mm (8.19 in)
• Depth	55 mm (2.17 in)	55 mm (2.17 in)	55 mm (2.17 in)	55 mm (2.17 in) (PP variant: 118 mm) (4.65 in)	55 mm (2.17 in)	55 mm (2.17 in) (PP variant: 118 mm) (4.65 in)
Weight, approx.	0.8 kg (1.76 lb)	0.8 kg (1.76 lb)	0.8 kg (1.76 lb)	0.8 kg (1.76 lb) (PP and FO variants: 1.3 kg (2.87 lb))	0.8 kg (1.76 lb)	0.8 kg (1.76 lb) (PP and FO variants: 1.3 kg (2.87 lb))

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

PM250D Power Modules

Overview



Example of PM250D Power Module, frame size FSA

The regenerative feedback capability of the PM250D Power Module in generating mode (electronic braking) means that energy is returned to the supply system and is not converted into heat in a braking resistor. This saves space, time-consuming dimensioning of the braking resistor as well as its wiring. Generated heat is also reduced.

An innovative circuit design reduces the supply harmonics. A line reactor is not required. This saves space and costs for engineering and procurement.

The PM250D Power Module is also designed for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated Drive ([siehe Control Units](#)).

The PM250D Power Modules with integrated line filter class A are suitable for connection to TN and TT supply systems.

Selection and ordering data

Rated power ¹⁾		Rated output current ²⁾ A	Input current A	Frame size	PM250D Power Module with integrated line filter class A Article No.
kW	hp				
380 ... 500 V 3 AC					
0.75	1	2.2	2.1	FSA	6SL3525-0PE17-5AA1
1.5	1.5 ³⁾	4.1	3.8	FSA	6SL3525-0PE21-5AA1
3	4	7.7	7.2	FSB	6SL3525-0PE23-0AA1
4	5	10.2	9.5	FSC	6SL3525-0PE24-0AA1
5.5	7.5	13.2	12.2	FSC	6SL3525-0PE25-5AA1
7.5	10	19	17.7	FSC	6SL3525-0PE27-5AA1

¹⁾ Rated power based on the rated output current I_N .
The rated output current I_N is based on the duty cycle for high overload (HO)

²⁾ The rated output current I_N is based on the duty cycle for high overload (HO). These current values are valid for 400 V and are specified on the rating plate of the Power Module.

³⁾ It is not possible to make any assignment to a particular standard.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

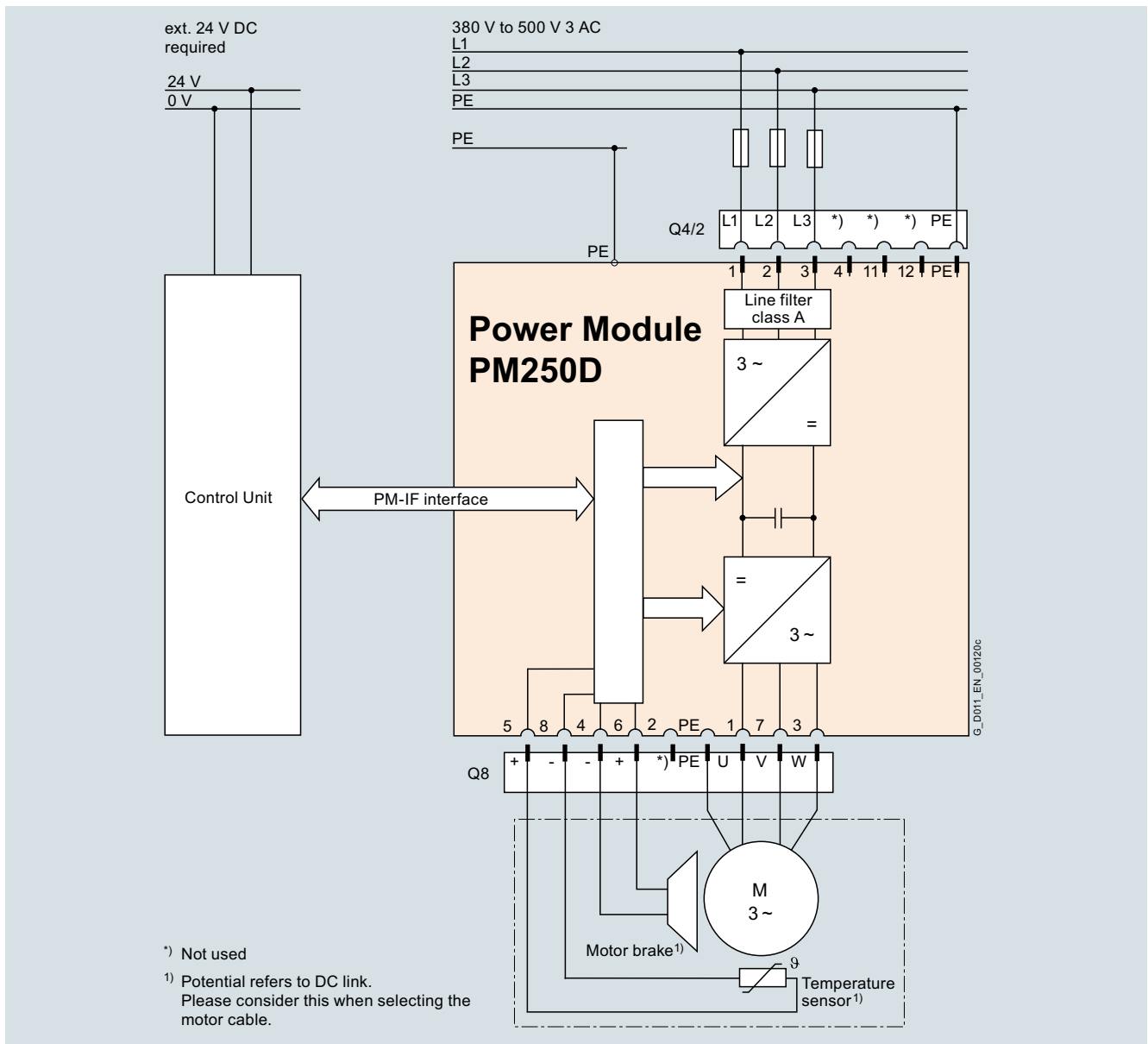
PM250D Power Modules

Integration

PM250D Power Modules communicate with the Control Unit via the PM-IF interface.

PM250D Power Modules feature the following interfaces as standard:

- PM-IF interface for connection of the PM250D Power Module and Control Unit.
- Motor connection via Q8 (connector) including control of the motor brake and temperature sensor
- Line supply connection via Q4/2 (socket)



Connection example PM250D Power Module with integrated line filter class A

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

PM250D Power Modules

Technical specifications

General technical specifications

	PM250D Power Modules					
Line voltage	380 ... 500 V 3 AC $\pm 10\%$					
Line supply requirements Short-circuit power ratio R_{SC}	>100					
Input frequency	47 ... 63 Hz					
Output frequency • Control mode V/f • Control mode Vector	0 ... 550 Hz ¹⁾ 0 ... 200 Hz					
Pulse frequency	4 kHz (standard), for higher pulse frequencies up to 16 kHz see derating data					
Power factor λ	0.95					
Converter efficiency η According to IEC 61800-9-2	95 ... 97 % ²⁾					
Efficiency class According to IEC 61800-9-2	IE2 ²⁾					
Output voltage, max. as % of input voltage	87 %					
Overload capability • High overload (HO)	Maximum duty cycle of a total cycle time of 300 s: • 2 \times rated output current I_N (i.e. 200 % overload) for 3 s followed by • 1.5 \times rated output current I_N (i.e. 150 % overload) for 57 s and • 0.87 \times rated output current I_N for the remaining 240 s					
Electromagnetic compatibility	Integrated line filter class A according to EN 55011					
Possible braking methods	Energy recovery in regenerative mode (max. with rated power possible); Integrated brake control supplies the DC supply voltage for the brake					
	Line input voltage	380 V AC	400 V AC	440 V AC	480 V AC	500 V AC
	Resulting brake voltage	171 V DC	180 V DC	198 V DC	216 V DC	225 V DC
	Disconnection on the DC side permits "fast" braking (max. output current 1 A)					
Operating temperature	-10 ... +55 °C (14 ... 131 °F) (operating temperature ranges of the Control Units must be taken into account)					
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)					
Permissible mounting position	Horizontal wall mounting and mounting in the horizontal position					
Relative humidity	<95 % RH, condensation not permissible					
Cooling	FSA and FSB: Convection FSC: Air cooling as required using the integrated fan					
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating >1000 m (3281 ft) see derating characteristics					
Short Circuit Current Rating (SCCR) ³⁾	40 kA					
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Phase failure detection • Overvoltage • Overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Converter overtemperature • Parameter locking 					
Compliance with standards	UL 508C (UL list number E121068), cUL, CE, UKCA, RCM					
CE marking, according to	Low-Voltage Directive 2014/35/EU Ecodesign requirements of the EU Directive 2019/1781 ²⁾					

¹⁾ For more information, see <https://support.industry.siemens.com/cs/document/107669667>

²⁾ The SINAMICS G120D frequency converters fall under the eco-design requirements of the EU Directive 2019/1781; however, the SINAMICS G120D frequency converters are considered to be frequency converters with regenerative feedback functionality. Therefore, no efficiency requirements apply in this case.

³⁾ Applies to industrial control cabinet installations according to NEC article 409 or UL 508A.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

PM250D Power Modules

Technical specifications

Line voltage 380 ... 500 V 3 AC	PM250D Power Modules			
		6SL3525-0PE17-5AA1	6SL3525-0PE21-5AA1	6SL3525-0PE23-0AA1
Rated output current I_N ¹⁾	A	2.2	4.1	7.7
Maximum output current I_{max}	A	4.4	8.2	15.4
Rated power	kW (hp)	0.75 (1)	1.5 (1.5)	3 (4)
Rated pulse frequency	kHz	4	4	4
Efficiency η	%	>95	>95	>95
Power loss ²⁾ At rated output current	kW	0.046	0.068	0.125
Cooling air requirement	m ³ /s (ft ³ /s)	0.004 (0.14)	0.005 (0.18)	0.009 (0.32)
Sound pressure level L_{pA} (1 m)	dB	–	–	–
Rated input current ³⁾	A	2.1	3.8	7.2
Line supply connection U1/L1, V1/L2, W1/L3, PE		Q4/2 (connector)	Q4/2 (connector)	Q4/2 (connector)
• Conductor cross-section	mm ²	1.5 ... 6	1.5 ... 6	2.5 ... 6
PE connection (external connection)		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
• Conductor cross-section (recommended)	mm ²	10 ... 16	10 ... 16	10 ... 16
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		Q8 (socket)	Q8 (socket)	Q8 (socket)
• Conductor cross-section	mm ²	1 ... 4	1 ... 4	2.5 ... 4
Motor cable length, max. Shielded	m (ft)	15 (49)	15 (49)	15 (49)
Degree of protection		IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3
Dimensions				
• Width	mm (in)	445 (17.52)	445 (17.52)	445 (17.52)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)
• Depth	mm (in)	110 (4.33)	110 (4.33)	180 (4.33)
Frame size		FSA	FSA	FSB
Weight, approx.	kg (lb)	5.7 (12.6)	5.7 (12.6)	8 (17.6)

¹⁾ The rated output current I_N is based on the duty cycle for high overload (HO).

²⁾ Typical values. More information can be found on the internet at <https://support.industry.siemens.com/cs/document/94059311>

³⁾ The input current depends on the motor load and line impedance. The input currents apply for load at rated power for a line impedance corresponding to $u_K = 1\%$.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

PM250D Power Modules

Technical specifications

Line voltage 380 ... 500 V 3 AC		PM250D Power Modules		
		6SL3525-0PE24-0AA1	6SL3525-0PE25-5AA1	6SL3525-0PE27-5AA1
Rated output current I_N ¹⁾	A	10.2	13.2	19
Maximum output current I_{max}	A	20.4	26.4	38
Rated power	kW (hp)	4 (5)	5.5 (7.5)	7.5 (10)
Rated pulse frequency	kHz	4	4	4
Efficiency η	%	>95	>95	>95
Power loss ²⁾ At rated output current	kW	0.167	0.218	0.291
Cooling air requirement	m ³ /s (ft ³ /s)	0.012 (0.42)	0.018 (0.64)	0.025 (0.88)
Sound pressure level L_{pA} (1 m)	dB	74.5	74.5	74.5
Rated input current ³⁾	A	9.5	12.2	17.7
Line supply connection U1/L1, V1/L2, W1/L3, PE		Q4/2 (connector)	Q4/2 (connector)	Q4/2 (connector)
• Conductor cross-section	mm ²	2.5 ... 6	4 ... 6	4 ... 6
PE-connection (external connection)		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
• Conductor cross-section (recommended)	mm ²	10 ... 16	10 ... 16	10 ... 16
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		Q8 (socket)	Q8 (socket)	Q8 (socket)
• Conductor cross-section	mm ²	2.5 ... 4	4	4
Motor cable length, max. Shielded	m (ft)	15	15	15
Degree of protection		IP65/UL Type 3	IP65/UL Type 3	IP65/UL Type 3
Dimensions				
• Width	mm (in)	445 (17.52)	445 (17.52)	445 (17.52)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)
• Depth	mm (in)	220 (8.66)	220 (8.66)	220 (8.66)
Frame size		FSC	FSC	FSC
Weight, approx.	kg (lb)	8.5 (18.7)	8.5 (18.7)	8.5 (18.7)

¹⁾ The rated output current I_N is based on the duty cycle for high overload (HO).

²⁾ Typical values. More information can be found on the internet at <https://support.industry.siemens.com/cs/document/94059311>

³⁾ The input current depends on the motor load and line impedance. The input currents apply for load at rated power for a line impedance corresponding to $u_K = 1\%$.

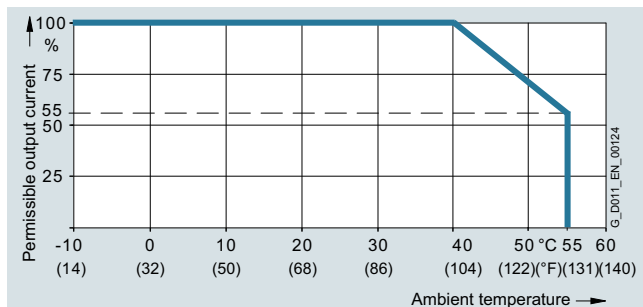
Characteristic curves

Derating data

Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.75	1	2.2	1.9	1.5	1.3	1.1	1	0.9
1.5	1.5 ¹⁾	4.1	3.5	2.9	2.5	2.1	1.8	1.6
3	4	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4	5	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	19	19	19	17.6	16.3	14.9	13.5

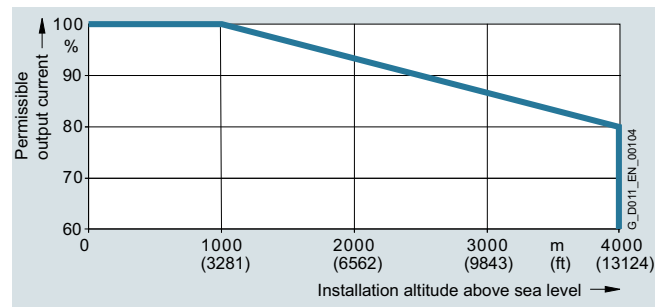
Ambient temperature



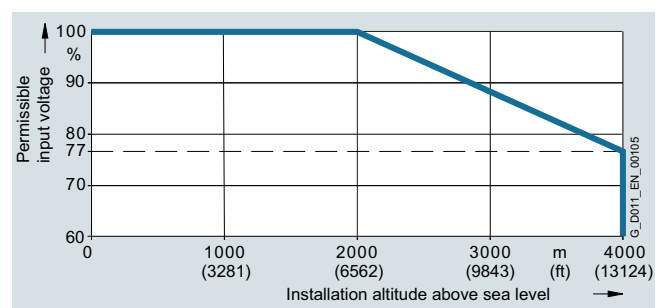
Permissible output current as a function of ambient temperature for PM250D Power Modules, frame sizes FSA to FSC

The operating temperature ranges of the Control Units should be taken into account. [The temperature ranges are specified in the technical specifications under Control Units.](#)

Installation altitude



Permissible output current as a function of installation altitude for PM250D Power Modules, frame sizes FSA to FSC

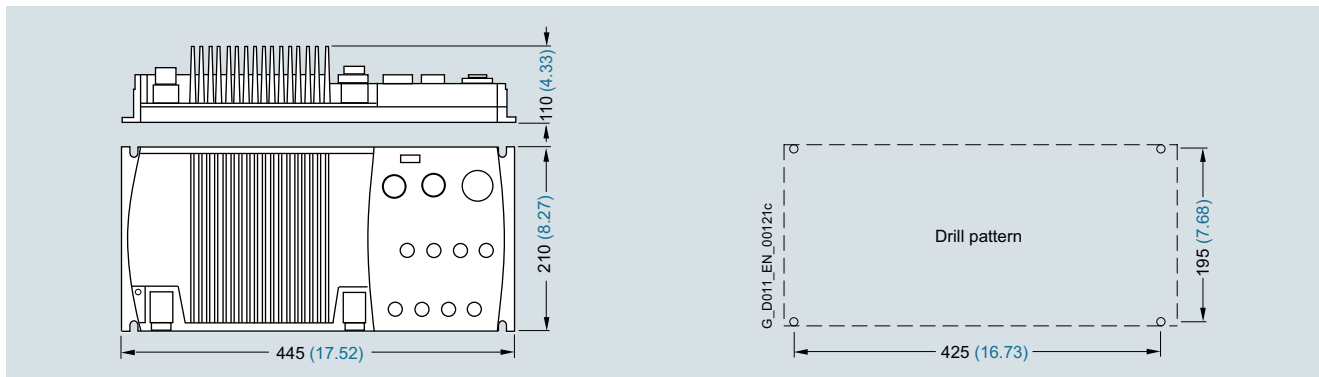


Permissible input voltage as a function of installation altitude for PM250D Power Modules, frame sizes FSA to FSC

¹⁾ It is not possible to make any assignment to a particular standard.

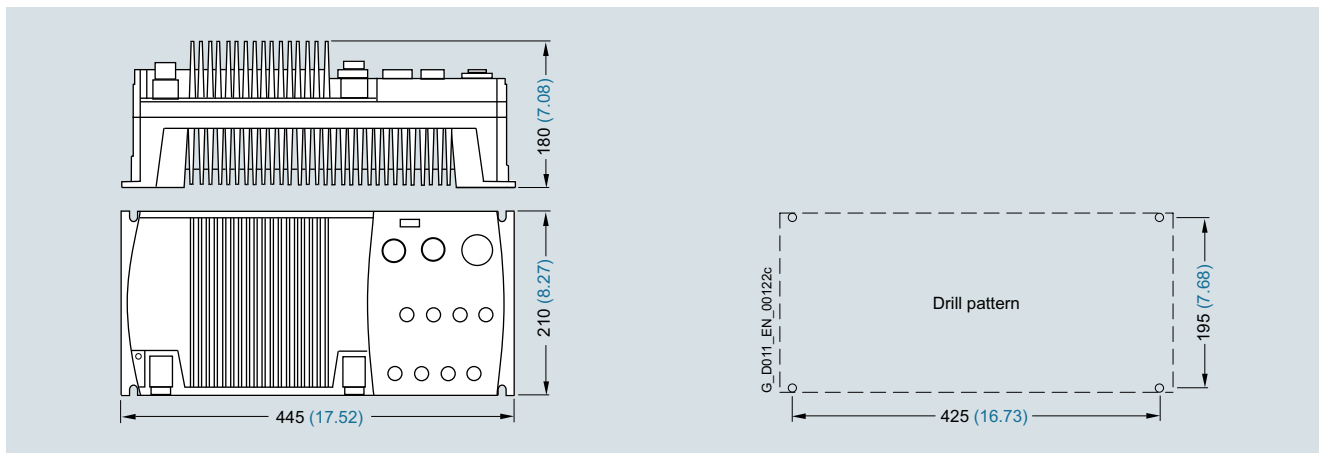
SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

PM250D Power Modules**Dimensional drawings**

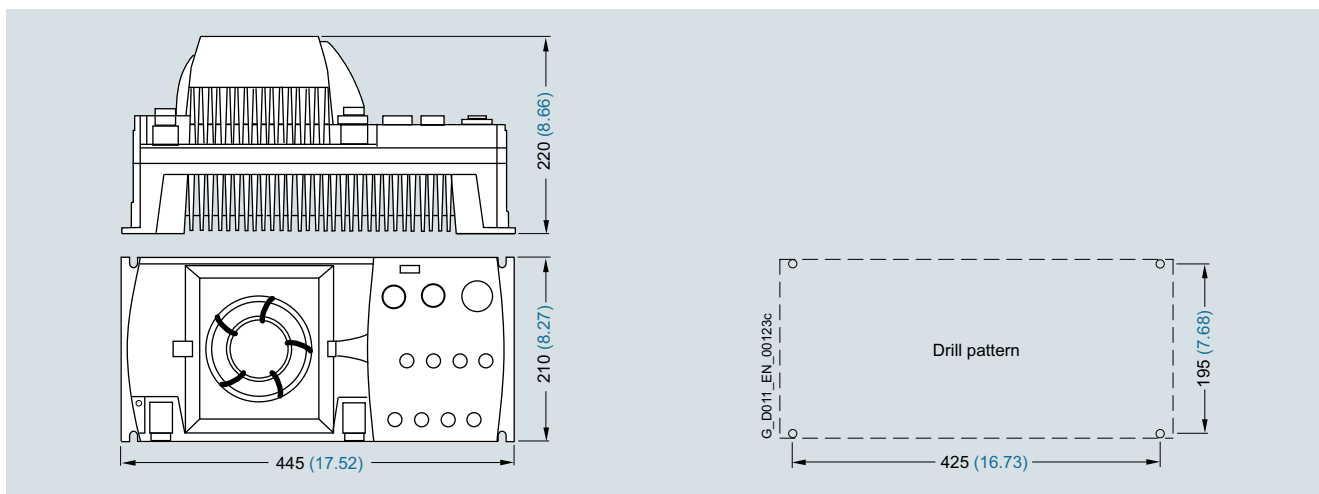
PM250D Power Module, frame size FSA, with integrated line filter class A and mounted Control Unit

With a CU2x0D-2 PN-F PP/FO Control Unit, the height increases to 128.3 mm (5.05 inches).



PM250D Power Module, frame size FSB, with integrated line filter class A and mounted Control Unit

With a CU2x0D-2 PN-F PP/FO Control Unit, the height increases to 198.3 mm (7.81 inches).



PM250D Power Module, frame size FSC, with integrated line filter class A and mounted Control Unit

Mounted with M5 or M6 screwed joints with a maximum washer diameter of 12 mm (0.47 inches).

3 mm (0.12 inches) Allen screw for the Control Unit.

Ventilation clearance required (for wall mounting) at top and bottom: 150 mm (5.9 inches).

All dimensions in mm (values in brackets are in inches).

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Recommended line-side power components

Overview

Selection and ordering data

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers.

Note for use in compliance with IEC standards:

3NA3 type fuses and 3RV type circuit breakers are recommended for European countries. The values in the table take into account the overload capability of the converter.

Note for use in compliance with UL regulations:

Fuses for use in North America must be UL-certified, Class J fuses with a rated voltage of 600 V AC.

Short Circuit Current Rating (SCCR) according to UL

Applies to industrial control panel installations according to NEC Article 409 or UL 508A

- PM250D: 100 kA (480 V 3 AC)

Additional information about the listed fuses and circuit breakers is available in the Catalogs LV 10, IC 10 and IC 10 AO as well as in the Industry Mall.

Individual protection

Rated power		SINAMICS G120D PM250D Power Modules		IEC-compliant			UL-compliant (according to UL category JDDZ)	
kW	hp	Type 6SL3525-...	Frame size	Fuse		Circuit breaker Article No.	Fuse type Rated voltage 600 V AC	
				Current A	Article No.		Class	Current A
3 AC 380 ... 500 V								
0.75	1	0PE17-5AA1	FSA	10	3NA3803	3RV2011-1JA10	J	10
1.5	1.5 ¹⁾	0PE21-5AA1	FSA	10	3NA3803	3RV2011-1JA10	J	15
3	4	0PE23-0AA1	FSB	16	3NA3805	3RV2011-4AA10	J	25
4	5	0PE24-0AA1	FSC	20	3NA3807	3RV2021-4BA10	J	35
5.5	7.5	0PE25-5AA1	FSC	20	3NA3807	3RV2021-4BA10	J	45
7.5	10	0PE27-5AA1	FSC	32	3NA3812	3RV2021-4PA10	J	60

Group protection (installation on power bus)

For installations with several converters, the converters are normally supplied from a 400 V power bus. Further information can be found in the operating instructions on the internet at www.siemens.com/sinamics-g120d/documentation

¹⁾ It is not possible to make any assignment to a particular standard.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Supplementary system components

Accessories

For SINAMICS G120D distributed frequency converters, the following supplementary system components are always required or are available depending on the intended application.

Designation	Order	See page
IOP-2 Handheld Intelligent Operator Panel ¹⁾	Application-dependent	8/35
• RS232 connecting cable ¹⁾	Application-dependent	8/35
Memory cards	Application-dependent	8/36
PC converter connection kit 2 (mini USB interface cable for communication with a PC)	Application-dependent	8/36
STARTER commissioning tool	Application-dependent	8/36
SINAMICS Startdrive commissioning tool	Application-dependent	8/36
Connecting cables for the Control Unit		8/37
• PROFINET connecting cable	Application-dependent	8/37
• PROFIBUS connecting cable	Application-dependent	8/37
• Connecting cables/connectors for supplying the Control Unit with 24 V DC power	Always required	8/37
• Connecting cables and connectors for digital inputs and outputs	Application-dependent	8/38
• Connecting cables and connectors for encoders and analog inputs	Application-dependent	8/38
Connecting cables for Power Modules		
• Connecting cables pre-assembled at one end and connector sets to connect to the line supply	Always required	8/38
• Motor cables pre-assembled at one end and connector sets to connect the Power Module to the motor	Always required	8/39
• Power bus distribution 400 V in IP65 degree of protection	Application-dependent	8/39

¹⁾ For use of the IOP-2 Handheld in combination with SINAMICS G120D and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required (Article No.: 3RK1922-2BP00). The cable must be ordered separately.

Accessories

IOP-2 Handheld Intelligent Operator Panel



IOP-2 Handheld for mobile use

The IOP-2 Handheld Intelligent Operator Panel is a very user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of SINAMICS G120D and SIMATIC ET 200pro FC-2 distributed converters.

The IOP-2 Handheld supports both newcomers and drive experts. Thanks to the membrane keyboard with a central sensor control field, the high-contrast color displays, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and a parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There is a basic commissioning wizard for general commissioning.

Up to two process values can be graphically visualized and up to four process values can be numerically visualized on the status screen/display. Process values can also be displayed in technological units.

The IOP-2 Handheld supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency converter into the IOP-2 Handheld and downloaded into other drive units of the same type as required.

In addition to the IOP-2, the IOP-2 Handheld includes a housing with rechargeable batteries, a charging unit, an RS232 connecting cable, and a USB cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 10 hours.

To connect the IOP-2 Handheld to SINAMICS G120D and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required in addition.

Updating the IOP-2 Handheld

The IOP-2 Handheld can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP-2 Handheld. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP-2 Handheld ¹⁾.

Description	Article No.
IOP-2 Handheld For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G120D SIMATIC ET 200pro FC-2 Included in the scope of delivery: <ul style="list-style-type: none"> • IOP-2 • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable 3 m (9.84 ft) long, can be used in combination with SINAMICS G120 SINAMICS G120C SINAMICS G120P • USB cable 1 m (3.28 ft) long 	6SL3255-0AA00-4HA1
RS232 connecting cable 2.5 m (8.20 ft) long, with optical interface for connecting the IOP-2 Handheld to SINAMICS G120D SIMATIC ET 200pro FC-2	3RK1922-2BP00

	IOP-2 Handheld 6SL3255-0AA00-4HA1
Display	High-contrast color display, a variety of display options
<ul style="list-style-type: none"> • Resolution 	320 × 240 Pixel
Operator panel	Membrane keyboard with central sensor control field
Operating languages	English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified
Ambient temperature	
<ul style="list-style-type: none"> • During transport and storage • During operation 	-20 ... +55 °C (-4 ... +131 °F) 0 ... 40 °C (32 ... 104 °F)
Humidity	Relative humidity < 95 %, non-condensing
Degree of protection	IP20
Dimensions (H × W × D)	195.04 × 70 × 37.58 mm (7.68 × 2.76 × 1.48 in)
Weight, approx.	0.724 kg (1.6 lb)
Compliance with standards	CE, UKCA, RCM, cULus, EAC, KC-REM-S49-SINAMICS

¹⁾ Information on updates for the IOP-2 Handheld is available at <https://support.industry.siemens.com/cs/document/67273266>

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Supplementary system components

Accessories

Memory cards



SINAMICS SD memory card

The parameter settings for a converter can be stored on the SINAMICS SD memory card. In case of service, e.g. after exchanging a converter and importing the data from the memory card, the system is immediately ready for operation again

- Parameter settings can be written from the memory card to the converter or saved from the converter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports series commissioning without the use of the Intelligent Operator Panel IOP-2 Handheld or the STARTER and SINAMICS Startdrive commissioning tools.
- If firmware is stored on the memory card and a Control Unit is installed, the firmware can be upgraded/downgraded during power-up ¹⁾

Note:

The memory card is optional, but it facilitates converter replacement.

Description	Article No.
SINAMICS SD card 512 MB	6SL3054-4AG00-2AA0

Optional firmware memory cards

SINAMICS SD card 512 MB + firmware V4.7 SP13 (Multicard V4.7 SP13)	6SL3054-7TG00-2BA0
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For an overview and more information on all available firmware versions, see

<https://support.industry.siemens.com/cs/document/67364620>

PC converter connection kit 2 (mini USB interface cable for communication with a PC)

For controlling and commissioning a converter directly from a PC via a point-to-point connection if the appropriate software (STARTER commissioning tool ²⁾, V4.3 and higher, or SINAMICS Startdrive) has been installed.

Description	Article No.
PC converter connection kit 2 USB cable (3 m/9.84 ft long) for • SINAMICS G120C • SINAMICS G120 Control Units - CU230P-2 - CU240E-2 - CU250S-2 • SINAMICS G115D • SINAMICS G120D Control Units - CU240D-2 - CU250D-2 (except for variants PP (Push Pull) and FO (Fiber Optic))	6SL3255-0AA00-2CA0

STARTER commissioning tool

The STARTER commissioning tool (V4.3 and higher) supports the commissioning and maintenance of SINAMICS G120D converters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Description	Article No.
STARTER commissioning tool ²⁾ on DVD-ROM	6SL3072-0AA00-0AG0

SINAMICS Startdrive commissioning tool

The SINAMICS Startdrive commissioning tool (V13 and higher) supports the commissioning and maintenance of SINAMICS G120D converters. SINAMICS Startdrive is part of the TIA Portal engineering platform. It supports the intuitive integration of SINAMICS drives in automation. The same operator control concept, the elimination of interfaces and a high degree of user-friendliness make it possible to quickly integrate SINAMICS into an automation process and start it up with the TIA Portal. The TIA Portal with SINAMICS Startdrive offers you a totally integrated engineering platform for the complete application from the project engineering phase through to commissioning and diagnostics.

Description	Article No.
SINAMICS Startdrive commissioning tool ³⁾ on DVD-ROM	6SL3072-4EA02-0XG0

¹⁾ You can find more information about firmware upgrades/downgrades on the internet at <https://support.industry.siemens.com/cs/document/67364620>

²⁾ STARTER commissioning tool is also available on the internet at www.siemens.com/starter

³⁾ The SINAMICS Startdrive commissioning tool is also available on the internet at <https://support.industry.siemens.com/cs/document/68034568>

Accessories

An overview of all available accessories (e.g. plugs and cables) can be found under the following link:

www.siemens.com/distributeddrives-supplementaryproducts

Connecting cables for the Control Unit

PROFINET connecting cable

Flexible plug-in cables and plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbps) between Industrial Ethernet stations with IP65 degree of protection.

Description	Article No.
IE connecting cable M12-180/M12-180 Pre-assembled IE FC TP trailing cable GP 2 x 2 PROFINET type C with two 4-pole M12 plugs (4-pole, D-coded), IP65/IP67 degree of protection, UL, plug/plug connector (IN/OUT) Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1 m (3.28 ft) • 1.5 m (4.92 ft) • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49.2 ft) 	6XV1870-8AE30 6XV1870-8AE50 6XV1870-8AH10 6XV1870-8AH15 6XV1870-8AH20 6XV1870-8AH30 6XV1870-8AH50 6XV1870-8AN10 6XV1870-8AN15
IE M12 Plug PRO For assembly in the field, M12 plug-in connector (D-coded), metal enclosure, UL, fast connection method, plug connector <ul style="list-style-type: none"> • 1 unit • 8 units • 1 unit (angled) 	6GK1901-0DB20-6AA0 6GK1901-0DB20-6AA8 3RK1902-2DA00
RJ45 PLUG PRO connector For on-site assembly for CU240D-2 PN-F PP or CU250D-2 PN-F PP Control Unit, UL 1 package = 1 unit <ul style="list-style-type: none"> • 1 unit 	6GK1901-1BB10-6AA0
SIMATIC NET POF/PCF cables (fiber optic) For CU240D-2 PN-F FO and CU250D-2 PN-F FO Coded cables for assembly in the field (sold by the meter) <ul style="list-style-type: none"> • POF standard cable GP 980/1000 Minimum order quantity: 20 m (66 ft) • POF trailing cable 980/1000 Minimum order quantity: 20 m (66 ft) • PCF standard cable GP 200/230 With UL approval Minimum order quantity: 20 m (66 ft) • PCF trailing cable 200/230 With UL approval Minimum order quantity: 20 m (66 ft) 	6XV1874-2A 6XV1874-2B 6XV1861-2D 6XV1861-2C
Plugs for fiber-optic cables POF/PCF plug-in connectors for assembly in the field <ul style="list-style-type: none"> • IE SC RJ POF PLUG PRO (1 unit) • IE SC RJ PCF PLUG PRO (1 unit) 	6GK1900-0MB00-6AA0 6GK1900-0NB00-6AA0

PROFIBUS connecting cable

Flexible plug-in cables/connectors for transmission of data (up to 12 Mbps) from PROFIBUS stations.

Description	Article No.
PROFIBUS M12 plug-in cable Pre-assembled with two 5-pole M12 plug/socket connectors, UL Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1 m (3.28 ft) • 1.5 m (4.92 ft) • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49.2 ft) 	6XV1830-3DE30 6XV1830-3DE50 6XV1830-3DH10 6XV1830-3DH15 6XV1830-3DH20 6XV1830-3DH30 6XV1830-3DH50 6XV1830-3DN10 6XV1830-3DN15
PROFIBUS M12 connector 5-pole, B-coded, metal enclosure, 1 package = 5 units <ul style="list-style-type: none"> • Pin insert Female contact insert • Female contact insert 	6GK1905-0EA00 6GK1905-0EB00

Connecting cables/connectors for supplying the Control Unit with 24 V DC power

Description	Article No.
7/8" plug-in cable For power supply, pre-assembled with two 5-pole 7/8" plug/socket connectors, UL 5 x 1.5 mm ² Length: <ul style="list-style-type: none"> • 0.3 m (0.98 ft) • 0.5 m (1.64 ft) • 1 m (3.28 ft) • 1.5 m (4.92 ft) • 2 m (6.56 ft) • 3 m (9.84 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) • 15 m (49.2 ft) 	6XV1822-5BE30 6XV1822-5BE50 6XV1822-5BH10 6XV1822-5BH15 6XV1822-5BH20 6XV1822-5BH30 6XV1822-5BH50 6XV1822-5BN10 6XV1822-5BN15
7/8" plug-in connector 5-pole, B-coded, plastic enclosure, 1 package = 5 units <ul style="list-style-type: none"> • Pin insert (OUT) • Female contact insert (IN) 	6GK1905-0FA00 6GK1905-0FB00
POWER PLUG PRO plug-in connector for the CU2x0D-2 PN-F PP/FO 5-pole push-pull power plug, metal enclosure, for on-site assembly 1 package = 1 unit <ul style="list-style-type: none"> • 1 unit 	6GK1907-0AB11-6AA0

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Supplementary system components

Accessories

Connecting cables and connectors for digital inputs and outputs

Description	Article No.
M12 plug-in cable With PUR sheath, to connect digital sensors and actuators, pre-assembled at one end, angled, plug connector, 5-pole, $5 \times 0.34 \text{ mm}^2$, UL Length: <ul style="list-style-type: none"> • 1.5 m (4.92 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) 	3RK1902-4HB15-5AA0 3RK1902-4HB50-5AA0 3RK1902-4HC01-5AA0
M12 plug For screw mounting, 5-pole screw-type connection max. 0.75 mm^2 , A-coded, max. 4 A, UL, plug connector <ul style="list-style-type: none"> • Straight • Angled 	3RK1902-4BA00-5AA0 3RK1902-4DA00-5AA0

Connecting cables and connectors for encoders and analog inputs

Description	Order (see Product Partner)
M12 cable connector 8-pole plug connector <ul style="list-style-type: none"> • Straight cable outlet • Angled cable outlet 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
M12 plug-in cable Pre-assembled at one end, straight, plug connector, 8-pole, $4 \times 2 \times \text{AWG}24$, shielded, PUR gray, suitable for trailing cables, for HTL and SSI encoders Length: <ul style="list-style-type: none"> • 1.5 m (4.92 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
M12 plug-in cable Pre-assembled at both ends, 8-pole M12 male connector to 12-pole M23 socket, $4 \times 2 \times \text{AWG}24$, shielded, PUR gray, suitable for trailing cables <ul style="list-style-type: none"> • HTL plug-in cable • SSI plug-in cable Length: <ul style="list-style-type: none"> • 1.5 m (4.92 ft) • 5 m (16.4 ft) • 10 m (32.8 ft) 	Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec Ordered from and supplied by KnorrTec
T distribution piece To connect two analog inputs 8-pole M12 male connector to 2×4 -pole M12 socket, angled	Ordered from and supplied by KnorrTec

Connecting cables for Power Modules

Connecting cables pre-assembled at one end and connector sets to connect to the line supply

Description	Article No.
Connecting cable pre-assembled at one end Power supply cable, open at one end, for Q4/2, angled, $4 \times 4 \text{ mm}^2$ <ul style="list-style-type: none"> • 1.5 m (4.92 ft) long • 5 m (16.4 ft) long 	3RK1911-0DB13 3RK1911-0DB33
Connector set for the power supply Q4/2 <ul style="list-style-type: none"> • 2.5 mm^2 • 4 mm^2 • 6 mm^2 	3RK1911-2BE50 3RK1911-2BE10 3RK1911-2BE30

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Supplementary system components

Accessories

Motor cables pre-assembled at one end and connector sets to connect the Power Module to the motor

Motor cables pre-assembled at one end for motors with brake and temperature sensor with Q8 plug, shielded	Article No. (HTG: supplied by Harting) (ZKT: supplied by KnorrTec)		
	4 × 1.5 mm ² 2 × (2 × 0.75 mm ²)	4 × 2.5 mm ² 2 × (2 × 0.75 mm ²)	4 × 4 mm ² 2 × 1 mm ² + 2 × 1.5 mm ²
• 1.5 m (4.92 ft) long	HTG: 61 88 201 0288 ZKT: 70020501000150	HTG: 61 88 201 0291 ZKT: 70009601000150	HTG: 61 88 201 0303 ZKT: 70017001000150
• 3 m (9.84 ft) long	HTG: 61 88 201 0289 ZKT: 70020501000300	HTG: 61 88 201 0292 ZKT: 70009601000300	HTG: 61 88 201 0304 ZKT: 70017001000300
• 5 m (16.4 ft) long	HTG: 61 88 201 0290 ZKT: 70020501000500	HTG: 61 88 201 0293 ZKT: 70009601000500	HTG: 61 88 201 0305 ZKT: 70017001000500
• 10 m (32.8 ft) long	HTG: 61 88 201 0299 ZKT: 70020501001000	HTG: 61 88 201 0301 ZKT: 70009601001000	HTG: 61 88 201 0306 ZKT: 70017001001000
Connector set for motor cable Q8, shielded	HTG: 61 83 401 0131 ZKT: 10032001	HTG: 61 83 401 0132 ZKT: 10032011	HTG: 61 83 401 0133 ZKT: 10032021

Power bus distribution 400 V in IP65 degree of protection

Description	Ordering (see Product Partner)
Power T clamp connector for 2.5 ... 6 mm² With attached 7-pole plug, female contact insert, grommet housing, UL Seals for various cable cross-sections must be ordered separately	Ordered from and supplied by Harting
T clamp connector Completely pre-assembled	Ordered from and supplied by KnorrTec
T distributor box, IDC connection power cable Pre-assembled, UL, uncut power cable, 2.5 ... 6 mm ² Push-in connection: 1.5 ... 6 mm ² Seals for various cable cross-sections must be ordered separately	Ordered from and supplied by Weidmüller
Y distributor For direct connection of 400 V supply line Q4/2, conductor cross-section 1.5 ... 4 mm ²	Ordered from and supplied by Harting

More information

A comprehensive range of supplementary products is provided for the distributed drive technology, e.g. pre-assembled cables and connectors. An overview is provided at the following link:
www.siemens.com/distributeddrives-supplementaryproducts

For more information about the connecting cables and plug-in connectors, please refer to Catalog IK PI.

SINAMICS G120D distributed converters

0.75 kW to 7.5 kW (1 hp to 10 hp)

Spare parts > Spare parts kit

Overview

A spare parts kit can be ordered, comprising small parts such as replacement seals, caps, PROFIBUS address windows and screws.

Selection and ordering data

Description	Article No.
Spare parts kit for SINAMICS G120D Comprising replacement seals, caps, PROFIBUS address windows and screws	6SL3500-0SK01-0AA0
Replacement caps for CU2x0D-2 PN-F PP/FO • 24 V push-pull PLUG PRO caps 1 package = 5 units	6ES7194-4JA50-0AA0
• RJ45 PLUG PRO caps 1 package = 5 units	6ES7194-4JD50-0AA0

Spare parts > Replacement fans

Overview

The Power Module fans are designed for extra long service life. Replacement fans can be ordered for special applications. In case of a replacement for frame size FSC, a replacement fan which comprises a pre-mounted unit with cover, fan and screws can be ordered.

Selection and ordering data

Rated power		SINAMICS G120D PM250D Power Module		Replacement fan (pre-mounted unit with cover, fan and screws)
kW	hp	Type 6SL3525-...	Frame size	Article No.
380 ... 500 V 3 AC				
4	5	0PE24-0AA1	FSC	6SL3500-0SF01-0AA0
5.5	7.5	0PE25-5AA1		
7.5	10	0PE27-5AA1		

SIMATIC ET 200pro FC-2 frequency converters 1.5 kW (2 hp)

9



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Further information about
SIMATIC ET 200pro FC-2
can be found in Catalog ST 70

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

Introduction

Application

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
Pumping, ventilating, compressing	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	V20 G120C G120X	G120X G130/G150 G180 ¹⁾ DCM	S120	G120	S110	S120
Moving	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/disengagers
	V20 G115D G120C ET 200pro FC-2²⁾	G120 G120D G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120 G120D	S110 S210 DCM	S120 S210 DCM
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	G120 G130/G150 G180 ¹⁾	S120 S150 DCM	V90 G120	S110 S210	S120 S210 DCM
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

The SIMATIC ET 200pro FC-2 frequency converter for a cabinet-free configuration with a high IP65 degree of protection and a power rating of up to 1.5 kW designed as a SIMATIC module, with an integrated safety function and regenerative feedback capability. It supplements the SIMATIC ET 200pro system range with distributed, speed-controlled drives. The frequency converter offers, in combination with the other modules of the modular SIMATIC ET 200pro system, solutions which have been exactly tailored to the plant/system.

Practical application examples and descriptions are available on the internet at www.siemens.com/sinamics-applications

More information

You may also be interested in these frequency converters::

- Horizontal distributed conveyor-related applications, degree of protection up to IP66 ⇒ SINAMICS G115D
- With positioning function in degree of protection IP65 ⇒ SINAMICS G120D
- More performance, higher functionality for the control cabinet in IP20 degree of protection ⇒ SINAMICS G120, SINAMICS G120C
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110

¹⁾ Industry-specific converters.

²⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter is available at www.siemens.com/et200pro-fc

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Overview



SIMATIC ET 200pro FC-2 frequency converters

The SIMATIC ET 200pro FC-2 frequency converter has the design of a SIMATIC ET 200pro module. It supplements the SIMATIC ET 200pro system range with distributed, speed-controlled drives. It is suitable for the open-loop and closed-loop control of asynchronous (induction) motors in a wide range of industrial applications. It is predestined for conveyor technology applications using drives networked via PROFIBUS and PROFINET, in particular in distributed designs without control cabinet with high degree of protection (IP65), when combining several drives. The modular, service-friendly concept is ideally suited to manufacturing processes with high plant standstill costs.

Reasons for using distributed drive systems

- Modular drive solutions – therefore standardized mechatronic elements that can be individually tested
- A control cabinet is not required, resulting in a smaller space requirement and lower cooling requirements
- Long motor cables between converter and motor are not required
 - Less power losses
 - Reduced noise radiation
 - Reduced costs for shielded cables
 - No additional filters
- Distributed configurations offer considerable benefits for conveyor systems with their extensive coverage (e.g. in the automotive and logistics sectors)

Siemens family of distributed drives

Siemens offers an innovative portfolio of frequency converters to optimally implement distributed drive solutions. The strengths of the individual members of the drive family permit simple adaptation to the widest range of application demands:

- Identical connection systems
- User-friendly commissioning and configuration tools

Products from the family of distributed drives:

- SINAMICS G115D distributed drive system (wall and motor-mounted)
- SINAMICS G120D frequency converters
- SIMATIC ET 200pro FC-2 frequency converters
- SIRIUS M200D motor starters

Safety Integrated

The distributed SIMATIC ET 200pro FC-2 frequency converters are already equipped with the integrated STO (Safe Torque Off) safety function, certified in accordance with IEC 61508 SIL 2 as well as EN ISO 13849-1 PL d and Category 3. It can be activated locally via the F-RSM or by means of PROFIsafe.

STARTER commissioning tool

The STARTER commissioning tool (V4.4 and higher) plus the corresponding SINAMICS Support Package (SSP) supports the commissioning and maintenance of SIMATIC ET 200pro FC-2 frequency converters.

The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Engineering Framework STEP7 classic (V5.5 and higher)

Hardware Support Packages (HSP) are available to integrate SIMATIC ET 200pro FC-2 in STEP7 classic.

Engineering Framework TIA Portal (as from V13 SP1)

TIA Portal is a powerful engineering framework providing full access to the whole digitized automation.

Hardware Support Packages (HSP) are available to integrate SIMATIC ET 200pro FC-2 in TIA Portal.

Selection and ordering data

	Article No.
SIMATIC ET 200pro FC-2 frequency converter with integrated safety function STO (Safe Torque Off)	6SL3514-1KE13-5AE0
Backplane bus module for mounting the frequency converter (absolutely essential for operation of the converter)	6SL3260-2TA00-0AA0

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Benefits

- Quick and easy installation
 - Flexibility as SIMATIC ET 200pro modules can be freely combined with the frequency converter
 - No wiring outlay due to self-assembling communication and supply rails in the backplane bus with each additional module
 - The load voltage is routed to downstream frequency converters or motor starters with minimal installation costs through pre-assembled power jumper plugs (max. 25 A).
- Accelerated engineering, fast installation and commissioning
 - Easy combination and expansion of converter functionality using I/O modules or RSM isolator modules within the distributed station
 - Module replacement possible without interrupting communication to the SIMATIC ET 200pro station and the other modules within SIMATIC ET 200pro
 - No configuration effort required or reduction of space requirements and installation expenditure for the braking resistor due to line-commutated energy recovery
 - Parameter assignment via IOP-2 Handheld, STARTER and optional memory card as parameter storage medium
 - Standard mini USB interface for commissioning
- Low-cost and uniform solutions
 - Communication via PROFIBUS and PROFINET (copper or POF fiber-optic cables) including the corresponding interface module
 - Safety Integrated functionality (STO) already integrated as standard
 - Activation of the fail-safe function (STO) of the frequency converter locally via the Safety Local isolator module F-RSM or via PROFIsafe with the F-Switch PROFIsafe module

Application

- The frequency converter controls the speed of induction motors steplessly.
- The modular, service-friendly concept of the frequency converter is ideally suited to manufacturing processes with high plant standstill costs.
- Ideal solutions can be created using several frequency converters combined in one distributed station when drives are operated in the same area or for the same purposes.
- The frequency converter handles both frequency control for simple applications and sensorless vector control (SLVC) for more complex drive tasks. It also handles the optimum control of a motor brake, if used.
- The converter also supports torque control, for example, for applications with mechanically coupled drives.
- The benefits of regenerative feedback lie primarily in the reduction in configuring overhead (no braking resistor necessary), reduced installation costs and lower space requirements.
- The STO safety function integrated as standard significantly reduces the overhead for drive solutions in plant sections where there is a hazard potential.

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Design

The SIMATIC ET 200pro FC-2 distributed frequency converter is a compact frequency converter for standard drives which has the design of a SIMATIC ET 200pro module. Each SIMATIC ET 200pro FC-2 frequency converter includes both the Control Unit as well as the Power Module in one unit. In addition, there is a backplane bus module for integrating the frequency converter in the SIMATIC ET 200pro system bus.



SIMATIC ET 200pro FC-2 frequency converter

The SIMATIC ET 200pro FC-2 frequency converter supplements the SIMATIC ET 200pro system range with distributed, speed-controlled drives. The frequency converter offers, in combination with the other modules of the modular SIMATIC ET 200pro system, solutions which have been exactly tailored to the plant/system and allows, through the combination of several frequency converters in one distributed station, ideal solutions when drives are operated in the same area or for the same purposes.



SIMATIC ET 200pro station with two SIMATIC ET 200pro FC-2 converters

It is completely embedded in the SIMATIC ET 200pro system and offers all the system advantages such as cabinet-free installation, easy mounting on the module rack, reduction of the wiring outlay due to self-assembling communication and supply rails in the backplane bus, comprehensive diagnostic mechanisms and high availability thanks to replaceability without affecting other modules in the SIMATIC ET 200pro station.

The certified STO safety function integrated as standard ensures that persons and machines are protected from the dangerous movement of machines. Integration of the safety system into the drive also simplifies the machine architecture and supports system-wide diagnostics.

Active and dynamic braking of the motor is possible without incurring any additional costs. The generated braking energy is fed back into the power supply, so there is no need for a braking chopper and braking resistors. To ensure full motor protection, a temperature sensor of the PTC type, bimetal, KTY or Pt1000 can be connected. The integrated 180 V DC brake control at 400 V line voltage ($U_{\text{line}} \times 0.45 = \text{brake voltage}$) allows the direct activation of a motor holding brake and makes a rectifier in the motor terminal box superfluous.

In combination with an SD memory card, the slot for the optional memory card can be used to save the parameter settings in order to facilitate fast replacement of modules with automatic reparameterization.

SIMATIC ET 200pro FC-2 frequency converters use the control modes frequency control and sensorless vector control. The SIMATIC ET 200pro FC-2 frequency converter also supports torque control, for example, for applications with mechanically coupled drives. The innovative power unit concept capable of energy recovery helps save energy.

Options for parameter assignment:

- STARTER, the graphical parameterization tool for Siemens drives
- The fieldbus
- A point-to-point connection via a mini USB interface
- The optical interface for connection of an IOP-2 Handheld

A parameter set download from the SIMATIC controller is also possible.

SIMATIC ET 200pro FC-2 frequency converters

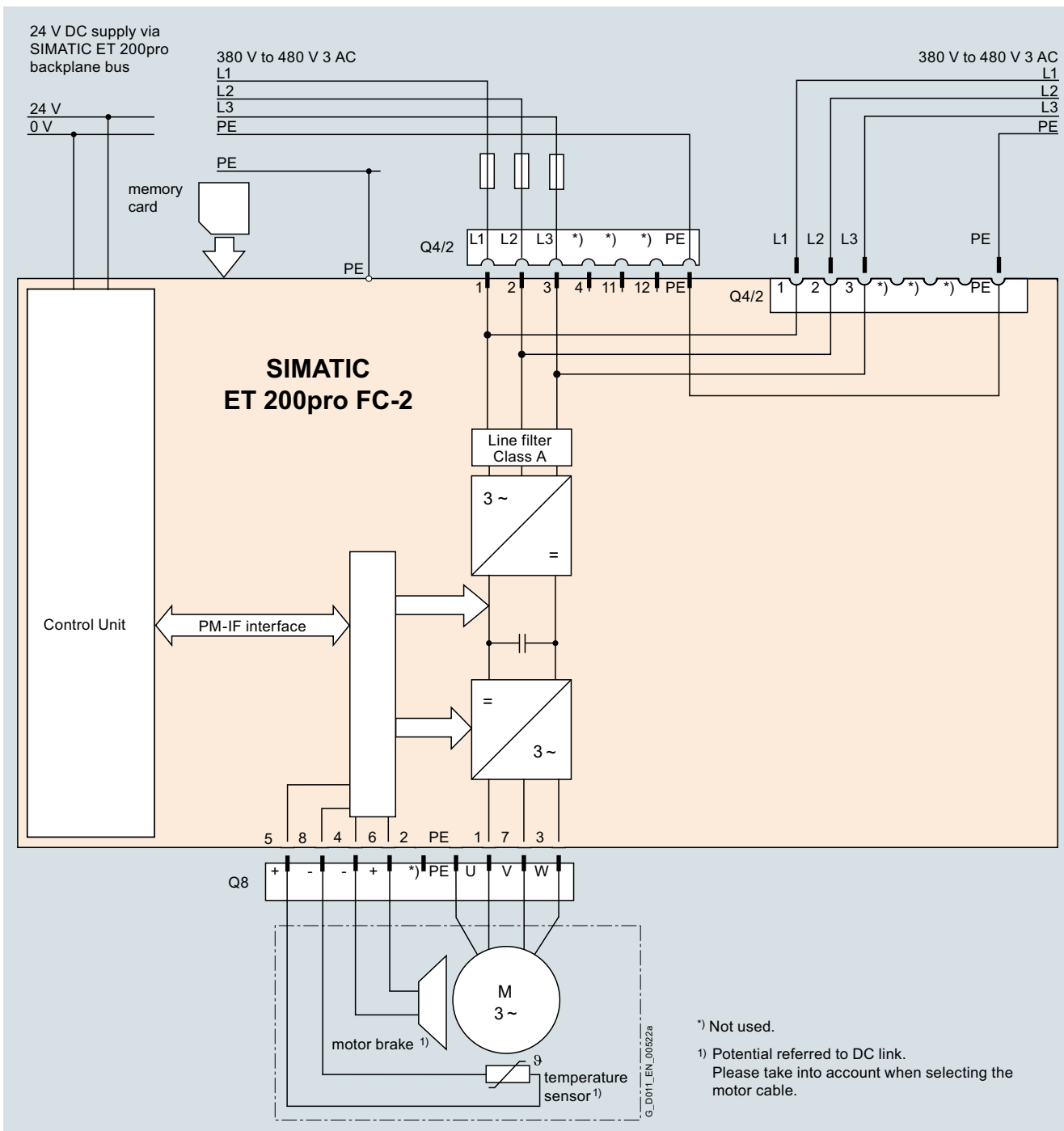
1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Integration

The distributed SIMATIC ET 200pro FC-2 frequency converters feature the following interfaces as standard:

- Line supply connection via Q4/2 (socket)
- Motor connection via Q8 (connector) including control of the motor brake and temperature sensor
- Power output via Q4/2 (connector) for looping the 400 V 3 AC further to a subsequent frequency converter or motor starter from the SIMATIC ET 200pro system



Connection example for SIMATIC ET 200pro FC-2

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Technical specifications

Distributed frequency converter	SIMATIC ET 200pro FC-2																		
Selection features																			
Integrated safety functions acc. to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3	<ul style="list-style-type: none"> • Safe Torque Off (STO) • Control of the integrated safety function via the Safety Local isolator module F-RSM or via F-Switch PROFIsafe 																		
Electrical specifications																			
Line voltage	380 ... 480 V 3 AC ±10 %																		
Power	<ul style="list-style-type: none"> • With an ambient temperature of 0 ... 55 °C (32 °F ... 131 °F) 1.1 kW • With an ambient temperature of 0 ... 45 °C (32 °F ... 113 °F) 1.5 kW 																		
Rated input current/output current	<ul style="list-style-type: none"> • With an ambient temperature of 0 ... 55 °C (32 °F ... 131 °F) 2 A/3.5 A • With an ambient temperature of 0 ... 45 °C (32 °F ... 113 °F) 2.5 A/3.9 A 																		
Line frequency	47 ... 63 Hz																		
Overload capability	<ul style="list-style-type: none"> • Overload current 1.5 x rated output current (i.e. 150 % overload) for 60 s, cycle time 300 s • Overload current 2 x rated output current (i.e. 200 % overload) for 3 s, cycle time 300 s 																		
Output frequency	0 ... 550 Hz																		
Pulse frequency	4 kHz (standard), 4 ... 16 kHz (in 2-kHz increments)																		
Standard SCCR (Short Circuit Current Rating)	10 kA																		
Skipped frequency range	1, parameterizable																		
Converter efficiency	95 ... 97 %																		
Interfaces	<ul style="list-style-type: none"> • Connection to PROFIBUS and PROFINET over the SIMATIC ET 200pro backplane bus • Mini USB interface for commissioning via PC (as from STARTER V4.4 plus SSP) • Optical interface for commissioning via the IOP-2 Handheld • Slot for an optional memory card (SD) for uploading or downloading parameter settings. Facilitates easy device replacement. • PTC, bimetal, KTY84, Pt1000 interface for motor temperature monitoring 																		
Functions																			
Open-loop/closed-loop control methods	<ul style="list-style-type: none"> • V/f control – linear ($M \sim n$) with/without flux current control (FCC), quadratic ($M \sim n^2$) or parameterizable • Vector control – sensorless • Closed-loop torque control 																		
Operating functions	<ul style="list-style-type: none"> • Jogging • BICO technology • Automatic restart following interruptions in operation due to a power failure • Smooth connection of converter to rotating motor 																		
Braking functions	<ul style="list-style-type: none"> • Integrated regenerative feedback functionality • Control of an electromagnetic holding brake <p>Integrated brake control supplies DC power supply to the brake</p> <table border="1"> <tr> <td>Line voltage</td> <td>380 V AC</td> <td>400 V AC</td> <td>440 V AC</td> <td>480 V AC</td> </tr> <tr> <td>Rectified brake voltage</td> <td>171 V DC</td> <td>180 V DC</td> <td>198 V DC</td> <td>216 V DC</td> </tr> <tr> <td>Recommended brake coil voltage for Siemens motors</td> <td>170 ... 200 V DC</td> <td>170 ... 200 V DC 184 ... 218 V DC</td> <td>184 ... 218 V DC</td> <td>184 ... 218 V DC</td> </tr> </table> <p>Disconnection on the DC side permits "fast" braking.</p>				Line voltage	380 V AC	400 V AC	440 V AC	480 V AC	Rectified brake voltage	171 V DC	180 V DC	198 V DC	216 V DC	Recommended brake coil voltage for Siemens motors	170 ... 200 V DC	170 ... 200 V DC 184 ... 218 V DC	184 ... 218 V DC	184 ... 218 V DC
Line voltage	380 V AC	400 V AC	440 V AC	480 V AC															
Rectified brake voltage	171 V DC	180 V DC	198 V DC	216 V DC															
Recommended brake coil voltage for Siemens motors	170 ... 200 V DC	170 ... 200 V DC 184 ... 218 V DC	184 ... 218 V DC	184 ... 218 V DC															
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Ground fault • Short-circuit • Stall protection • Thermal motor protection (R^t or sensor) • Converter overtemperature • Motor blocking protection • Phase failure detection 																		
Connectable motors	<ul style="list-style-type: none"> • Low-voltage asynchronous (induction) motors • Motor cable lengths: max. 15 m (49 ft) (shielded) 																		
Mechanical specifications																			
Degree of protection	IP65																		
Operating temperature	0 ... 55 °C (32 ... 131 °F)																		
Mounting position	Vertical wall mounting (vertical alignment of the cooling fins)																		
Dimensions (W x H x D)	155 mm x 246 mm x 248 mm (6.10 in x 9.69 in x 9.76 in)																		
Weight, approx.	4 kg (8.8 lb)																		
Standards																			
Certificates of suitability	UL508C, cUL, CE, UKCA, Low-Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU																		

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Characteristic curves

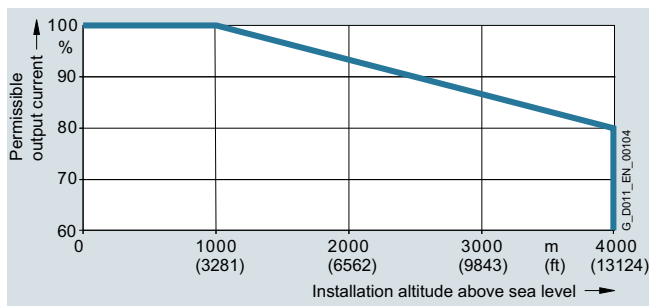
Derating data

Pulse frequency

Ambient temperature °C	Rated output current in A at a pulse frequency of						
	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0 ... 55 (1.1 kW)	3.5	2.8	2.2	1.6	1.1	0.5	0.0
0 ... 45 (1.5 kW)	3.9	3.9	3.9	3.6	3.3	2.7	2.2

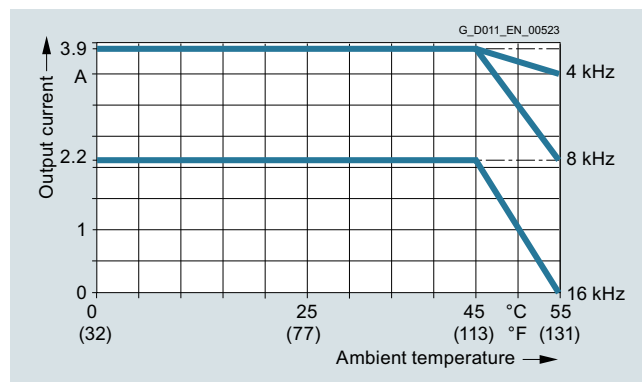
Rated output current as a function of the pulse frequency

Installation altitude



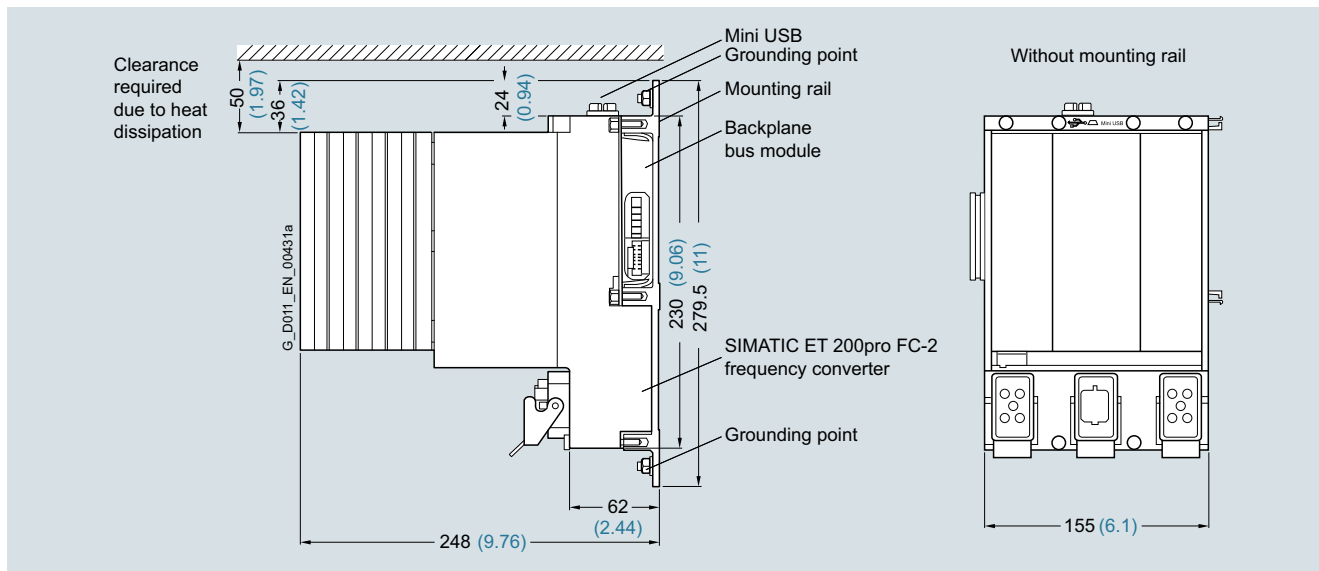
Permissible output current as a function of the installation altitude

Relationship between pulse frequency, temperature and output base-load current



Output current as a function of the pulse frequency and ambient temperature

Dimensional drawings



SIMATIC ET 200pro FC-2 frequency converter with backplane bus module and mounting rail

All dimensions in mm (values in brackets are in inches).

Accessories

IOP-2 Handheld Intelligent Operator Panel



IOP-2 Handheld for mobile use

The IOP-2 Handheld Intelligent Operator Panel is a very user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of SINAMICS G120D and SIMATIC ET 200pro FC-2 distributed converters.

The IOP-2 Handheld supports both newcomers and drive experts. Thanks to the membrane keyboard with a central sensor control field, the high-contrast color displays, the menu-based operation and the application wizards, it is easy to commission standard drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and a parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There is a basic commissioning wizard for general commissioning.

Up to two process values can be graphically visualized and up to four process values can be numerically visualized on the status screen/display. Process values can also be displayed in technological units.

The IOP-2 Handheld supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency converter into the IOP-2 Handheld and downloaded into other drive units of the same type as required.

In addition to the IOP-2, the IOP-2 Handheld includes a housing with rechargeable batteries, a charging unit, an RS232 connecting cable, and a USB cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 10 hours.

To connect the IOP-2 Handheld to SINAMICS G120D and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required in addition.

Updating the IOP-2 Handheld

The IOP-2 Handheld can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP-2 Handheld. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP-2 Handheld ¹⁾.

Description	Article No.
IOP-2 Handheld For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G120D SIMATIC ET 200pro FC-2 Included in the scope of delivery: <ul style="list-style-type: none"> • IOP-2 • Handheld housing • Rechargeable batteries (4 x AA) • Charging unit (international) • RS232 connecting cable 3 m (9.84 ft) long, can be used in combination with SINAMICS G120, SINAMICS G120C, SINAMICS G120P • USB cable 1 m (3.28 ft) long 	6SL3255-0AA00-4HA1
RS232 connecting cable 2.5 m (8.20 ft) long, with optical interface for connecting the IOP-2 Handheld to SINAMICS G120D, SIMATIC ET 200pro FC-2	3RK1922-2BP00

	IOP-2 Handheld 6SL3255-0AA00-4HA1
Display	High-contrast color display, a variety of display options
<ul style="list-style-type: none"> • Resolution 	320 × 240 pixels
Operator panel	Membrane keyboard with central sensor control field
Operating languages	English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified
Ambient temperature	
<ul style="list-style-type: none"> • During transport and storage • During operation 	-20 ... +55 °C (-4 ... +131 °F) 0 ... 40 °C (32 ... 104 °F)
Humidity	Relative humidity < 95 %, non-condensing
Degree of protection	IP20
Dimensions (H × W × D)	195.04 × 70 × 37.58 mm (7.68 × 2.76 × 1.48 in)
Weight, approx.	0.724 kg (1.6 lb)
Compliance with standards	CE, UKCA, RCM, cULus, EAC, KC-REM-S49-SINAMICS

¹⁾ Information on updates for the IOP-2 Handheld is available at <https://support.industry.siemens.com/cs/document/67273266>

SIMATIC ET 200pro FC-2 frequency converters

1.5 kW (2 hp)

SIMATIC ET 200pro FC-2 frequency converters

Accessories

Memory cards



SINAMICS SD memory card

The parameter settings of the converter and the firmware can be stored on the optional SINAMICS SD memory card. When service is required, the data are automatically downloaded from the memory card in the converter and the system is ready for use again without further interventions.

- Parameter settings can be written from the memory card to the converter or saved from the converter to the memory card.
- Up to 100 parameter sets can be stored.
- The memory card supports series commissioning without the use of the Intelligent Operator Panel IOP-2 Handheld or the STARTER commissioning tool.
- If firmware is stored on the memory card and a Control Unit is installed, the firmware can be upgraded/downgraded during power-up¹⁾

Note:

The memory card is optional, but it facilitates converter replacement.

Description	Article No.
SINAMICS SD card 512 Mbyte	6SL3054-4AG00-2AA0

Optional firmware memory cards

SINAMICS SD card 512 Mbyte + firmware V4.7 SP13 (Multicard V4.7 SP13)	6SL3054-7TG00-2BA0
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For an overview and more information on all available firmware versions, see <https://support.industry.siemens.com/cs/document/67364620>

STARTER commissioning tool

The STARTER commissioning tool (V4.4 and higher) plus SSP supports the commissioning and maintenance of SIMATIC ET 200pro FC-2 frequency converters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Description	Article No.
STARTER commissioning tool ²⁾ on DVD-ROM	6SL3072-0AA00-0AG0

PC converter connection kit 2

The mini USB interface cable is used to control and commission a converter directly from a PC via a point-to-point connection if the appropriate software (STARTER commissioning tool version 4.4 and higher, plus SSP) has been installed.

Description	Article No.
PC converter connection kit 2 Mini USB interface cable for communication with a PC, 3 m (9.84 ft) long	6SL3255-0AA00-2CA0

Connecting cables pre-assembled at one end and connector sets to connect to the line supply

Description	Artikel-Nr.
Connecting cable pre-assembled at one end Power supply cable, open at one end, for Q4/2, angled, 4 × 4 mm ²	
• 1.5 m (4.92 ft) long	3RK1911-0DB13
• 5 m (16.4 ft) long	3RK1911-0DB33
Connector set for the power supply Q4/2	
• 2,5 mm ²	3RK1911-2BE50
• 4 mm ²	3RK1911-2BE10
• 6 mm ²	3RK1911-2BE30

Motor cables pre-assembled at one end and connector sets to connect the converter to the motor

Motor cables pre-assembled at one end for motors with brake and temperature sensor with Q8 plug, shielded	Article No.
	(HTG: supplied by Harting) (ZKT: supplied by KnorrTec)
Cross-section	4 × 1,5 mm ² 2 × (2 × 0,75 mm ²)
• 1.5 m (4.92 ft) long	HTG: 61 88 201 0288 ZKT: 70020501000150
• 3 m (9.84 ft) long	HTG: 61 88 201 0289 ZKT: 70020501000300
• 5 m (16.4 ft) long	HTG: 61 88 201 0290 ZKT: 70020501000500
• 10 m (32.8 ft) long	HTG: 61 88 201 0299 ZKT: 70020501001000
Connector set for motor cable Q8, shielded	HTG: 61 83 401 0131 ZKT: 10032001

Power jumper plugs

The power jumper plug is used for 400 V power transmission to following 400 V modules.

Description	Article No.
Power jumper plugs	3RK1922-2BQ00

More information

A comprehensive range of supplementary products is provided for the distributed drive technology, e.g. pre-assembled cables and connectors. An overview is provided at the following link: www.siemens.com/distributeddrives-supplementaryproducts

For more information about the connecting cables and plug-in connectors, please refer to Catalog IK PI.

¹⁾ You can find more information about firmware upgrades/downgrades on the internet at <https://support.industry.siemens.com/cs/document/67364620>

²⁾ The STARTER commissioning tool is also available on the internet at www.siemens.com/starter

SIMOTICS motors and SIMOGEAR geared motors



10/2

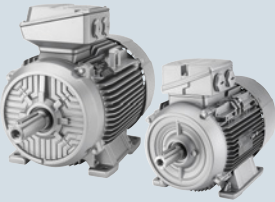
Overview

You can find more information on motors/geared motors on the internet at:
www.siemens.com/industrymall

Drive Technology Configurator
Product selection via selectors
www.siemens.com/dt-configurator

**SIZER for Siemens Drives
(integrated into TIA Selection Tool)**
Engineering tool
www.siemens.com/sizer

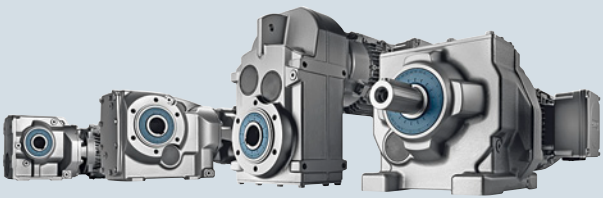
SIMOTICS motors and SIMOGEAR geared motors

Motor type	Features	Degree of protection	Cooling method
 <p>SIMOTICS GP 1LE10 and VSD10 line 1LE10 standard motors SIMOTICS GP VSD4000 line 1FP10 reluctance motors</p>	<p>For general purpose applications Motors with aluminum housing</p>	IP55	Natural cooling/ forced ventilation
<p>SIMOTICS SD 1LE15, 1LE16, and VSD10 line 1LE15 standard motors SIMOTICS SD VSD4000 line 1FP15 reluctance motors</p>	<p>For severe duty applications Motors with cast-iron housing</p>	IP55	Natural cooling

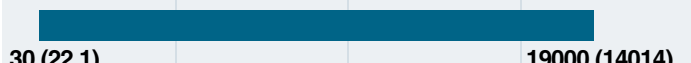
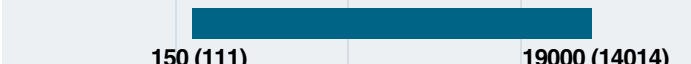
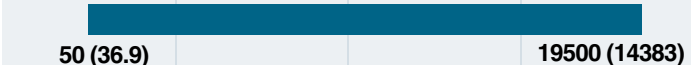


SIMOTICS motors and SIMOGEAR geared motors

Shaft height (SH)	Rated power P_N for S1 duty kW (hp)	Rated torque M_N	Catalog
63, 71, 80, 90, 100, 112, 132, 160, 180, 200	0.09 (0.12) 45 (60.4)	0.6 ... 294 Nm (0.44 ... 217 lb _r -ft)	D 81.1
71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315, 355, 400, 450	0.09 (0.12) 1000 (1341)	1.0 ... 8100 Nm (0.74 ... 5975 lb _r -ft)	

SIMOTICS motors and SIMOGEAR geared motors

Motor type	Features	Degree of protection	Gearbox designation
SIMOGEAR 2KJ3 geared motors			
 <p>SIMOGEAR 2KJ3 geared motors</p>	Helical geared motors	IP55	<p><i>Z19 ... Z189</i> (2-stage)</p> <p><i>D19 ... D189</i> (3-stage)</p> <p><i>E39 ... E149</i> (1-stage)</p> <p><i>D29-Z19 ... D189-D69</i> (tandem geared motors 4-stage to 6-stage)</p>
	Parallel shaft geared motors	IP55	<p><i>FZ29 ... FZ189</i> (2-stage)</p> <p><i>FD29 ... FD189</i> (3-stage)</p> <p><i>FZ29-Z19 ... FD189-D69</i> (tandem geared motors 4-stage to 6-stage)</p>
	Bevel geared motors	IP55	<p><i>B19 ... B49</i> (2-stage)</p> <p><i>K39 ... K189</i> (3-stage)</p> <p><i>K39-D/Z19 ... K189-D/Z69</i> (tandem geared motors 5-stage and 6-stage)</p>
	Helical worm geared motors	IP55	<p><i>C29 ... C89</i> (2-stage)</p> <p><i>C29-D/Z19 ... C89-D/Z39</i> (tandem geared motors 4-stage and 5-stage)</p>
	Worm geared motors	IP55	<i>S09 ... S29</i> (1-stage)

SIMOTICS motors and SIMOGEAR geared motors

Gearbox size	Maximum output torque M_{2max} Nm (lb _f -ft)					Gearbox ratio i	Catalog
	10	100	1000	10000	100000		
19, 29, 39, 49, 59, 69, 79, 89, 109, 129, 149, 169, 189						1.29 ... 27816	D 50.1
	30 (22.1)			19000 (14014)			
29, 39, 49, 69, 79, 89, 109, 129, 149, 169, 189						4 ... 29900	
	150 (111)			19000 (14014)			
19, 29, 39, 49, 69, 79, 89, 109, 129, 149, 169, 189						3.6 ... 14900	
	50 (36.9)			19500 (14383)			
29, 39A, 49, 69, 89						6.5 ... 19000	
	61 (45.0)		1450 (1070)				
09, 19, 29						5.0 ... 100	
	33 (24.3)	116 (85.6)					

SIMOTICS motors and SIMOGEAR geared motors

Notes

10

Engineering tools



11/2	Drive Technology Configurator
11/3	TIA Selection Tool
11/4	SIMARIS planning tools for systems with SINAMICS drives
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11/7	SIZER for Siemens Drives engineering tool (integrated in the TIA Selection Tool)
11/8	STARTER commissioning tool
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11/13	Drive ES engineering software

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks. In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place. For additional information on industrial security measures that may be implemented, please visit

www.siemens.com/industrialsecurity

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats. To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under www.siemens.com/cert

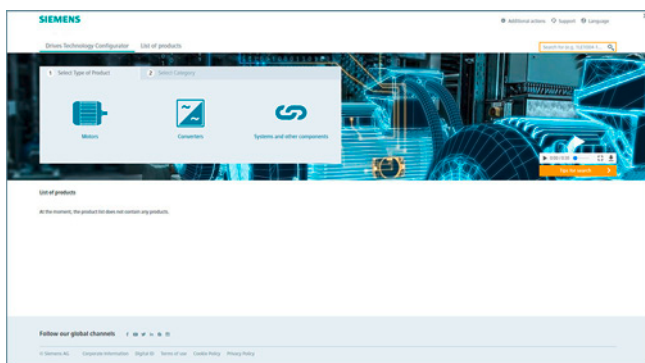
Engineering tools

Drive Technology Configurator

Overview

The Drive Technology Configurator (DT Configurator) helps you to configure the optimum drive technology products for your application – starting with gear units, motors, converters as well as the associated options and components and ending with controllers, software licenses and connection systems. Whether with little or detailed knowledge of products: preselected product groups, deliberate navigation through selection menus and direct product selection through entry of the article number support quick, efficient and convenient configuration.

In addition, comprehensive documentation comprising technical data sheets, 2D dimensional drawings/3D CAD models, operating instructions, certificates, etc. can be selected in the DT Configurator. Immediate ordering is possible by simply transferring a parts list to the shopping cart of the Industry Mall.



Drive Technology Configurator for efficient drive configuration with the following functions

- Quick and easy configuration of drive products and associated components – gear units, motors, converters, controllers, connection systems
- Configuration of drive systems for pumps, fans and compressor applications from 1 kW to 2.6 MW
- Retrievable documentation for configured products and components, such as
 - Data sheets in up to 9 languages in PDF or RTF format
 - 2D dimensional drawings/3D CAD models in various formats
 - Terminal box drawing and terminal connection diagram
 - Operating instructions
 - Certificates
 - Start-up calculation for SIMOTICS motors
 - EPLAN macros
- Support with retrofitting in conjunction with Spares On Web www.siemens.com/sow
- Ability to order products directly through the Siemens Industry Mall

Access to the Drive Technology Configurator

The Drive Technology Configurator can be called up without registration and without a login:
www.siemens.com/dt-configurator

Overview

Selection guide and configurator for automation technology

Error-free configuration without expert knowledge through intelligent configurators and selection wizards. Desktop and cloud versions enable cross-team collaboration with maximum flexibility.

There are two versions of the TIA Selection Tool:

- for downloading and executing on Windows PCs (from Microsoft Windows 10)
- One for running from the cloud, which is launched from mobile devices directly in the browser (we recommend Safari, Chrome and Firefox)

Projects stored in the cloud can be edited with both tools. This makes it possible to work on-the-go using a tablet, at home on a PC – and vice versa, or together with colleagues and customers.

In order to use the full functionality, we recommended setting up a Siemens Industry Mall account for both cases. This gives you access to prices and enables you to save your projects to our cloud.

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

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 the Industry Mall can also be compiled.

You can find more information on the SIZER for Siemens Drives engineering tool at

<https://support.industry.siemens.com/cs/ww/en/ps/13434/dl>

Engineering tools

SIMARIS planning tools for systems with SINAMICS drives

Overview

Electrical planning: Even easier with software!

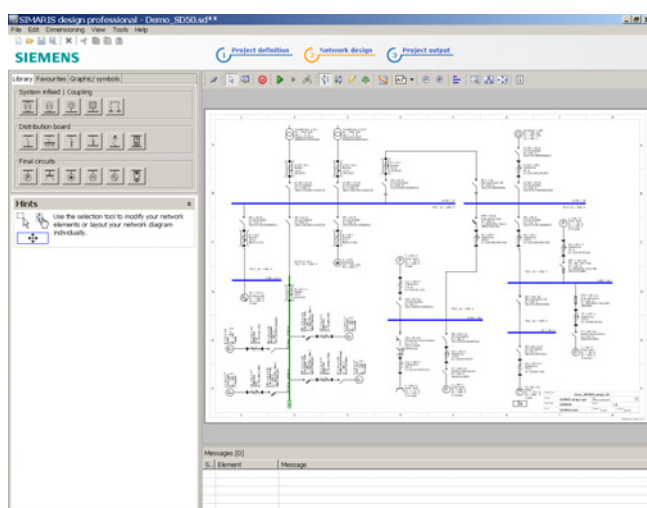
Electrical planning for power distribution in non-residential and industrial buildings has never been more complex. To ensure you, as a specialist planner, have the best hand when it comes to electrical planning with SINAMICS drives, we provide support with the following efficient software tools: SIMARIS design for dimensioning and SIMARIS project for calculating the space requirements of the distribution boards.

Supported SINAMICS drives:

- SINAMICS G120, SINAMICS G120D, SINAMICS G120X
- SINAMICS G115D
- SINAMICS G130, SINAMICS G150

SIMARIS planning tools for systems with SINAMICS drives > SIMARIS design

Overview



SIMARIS design is a planning tool for quick and effective network calculation and dimensioning of power distribution for non-residential and industrial buildings.

Starting in the planning phase, the entire electrical circuit required for the project can be structured and dimensioned on the basis of real products. For this purpose, the network structure is initially set up based on the stored modules for infeeds, couplings, distributors and branch circuits. It is also possible to reuse stored favorites, such as those processed for previous similar projects. Suitable components and distribution systems are then automatically selected from the product database stored in SIMARIS design based on the selected project-specific parameters and technical data. This precludes the extra costs so often incurred in the implementation phase as a result of systems that have not been correctly coordinated.

Any configuration of electric power distribution is subject to frequent change and adaptation, not only in the planning phase, but also in the implementation phase. SIMARIS design makes it easy to incorporate such changes in the supply concept and to automatically check their reliability in terms of sound engineering practice and the currently applicable standards.

SIMARIS design professional, a program version available for a fee, offers additional useful functions. It can be used to carry out and also document selectivity analyses, essential for safety power supply systems. There is also the option of analyzing and optimizing the energy efficiency of the planned network.

The versatile output variants enable precise documentation of the project structure and of the calculated data suitable for every phase of a project.

There is also the option of exporting the project data. This enables further processing of the planned project in SIMARIS project, and thus also supports and facilitates system planning.

Benefits

- Reduction in processing overhead for projects
- Dimensioning of electrical networks on the basis of real products according to sound engineering practice and the currently applicable standards (VDE, IEC)
- Automatic selection of the correct components from medium voltage through to interfacing of the load from the stored product database, i.e. no detailed knowledge of products and systems required
- Open definition of the types of mains selection and switching states
- Calculation of the short circuit current, load flow, voltage drop and energy balance
- Incorporation of the required person, short circuit and overload protection
- Option of factoring in any necessary functional endurance
- Display and dimensioning of cable and busbar trunking systems for power conveyance and distribution
- High planning reliability coupled with flexibility in the planning and implementation process
- Tracking changes via Change index possible
- Simple adaptation in the case of application changes or expansions
- Option for saving frequently required modules in the Favorites library
- Output of the created network diagram, as well as detailed parts lists and data lists
- Incorporation of country-specific product portfolios
- Comprehensive documentation of planning results with simple data transfer (Office, CAD etc.)

Application

SIMARIS design is a software tool for the network calculation and dimensioning of power distribution for non-residential and industrial buildings. Whether for a shopping center, a hospital or production facilities – with SIMARIS design you can reduce the overhead required for the overall planning of power distribution systems and hence the time spent on the selection and dimensioning of equipment.

More information

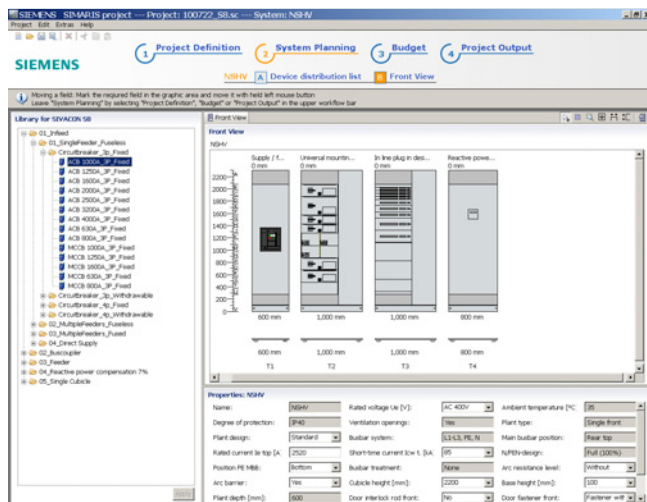
For further information and available downloads, please go to: www.siemens.com/simarisdgign

If you have any other questions, please do not hesitate to contact our Customer Support Center:

Phone.: +49 70 00 7 46 27 47

Email: technical-assistance@siemens.com

Overview



SIMARIS project is a planning tool for fast calculation of space requirements and electrical power distribution system budgets for non-residential and industrial buildings, and for generating specifications automatically.

The following is determined in SIMARIS project based on the pre-defined project structure and the basic technical specifications selected:

- For medium-voltage switchboards: selection of the required system and the required fields, then presentation of a front view with dimensions.
- Following selection of the system for transformers, the required quantity must be selected. Selected transformers are presented as a parts list.
- For low-voltage switchboards and distribution boards: selection of the required protection devices and switching devices per system. The most suitable distribution system is determined automatically based on the list of distribution devices thus created. It is then equipped with the devices and presented graphically in an automatically generated front view that includes dimensions.
- Following selection of the system for busbar trunking systems the length is specified and the additionally required components are selected, e.g. infeeds, junction units and tap-off units. All the resulting components are listed in a parts list.

Detailed information about Siemens devices or their article numbers is not needed because SIMARIS project makes the selection automatically on the basis of the parameters entered. For each item of switchboard or each distribution board, SIMARIS project takes the wiring, control and measurement etc. into account.

A system plan drawn up in SIMARIS design can also be imported into SIMARIS project, which means that selecting devices becomes redundant and SIMARIS project builds up the project structure automatically.

Convenient output versions are available to document the results, including the automatic generation of specifications for the planned systems.

Typical versions of a system planned in SIMARIS project can be saved and repeatedly integrated in new projects from the Favorites library. Automatically created systems can also be subsequently optimized or changed. This is particularly relevant if planning becomes more detailed and the budget needs to be reinforced as a result.

For detailed calculation of costs – on an up-to-date and regional basis – and for more project support, please contact your Siemens representative.

Benefits

- Intuitive and easy to operate
- Automatic selection and placement of matching distribution systems
- Fast determination of the space requirements and cost of power distribution plants
- End-to-end planning, from medium-voltage switchgear assemblies, transformers, low-voltage switchgear and busbar trunking systems right through to the distribution boards
- Simple adaptation of project planning with increasing clarification of implementation requirements, but also in the event of application changes or expansions
- Saving planned systems for similar projects individually in the favorites library and importing them from there into new projects
- Option of factoring in functional endurance for busbar systems
- Convenient output versions for documentation, such as graphic views, lists and specifications
- Projects created in SIMARIS design can also be imported

Application

SIMARIS project is suitable for the fast determination of the space requirements and cost of electrical power distribution in all industrial and non-residential buildings and for the automatic generation of specifications. From shopping centers to hospitals and production buildings – with SIMARIS project it is possible to reduce the amount of work required for the overall planning of power distribution systems and hence the time spent on selecting and dimensioning the necessary equipment.

More information

For further information and available downloads, please go to: www.siemens.com/simariproject

If you have any other questions, please do not hesitate to contact our Customer Support Center:

Phone.: +49 70 00 7 46 27 47

Email: technical-assistance@siemens.com

Engineering tools

SinaSave energy efficiency tool

Overview

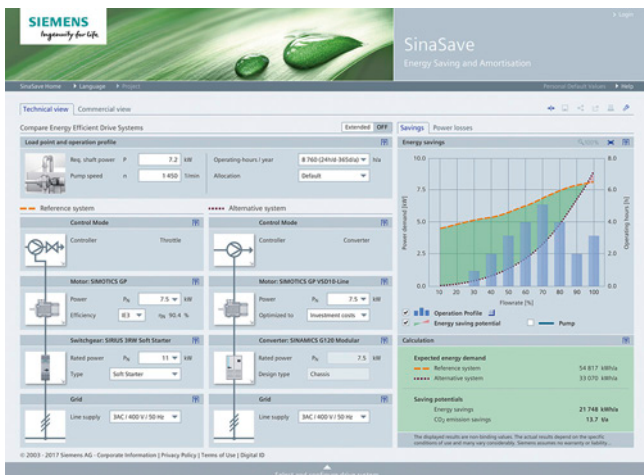
The SinaSave energy efficiency tool calculates potential energy savings and amortization times based on your individual conditions of use and therefore offers practical assistance in making decisions about investments in energy-efficient technologies.

From SinaSave Version 6.0 and higher, the drive systems to be compared and the relevant drive component parameters are displayed graphically. An additional expansion are the numerous comparison possibilities for different control types and comprehensive product combinations for drive solutions for pump and fan applications. In addition to SIMOTICS motors and SINAMICS converters, the product portfolio comprises SIRIUS switching devices, offering a comprehensive range of comparison possibilities – according to your individual requirements.



SinaSave offers numerous comparison scenarios:

- Comparison of drive systems for pump and fan applications in the output range from 0.55 kW (low voltage) to 5.5 MW (medium voltage) for
 - Reactor control (fixed speed; motor and switching device)
 - Bypass control (fixed speed; motor and switching device)
 - Speed control (variable speed; motor and converter)
- Comparison and evaluation of standard motors (incl. ignition protection motors) in different energy efficiency classes



SinaSave supports the evaluation of the various comparisons of product and system by

- Displaying the potential savings for energy and energy costs, as well as CO₂ emissions
- Estimation of the amortization time
- Estimation of the individual total lifecycle costs
- Representation of the system power losses according to IEC 61800-9-2 for full load and partial load
- Direct comparison of Siemens drives with the reference Power Drive System (PDS) described in IEC 61800-9-2



Access to the SinaSave energy efficiency tool

SinaSave can be accessed without the need for registration or logging in:

www.automation.siemens.com/sinasave

More information

Further information about the amortization calculator for energy-efficient drive systems is available on the internet at:

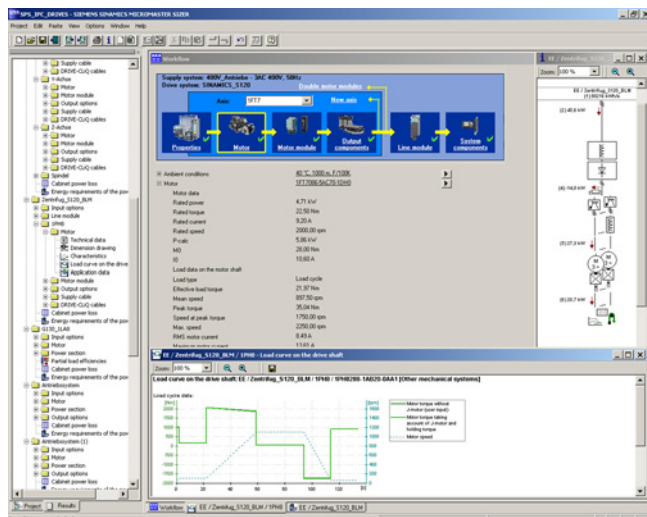
www.siemens.com/sinasave

Further information about services for energy saving is available on the internet at:

www.siemens.com/energysaving

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 low-voltage motors, including servo geared motors
- SIMOGEAR geared motors
- SINAMICS low-voltage drive systems
- Motor starters
- SINUMERIK CNC
- 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 Windows system drive
- Screen resolution 1024 × 768 pixels
- Operating system:
 - Windows 7 (32/64-bit) Professional, Enterprise, Ultimate, Home
 - Windows 8.1 (32/64-bit) Professional, Enterprise, Ultimate, Home
 - Windows 365
 - Windows 10 (64-bit) Professional, Enterprise
- Microsoft Office 2003/2007/2010/2013/2016
- Microsoft Internet Explorer V8.0
- Microsoft .NET Framework 2.0
- OpenGL 2.1

More information

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 the Industry Mall can also be compiled.

You can find more information on the SIZER for Siemens Drives engineering tool at

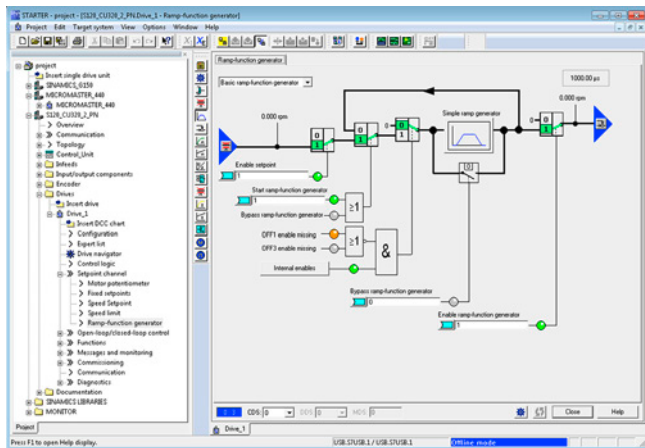
<https://support.industry.siemens.com/cs/ww/en/ps/13434/dl>

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

Engineering tools

STARTER commissioning tool

Overview



The user-friendly STARTER commissioning tool can be used for:

- Commissioning
- Optimization
- Diagnostics

This software can be operated as a standalone PC application, or integrated as a TIA-compatible program in SIMATIC STEP 7, or highly integrated into the SCOUT Engineering System (for SIMOTION). The basic functions and handling are the same in both cases.

In addition to the SINAMICS drives, STARTER also supports MICROMASTER 4 devices.

The project wizards can be used to create the drives within the structure of the project tree.

Beginners are supported by solution-based dialog guidance, whereby a standard graphics-based display maximizes clarity when setting the drive parameters.

First commissioning is guided by a wizard which makes all the basic settings in the drive. Therefore, getting a motor up and running is merely a question of setting a few of the drive parameters as part of the drive configuration process.

The individual settings required are made using graphics-based parameterization screens, which also precisely visualize the principle of operation of the drive.

Examples of individual settings that can be made include:

- How terminals are used
- Bus interface
- Setpoint channel (e.g. fixed setpoints)
- Closed-loop speed control (e.g. ramp-function generator, limits)
- BICO interconnections
- Diagnostics

For experts, the expert list can be used to specifically and quickly access individual parameters at any time. An individual compilation of frequently used parameters can be saved in dedicated user lists and watch tables.

In addition, the following functions are available for optimization purposes:

- Self-optimization of the controller settings (depending on drive unit)
- Setup and evaluation of trace recordings¹⁾
 - Tool function for recording 2×8 signals with
 - Measuring cursor function
 - Extensive trigger functions
 - Several Y scales
 - Sampling times in the current controller cycle clock

Diagnostics functions provide information about:

- Control/status words
- Parameter status
- Operating conditions
- Communication states

Performance features

- User-friendly: Only a small number of settings need to be made for successful first commissioning: The motor starts to rotate
- Solution-oriented dialog-based user guidance simplifies commissioning
- Self-optimization functions reduce manual effort for optimization.

System requirements

The following minimum requirements must be complied with:

- Hardware
 - PG or PC with Pentium III min. 1 GHz (recommended >1 GHz)
 - Work memory 2 GB (4 GB recommended)
 - Screen resolution 1024 × 768 pixels, 16-bit color depth
 - Free hard disk memory: min. 5 GB
- Software
 - Microsoft Internet Explorer V6.0 or higher
 - 64-bit operating systems:
 - Microsoft Windows Server 2016
 - Microsoft Windows Server 2019
 - Microsoft Windows 10 Pro
 - Microsoft Windows 10 Enterprise

Supported virtualization platforms

STARTER (V5.1 SP1 and higher) can be installed on a virtual machine. For this purpose, one of the following virtualization platforms in the specified version or a newer version can be used:

- VMware vSphere Hypervisor (ESXi) 6.7
- VMware Workstation pro V16.1.x
- VMware Player V16.1.x
- Microsoft Windows Server 2016 Hyper-V

You can use the following guest operating systems to install STARTER within the selected virtualization platform:

- Windows 10 Professional/Enterprise (64-bit)

¹⁾ Depending on drive unit.
Not supported for MICROMASTER 4, SINAMICS G110, SINAMICS G120 <firmware V4.4, SINAMICS G110D and SINAMICS G120D <firmware V4.5.

Integration

Data can be exchanged (depending on the version) via PROFIBUS or PROFINET/Ethernet or via a serial interface.

For commissioning and service, a PG/PC can be connected to the CU320-2 Control Unit via PROFIBUS. A PROFIBUS connection must be available with a connecting cable at the PG/PC.

Further, communication between a CU320-2 Control Unit and PG/PC can also be established via Ethernet, either via an (optional) CBE20 Communication Board or the Ethernet interface -X127 on the CU320-2 Control Unit.

Note:

The terminal strip -X127 is suitable as a communication link to the PG/PC only for the purposes of servicing and commissioning.

Selection and ordering data

Description	Article No.
STARTER commissioning tool for SINAMICS and MICROMASTER English, French, German, Italian, Spanish	6SL3072-0AA00-0AG0

Accessories

Depending on the version of the Control Unit (CU), the Control Unit of the drive unit can communicate with the programming device (PG) or PC via PROFIBUS or PROFINET/Ethernet or via a serial interface. The following accessories are available for the particular drive system as listed in the following table.

Description	Recommended accessories
	For communication between the drive unit and the programming device or PC Article No.
SIMATIC ET 200pro FC-2	
<ul style="list-style-type: none"> • USB PC converter connection kit 2 Mini USB interface cable for communication with a PC, 3 m (9.84 ft) 	6SL3255-0AA00-2CA0
<ul style="list-style-type: none"> • PROFIBUS Connection to the PROFIBUS system in the plant 	See supplementary products ¹⁾
<ul style="list-style-type: none"> • PROFINET/Ethernet Connection to the PROFINET system in the plant 	See supplementary products ¹⁾
SINAMICS G120D	
<ul style="list-style-type: none"> • USB PC converter connection kit 2 Mini USB interface cable for communication with a PC, 3 m (9.84 ft) 	6SL3255-0AA00-2CA0
<ul style="list-style-type: none"> • PROFIBUS Connection to the PROFIBUS system in the plant 	See supplementary products ¹⁾
<ul style="list-style-type: none"> • PROFINET/Ethernet Connection to the PROFINET system in the plant 	See supplementary products ¹⁾

More information

The STARTER commissioning tool is also available on the internet under www.siemens.com/starter

¹⁾ An overview of all the supplementary products (e.g. cables and connectors) that are available for the distributed converter family can be found at the following link: www.siemens.com/distributeddrives-supplementaryproducts

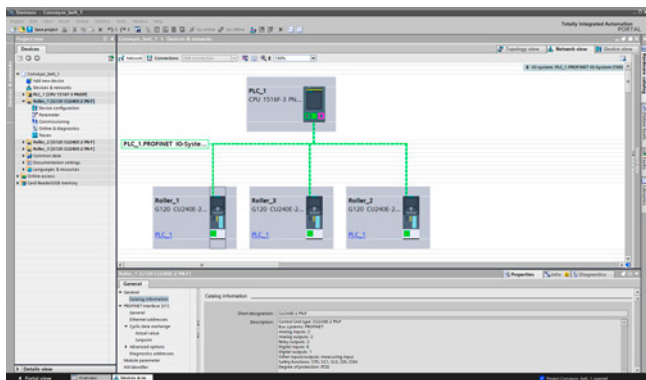
Engineering tools

SINAMICS Startdrive commissioning tool

Overview

SINAMICS Startdrive is integrated in the TIA Portal and is a tool for the configuration, commissioning and diagnostics of the SINAMICS family of converters.

The SINAMICS Startdrive commissioning tool has been optimized with regard to user friendliness and consistent use of the TIA Portal benefits of a common working environment for PLC, HMI and drives. Time-saving and guided step-by-step commissioning with maximum flexibility is complemented by user-friendly graphic function views for all drive functions, including functional safety (Safety Integrated) and drive-based technology functions (e.g. EPos). The automatic message display, the powerful real-time trace and the context-sensitive online help make converter diagnostics very easy.



The software packages based on the TIA Portal are harmonized with each other and offer important benefits, the main advantage being a shared project storage. The TIA Portal enables simple integration of SINAMICS converters in your automation solution. Thanks to the standardization of operator actions and the integration in general TIA Portal operating concepts (e.g. UMAC, Openness) as well as standard TIA Portal functions (e.g. Undo/Redo), familiarization is easy both for drive experts as well as SIMATIC users. Special focus is placed on the interaction between SIMATIC and SINAMICS, especially when connecting the SINAMICS drives to SIMATIC technology objects.

Integration

Supported frequency converters

SINAMICS Startdrive Basic enables complete commissioning, diagnostics, parameterization, optimization and connection to the PLC for the following SINAMICS converters integrated in SINAMICS Startdrive:

- SINAMICS G120, G120C, G120D, G120P
- SINAMICS G115D
- SINAMICS G130, G150
- SINAMICS S120 ^{*)}, S150
- SINAMICS S210
- SINAMICS MV

SINAMICS Startdrive Advanced

With SINAMICS Startdrive Advanced (available as of V15) you benefit from powerful engineering functions that save you considerable time and ultimately costs.

- Advanced functions for SINAMICS Startdrive: Safety acceptance test for SINAMICS G120, SINAMICS S120 and SINAMICS S210
 - Safety Activation Test
 - Improved optimization options in the drive for CU320-2 PN/DP and CU310-2 PN-based drive units: Extended measuring functions (available as of V5.2 SP3)
 - Prompted acceptance test wizard for all drive-based Safety Integrated functions (Basic and Extended Safety)
 - Automatic and safety function-specific generation of traces to analyze the machine behavior
 - Generation of an acceptance report as Excel file (xlsx format, can also be used with OpenOffice)
 - Available for SINAMICS G120, G120C, G115D, G120D, G120P, S120 and S210
- Also contains all Startdrive Basic functions
- License key only required, no additional installation

* Including SINAMICS S220 Smart Line Modules in booksize format as of SINAMICS Startdrive V17 Update 1.

Integration

New in V17

Startdrive Basic V17

- Extension for UMAC: Additional function right for drive parameter changes including DCC
- Extension of the SINAMICS S210 family: Support of the SINAMICS firmware V5.2 SP3
- Extension of the SINAMICS S120 family: Support of CU320-2 DP (in V4.8 or higher) for SINAMICS S120 Booksize and Chassis
- Extension of the SINAMICS MV family: Support of the SINAMICS firmware V5.2 SP2
- Extensions for CU320-2 PN/DP and CU310-2 PN-based drive units
 - Support of the SINAMICS firmware V5.2 SP3
 - User-defined parameter list
 - Data set switchover (drive, motor, encoder and command data sets)
 - Improved optimization option in the drive (Bode diagram)
 - Extensions for CU320-2 Integrated in SIMATIC Drive Controller
 - EPOS (basic positioner)
 - DCC (Drive Control Chart)
 - Improved interaction between drives and SIMATIC technology objects
 - Transfer of optimization parameters from One Button Tuning (OBT) of the drive to the technology object
 - Display of drive configuration status in the technology object
 - Support of new SINAMICS Technology Extensions (TEC) function, see <https://support.industry.siemens.com/cs/ww/en/view/109771648>
- Extension of the SINAMICS G120 family:
 - Support of the SINAMICS G115D distributed drive
 - Improved AS-i connection for SINAMICS G115D AS-i (in combination with SIMATIC ET200SP AS-i Master)
- Extension of technology object "BasicPosControl"
 - Physical units
 - Entry of mechanical data
- Extension of Openness for drive units
 - Support of the SINAMICS G115D distributed drive
 - More information on Startdrive Openness can be found at <https://support.industry.siemens.com/cs/ww/en/view/109763491>

Startdrive Advanced V17

- Extension of safety acceptance test
 - Safety Activation Test
 - Support of the SINAMICS G115D distributed drive
- Extension for CU320-2 PN/DP and CU310-2 PN-based drive units: Improved optimization options in the drive: Extended measuring functions (available as of V5.2 SP3)

Installation versions

SINAMICS Startdrive can be installed as an optional package to SIMATIC STEP 7 or as a stand-alone application (without SIMATIC STEP 7).

System requirements

The following table shows the recommended hardware and system equipment for the operation of SINAMICS Startdrive.

Hardware	Recommendation
Computer	As of SIMATIC FIELD PG M5 Advanced (or comparable PC)
Processor	Intel Core i5-8400H (2.5 ... 4.2 GHz; 4 cores + hyper-threading; 8 MB Smart Cache)
RAM	16 GB or more (32 GB for large projects)
Hard disk	SSD with at least 50 GB available memory
Screen resolution	15.6" Full HD display (1920 × 1080 or larger)
Operating systems	<ul style="list-style-type: none"> • Windows 10 (64 bit) <ul style="list-style-type: none"> - Windows 10 Professional Version 1909, 2004, 2009/20H2 - Windows 10 Enterprise 1909, 2004, 2009/20H2 - Windows 10 IoT Enterprise 2016 LTSC - Windows 10 IoT Enterprise 2019 LTSC • Windows Server (64 bit) <ul style="list-style-type: none"> - Windows 10 Professional Version 1909, 2004, 2009/20H2 - Windows 10 Enterprise 1909, 2004, 2009/20H2 - Windows 10 IoT Enterprise 2016 LTSC - Windows 10 IoT Enterprise 2019 LTSC

Compatibility with other products

- SINAMICS Startdrive V17 operates with STEP 7, WinCC and Scout TIA V17 in one framework
- SINAMICS Startdrive V17 can be installed on the same computer as other versions of SINAMICS Startdrive V12 to V16
- SINAMICS Startdrive can be installed on the same computer as SINAMICS MICROMASTER STARTER

Supported virtualization platforms

SINAMICS Startdrive can be installed in a virtual machine. For this purpose, one of the following virtualization platforms in the specified version or a newer version can be used:

- Windows 10 Professional Version 1909, 2004, 2009/20H2
- Windows 10 Enterprise 1909, 2004, 2009/20H2
- Windows 10 IoT Enterprise 2016 LTSC
- Windows 10 IoT Enterprise 2019 LTSC

Supported security programs

The following security programs have been tested with SINAMICS Startdrive V17:

- Virus scanners:
 - Symantec Endpoint Protection 14.2
 - Trend Micro OfficeScan 12.0
 - McAfee Endpoint Security (ENS) 10.6
 - Kaspersky Endpoint Security 11.3
 - Windows Defender
 - Qihoo 360 "Safe Guard 12.1" + "Virus Scanner"
- Encryption software:
 - Microsoft BitLocker
- Host-based Intrusion Detection System
 - McAfee Application Control 8.2

Engineering tools

SINAMICS Startdrive commissioning tool

Selection and ordering data

Description	Article No.
SINAMICS Startdrive Basic V17 commissioning tool Single license and certificate of license English, French, German, Italian, Spanish, Chinese Simplified <ul style="list-style-type: none"> On DVD-ROM Software download (email address required for delivery) 	6SL3072-4HA02-0XA0 6SL3072-4HA02-0XG0
SINAMICS Startdrive Advanced V17 commissioning tool License key (floating license) English, French, German, Italian, Spanish, Chinese Simplified <ul style="list-style-type: none"> On DVD-ROM with license key on USB flash drive Software download incl. license key (email address required for delivery) 	6SL3072-4HA02-0XA5 6SL3072-4HA02-0XG5
Upgrade SINAMICS Startdrive Advanced V15 ... V16 to V17 <ul style="list-style-type: none"> On DVD-ROM with license key on USB flash drive Software download incl. license key (email address required for delivery) 	6SL3072-4HA02-0XE5 6SL3072-4HA02-0XK5
Software Update Service with SINAMICS Startdrive Advanced in the TIA Portal Delivery is performed according to the number of ordered SUS products (e.g. 10 upgrade license keys (floating license) with 10 DVD-ROMs, 10 USB flash drives, etc.) <ul style="list-style-type: none"> On DVD-ROM with upgrade license key on USB flash drive Software download incl. license key (email address required for delivery) 	6SL3072-4AA02-0XL8 6SL3072-4AA02-0XY8

Accessories

Depending on the version of the Control Unit (CU), the Control Unit of the drive unit can communicate with the programming device (PG) or PC via PROFIBUS or PROFINET/Ethernet or via a serial interface. The following accessories are available for the particular drive system as listed in the following table.

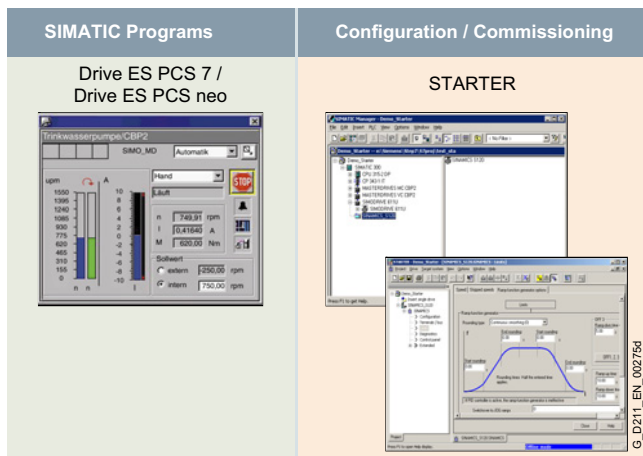
Description	Recommended accessories
For communication between the drive unit and the programming device or PC Article No.	
SINAMICS G115D	
<ul style="list-style-type: none"> USB PC converter connection kit 2 Mini USB interface cable for communication with a PC, 3 m (9.84 ft) 	6SL3255-0AA00-2CA0
<ul style="list-style-type: none"> PROFINET/Ethernet Connection to the PROFINET system in the plant 	See supplementary products ¹⁾
SINAMICS G120D	
<ul style="list-style-type: none"> USB PC converter connection kit 2 Mini USB interface cable for communication with a PC, 3 m (9.84 ft) 	6SL3255-0AA00-2CA0
<ul style="list-style-type: none"> PROFIBUS Connection to the PROFIBUS system in the plant 	See supplementary products ¹⁾
<ul style="list-style-type: none"> PROFINET/Ethernet Connection to the PROFINET system in the plant 	See supplementary products ¹⁾

More information

The SINAMICS Startdrive Basic commissioning tool is available free on the internet at www.siemens.com/startdrive

¹⁾ An overview of all the supplementary products (e.g. cables and connectors) that are available for the distributed drives family can be found at the following link:
www.siemens.com/distributeddrives-supplementaryproducts

Overview



Drive ES/STARTER is the engineering system used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively.

The following software packages are available for selection:

- STARTER
- Drive ES PCS 7 / Drive ES PCS neo

The Drive ES (**Drive Engineering Software**) fully integrates drives from Siemens into the world of Totally Integrated Automation (STEP 7 V5.x).

Design

The following software packages are available for selection:

- **STARTER**
- **Drive ES PCS 7 (APL Style or Classic Style) / Drive ES PCS neo**

STARTER

The STARTER commissioning tool is for first-time users of the world of Totally Integrated Automation and the basic software for setting the parameters of the SINAMICS and MICROMASTER 4 drives online and offline in this environment. The STARTER integration enables both the automation system and the drives to be handled using the SIMATIC Manager software. STARTER is the starting point for common data archiving in complete projects and for extending the use of the routing and the SIMATIC tele-service to drives. STARTER provides the configuration tools for the Motion Control functions – slave-to-slave communication, equidistance and isochronous operation with PROFIBUS DP and ensures that drives with PROFINET IO are simply integrated into the SIMATIC environment.

Drive ES PCS 7 (APL Style or Classic Style)

Drive ES PCS 7 links the drives with a PROFIBUS DP interface into the SIMATIC PCS 7 process control system, and it requires that SIMATIC PCS 7, V6.1 and higher has first been installed. Drive ES PCS 7 provides a block library with blocks for the drives and the corresponding faceplates for the operator station, which enables the drives to be operated from the PCS 7 process control system. From V6.1 and higher, drives will also be able to be represented in the PCS 7 Maintenance Station.

From Drive ES PCS 7 V8.0 and higher, two versions of the library are available: The APL (Advanced Process Library) variant and the previous version in the so-called Classic Style.

Detailed contents of the Drive ES PCS 7 (APL Style or Classic Style)

- **Block library for SIMATIC PCS 7** Faceplates and control blocks for SIMOVERT MASTERDRIVES VC and MC, as well as MICROMASTER/MIDIMASTER of the third and fourth generation and SIMOREG DC MASTER and SINAMICS
- **STEP 7 V5.x slave object manager** for user-friendly configuration of drives and non-cyclic PROFIBUS DP communication with the drives
- **STEP 7 V5.x device object manager** for easy configuration of drives with PROFINET-IO interfaces (V8.0 SP1 and higher)
- **SETUP program** for installing the software in the SIMATIC PCS 7 environment

Drive ES PCS neo

Siemens SINAMICS drives can be controlled via SIMATIC PCS neo and operated and monitored on the OCM client with the SINAMICS library Drive ES PCS neo. The drive ES PCS neo faceplates make the data relevant for system operation available on the OCM client. The STARTER commissioning tool on the engineering server can also be used for parameter assignment, commissioning and detailed diagnostics of the SINAMICS drives.

Engineering tools

Drive ES engineering software

Selection and ordering data

Description	Article No.
Drive ES PCS 7 V8.2 SPx ¹⁾ Block library for PCS 7 for the integration of drives in Classic Style (as predecessor) Requirement: PCS 7 V8.2 and higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-8JD00-2AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD00-0AB2
<ul style="list-style-type: none"> • Upgrade from V6.x/V7.x/V8.x to V8.2 SPx ¹⁾ 	6SW1700-8JD00-2AA4
Drive ES PCS 7 APL V8.2 SPx ¹⁾ Block library for PCS 7 for the integration of drives in APL Style (Advanced Process Library) Requirement: PCS 7 V8.2 and higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-8JD01-2AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD01-0AB2
<ul style="list-style-type: none"> • Upgrade of APL V8.x to V8.2 SPx ¹⁾ or Drive ES PCS 7 V6.x, V7.x, V8.x classic to Drive ES PCS 7 APL V8.2 SPx ¹⁾ 	6SW1700-8JD01-2AA4
Drive ES PCS 7 V9.0 SPx ¹⁾ Block library for PCS 7 for the integration of drives in Classic Style (as predecessor) Requirement: PCS 7 V9.0 or higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-1JD00-0AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD00-0AB2
<ul style="list-style-type: none"> • Upgrade from V6.x/V7.x/V8.x/V9.x to V9.0 SPx ¹⁾ 	6SW1700-1JD00-0AA4
Drive ES PCS 7 APL V9.0 SPx ¹⁾ Block library for PCS 7 for the integration of drives in APL Style (Advanced Process Library) Requirement: PCS 7 V9.0 or higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-1JD01-0AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD01-0AB2
<ul style="list-style-type: none"> • Upgrade of APL V8.x, V9.x to V9.0 SPx ¹⁾ or Drive ES PCS 7 V6.x, V7.x, V8.x, V9.x classic to Drive ES PCS 7 APL V9.0 SPx ¹⁾ 	6SW1700-1JD01-0AA4
Drive ES PCS 7 V9.1 SPx ¹⁾ Block library for PCS 7 for the integration of drives in Classic Style (as predecessor) Requirement: PCS 7 V9.1 or higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-2JD00-0AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD00-0AB2
<ul style="list-style-type: none"> • Upgrade from V6.x/V7.x/V8.x/V9.x to V9.1 SPx ¹⁾ 	6SW1700-2JD00-0AA4

Description	Article No.
Drive ES PCS 7 APL V9.1 SPx ¹⁾ Block library for PCS 7 for the integration of drives in APL Style (Advanced Process Library) Requirement: PCS 7 V9.1 or higher Type of delivery: CD-ROM Languages: en, de, fr, it, es With electronic documentation	
<ul style="list-style-type: none"> • Single-user license incl. 1 runtime license 	6SW1700-2JD01-0AA0
<ul style="list-style-type: none"> • Runtime license (without data storage medium) 	6SW1700-5JD00-1AC0
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD01-0AB2
<ul style="list-style-type: none"> • Upgrade of APL V8.x, V9.x to V9.1 SPx ¹⁾ or Drive ES PCS 7 V6.x, V7.x, V8.x, V9.x classic to Drive ES PCS 7 APL V9.1 SPx ¹⁾ 	6SW1700-2JD01-0AA4
Drive ES PCS neo V3.0 / V3.1 Block library for SIMATIC PCS neo for the integration of SINAMICS drives Requirement: PCS neo V3.0 or higher Type of delivery V3.0: The SINAMICS library is a component of the SIMATIC PCS neo V3.0 product. Type of delivery V3.1: Integration via the import of a SINAMICS device type file (Product Support) License reference for the license code and the Certificate of License for the Drive ES PCS neo SINAMICS library via OSD Languages: de, en	
License for the Drive ES PCS neo SINAMICS library (engineering and runtime software)	6SW1700-1JE01-0AH0
Floating license for 1 engineering user on the engineering server A runtime license for a PCS neo Controller (single license for 1 installation)	
Runtime license Drive ES PCS neo SINAMICS library To execute the function blocks for a SIMATIC PCS neo Controller Language-neutral, single license for 1 installation Type of delivery: Electronic Certificate of License (OSD)	6SW1700-1JE00-1AH0

Options

Drive ES PCS 7 software update service

A software update service can also be purchased for the Drive ES PCS 7 software. The user will automatically receive the latest software, service packs and full versions for one year after ordering.

The update service can only be ordered in addition to an existing (i.e. previously ordered) full version.

- Period of update service: 1 year

The update service is automatically extended by 1 further year unless canceled up to 6 weeks prior to expiration.

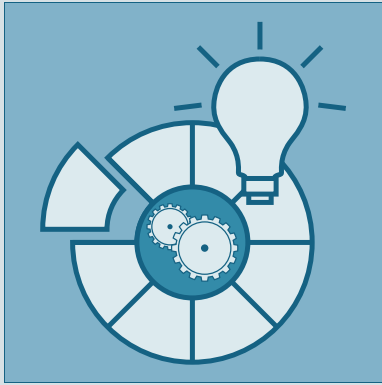
Description	Article No.
Drive ES PCS 7	
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD00-0AB2
Drive ES PCS 7 APL	
<ul style="list-style-type: none"> • Update service for single-user license 	6SW1700-0JD01-0AB2

More information

Further information is available on the internet at: www.siemens.com/drive-es

* Orders are automatically supplied with the latest Service Pack (SP).

Drive applications



12/2 **Drive applications**

12/5 **Conveyor technology**

You can find additional information on the internet at
www.siemens.com/sinamics-applications
<https://support.industry.siemens.com>

Drive applications

Drive applications

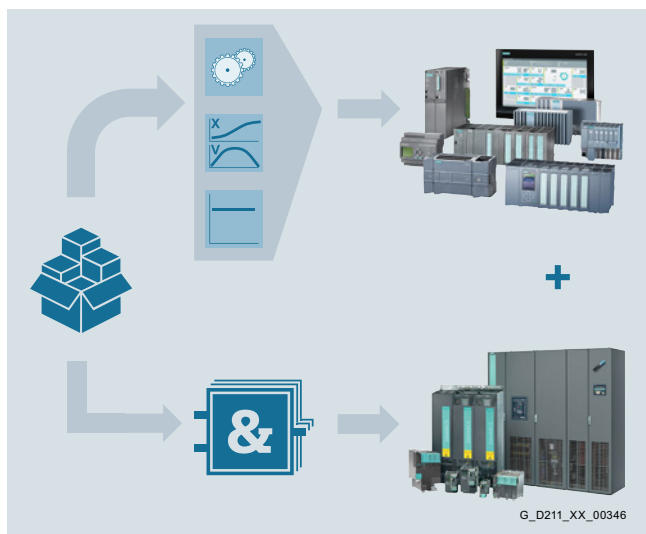
Overview

Standard applications: Understanding and profiting from know-how

The development of standard applications is a major area of activity within the Siemens automation and drive environment. The scope of these standard applications ranges from clearly organized documentation that focuses on one or several technologies (e.g. Safety Integrated) to complete, comprehensive, standardized solutions for complex tasks (e.g. cross cutters).

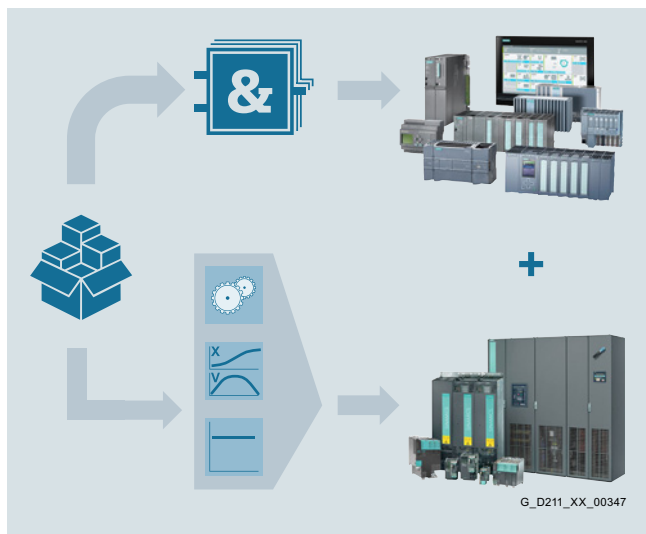
Standard application requirements

One feature that all application examples have in common is that they are designed to help users help themselves. They have been created by developers with extensive tool, commissioning and application know-how to make them as user-friendly as possible. Standard applications generally provide the user with reusable components.



Technology functions in the higher-level control system

- Tested SIMATIC PLC blocks
- Reusable HMIs and faceplates



Technology functions in the drive

- Tested SIMATIC PLC blocks
- Reusable HMIs and faceplates
- Application-specific Drive Control Charts (DCC)

Expandable drive technologies

BICO 	B inector & C onector Technology Linkability of binary and analog signals directly in the drive (cf. with a soldering iron)
FFB 	F ree F unction B locks Fixed predefined blocks in limited number
EPos 	E asy B asic P ositioner Completely autonomous positioning function in the drive (referencing, traversing tables, MDI, etc.)
PID 	Technology Controller Additional PID controllers for applicative process control loops

G_D011_EN_00419

Standard technology functions

TEC 	SINAMICS T echnology E xtensions Configurable functions-/technology modules for application-specific tasks to additional extension of firmware functions
DCC 	SINAMICS D rive C ontrol C hart Creating own and complex technology functions based on graphic signal processing diagrams with standard and extension libraries

G_D011_EN_00494a

Advanced technology functions

The development of standard technological applications is a dedicated area of activity within the Siemens automation and drive environment. Owing to the generally large size of the applications, they are supplied with detailed documentation and example codes.

These applications focus on the use of product features such as SINAMICS Drive Control Chart (DCC) with its Drive Control Block (DCB) libraries of DCB Standard and DCB Extension, SINAMICS Technology Extensions (TEC) and Free Function Blocks (FFB).

This enables extensive, complete and standardized solutions to be developed for complex drive tasks.

These solutions can be flexibly adapted while at the same time allowing the user to expand them with additional elements or special functions as required.

Overview

Application examples

Freely available application examples offer:

- Explanation of the necessary configuring steps with Siemens engineering tools
- Reusable standardized blocks for SIMATIC PLC
- Functionally coordinated programs and blocks
- Significantly shorter commissioning times

Various application examples also explain how to use Free Function Blocks (FFB), logic processing integrated in the drive with Drive Control Chart (DCC) and Safety Integrated.

The following application examples are just a selection of some of the many applications that are available on the internet at:

- SINAMICS G: Controlling the speed of a G110M/G120 (Startdrive) with S7-1500 (TO) via PROFINET or PROFIBUS with Safety Integrated (via terminal) and HMI
<https://support.industry.siemens.com/cs/document/78788716>
- SINAMICS G: Positioning a G110M/G120 (Startdrive) with S7-1500 (TO) via PROFINET/PROFIBUS with Safety Integrated and HMI
<https://support.industry.siemens.com/cs/document/81666970>
- SINAMICS S: Controlling the speed of a SINAMICS S120 with SIMATIC S7-300/400F (STEP 7 V5) via PROFINET/PROFIBUS with Safety Integrated (via PROFIsafe) and HMI
<https://support.industry.siemens.com/cs/document/68624711>
- SINAMICS S: SINAMICS S120 web server – user-defined sample pages
<https://support.industry.siemens.com/cs/document/78388880>
- SIMATIC – Fail-safe LDrvSafe library for controlling Safety Integrated Functions for the SINAMICS converter family
<https://support.industry.siemens.com/cs/document/109485794>

You can find additional information on the internet at:

www.siemens.com/sinamics-applications

<https://support.industry.siemens.com>

Drive applications

Drive applications

Integration

Overview of drive applications for SINAMICS drives, including SIMATIC ET 200pro FC-2 frequency converters

Drive applications	Low voltage										
	Standard Performance frequency converters						Distributed frequency converters			SIMATIC ET 200pro FC-2 ¹⁾	
	SINAMICS						SINAMICS				
V20	G120C	G120	CU230P-2	CU240E-2	CU250S-2	G130 G150	CU320-2	G115D	G120D	CU240D-2	CU250D-2
Standard technology functions											
BICO technology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Free Function Blocks (FFB)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Basic positioner (EPos)	–	–	–	–	✓	–	–	–	–	✓	–
Technology controller (PID)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Advanced technology functions											
SINAMICS Drive Control Chart (DCC)	–	–	–	–	–	✓	–	–	–	–	–
SINAMICS Technology Extension (TEC)	–	–	–	–	–	✓	–	–	–	–	–
Applications & Branch know-how											

Siemens has applied these technology functions (standard and/or advanced) to generate numerous application solutions. These applications can be downloaded from the Siemens application support website at:
www.siemens.com/sinamics-applications

Drive applications	Low voltage								
	Industry-specific frequency converters			Servo converters			High performance frequency converters		
	SINAMICS								
G120P	G120X	G180 ²⁾	V90	S110	S210	S120 S120M	CU310-2	CU320-2	CU320-2
CU230P-2		CB08		CU305					
Standard technology functions									
BICO technology	✓	✓	✓	–	✓	–	✓	✓	✓
Free Function Blocks (FFB)	✓	✓	–	–	✓	–	✓	✓	✓
Basic positioner (EPos)	–	–	–	✓	✓	–	✓	✓	✓
Technology controller (PID)	✓	✓	✓	–	✓	–	✓	✓	✓
Advanced technology functions									
SINAMICS Drive Control Chart (DCC)	–	–	–	–	–	–	✓	✓	✓
SINAMICS Technology Extension (TEC)	–	–	–	–	–	–	✓	✓	✓
Applications & Branch know-how									

Siemens has applied these technology functions (standard and/or advanced) to generate numerous application solutions. These applications can be downloaded from the Siemens application support website at:
www.siemens.com/sinamics-applications

¹⁾ Information on the SIMATIC ET 200pro FC-2 frequency converter with PROFINET, PROFIBUS DP or EtherNet/IP – depending on the SIMATIC ET 200pro station – is available at:
www.siemens.com/et200pro-fc

²⁾ SINAMICS G180 has its own Control Unit with its own firmware. Compared to the SINAMICS firmware, some functionalities are not available or implemented differently

Overview**Optimal conveyor technology with Siemens products, systems and solutions**

Siemens provides what is probably the most comprehensive modular system for conveyor applications. Everything from a single source, from the control level, visualization, identification and fieldbus components all the way to motor starters, frequency converters, and geared motors.

Siemens provides flexible, future-oriented solutions both for standard and for highly complex applications – individually tailored to your requirements.

The integrated modular system

As a partner for everything relating to warehouse and conveyor technology, we can provide you with a quotation for conveyor and warehouse-related equipment up to complete plants for the transport of piece goods or bulk goods that precisely fit your requirements.

- Optimum products and systems – everything from drive and automation technology to safety technology and power distribution
- Competent technical guidance and extensive support to draw-up concepts that are truly fit for the future
- Global service, locally available in over 130 countries

Conveyor systems with value added

In conveyor systems, efficiency and productivity is dependent on the level of integration across all industries. Siemens provides you with everything needed for implementing integrated solutions.

More information

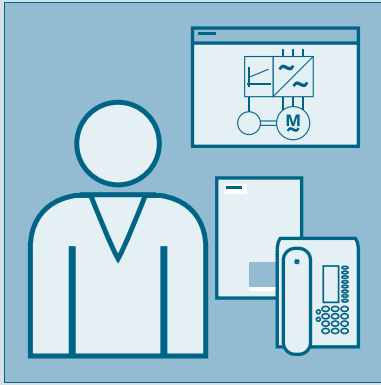
You can find additional information on the internet at www.siemens.de/foerdertechnik

Drive applications

Notes

12

Services and documentation



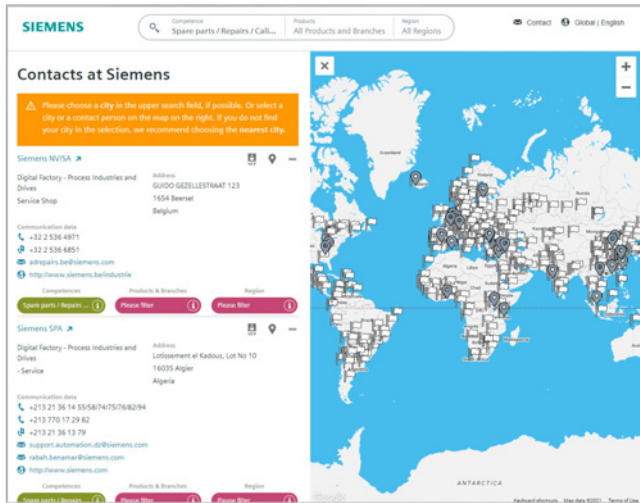
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Services and documentation

Partner

Overview

Partners at Siemens



At your service locally, around the globe for consulting, sales, training, service, support, spare parts on the entire portfolio of Siemens.

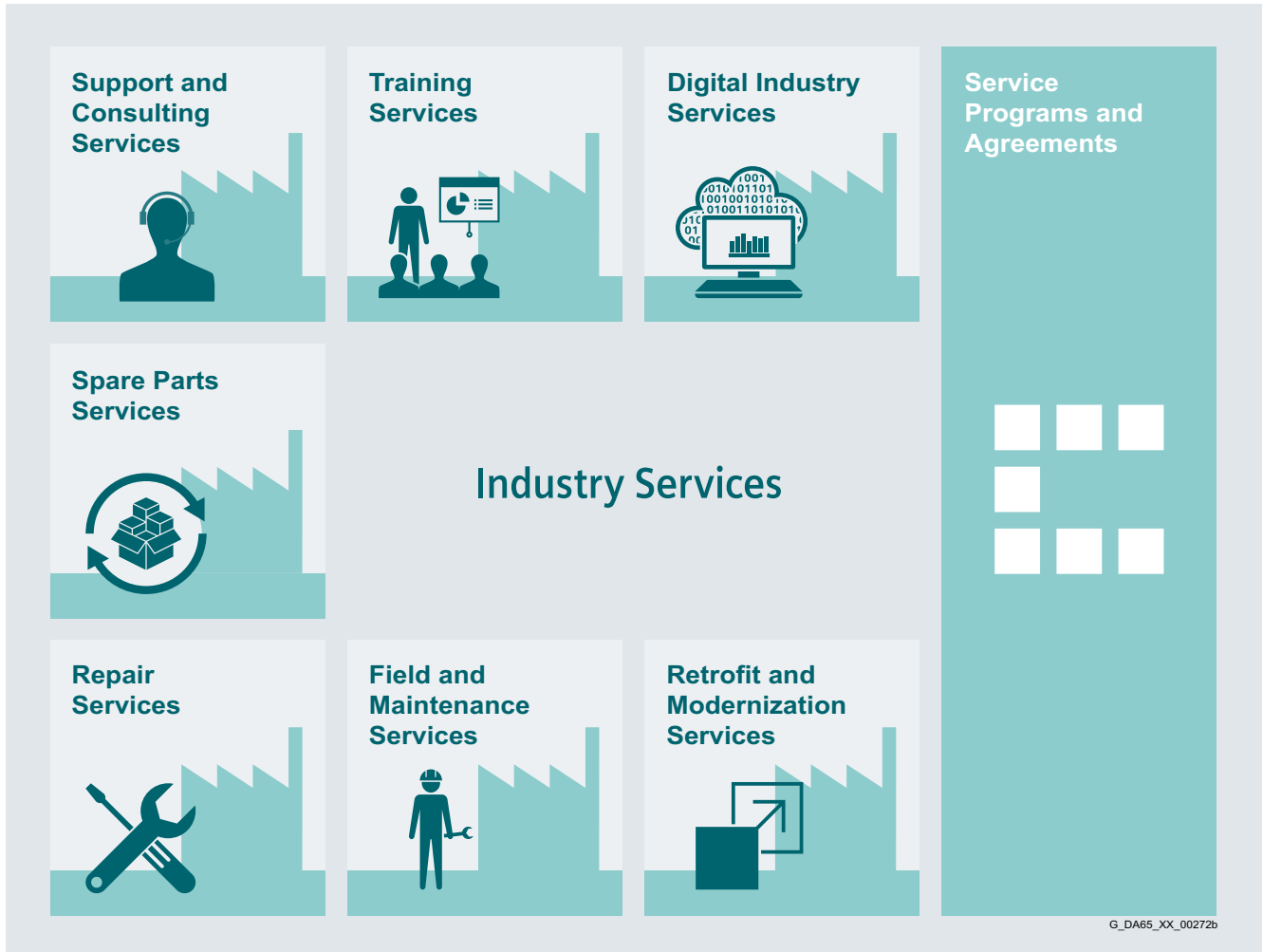
Your partner can be found in our Personal Contacts Database at: www.siemens.com/automation-contact

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

Keep your business running and shaping your digital future – with Industry Services

Optimizing the productivity of your equipment and operations can be a challenge, especially with constantly changing market conditions. Working with our service experts makes it easier.

We understand your industry's unique processes and provide the services needed so that you can better achieve your business goals.

You can count on us to maximize your uptime and minimize your downtime, increasing your operations' productivity and reliability. When your operations have to be changed quickly to meet a new demand or business opportunity, our services give you the flexibility to adapt. Of course, we take care that your production is protected against cyber threats. We assist in keeping your operations as energy and resource efficient as possible and reducing your total cost of ownership. As a trendsetter, we ensure that you can capitalize on the opportunities of digitalization and by applying data analytics to enhance decision making: You can be sure that your plant reaches its full potential and retains this over the longer lifespan.

You can rely on our highly dedicated team of engineers, technicians and specialists to deliver the services you need – safely, professionally and in compliance with all regulations. We are there for you, where you need us, when you need us.

www.siemens.com/industryservices

Services and documentation

Industry Services

Industry Services – Portfolio overview

Overview



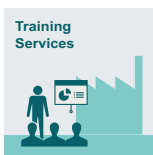
Digital Industry Services

Digital Industry Services make your industrial processes transparent to gain improvements in productivity, asset availability, and energy efficiency.

Production data is generated, filtered and translated with intelligent analytics to enhance decision-making.

This is done whilst taking data security into consideration and with continuous protection against cyber-attack threats.

www.siemens.com/global/en/products/services/industry/digital-industry-services.html

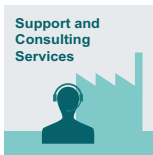


Training Services

From the basics and advanced to specialist skills, SITRAIN courses provide expertise right from the manufacturer – and encompass the entire spectrum of Siemens products and systems for the industry.

Worldwide, SITRAIN courses are available wherever you need a training course in more than 170 locations in over 60 countries.

<https://support.industry.siemens.com/cs/ww/en/sc/2226>



Support and Consulting Services

Industry Online Support site for comprehensive information, application examples, FAQs and support requests.

Technical and Engineering Support for advice and answers for all inquiries about functionality, handling, and fault clearance. The Service Card as prepaid support for value added services such as Priority Call Back or Extended Support offers the clear advantage of quick and easy purchasing.

Information & Consulting Services, e.g. SIMATIC System Audit; clarity about the state and service capability of your automation system or Lifecycle Information Services; transparency on the lifecycle of the products in your plants.

<https://support.industry.siemens.com/cs/ww/en/sc/2235>



Spare Parts

Spare Parts Services are available worldwide for smooth and fast supply of spare parts – and thus optimal plant availability. Genuine spare parts are available for up to ten years. Logistic experts take care of procurement, transport, custom clearance, storage and order management.

Reliable logistics processes ensure that components reach their destination as needed.

Since not all spare parts can be kept in stock at all times, Siemens offers a preventive measure for spare parts provisioning on the customer's premises with optimized **Spare Parts Packages** for individual products, custom-assembled drive components and entire integrated drive trains – including risk consulting.

Asset Optimization Services help you design a strategy for parts supply where your investment and carrying costs are reduced and the risk of obsolescence is avoided.

<https://support.industry.siemens.com/cs/ww/en/sc/2110>



Repair Services

Repair Services are offered on-site and in regional repair centers for fast restoration of faulty devices' functionality.

Also available are extended repair services, which include additional diagnostic and repair measures, as well as emergency services.

<https://support.industry.siemens.com/cs/ww/en/sc/2154>



Field and Maintenance Services

Siemens specialists are available globally to provide expert field and maintenance services, including commissioning, functional testing, preventive maintenance and fault clearance.

All services can be included in customized service agreements with defined reaction times or fixed maintenance intervals.

<https://support.industry.siemens.com/cs/ww/en/sc/2265>



Retrofit and Modernization Services

Provide a cost-effective solution for the expansion of entire plants, optimization of systems or upgrading existing products to the latest technology and software, e.g. migration services for automation systems.

Service experts support projects from planning through commissioning and, if desired over the entire extended lifespan, e.g. Retrofit for Integrated Drive Systems for an extended lifetime of your machines and plants.

<https://support.industry.siemens.com/cs/ww/en/sc/2286>



Service Programs and Agreements

A technical Service Program or Agreement enables you to easily bundle a wide range of services into a single annual or multi-year agreement.

You pick the services you need to match your unique requirements or fill gaps in your organization's maintenance capabilities.

Programs and agreements can be customized as KPI-based and/or performance-based contracts.

<https://support.industry.siemens.com/cs/ww/en/sc/2275>

Overview

Online Support – fast, intuitive, whenever you want, wherever you need

Web

www.siemens.com/online-support

App

Scan the QR code for information on our Online Support app.

- FAQ / Application examples**
Information about industrial products, programming and configuration as well as application examples
- Technical information**
Videos, documentation, manuals, updates, product notes, compatibility tool, certificates, planning data such as dimensional drawings, product data, 3D models
- Forum**
Exchange information and experience with other users and experts

Online Support for Siemens Industry Products

Siemens Industry and Online Support with some 1.7 million visitors per month is one of the most popular web services provided by Siemens. It is the central access point for comprehensive technical know-how about products, systems and services for automation and drives applications as well as for process industries.

In connection with the challenges and opportunities related to digitalization you can look forward to continued support with innovative offerings.

Services and documentation

Training

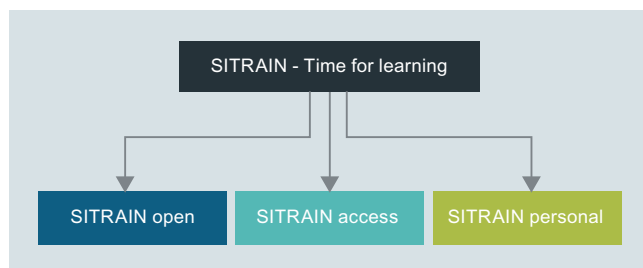
SITRAIN - Digital Industry Academy

Overview



Time for learning

Today's demands on our knowledge are every bit as diverse and dynamic as our profession itself. We keep learning more and longer – for our work, for our career and for ourselves. Advancing digitalization entails new topics and is also changing the way we absorb and process knowledge. SITRAIN – Digital Industry Academy offers the right source of knowledge here, which we can use anytime in just the way we need it. The time for learning is now.



Knowledge for every need

With its three areas – SITRAIN open, SITRAIN access and SITRAIN personal – SITRAIN offers you an all-encompassing range of options for an ongoing expansion of your knowledge and skills, suited for every type of learner. And SITRAIN uses advancing digitalization to continuously expand content and offer new training methods.

Find
your local
offer here



SITRAIN – Digital Industry Academy Customer Support Germany

Tel.: +49 911 895-7575

E-Mail: sitrain.digital.industry.academy.de@siemens.com

Knowledge you can always find

SITRAIN open bundles useful information, worthwhile data and up-to-date expert knowledge about Siemens products for industry. Search it anytime, find anything – and always the right stuff.

Knowledge that gets you ahead

SITRAIN access is learning in the digital age. It offers you individualized ways to build your knowledge and access to exclusive digital training courses. Take advantage of sustainable learning success with a wide range of learning methods. Improve your skills – whether working in groups with others, or by yourself. Whenever, wherever and however you need to.

Knowledge you can experience

We all want to learn from the best. And SITRAIN personal's training courses let you benefit from our well-practiced trainers' expert knowledge, along with direct access to our training equipment. That's the best way to convey knowledge – whether at your company or in our training classrooms.

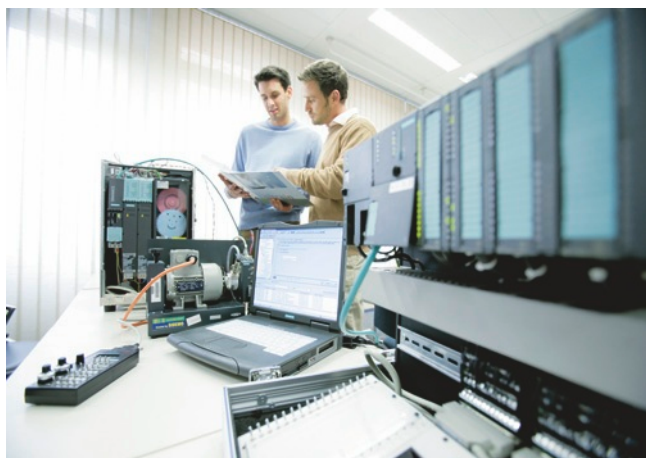
SITRAIN – Digital Industry Academy

www.siemens.com/sitrain

- SITRAIN open:
www.siemens.com/sitrain-open
- SITRAIN access:
www.siemens.com/sitrain-access
- SITRAIN personal:
www.siemens.com/sitrain-personal

Overview

Training courses for SINAMICS drive system



This provides an overview of the training courses available for the SINAMICS drive system.

The courses are modular in design and are directed at a variety of target groups as well as individual customer requirements.

The system overview will acquaint decision-makers and sales personnel with the system very quickly.

The engineering course provides all the information you need to configure the drive system.

The courses dedicated to diagnostics and servicing, parameterization and commissioning, communication as well as extended functions such as Safety Integrated are sure to provide all the technical knowledge service engineers will need.

All courses contain as many practical exercises as possible to enable intensive and direct training on the drive system and with the tools in small groups.

Please also take note of the training options available for SIMOTICS motors. You will find more information about course contents and dates in Catalog ITC and on the internet.

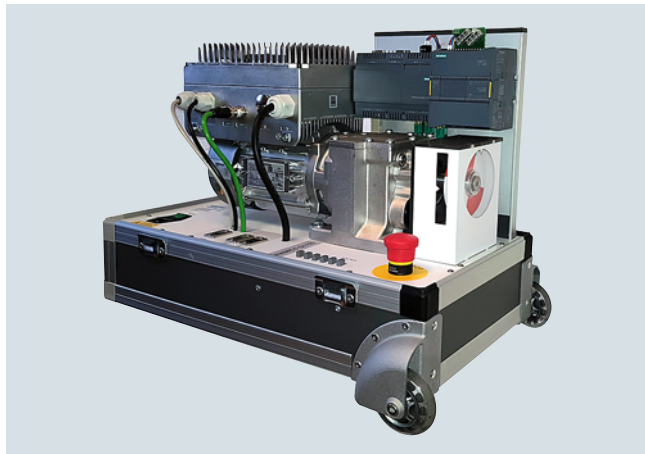
Title (all courses are available in English and German)	Target group			Duration	Order code
	Planners, decision-makers, sales personnel	Commissioning engineers, configuring engineers	Service personnel, maintenance technicians		
Courses Fundamentals and overview					
SINAMICS and SIMOTICS – Basics of drive technology	✓	✓	✓	5 days	DR-GAT
SINAMICS and SIMOTICS – System overview	✓	–	–	3 days	DR-SYS
SINAMICS System Overview	✓	–	–	2 days	DR-SN-UEB
Courses SINAMICS S120					
Planning and engineering	✓	–	–	5 days	DR-S12-PL
Parameterizing and commissioning	–	✓	–	5 days	DR-S12-PM
Parameterization and commissioning in the TIA	–	✓	–	5 days	DR-S12-PMT
Parameterization Advanced Course	–	✓	–	5 days	DR-S12-PA
Parameterizing and optimizing	–	✓	–	5 days	DR-S12-OPT
Parameterizing Safety Integrated	–	✓	–	4 days	DR-S12-SAF
Diagnostics and service	–	–	✓	5 days	DR-S12-DG
Diagnostics at chassis and cabinet units	–	✓	✓	3 days	DR-S12-CHA
Courses SINAMICS G120 (including SINAMICS G120X, SINAMICS G120D and SINAMICS G115D)					
Planning and engineering	✓	–	–	2 days	DR-G12-PL
Parameterizing and commissioning	–	✓	–	2 days	DR-G12-PM
Parameterization Advanced Course	–	✓	–	3 days	DR-G12-PA
Parameterizing Safety Integrated	–	✓	–	2 days	DR-G12-SAF
Courses SINAMICS G130/G150/G180/S150					
DYNAVERT – commissioning and diagnostics	–	✓	✓	2 days	DR-DYNA
SINAMICS G150/G130/S150 – diagnostics and service	–	✓	✓	5 days	DR-G15-DG
SINAMICS G180 – diagnostics and service	–	–	✓	2.5 days	DR-G18-DG

Services and documentation

Training

SINAMICS G115D training case

Overview



SINAMICS G115D training case

The SINAMICS G115D training case is a convincing demonstration system thanks to its compact design. It is suitable for direct customer presentations as well as for testing in the technical department. The functions of SINAMICS G115D in combination with a SIMOGEAR geared motor can be demonstrated and tested quickly and easily with this case.

It contains the following components:

- SINAMICS G115D distributed drive system motor-mounted, PROFINET, frame size FSA, 0.37 kW
- SIMOGEAR 2KJ8 helical geared motor
- SIMATIC S7-1200F controller
- MindConnect IoT 2040

The SINAMICS G115D training case is supplied in the form of a trolley case.

Technical specifications

	SINAMICS G115D training case 6AG1067-1AA38-0AA0
Supply voltage	110 V / 230 V 1 AC
Dimensions	
• Width	630 mm (24.80 in)
• Height	430 mm (16.93 in)
• Depth	480 mm (18.90 in)
Weight, approx.	43.5 kg (95.9 lb)

Selection and ordering data

Description	Article No.
SINAMICS G115D training case	6AG1067-1AA38-0AA0

SINAMICS G120D training case

Overview



SINAMICS G120D training case

The SINAMICS G120D training case contains the following components:

- SINAMICS G120D distributed frequency converter
 - PM250D Power Module
 - CU250D Control Unit
- SIMATIC S7-300 controller
- SIMATIC Touch Panel KTP600
- SIMOGEAR helical geared motor with HTL encoder

The SINAMICS G120D training case is supplied in the form of a trolley case.

Technical specifications

	SINAMICS G120D training case 6AG1067-2AA00-0AA2
Supply voltage	3 AC 400 V
Protection	16 A
Dimensions	
• Width	720 mm (28.35 in)
• Height	380 mm (14.96 in)
• Depth	300 mm (11.81 in)
Weight, approx.	47 kg (104 lb)

Selection and ordering data

Description	Article-No.
SINAMICS G120D training case	6AG1067-2AA00-0AA2

Overview

Complete equipment for machine tools and production systems

Our supplied range of products and services also includes complete equipment for machine tools and production systems with all services in the process chain from consulting through to after-sales service.

We support you in the areas of engineering, production and logistics:

Engineering support

Siemens supports you with advice on design in accordance with standards and concepts for drive systems, control, operation and safety.

Our engineers configure for you in EPLAN P8 and other commonly used CAD systems, execute projects designed to cost and adapt your documents where necessary to UL or new systems.

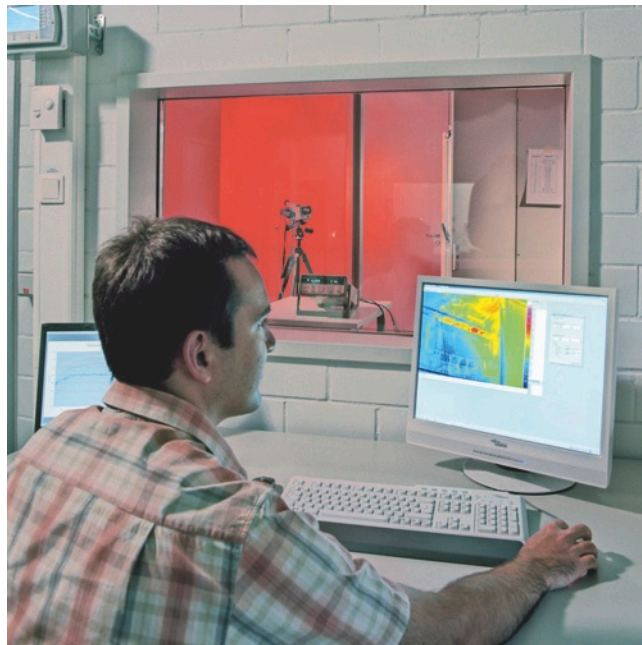
Our Technical Competence Center Cabinets in Chemnitz supports you with selecting and optimizing the suitable control cabinet air-conditioning system. Apart from calculation and simulation, we also use instrumentation testing in our heat laboratory with load simulation.

We also offer the following services:

- Vibration measurements and control cabinet certification in the field
- Measurement of conducted interference voltages in our laboratory



Cabinet engineering



Testing in the heat laboratory

Production at a high level of quality

Complete equipment is manufactured at a high industrial level. This means:

- Examining consistency of the order documentation
- Checking for adherence to current regulations
- Collision check in 3D layout, taking into account the free space required thermally and electrically
- Automatic preparation of enclosures, cables and cable bundles
- Automated inspection and shipment free of faults
- Documentation and traceability
- Declaration of conformity regarding the Low-Voltage Directive and manufacturer's declaration on machinery directive
- UL label on request

Superior logistics

Everything from a single source offers you the following advantages:

- Cost savings for procurement, stockkeeping, financing
- Reduction in throughput times
- Just-in-time delivery

Individual support and maximum flexibility

Our technical consultants for complete equipment support customers and sales departments in the various regions. Our control cabinet customers are supported in the Systems Engineering Plant Chemnitz (WKC) by ordering centers and production teams that are permanently assigned to customers.

Distance does not present a problem; we also use web cams for consulting our customers.

Services and documentation

Control cabinets

Overview



Worldwide repair service

Customer-specific logistics models, flexible production capacity and production areas as well as change management in all process phases ensure maximum flexibility.

Customized supplementary products

As part of its complete equipment program, Siemens also offers the development and construction of customized supplementary products, e.g. special operator panels and power supply systems.

Liability for defects

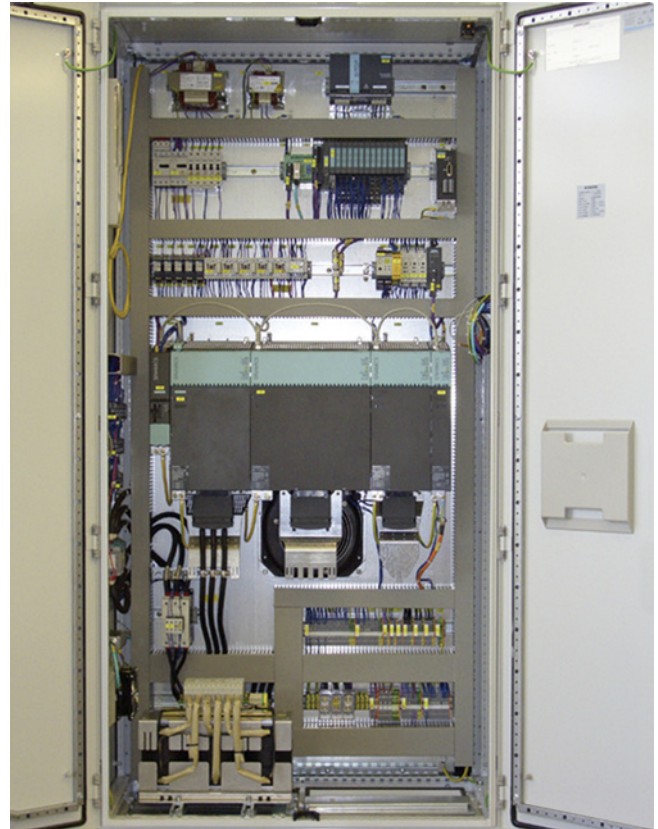
Of course we accept the same liability for defects for our complete equipment as for our SINUMERIK and SINAMICS products.

Furthermore, you can use our worldwide repair service anywhere and at any time.

Your benefits

One partner, one quotation, one order, one delivery, one invoice, and one contact partner for liability of defects.

For series production or individual items, Siemens is your competent partner for complete equipment.



Control cabinet with SINAMICS S120 in booksize format

Overview



Our understanding of an application is the customer-specific solution of an automation task based on standard hardware and software components. In this respect, industry knowledge and technological expertise are just as important as expert knowledge about how our products and systems work. We are setting ourselves this challenge with more than 280 application engineers in 20 countries.

Application centers

We currently have application centers in:

- Germany: Head Office in Erlangen and in other German regions, e.g. in Munich, Nuremberg, Stuttgart, Mannheim, Frankfurt, Chemnitz, Cologne, Bielefeld, Bremen, Hanover, Hamburg
- Belgium: Brussels
- Brazil: Sao Paulo
- China: Beijing and 12 regions
- Denmark: Ballerup
- France: Paris
- Great Britain: Manchester
- India: Mumbai
- Italy: Bologna, Milan
- Japan: Tokyo, Osaka
- The Netherlands: The Hague
- Austria: Vienna
- Poland: Warsaw
- Sweden: Göteborg
- Switzerland: Zurich, Lausanne
- Spain: Madrid
- South Korea: Seoul
- Taiwan: Taipei
- Turkey: Istanbul
- USA: Atlanta

These application centers specialize in the use of SIMATIC/SIMOTION/SINAMICS. You therefore can rely on automation and drive specialists for implementing successful applications. By involving your personnel at an early stage in the process, we can provide a solid basis for rapid knowledge transfer, maintenance and further development of your automation solution.

Advice on applications and implementation

We offer a variety of consultation services to help you find the optimum solution for the SIMATIC/SIMOTION/SINAMICS application you want to implement:

The quotation phase includes

- clarification of technical questions,
- discussion of machine concepts and customer-specific solutions,
- selection of suitable technology and
- suggestions for implementation.

A technical feasibility study is also performed at the outset. In this way, difficult points of the application can be identified and solved early on. We can also configure and implement your application as a complete solution from a single source.

A large number of proven standard applications are available for use during the implementation phase. This saves engineering costs.

The system can be commissioned by experienced, competent personnel, if required. This saves time and trouble.

If servicing is required, we can support you on site or remotely. For further information about servicing, please see the section "Industry Services".

On-site application training

Training for the implemented applications can also be organized and carried out on site. This training for machine manufacturers and their customers does not deal with individual products, but the entire hardware and software system (for example, automation, drives and visualization).

From an initial concept to successful installation and commissioning: We provide complete support for SIMATIC/SIMOTION/SINAMICS! Contact your Siemens representative.

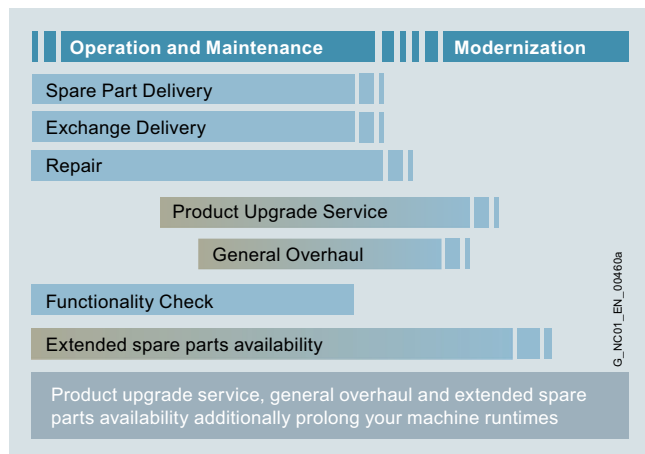
You can find further information at www.siemens.com/machinebuilding

Services and documentation

Spare parts services

Spare parts services during the lifecycle

Overview



Spare parts services during the lifecycle

Siemens also provides constant support to customers after delivery of the machines or plant. This includes spare parts, repairs, as well as other supplementary services, and has a positive effect on machine operating times, inventories and costs.

When customers purchase a high-quality machine or plant, they intend to use it as intensively as possible, preferably for three shifts a day over many years. Under such circumstances, it is normal for parts to fail eventually. It is essential to replace the part as quickly as possible, because every hour of a plant stoppage costs money. To satisfy the multi-faceted requirements in the different areas, we have created comprehensive spare parts services.

You can sign up for the spare parts service that suits your requirements perfectly:

- Delivery of spare parts
- Delivery as exchange product
- Repair
- Product upgrade service
- General overhaul
- Function check
- Return of diagnostic parts
- Stock reduction of your spare parts store
- Extended spare parts availability

Benefits

- Optimum price/performance ratio and top quality
- Lifecycle management over the complete lifecycle
- Outstanding quality and availability of your machines and plant using Siemens original spare parts
- Global network and optimized logistics chains – 24 hours a day, 365 days a year
- Additional services from Siemens

More Information

More information is available on the internet at:

www.siemens.com/motioncontrol/spareparts

For further information, please approach your contact at your local Siemens office.

Contact information is available on the internet at:

www.siemens.com/automation-contact

Delivery of spare parts

Overview

In every industry worldwide, plants and systems are required to operate with constantly increasing reliability. Lack of a specific spare part can result in considerable costs. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

Ordering mode	Logistics service	Note
Standard	Cost-optimized: Contracted shipping company	Delivery within the normal national delivery times through the contracted shipping company
Plant stoppage	Time-optimized: Express, courier, collection	You choose the shortest possible delivery time for your own benefit: <ul style="list-style-type: none"> • Delivery by means of collection or courier service • Delivery by express service
Emergency service	Special logistics: Courier	You can also order the spare parts from us outside normal working hours, as well as on weekends or national holidays round-the-clock. <ul style="list-style-type: none"> • Your delivery will arrive by courier

Benefits

- New liability for defects for the spare part
- Long-term spare parts availability
- Optimum system compatibility

Overview

In addition to the simple delivery of spare parts, with many products, we also offer you the option of an exchange. This has the advantage that you not only receive the spare part quickly, but are able to return the defective device to us for a credit. You therefore receive our spare part at the lower exchange price.

A credit will be awarded on condition that the repair code indicates that repurchasing is admissible, a replacement is obtained from the spare parts store, and that the returned product is repairable.

The ordering mode and logistics service determine the delivery of spare parts:

Ordering mode	Logistics service	Note
Standard	Cost-optimized: Contracted shipping company	Delivery within the normal national delivery times through the contracted shipping company
Plant stoppage	Time-optimized: Express, courier, collection	You choose the shortest possible delivery time for your own benefit: <ul style="list-style-type: none"> • Delivery by means of collection or courier service • Delivery by express service
Emergency service	Special logistics: Courier	You can also order the spare parts from us outside normal working hours, as well as on weekends or national holidays round-the-clock. <ul style="list-style-type: none"> • Your delivery will arrive by courier

Return

For returns, we require the following information:

- Reason for return
- If defective: detailed description of the fault
- Machine number
- Machine/system manufacturer
- End customer

We will then be able to provide you with additional information in the repair report/inspection report regarding the diagnosis/inspection as well as information about the completed repair.

Benefits

- Savings thanks to the option of returning defective parts
- A spare part is available immediately in the event of failure
- New liability for defects for the spare part
- Long-term spare parts availability
- Optimum system compatibility

Repair

Overview

Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum – with our worldwide repair facilities. The advantage for you: Defects can be rectified before they cause further harm.

Repair is a favorable option when you have specific reasons for not replacing the defective device or part with a new one (delivery as exchange product).

We maintain a global network of Siemens repair shops and certified partners to ensure that we will always be able to process your repairs quickly.

We can offer you different types of repair depending on your requirements:

Normal repair

Normal repair at standard conditions normally takes 10 working days following receipt of the defective item at our repair shop.

Fast repair

In particularly urgent cases, we offer you the option of a fast repair within 1 or 2 working days for many products at additional cost.

Turnaround repair

With a turnaround repair, we organize on your behalf collection of the device/component to be repaired.

Mobile repair service

We come to you and perform the required repairs on site, for example, when the device/component cannot be removed due to its weight.

Function repair

A function repair is the same as a normal repair but excludes the repair of cosmetic defects, e.g. scratches, labels, discoloration. The conditions applicable to function repairs should be observed in this case. The function repair service is only available for machine manufacturers or machine operators. Please ask your regional Siemens contact.

For repairs, we require the following information:

- Reason for return
- If defective: detailed fault report
- Machine number
- Machine/system manufacturer
- End customer

Benefits

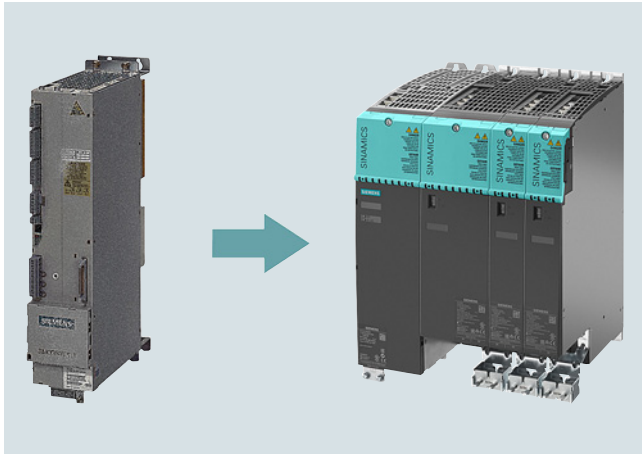
- Short downtimes for machines and plants
- Only certified original parts are used
- Additional services from Siemens:
 - Longer availability of your machine/plant through the preventive replacement of wear parts and aging parts
 - Highest standards of quality
 - Use of the comprehensive test concept of series production, including software, firmware, ASICs, complex function blocks, etc.
 - Implementation of all the hardware and software/firmware enhancements known by development, production, service and quality management departments, as well as suppliers
- Information supplied by repair report/inspection report

Services and documentation

Spare parts services

Product upgrade service

Overview



Product upgrade service: From OLD to NEW

A long service life is expected from machines and plants. The service life of the electronic components is, however, limited and normally shorter than the planned machine/plant operating times. To ensure that the required extended availability of the machine/plant is achieved, we offer you the product upgrade service at an attractive price.

In the course of their lifecycle, electronic components are normally redesigned/upgraded several times. With the product upgrade service, you will always receive the latest technology.

A planned product upgrade from OLD to NEW helps to prevent unplanned machine stoppages and supports a safer and longer machine/plant availability. The upgrade service is mainly offered for older components that will soon be discontinued.

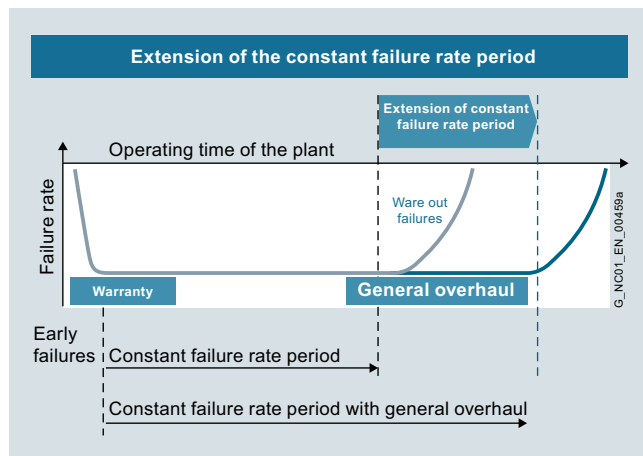
For information about potential upgrades from the latest upgrade list, please ask your regional Siemens contact. The product upgrade service is only available for machine manufacturers or machine operators.

Benefits

- Price benefit through upgrade service
- New liability for defects for the new component
- Extended availability of your machine/plant
- Prevention of component failures due to wear and aging
- Prevention of machine stoppages due to unavailability of spare parts
- Reduced spare parts inventories
- Latest technology
- Easier servicing due to fewer variants
- Industry Services through Siemens are assured for the future

General overhaul

Overview



Extension of the period with a constant failure rate

A long service life is expected from machines and plants. The service life of electronic components and mechanical parts is, however, limited and normally shorter than the planned machine/plant operating times. For higher availability of the machines or plants, we offer a general overhaul (preventive maintenance) for electronic components and motors at favorable conditions.

During the planned general overhaul, wear parts and aging parts are replaced in accordance with their stated service life so as to reduce unplanned downtimes. In the case of motors, in addition to a general overhaul, replacement of bearings and encoders is also offered.

If a fault is detected during a general overhaul, troubleshooting and repair will be performed at the repair price without requesting confirmation or interrupting the process. In the case of extensive wear or damage, a general overhaul/repair will not be performed. A fixed lump sum for expenses will be charged in this case.

Benefits

- Preventive replacement of wear parts and aging parts in accordance with their stated service life
- Reduction in unplanned plant stoppages
- Enhanced production reliability
- Extended availability of your machine/plant
- New liability for defects for 12 months for the components subjected to a general overhaul
- Low price

Overview

It is checked that the components function reliably.

The first step involves cleaning the component. Then all the hardware and software/firmware enhancements are implemented that are known by development, production, service and quality management departments, as well as suppliers. Using the comprehensive test concept of series production, all the functions of the software, firmware, ASICs, complex and less complex function blocks are checked.

If a fault is detected during the function check, troubleshooting and repair will be performed at the repair price without requesting confirmation or interrupting the process. In the case of extensive wear or damage, no repairs will be performed. A fixed lump sum for expenses will be charged. .

Benefits

- The component is checked and can be deployed again
- The component contains all the known improvements
- The customer's own spare parts stock is up-to-date
- Low price

Return of diagnostic parts

Overview



Spare parts used for diagnostic purposes from the spare parts store can be returned within 3 months and a credit note for up to 85 % is issued.

For unused spare parts in their original packaging, you will receive a credit of 100 % in which case you will be charged a fixed price for handling.

Benefits

- Can be used for diagnostics
- Reduced spare parts inventories
- Low costs

Services and documentation

Spare parts services

Stock reduction in spare parts store

Overview



Thanks to fast delivery of spare parts from Siemens, manufacturers and plant operators are able to reduce their spare parts inventories. Siemens offers an analysis for this purpose to indicate exactly which parts must be available in the customer's stores for a specific combination of machines and which should be obtained directly from Siemens.

Benefits

- Reduced costs
- Stock optimization
- Minimization of fault downtimes

Extended spare part availability

Overview

We normally retain spare parts for all products and systems for a period of 10 years after discontinuation of product marketing.

In individual cases, when we do not carry spare parts, we will offer a repair.

For a wide range of products and systems, we extend the availability of spare parts. We can provide you with the current spare parts availability for your machine/plant as a service once you have registered online with identSNAPSHOT.

www.siemens.com/identsnapshot

If you require longer availability of spare parts, please contact your regional sales representative.

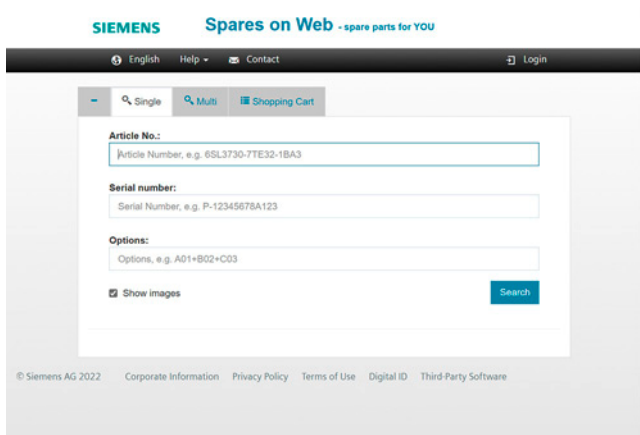
Benefits

- Higher plant availability
- Investment protection
- Reduction of lifecycle costs



Overview

Spares on Web – online identification of spare parts



The screenshot displays the Siemens Spares on Web interface. At the top, the Siemens logo and the text "Spares on Web - spare parts for YOU" are visible. Below this, there is a navigation bar with "English", "Help", "Contact", and "Login" links. The main search area contains three input fields: "Article No." with a placeholder "Article Number, e.g. 6SL3730-7TE32-1BA3", "Serial number" with a placeholder "Serial Number, e.g. P-12345678A123", and "Options" with a placeholder "Options, e.g. A01+B02+C03". A "Search" button is located to the right of the options field. There is also a checkbox labeled "Show images". At the bottom of the page, there is a footer with copyright information: "© Siemens AG 2022" and links for "Corporate Information", "Privacy Policy", "Terms of Use", "Digital ID", and "Third-Party Software".

Spares on Web is a web-based tool for identifying spare parts. After you have entered the Article No. and serial number, the spare parts available for the relevant unit are displayed.

www.siemens.com/sow

Services and documentation

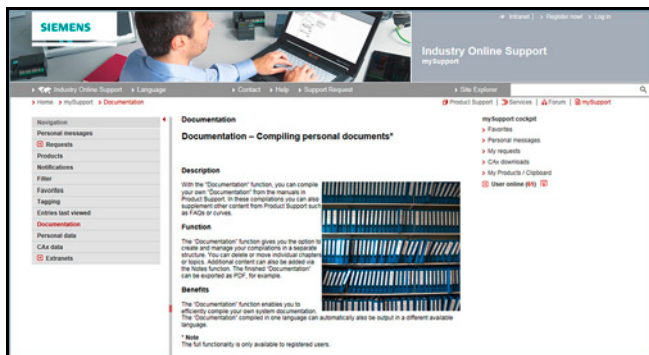
Supplementary products for distributed drive technology

Overview

A comprehensive range of supplementary products is provided for the distributed drive technology, e.g. pre-assembled cables and connectors. An overview is provided at the following link:
www.siemens.com/distributeddrives-supplementaryproducts

Overview

mySupport documentation – Compiling personal documents



mySupport documentation is a web-based system for generating personalized documentation based on standard documents and is part of the Siemens Industry Online Support portal.

In mySupport, a personal document library can be created in the "Documentation" category. This library can be accessed online in mySupport or also be generated in various formats for offline use.

Previously, this functionality was available in the My Documentation Manager for configurable manuals. Due to the integration in mySupport, all entries of the Industry Online Support can now be imported into the personal document library, including FAQs or product notifications.

If you have already worked with the My Documentation Manager, all of the previously created libraries will continue to be available without restrictions in mySupport.

In addition, the personal library in mySupport can be shared with other mySupport users. In this way, a collection of relevant documents can be created very effectively and used together with other mySupport users all over the world.

You must register/log in for configuring and generating/managing.

Benefits

- Display
View, print or download standard documents or personalized documents
- Configure
Transfer standard documents or parts of them to personalized documents
- Generate/Manage
Generate and manage personalized documents in the formats PDF, RTF or XML in all available languages

Function

Opening mySupport documentation in the Industry Online Support portal

- About the product support, entry type "Manual":
<https://support.industry.siemens.com/cs/ww/en/ps/manual>
By clicking on the required version of the manual and then "Show and configure", the manual opens in a modular view, where you can navigate from topic to topic. Here the direct link to a topic can be used and made available to other users. The selected document can be added to the personal library via "mySupport Cockpit" > "Add to mySupport documentation".
- Via the direct link
<https://support.industry.siemens.com/my/ww/en/documentation/advanced>
After logon/registration, the online help is displayed as the current document.

More information

You can find additional information on the internet at

- <https://support.industry.siemens.com/my/ww/en/documentation>
- https://support.industry.siemens.com/cs/helpcenter/en/index.htm?#persoenliche_bibliothek_aufbauen.htm

Services and documentation

Documentation

General documentation

Overview

A high-quality programmable control or drive system can be used to maximum effect only if the user is aware of the performance of the products used 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.

A comprehensive range of documentation is available which includes a Getting Started guide, operating instructions, installation manuals and a list manual.

The documents are available in hardcopy form or as a PDF file for downloading from the internet.

Information and documentation relating to SINUMERIK, SINAMICS, SIMOTION and SIMOTICS are available on the internet at <https://support.industry.siemens.com/cs/document/109476679>

Application

Explanations of the manuals:

- **Operating Instructions**
contain all the information needed to install the device and make electrical connections, information about commissioning and a description of the converter functions.
Phases of use: Control cabinet construction, commissioning, operation, maintenance and servicing.
- **Hardware Installation Manual**
contains all relevant information about the intended use of the components of a system (technical specifications, interfaces, dimensional drawings, characteristics, or possible applications), information about installation and electrical connections and information about maintenance and servicing.
Phases of use: Control cabinet configuration/construction, maintenance and servicing.
- **Operating and Installation Instructions**
(for converter and accessories)
contain all relevant information about the intended use of the components, such as technical specifications, interfaces, dimensional drawings, characteristics, or possible applications.
Phases of use: Control cabinet configuration/construction.
- **Manual/Configuration Manual**
contains all necessary information about the intended use of the components of a system, e.g. technical specifications, interfaces, dimensional drawings, characteristics, or possible applications.
Phases of use: Cabinet configuration/setup, circuit diagram configuration/drawing.
- **Commissioning Manual**
contains all information relevant to commissioning after installation and wiring. It also contains all safety and warning notices relevant to commissioning in addition to overview drawings.
Phases of use: Commissioning of components that have already been connected, configuration of system functions.
- **List Manual**
contains all parameters, function diagrams, and faults/alarms for the product/system as well as their meanings and setting options. It contains parameter data and fault/alarm descriptions with functional correlations.
Phases of use: Commissioning of components that have already been connected, configuration of system functions, fault cause/diagnosis.
- **Getting Started**
provides information about getting started for the first-time user as well as references to additional information. It contains information about the basic steps to be taken during commissioning. The information in the other documentation should be carefully observed for all of the other work required.
Phases of use: Commissioning of components that have already been connected.
- **Function Manual Drive Functions**
contains all the relevant information about individual drive functions: Description, commissioning and integration in the drive system.
Phases of use: Commissioning of components that have already been connected, configuration of system functions.

Appendix



14/2	Certificates of suitability
14/4	Software licenses
14/6	Conversion tables
14/9	Conditions of sale and delivery/Export regulations

Appendix

Certificates of suitability








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 <i>Independent public testing body in North America</i>				
	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/7.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 standard			
		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. <i>Independent public testing body in North America, Nationally Recognized Testing Laboratory (NRTL)</i>				
TÜV: TÜV SÜD Product Service <i>Independent public testing body in Germany, Nationally Recognized Testing Laboratory (NRTL) for North America</i>				
	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

Overview

Test code	Tested by	Device series/ Component	Test standard	Product category/ File-No.
CSA: Canadian Standards Association <i>Independent public testing body in Canada</i>				
	CSA according to CSA standard	SINUMERIK	Standard CSA C22.2 No. 142	2252-01 : LR 102527
FMRC: Factory Mutual Research Corporation <i>Independent public testing body in North America</i>				
	FM according to FM standard	SINUMERIK	Standard FMRC 3600, FMRC 3611, FMRC 3810, ANSI/ISA S82.02.1	–
EAC: Ivanovo-Certificate <i>Independent public testing body in the Russian Federation</i>				
	EAC in accordance with EAC Directive	SINAMICS SINUMERIK SIMOTION	Standard IEC 61800-5-1/-2, IEC 61800-3	–
RCM: Australian Communications and Media Authority <i>Independent public testing body in Australia</i>				
	RCM according to EMV standard	SINAMICS SINUMERIK SIMOTION	Standard IEC AS 61800-3, EN 61800-3	–
KC: National Radio Research Agency <i>Independent public testing body in South Korea</i>				
	KC according to EMV standard	SINAMICS SINUMERIK SIMOTION	Standard KN 11	–
BIA <i>Federal Institute for Occupational Safety</i>				
–	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

Software licences

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 Industry Automation & Drive Technologies offers various types of software license:

- Floating license
- Single license
- Rental license
- Rental floating license
- Trial license
- Demo license
- Demo floating license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started. A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software per license.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per instance, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific period of time (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

Rental floating license

The rental floating license corresponds to the rental license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

Demo license

The demo license support the "sporadic use" of engineering software in a non-productive context, for example, use for testing and evaluation purposes. It can be transferred to another license. After the installation of the license key, the software can be operated for a specific period of time, whereby usage can be interrupted as often as required.

One license is required per installation of the software.

Demo floating license

The demo floating license corresponds to the demo license, except that a license is not required for each installation of the software. Rather, one license is required per object (for example, user or device).

Certificate of License (CoL)

The CoL is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

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.

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 Industry Automation & Drive Technologies supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Software Update Service (SUS)

As part of the SUS contract, all software updates for the respective product are made available to you free of charge for a period of one year from the invoice date. The contract will automatically be extended for one year if it is not canceled three months before it expires.

The possession of the current version of the respective software is a basic condition for entering into an SUS contract.

You can download explanations concerning license conditions from https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

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

Force (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	dyne	N
lb	1	16	453.6	4.448×10^5	4.4482
oz	0.0625	1	28.35	2.780×10^4	0.27801
gm	2.205×10^{-3}	0.03527	1	1.02×10^{-3}	N.A.
dyne	2.248×10^{-6}	3.59×10^{-5}	980.7	1	0.00001
N	0.22481	3.5967	N.A.	100000	1

Mass (to convert from A to B, multiply by entry in table)

A \ B	lb	oz	gm	kg	slug
lb	1	16	453.6	0.4536	0.0311
oz	6.25×10^{-2}	1	28.35	0.02835	1.93×10^{-3}
gm	2.205×10^{-3}	3.527×10^{-2}	1	10^{-3}	6.852×10^{-5}
kg	2.205	35.27	10^3	1	6.852×10^{-2}
slug	32.17	514.8	1.459×10^4	14.59	1

Rotation (to convert from A to B, multiply by entry in table)

A \ B	rpm	rad/s	degrees/s
rpm	1	0.105	6.0
rad/s	9.55	1	57.30
degrees/s	0.167	1.745×10^{-2}	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) (rpm)	1.587×10^{-5}	1.183×10^{-2}
(lb-ft) (deg./s)	3.173×10^{-5}	2.366×10^{-2}
(lb-ft) (rpm)	1.904×10^{-4}	0.1420
Watts	1.341×10^{-3}	1

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	000000	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

Notes

1. General Provisions

By using this catalog you can purchase products (hardware, software and services) described therein from Siemens Aktiengesellschaft subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Please note that the scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in 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 description text, 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 License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany"¹⁾ and/or
- for consulting services the "Allgemeine Geschäftsbedingungen für Beratungsleistungen der Division DF – Deutschland" (available only in German) and/or
- for other services, the „Supplementary Terms and Conditions for Services ("BL")"¹⁾ and/or
- for other supplies the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾.

In case such supplies 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⁾, a notice will be contained in the scope of delivery in which the applicable conditions for Open Source Software are specified. 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 of the Division DF for Customers with a Seat or Registered Office Outside of Germany"¹⁾ and/or
- for other services the "International Terms & Conditions for Services"¹⁾ supplemented by "Software Licensing Conditions"¹⁾ and/or
- for other supplies of hard- and software 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 our supplies and/or services 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.

An exact explanation of the metal factor can be downloaded at: https://mall.industry.siemens.com/legal/ww/en/terms_of_trade_en.pdf

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the individual pages of this catalog – especially with regard to data, dimensions and weights given – these are subject to change without prior notice.

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 Regulations

We shall not be obligated to fulfill any agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes and/or other sanctions.

Export may be subject to license. We shall indicate in the delivery details whether licenses are required under German, European and US export lists.

Our products are controlled by the U.S. Government (when labeled with "ECCN" unequal "N") and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. Government or as otherwise authorized by U.S. law and regulations. Products labeled with "AL" unequal "N" are subject to European / national export authorization.

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Products without label, with label "AL:N" / "ECCN:N", or label "AL:9X9999" / "ECCN: 9X9999" may require authorization from responsible authorities depending on the final end-use, or the destination.

If you transfer goods (hardware and/or software and/or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you shall comply with all applicable national and international (re-)export control regulations. In any event of such transfer of goods, works and services you shall comply with the (re-) export control regulations of the Federal Republic of Germany, of the European Union and of the United States of America.

Prior to any transfer of goods, works and services provided by us to a third party you shall in particular check and guarantee by appropriate measures that

- there will be no infringement of an embargo imposed by the European Union, by the United States of America and/ or by the United Nations by such transfer, by brokering of contracts concerning those goods, works and services or by provision of other economic resources in connection with those goods, works and services, also considering the limitations of domestic business and prohibitions of by-passing those embargoes;
- such goods, works and services are not intended for use in connection with armaments, nuclear technology or weapons, if and to the extent such use is subject to prohibition or authorization, unless required authorization is provided;
- the regulations of all applicable Sanctioned Party Lists of the European Union and the United States of America concerning the trading with entities, persons and organizations listed therein are considered.

If required to enable authorities or us to conduct export control checks, you, upon request by us, shall promptly provide us with all information pertaining to the particular end customer, the particular destination and the particular intended use of goods, works and services provided by us, as well as any export control restrictions existing.

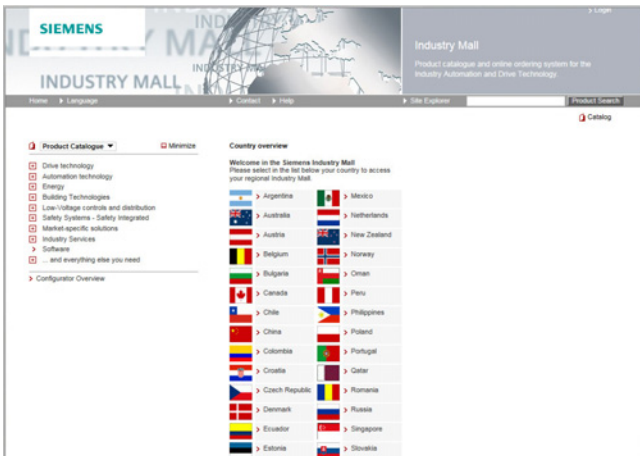
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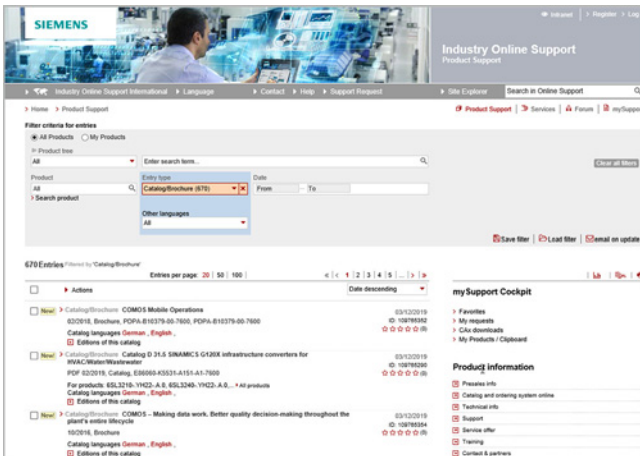
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