SINAMICS G110, SINAMICS G120 Standard Inverters

SINAMICS G110D, SINAMICS G120D Distributed Inverters

Catalog D 11.1 · 2009

SINAMICS Drives

Answers for industry.

SIEMENS

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E86060-K5511-A101-A4-7600

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E86060-K5251-A131-A2-7600

Low Voltage Motors D 81.1
IEC Squirrel-Cage Motors
Frame sizes 56 to 450

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ET 200S FC Frequency inverters

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Motion Control PM 21
SIMOTION, SINAMICS S120 and
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Low-Voltage Controls and Distribution LV 1
SIRIUS · SENTRON · SIVACON

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Technical Information incl. LV 1 T

Catalog CA 01 CA 01
The Offline-Mall
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E86060-D4001-A510-C7-7600

Industry Mall
Information and ordering platform
in the Internet:

http://www.siemens.com/automation/mall

Additional documentation

You will find all information material, such as brochures, catalogs, manuals and operating instructions for standard drive systems up-to-date on the Internet at the addresses

http://www.siemens.com/sinamics-g110/printmaterial
http://www.siemens.com/sinamics-g120/printmaterial
http://www.siemens.com/sinamics-g110d/printmaterial
http://www.siemens.com/sinamics-g120d/printmaterial

You can order the listed documentation or download it in common file formats (PDF, ZIP).

new New products in this catalog.

[1)] German

SINAMICS Drives

SINAMICS G110, SINAMICS G120 Standard Inverters

SINAMICS G110D, SINAMICS G120D Distributed Inverters

Catalog D 11.1 · 2009

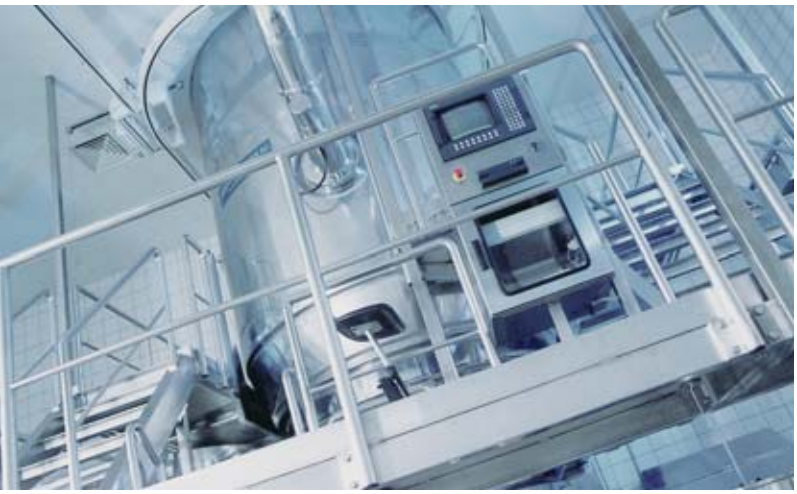
The products and systems described in this catalog are manufactured and marketed using a certified quality management system in accordance with DIN EN ISO 9001: 2000 and DIN EN ISO 14001: 2004 (Certificate Registration No. DE-000357 QM UM). The certificate is recognized in all IQNet countries.

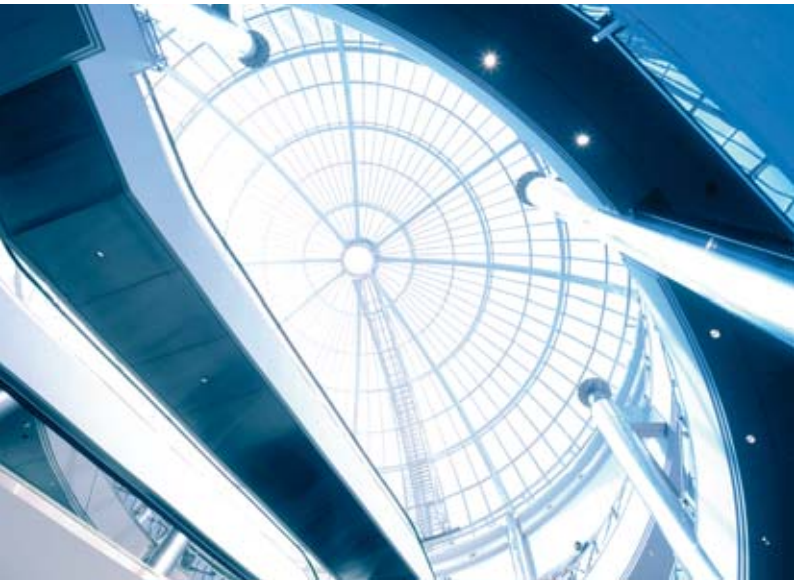
Supersedes:
Catalog D 11.1 · 2008

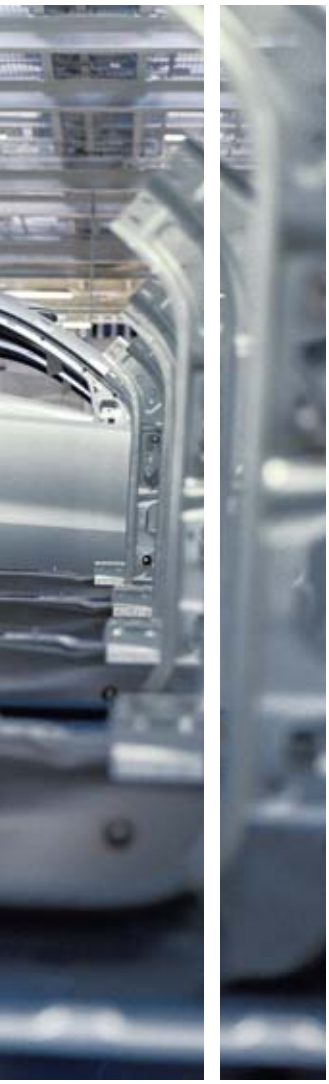
Refer to the Industry Mall for current updates of this catalog:
www.siemens.com/automation/mall

The products contained in this catalog can also be found in the e-Catalog CA 01.
Order No.:
E86060-D4001-A510-C7-7600

Please contact your local Siemens branch







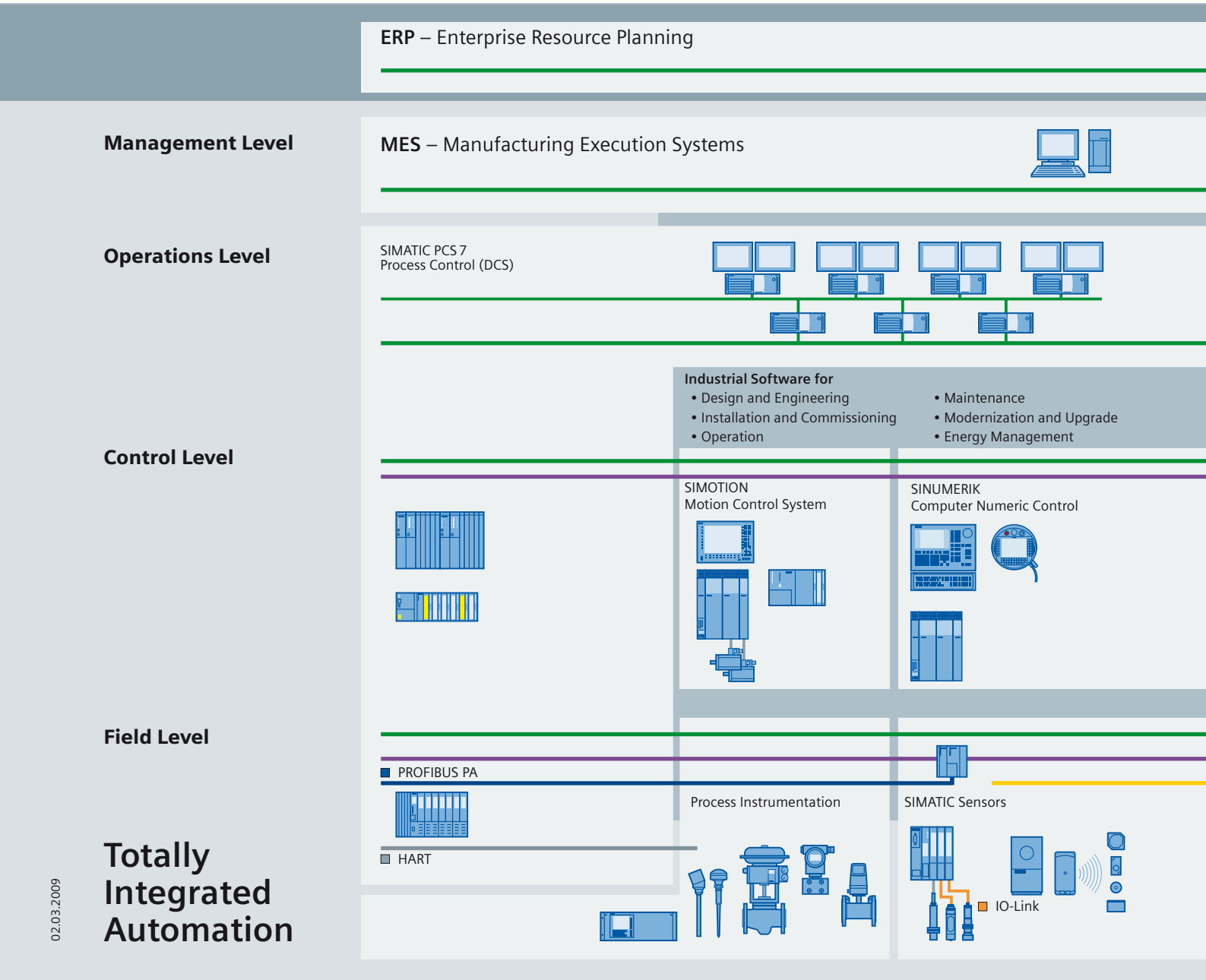
Answers for industry.

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

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

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

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

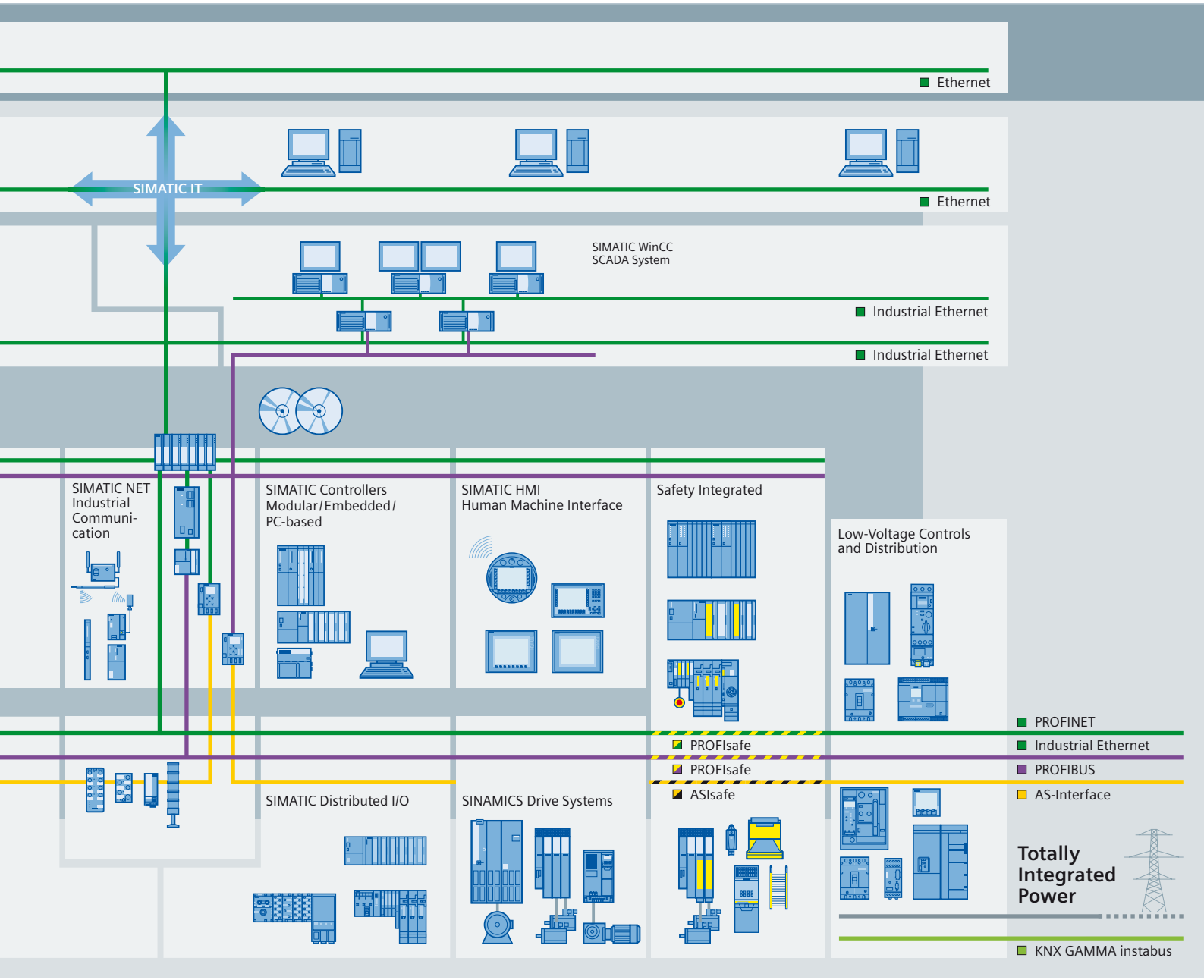


02.03.2009

Setting standards in productivity and competitiveness.

Totally Integrated Automation.

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



TIA is characterized by its unique continuity.

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

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

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

Introduction

Application areas of the SINAMICS family

Applications

SINAMICS is the new drive family from Siemens for industrial machinery and plant construction. SINAMICS offers solutions for all drive tasks:

- Simple pump and fan applications in the process industry
- Demanding single-motor drives in centrifuges, presses, extruders, elevators, as well as conveyor and transport systems
- Drive line-ups in textile, foil and paper machines as well as in rolling mills
- Servo drives with a high dynamic performance for machine tools, packaging and printing machines

Versions

Depending on the application, the SINAMICS family offers the ideal version for each and every drive task.

- SINAMICS G is designed for standard applications with asynchronous motors. These applications have less stringent demands regarding the dynamic response of the motor speed
- SINAMICS S handles demanding drive tasks with synchronous and asynchronous motors and fulfills high requirements regarding
  - the dynamic performance and accuracy
  - the integration of extensive technological functions in the drive control system

Platform concept and Totally Integrated Automation

All of the SINAMICS versions are consequentially based on a platform concept. Common hardware and software components, as well as standardized tools for design, configuration and commissioning tasks, ensure a high level of integration across all components. SINAMICS seamlessly handles the widest range of drive tasks without any system gaps. The different SINAMICS versions can be easily combined with each other.

SINAMICS is a part of the Siemens concept “Totally Integrated Automation”. The degree of integration and standardization of SINAMICS regarding engineering, data management, and communication with the automation level means that solutions with SIMOTION, SINUMERIK and SIMATIC control systems are easy to implement.

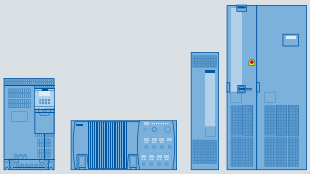
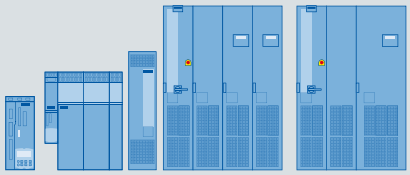
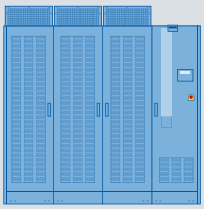
SINAMICS as part of the Siemens modular automation system

Quality in accordance with DIN EN ISO 9001

SINAMICS is able to meet the highest requirements in terms of quality. Comprehensive quality assurance measures in all development and production processes ensure a consistently high level of quality.

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

The SINAMICS drive family

Low voltage								Medium voltage
For basic applications		For high-quality applications			For basic servo drives	For sophisticated applications		For high-power applications
								
SINAMICS G110	SINAMICS G110D	SINAMICS G120	SINAMICS G120D	SINAMICS G130/G150	SINAMICS S110	SINAMICS S120	SINAMICS S150	SINAMICS GM150/SM150/GL150
V/f Control	*V/f* Control/FCC	*V/f* Control / Vector Control			Servo Control	*V/f* Control / Vector Control / Servo Control		*V/f* Control / Vector Control
0.12 kW ... 3 kW	0.75 kW ... 7.5 kW	0.37 kW ... 250 kW	0.75 kW ... 7.5 kW	75 kW ... 1500 kW	0.12 kW ... 90 kW	0.12 kW ... 4500 kW	75 kW ... 1200 kW	0.8 MW ... 120 MW
Pumps, fans, conveyor belts	Conveyor technology	Pumps, fans, conveyor belts, compressors, mixers, mills, extruders			Single-axis positioning applications for machine and plant engineering	Motion Control applications in production machines (packaging, textile, printing, paper, plastic), machine tools, plants and process lines	Test bay drives, cross cutters, centrifuges	Pumps, fans, compressors, mixers, extruders, rolling mills mining hoist drives

G_D011_EN_00164b

Common Engineering Tools

SIZER – for simple planning and configuration **STARTER – for fast commisioning, optimization and diagnostics**

The SINAMICS drive family

Tailored to suit different application areas, the SINAMICS range encompasses the following products:

Low-voltage converters / inverters (line supply < 1000 V)

- **SINAMICS G110** – the versatile drive for low power ratings
- **SINAMICS G120** – the modular single-motor drive for low to medium power ratings
- **SINAMICS G110D** – the distributed, compact single-motor drive in a high degree of protection for basic applications
- **SINAMICS G120D** – the distributed, modular single-motor drive in a high degree of protection for sophisticated applications
- **SINAMICS G130** and **SINAMICS G150** – the universal drive solution for high-power single drives
- **SINAMICS S110** – the basic positioning drive for single-axis applications
- **SINAMICS S120** – the flexible, modular drive system for demanding tasks
- **SINAMICS S150** – the drive solution for demanding single-motor drives with a high power rating

Medium-voltage drive converters (line supply > 1000 V)

- **SINAMICS GM150** – the universal drive solution for single-motor drives
- **SINAMICS SM150** – the drive solution for demanding single and multi-motor drives
- **SINAMICS GL150** – the drive solution for synchronous motors up to 120 MW

The SINAMICS family is characterized by the following system properties:

- Standard functionality based on a platform concept
- Standardized engineering
- High degree of flexibility and combinability
- Wide range of performance and power ratings
- Designed for global use
- SINAMICS Safety Integrated
- A higher level of efficiency and effectiveness
- Wide range of coupling options to higher-level controls
- Totally Integrated Automation

The members of the SINAMICS drive family

SINAMICS low-voltage inverters

SINAMICS G110	SINAMICS G120	SINAMICS G110D	SINAMICS G120D
			
The versatile drive for low power ratings	*The modular single-motor drive for low to medium power ratings*	*The distributed, compact single-motor drive in a high degree of protection for basic applications*	*The distributed, modular single-motor drive in a high degree of protection for demanding applications*
Main applications			
• Machines and plants in industrial and commercial environments	• Machines and plants in industrial environments and commercial applications (machinery construction, automotive, textiles, chemicals, printing, steel)	• Horizontal conveyor system applications in the industrial environment, main focus on distribution and logistics in airports; generally suitable for basic conveyor-related tasks with local control or connected to a bus via AS-Interface	• Conveyor-related drive applications in the industrial environment, main focus on the automobile industry; also suitable for high-performance applications, including airports and in the food, beverage and tobacco industry (without tenside)
Application examples			
• Pumps and fans • Auxiliary drives • Conveyor systems • Advertising panels • Door or gate drives • Centrifuges	• Pumps and fans • Compressors • Conveyor systems	• Conveyor systems • Airports • Distribution logistics	• Conveyor systems • Electric monorail systems in distribution logistics
Highlights			
• Compact • Can be flexibly adapted to various applications • Simple and fast commissioning • Clear terminal layout • Optimum interaction with SIMATIC and LOGO!	• Modular • Can be flexibly expanded • Simple and fast commissioning • Regenerative feedback • Innovative cooling concept • Optimum interaction with SIMOTION and SIMATIC • SINAMICS Safety Integrated	• Low profile design with standard drilling dimensions (standard footprint) in IP65 degree of protection • Simple and fast commissioning • Versions with and without a maintenance switch • Optional key-operated switch • AS-Interface with bus parameterization • Quick stop function • Integrated brake control, 180 V DC • Optimum interaction with SIMATIC and LOGO!	• Low profile design with standard drilling dimensions (standard footprint) in IP65 degree of protection • Modular • Can be flexibly expanded • Simple and fast commissioning • Regenerative feedback • Optimum interaction with SIMOTION and SIMATIC • SINAMICS Safety Integrated
Catalog D 11.1	**Catalog D 11.1**	**Catalog D 11.1**	**Catalog D 11.1**

SINAMICS low-voltage drive converters

SINAMICS G130, SINAMICS G150	SINAMICS S110	SINAMICS S120	SINAMICS S150
			
The universal drive solution for high-power single drives	*The basic positioning drive for single-axis applications*	*The flexible, modular drive system for complex drive tasks*	*The drive solution for demanding high-power single drives*
Main applications			
• Plants and machines in the process and production industry, water/waste, power stations, oil and gas, petrochemicals, raw materials for the chemical industry, paper, cement, stone, steel	• Machine and plants in the industrial environment, where machine axes should be quickly and precisely positioned in the simplest possible way.	• Machines and plants in the industrial environment (packaging, plastics, textiles, printing, wood, glass, ceramics, presses, paper, lifting equipment, semiconductors, automated assembly and testing equipment, handling, machine tools)	• Machines and plants in the process and production industry, food, beverage and tobacco, automotive and steel industry, mining/open-cast mining, shipbuilding, lifting equipment, conveyors
Application examples			
• Pumps and fans • Compressors • Extruders and mixers • Crushers	• Handling equipment • Feed and withdrawal devices • Stacking units • Automatic assembly machines • Laboratory automation • Metalworking • Woodworking, glass and ceramic industries • Printing machines • Plastics processing machines	• Motion Control applications (positioning, synchronous operation) • Numerical Control, interpolating motion control • Converting • Technological applications	• Test stand drives • Centrifuges • Elevators and cranes • Cross cutters and shears • Conveyor belts • Presses • Cable winches
Highlights			
• Space-saving • Low noise • Simple and fast commissioning • SINAMICS G130: Modular components • SINAMICS G150: Ready-to-connect cabinet unit • Optimum interaction with SIMATIC	• For universal use • Flexible and modular • Scalable in terms of power rating, function, number of axes, performance • Simple and fast commissioning, auto-configuration • Innovative, futureproof system architecture • (Graded infeed/regenerative feedback concepts) • Wide range of motors • (Optimum interaction with SIMOTION, SIMATIC and SINUMERIK) • SINAMICS Safety Integrated	• For universal use • Flexible and modular • Scalable in terms of power rating, function, number of axes, performance • Simple and fast commissioning, auto-configuration • Innovative, futureproof system architecture • Graded infeed/regenerative feedback concepts • Wide range of motors • Optimum interaction with SIMOTION, SIMATIC and SINUMERIK • SINAMICS Safety Integrated	• Four-quadrant operation as standard • High control accuracy and dynamic response • Almost free of line-current harmonics, considerably lower than the IEEE 519 THD limits • Tolerant to fluctuations in the line voltage • Reactive power compensation option • Simple and fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC
Catalog D 11	**Catalog PM 22**	**Catalogs PM 21 and D 21.3**	**Catalog D 21.3**

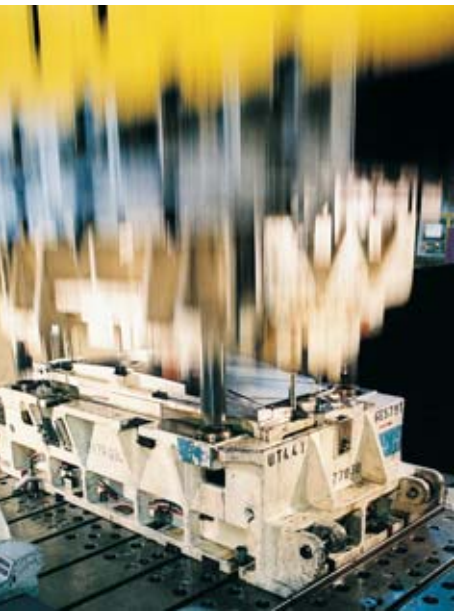
The members of the SINAMICS drive family

1

SINAMICS medium-voltage drive converters		
SINAMICS GM150	**SINAMICS SM150**	**SINAMICS GL150**
		
The universal drive solution for single-motor drives	*The drive solution for demanding single-motor and multi-motor drives*	*The drive solution for synchronous motors up to 120 MW*
Main applications		
• Machines and plants in the process industry	• Machines and plants, e.g. in the steel and mining industry	• Machines and plants in the process industry, especially in the oil, gas and petrochemicals sectors
Application examples		
• Pumps and fans • Compressors • Extruders and mixers • Crushers • Marine drives	• Rolling mills • Mine hoists • Test stand drives • Conveyor belts	• Compressors • Pumps and fans • Extruders and mixers • Marine drives • Blast furnace blowers
Highlights		
• Space-saving • Simple and fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC	• Four-quadrant operation as standard • High efficiency and minimum load on the motor • High control accuracy and dynamic response • Almost no line harmonics • Reactive power compensation option • Simple and fast commissioning • Ready-to-connect cabinet unit • Optimum interaction with SIMATIC	• Compact design and high power density • Easy to operate and monitor • Extremely reliable in operation and almost maintenance-free • Fully digital Transvector control • Two directions of rotation by reversal of rotating field • Can be seamlessly integrated into higher-level automation systems
Catalog D 12	**Catalog D 12**	**–**

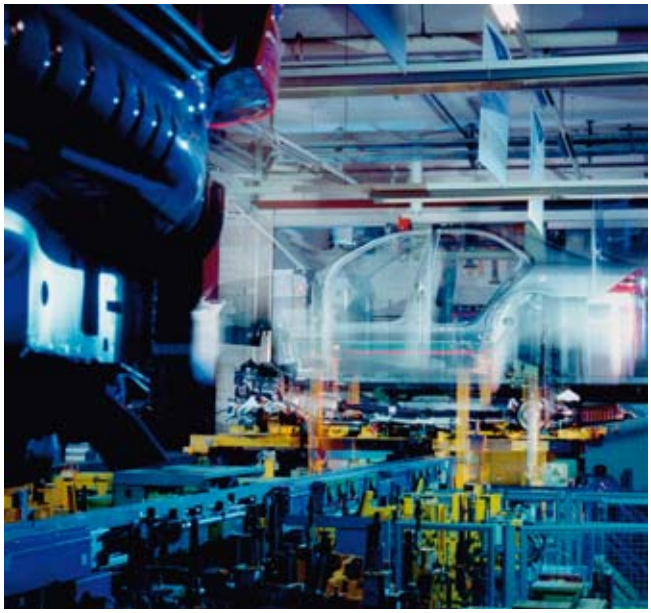
Highlights

2



Safety Integrated

Overview



The integrated safety functions of SINAMICS G120 and SINAMICS G120D provide highly effective application-oriented protection for personnel and machinery.

SINAMICS G120 and SINAMICS G120D offer the following Safety Integrated functions (terms as defined in IEC 61800-5-2):

- Safe Torque Off (STO)
- Safe Stop 1 (SS1)
- Safely Limited Speed (SLS)
- Safe Brake Control (SBC) (SINAMICS G120 only)

The Safety Integrated functions are completely integrated into the drive system. They can be activated as follows:

- via safe digital inputs on the Control Unit (SINAMICS G120 only) without the need for an additional safety relay
- via PROFIBUS with PROFIsafe
- via PROFINET with PROFIsafe

The Safety Integrated functions are implemented electronically and therefore offer short response times in comparison to solutions with externally implemented monitoring functions. This system is absolutely unique worldwide in that it does not require speed feedback through sensors or encoders.

The STO and SBC functions can be used without restriction for all applications.

The SS1 and SLS functions may be used for any application in which the load can never accelerate when the frequency inverter is switched off. Therefore, they are not suitable for applications with loads that can pull, e.g. lifting gear and winders.

Legal framework

Machine manufacturers and plant construction companies must ensure that their machines or plants are not a source of danger due to functional faults as well as general risks relating to electric shock, heat or radiation.

In Europe, for example, the EU General Directive stipulates that the Machinery Directive must be maintained for safety at work. In order to ensure compliance with this directive, it is recommended that the corresponding harmonized European standards are applied. This initiates 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 the compliance with all relevant directives and regulations in the free movement of goods.

Safety-related standards

Functional safety is specified in various standards.
EN ISO 12100 and EN 1050, for example, are concerned with the construction and risk assessment of machines. EN 62061 (only applicable for electrical and electronic control systems) and EN ISO 13849-1, which will replace the previously used EN 954-1 as from 2009, define the functional and safety-related requirements of control systems with relevance to safety.

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

- EN 954-1: Categories B, 1 … 4
- EN ISO 13849-1: Performance Level PL a … e
- EN 62061: Safety Integrity Level SIL 1 … 3

Trend toward integrated safety systems

The trend toward greater complexity and increasing modularity of machines has seen a shift in safety functions away from the classical central safety functions (for example, shutdown of all drives by a line contactor) and into the machine control system and the drives. One advantage of this development is that some safety-related circuitry involving complex hardware is now no longer necessary.

Integrated safety functions act much faster than those of a conventional design. As a consequence, the safety of a machine is increased further with Safety Integrated. Furthermore, safety measures controlled by integrated safety systems are perceived as less interfering by the operator of the machine due to the faster action, so the motivation to consciously bypass safety functions is significantly reduced.

Function

Safety functions integrated in the SINAMICS G120 and SINAMICS G120D drive systems

SINAMICS G120 and SINAMICS G120D are characterized by a large number of integrated safety functions.

The inverters fulfill the equipment requirements of

- Category 3 according to EN 954-1
- Safety Integrity Level (SIL) 2 according to EN 61508

The Safety Integrated functions provided by SINAMICS G120 and SINAMICS G120D have been certified by independent institutes. You can obtain the corresponding external test certificates and manufacturer's declarations from your Siemens contact person

- for SINAMICS G120 under:
http://www.siemens.com/sinamics-g120/certificates
- for SINAMICS G120D under:
http://www.siemens.com/sinamics-g120d/certificates

The Safety Integrated functions currently available in SINAMICS G120 and SINAMICS G120D are listed below (functions and designations as defined in IEC 61800-5-2):

Safe Torque Off (STO)

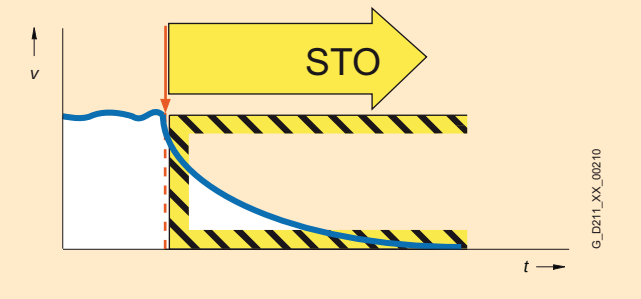
Function description

This function is a mechanism that prevents the drive from restarting unexpectedly, in accordance with EN 60204-1, Section 5.4. Safe Torque Off cancels the drive pulses and disconnects the power supply to the motor (corresponds to Stop Category 0 acc. to EN 60204-1). The drive is reliably torque-free. This state is monitored internally in the drive.

Application, customer benefits

STO has the immediate effect that the drive cannot provide any torque-generating energy.

STO can be used wherever the drive will reach a standstill autonomously due to the load torque or friction in a sufficiently short time or when the drive can safely coast down.



Safe Stop 1 (SS1)

Function description

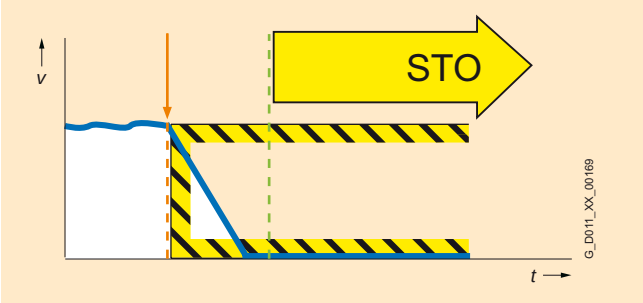
The Safe Stop 1 function can safely stop the drive in accordance with EN 60204-1, Stop Category 1. When the SS1 function is selected, the drive brakes autonomously along an adjustable, monitored ramp and automatically activates the Safe Torque Off and Safe Brake Control functions (if used) when 2 Hz is reached.

If the drive does not brake along the parameterized ramp when the stop function is activated, Safe Torque Off and Safe Brake Control (if used) are activated instantaneously.

Application, customer benefits

This integrated fast-brake function eliminates the need for complex external monitoring equipment. Furthermore, it is often possible to eliminate mechanical brakes which wear, or to lessen the load on them, so that maintenance costs and the stresses on the machine can be reduced.

Safe Stop 1 is employed for applications which require monitored braking, e.g. on centrifuges, conveyor vehicles, etc.



2

Function

Safely Limited Speed (SLS)

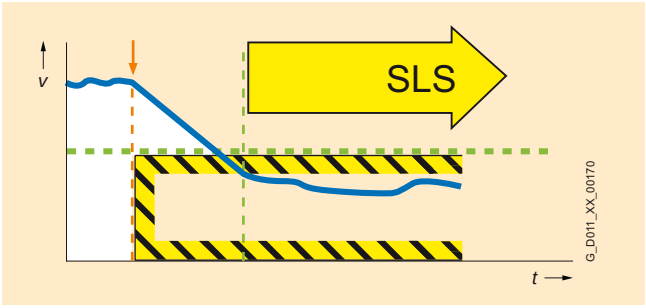
Function description

The Safely Limited Speed function safely monitors the drive and, depending on the mode selected, either limits the motor speed to a safe value or monitors the system directly for a parameterized maximum speed.

If the drive does not follow the parameterized ramp or exceeds the maximum speed when the function is activated, it is either braked along the Safe Stop 1 ramp or Safe Torque Off and Safe Brake Control (if used) are activated (depending on which mode is selected).

Application, customer benefits

When many machines are being set up, the operating personnel must work on the moving machine. This either occurs in stages because the operator must exit the danger area repeatedly when the machine is started up, or the operator works on the moving machine and is therefore exposed to increased risk. The SLS function can save a considerable amount of time here and still increase the safety of operating personnel.



Safe Brake Control (SBC)

Function description

Safe Brake Control SBC is used to control holding brakes which are operative at zero current, e.g. motor brakes. The brake control circuit is a fail-safe, two-channel design.

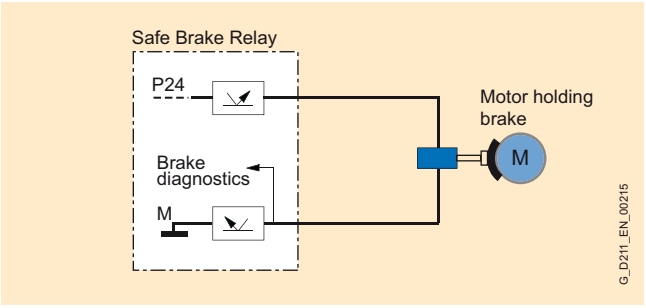
The Safe Brake Control is activated when the Safe Torque Off function is selected and when safety monitors respond with safe pulse cancellation.

- This function is available only for the SINAMICS G120 system. It requires an additional Safe Brake Relay.
- Safe Brake Control does not detect mechanical faults in the brake itself, such as worn brake linings.
- The Safe Brake Relay is only capable of controlling 24 V motor brakes.

Application, customer benefits

SBC can also be activated in combination with STO and SS1. SBC provides the option of safely controlling a motor brake on the motor when the torque-generating energy has been disconnected.

As the Safe Brake Control module does not contain any mechanical components, there are no restrictions on the switching frequency.



New functions from firmware V3.2 and higher

With firmware V3.2, the existing safety functions have been expanded as follows:

- Starting the motor with activated SLS
- Reversing operation with activated SLS
- Improved use of PROFIsafe feedback signals. The actual status of the safety functions is signaled to the F-CPU using the feedback signals
- The replacement of a fail-safe inverter has been significantly simplified as the operator no longer has to make any parameter changes

Function

PROFIsafe

PROFIsafe is an open communications standard that supports standard and safety-related communication over the same communications cable (hard-wired or wireless). A second, separate bus system is therefore not necessary. To ensure safe communication, the transmitted telegrams are continuously monitored. Possible errors, such as lost or repeated telegrams or those received in the wrong order are avoided in that safety-related telegrams are numbered consecutively, their reception is monitored within a defined period, and an identifier for the sender and receiver of a telegram is transferred. A CRC (cyclic redundancy check) data security mechanism is also used.

PROFIsafe can be implemented on PROFIBUS and PROFINET for the SINAMICS G120 and SINAMICS G120D systems.

Licensing

The Safety Integrated functions for SINAMICS G120 and SINAMICS G120D do not require a license.

The availability of Safety Integrated functions depends on the type of Control Unit, i.e. whether it is a standard Control Unit or a Fail-safe Control Unit.

An overview of the Safety Integrated functions of SINAMICS G120 and SINAMICS G120D with their secondary conditions is given in the following table:

Function	Activation	Underlying function	Response when a limit value is exceeded	External setpoint input effective	Encoder required
STO	• PROFIsafe over PROFIBUS or PROFINET • Fail-safe digital inputs (with SINAMICS G120 only)	SBC (if parameterized)	–	no	no
SS1	• PROFIsafe over PROFIBUS or PROFINET • Fail-safe digital inputs (with SINAMICS G120 only)	STO when 2 Hz is reached, followed by SBC (if parameterized)	Activation of STO Activation of SBC (if parameterized)	no	no
SLS	• PROFIsafe over PROFIBUS or PROFINET • Fail-safe digital inputs (with SINAMICS G120 only)	–	Activation of STO or SS1 Activation of SBC (if parameterized)	yes (depending on mode)	no
SBC (only with SINAMICS G120)	• With STO • With SS1 when 2 Hz is reached	–	–	–	no

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. Thereby ensuring that the system is always switched to a safe state if a component fails or in the event of an open circuit. If an error is discovered in the switch-off signal paths, the “Safe Torque Off” function 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 status must prevail before each action is carried out and a specific acknowledgement must be made after each action. If this expectation is not fulfilled in a monitoring channel, the drive is stopped through two channels and an appropriate message is output.

Forced dormant error detection using a 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 954-1 and IEC 61508 in terms of timely fault detection. This functionality must be implemented by initiating a test stop, either manually at regular intervals (cyclically) or using an automated process. The test stop cycle is monitored and an alarm is output following a timeout.

A test stop does not require Power On. The acknowledgment is set by canceling the test stop request.

When the appropriate safety devices are implemented (e.g. guard doors), it can be assumed that running machinery will not pose any risk to personnel. For this reason, only an alarm is output to inform the user that a forced dormant error detection run is due, thereby requesting that this be carried out at the next available opportunity.

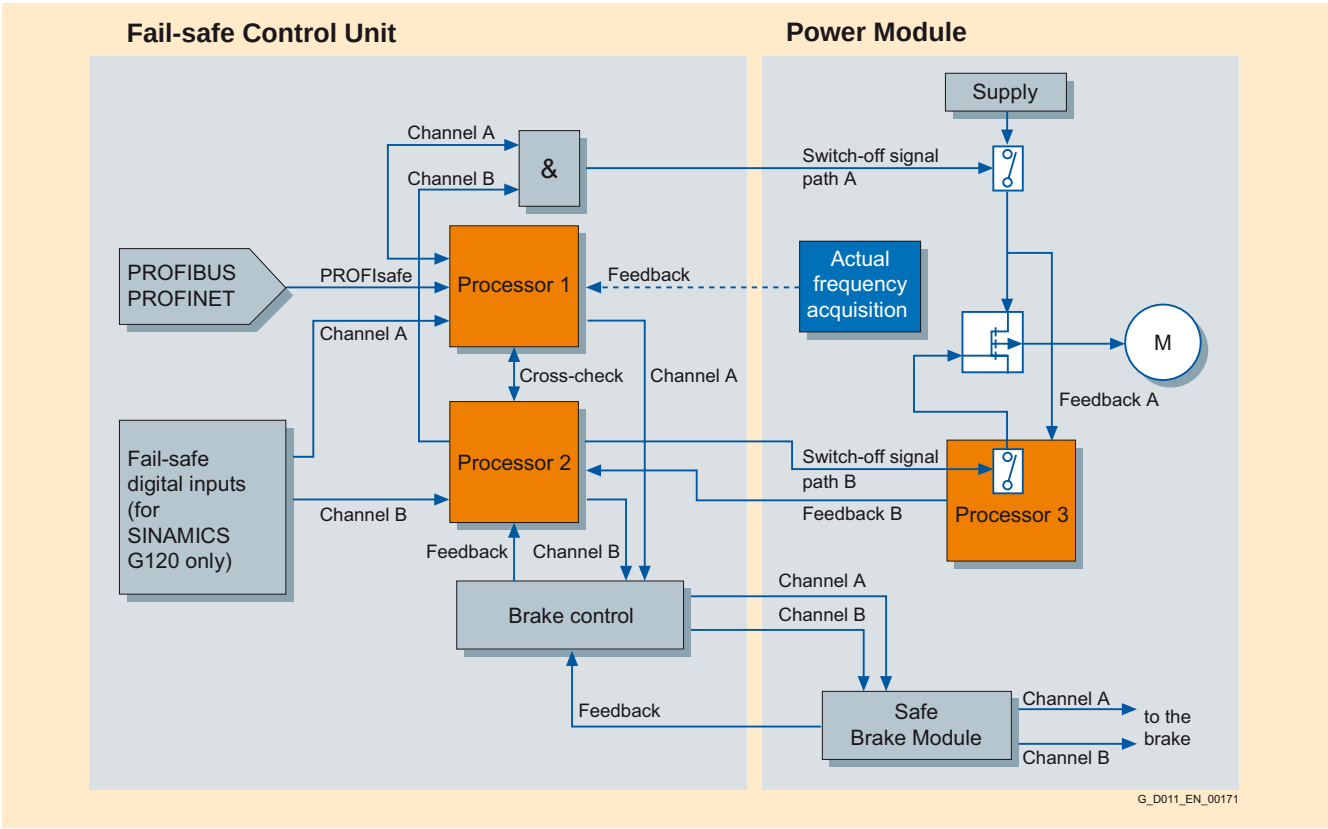
Examples of when forced dormant error detection must be performed:

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

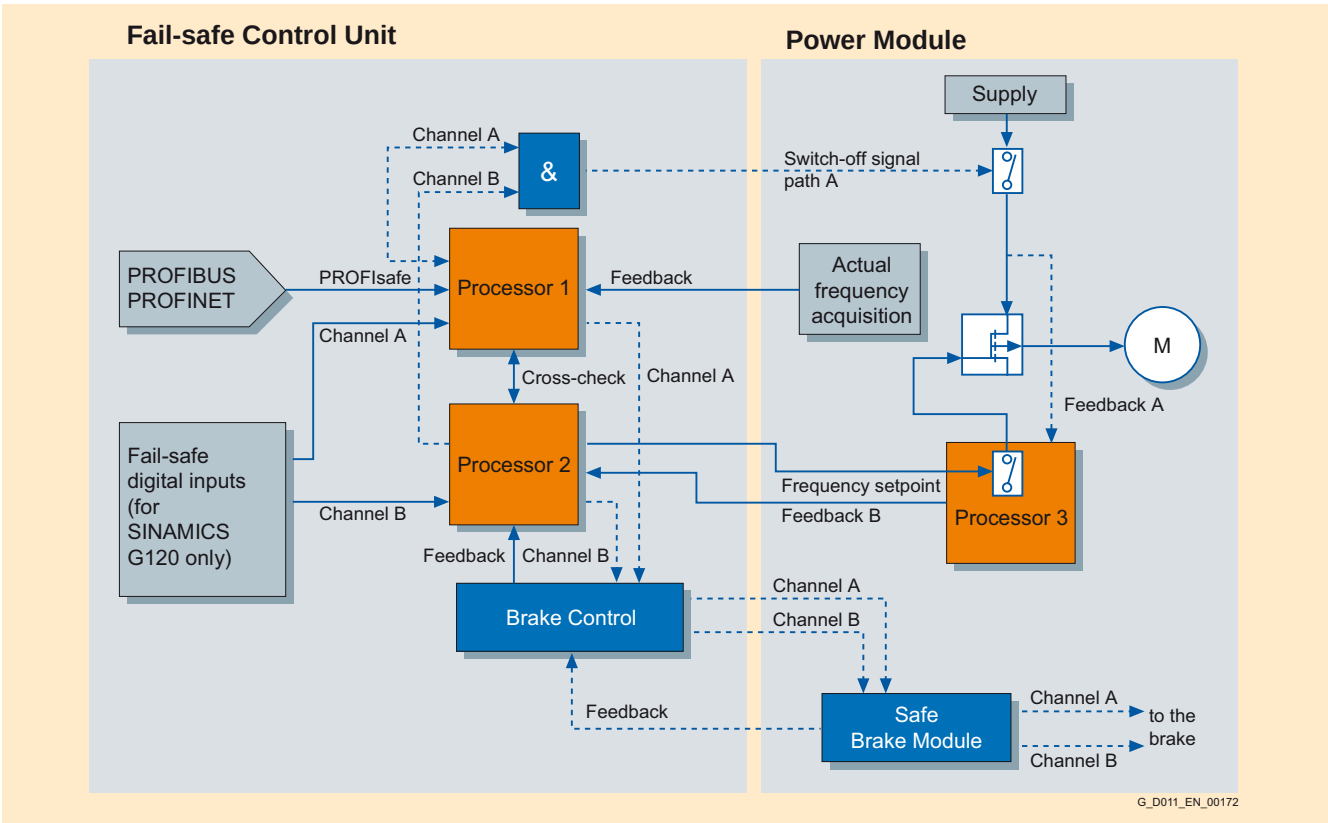
2

Function

STO function architecture for SINAMICS G120 and SINAMICS G120D



SS1 and SLS function architecture for SINAMICS G120 and SINAMICS G120D



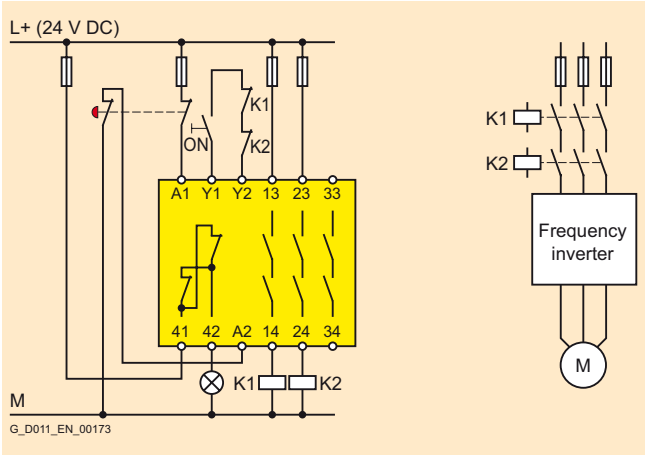
Function

Comparison between conventional and integrated safety systems

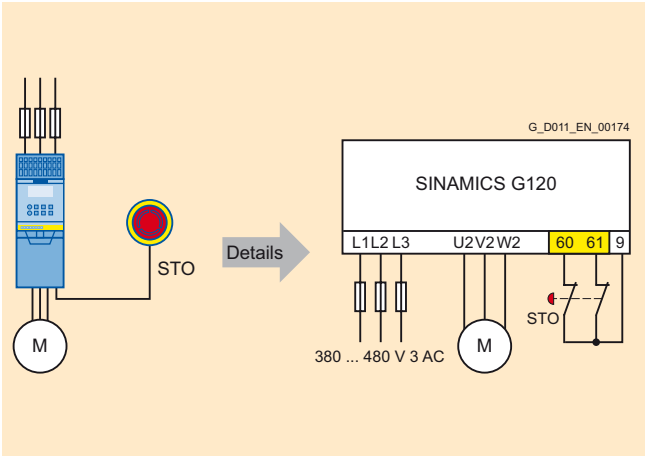
To implement safety functions in conjunction with drives, in some cases complex and costly solutions are required.

These costs are significantly reduced using the safety functions integrated in SINAMICS G120 and SINAMICS G120D.

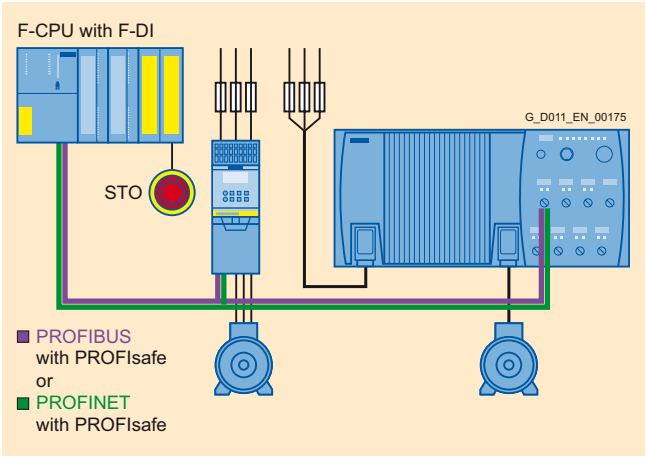
Safe Torque Off (STO)



Conventional wiring

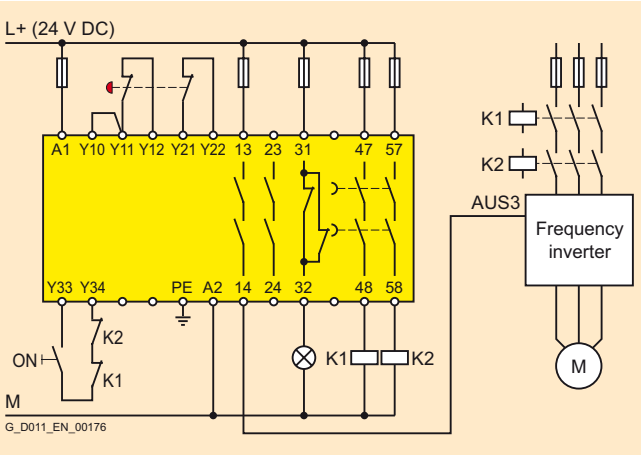


Integrated safety via fail-safe inputs

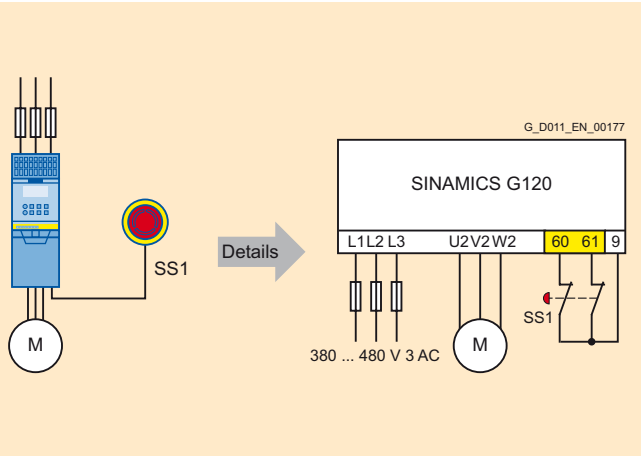


Integrated safety via PROFIsafe

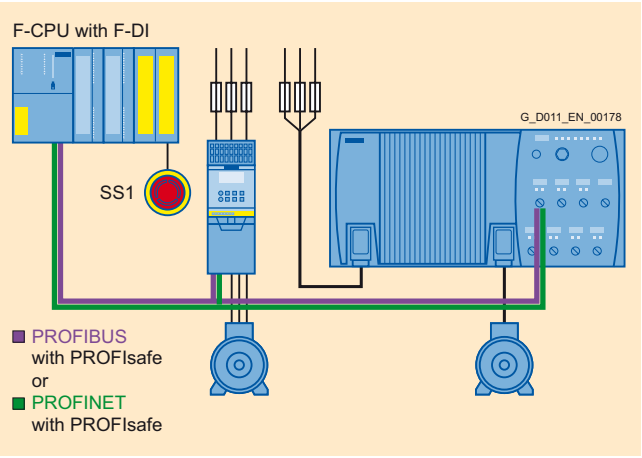
Safe Stop 1 (SS1)



Conventional wiring



Integrated safety via fail-safe inputs

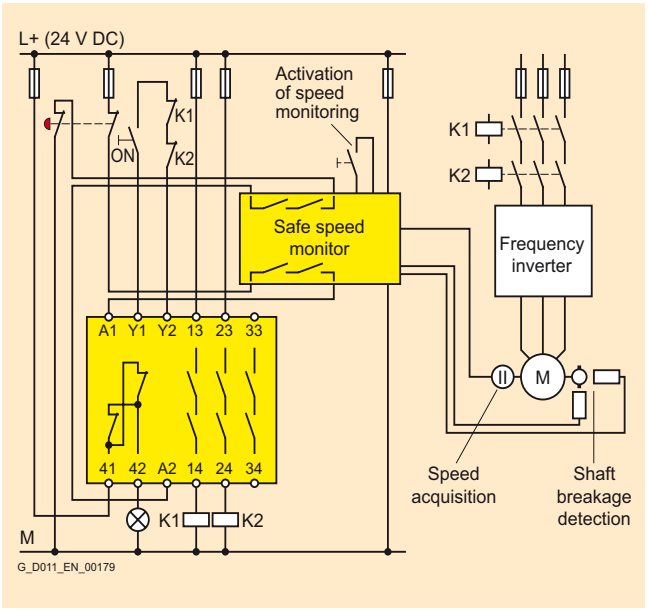


Integrated safety via PROFIsafe

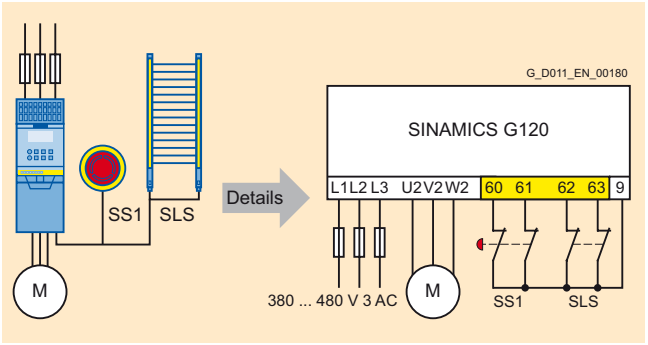
Safety Integrated

Function

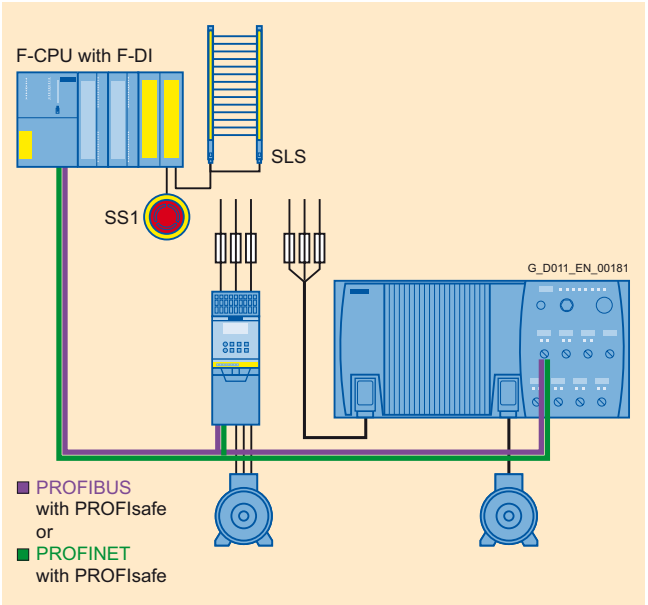
Safely Limited Speed (SLS)



Conventional wiring



Integrated safety via fail-safe inputs



Integrated safety via PROFIsafe

Efficient Infeed Technology

Overview

Siemens is setting a completely unique new global standard in the field of compact inverters: The technology applied is a world first and provides regenerative feedback capability in smaller, lighter and much lower-cost inverter units.

Available inverters with Efficient Infeed Technology

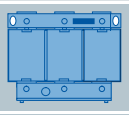
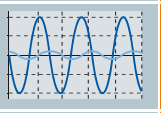
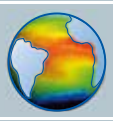
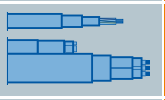
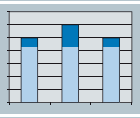
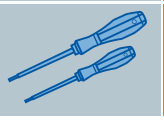
The following inverters are equipped with Efficient Infeed Technology:

- SINAMICS G120 (integrated in PM250 and PM260 Power Modules)
- SINAMICS G120D
- SIMATIC ET 200S FC
- SIMATIC ET 200pro FC

SINAMICS G120 and SINAMICS G120D are listed in this catalog (Parts 4 and 6).
You can find information on the two SIMATIC ET 200 drive converters in Part 9 and in the Catalog IK PI.

Potential savings thanks to Efficient Infeed Technology

The table below shows the advantages of the technology as compared to conventional 2-quadrant inverters.

	Standard Technology	Efficient Infeed Technology
Line reactor 	Required	Not required
Braking resistor 	Required	Not required
Configuration overhead 	Standard	Low
Generated harmonics 	Standard	Minimal
Heat generated when braking 	Yes	No
Power infeed 	Standard	Approx. 22% less
Power consumption 	Standard	Approx. 22% less
Energy efficiency 	Standard	Good
Reactive power compensation 	No	Yes
Installation outlay 	Standard	Low

G_D011_EN_00182

Three technical criteria are of particular significance:

- Regenerative feedback
  - 100 % braking power is fed back, allowing continuous braking. This is not possible in practice using braking resistors
  - A braking resistor does not need to be configured
  - No need for installation, cooling monitoring, etc. for external components
- Minimal reactive power distortion
  - The current consumption does not manifest any spikes but is almost like a block, therefore a minimum transformer throughput rating is required and reduced reactive power distortion
  - In order to achieve such a low harmonic content (line harmonics) for an inverter with a conventional DC link, a line reactor with a u_K = 6 % is required
  - Results in approx. 22 % lower current consumption, which corresponds to approximately 40 % lower losses in the supply system
  - The load on the power supply system is therefore reduced
- Reactive power compensation, improved cos φ
  - Slightly capacitive behavior at the input ~ 0.94
  - Compensates the reactive power of motors and other inductive loads on the same supply
  - The current required for the entire system is reduced. In a system comprising one inverter with motor and another motor on the same supply, the total current consumption is reduced by up to 12 %.

Line supply conditions

Inverters with Efficient Infeed Technology have a much lower harmonic content (and therefore lower reactive current component) than a standard frequency inverter. The harmonics up to and including the 11th are significantly lower than specified in the relevant standard. These relevant harmonics are less than half the magnitude stipulated by the relevant standard (EN 61000-3-12).

The requirements on the line supply are no more stringent than for comparable standard inverters. Experience has proven that this technology can be applied worldwide. Sole exception: In "island networks" with a separate generator (without a line supply), an external capacitor must be used to reduce resonance effects. This must be dimensioned according to the particular system.

Permissible ratio between the line supply short-circuit power S_{K_line} and the inverter apparent power $S_{inverter}$:

$S_{K\_line} \geq 100 \times S_{inverter}$ corresponding to $u_K \leq 1$ %

Benefits

- Continuous braking with 100 % rated power
- Energy savings through regenerative feedback with the motor operating in generator mode
- The braking resistor, line reactor and brake chopper can be eliminated
- No costly configuration of the braking resistors and no costly cabling
- Requires considerably less space than a conventional compact inverter
- Up to 22 % lower power infeed
- No additional heat generated when braking
- Cost saving
- Space saving

Efficient Infeed Technology

Applications

Whenever an application involves movements with frequent changes in speed or rotational direction or requires masses to be electrically braked, inverters with regenerative feedback capability are an attractive drive solution for both operating companies and machine manufacturers.

This is true in part for applications with vertical motion in general or for driven loads with a high moment of inertia:

- Drives for conveyor vehicles
- Stage machinery in theaters
- Cranes
- Heavy load transport systems/conveyors
- Storage and retrieval machines
- Centrifuges
- Renewable energy sources (hydro-electric power, wind power)
- Brake testing systems
- Drum-type crushers/revolving screens
- Vertical load hoists
- Industrial washing machines
- Shuttles/elevator systems/endless bucket belts
- Rolling mills/conveyor belts
- Winding machines

Generally, for applications with a high braking power over long periods of time, in many cases it makes sense to use Efficient Infeed Technology – this reduces the costs and the amount of space required.

Additional information

Capacitive reactive currents

For the PM250 Power Modules that are capable of energy recovery with integrated class A EMC filter and PM250D, as a result of the topology, the capacitance that is effective at the inverter input is greater than that for conventional PM240 Power Modules. This results in higher capacitive reactive currents as soon as voltage is connected to the Power Module.

The capacitive reactive current only has to be taken into consideration when determining the cable cross-section and infeed point for group drives with a low coincidence factor.

Rated power of the PM250 Power Module for low overload LO		**Filter capacitance**	**50-Hz impedance**	**Current at 400 V**	**60-Hz impedance**	**Current at 480 V**
Values apply to PM250 Power Modules with integrated class A line filter						
kW	hp	µF	Ω	A	Ω	A
7.5	10	42.4	75.1	3.08	62.6	4.43
11	15	42.4	75.1	3.08	62.6	4.43
15	20	42.4	75.1	3.08	62.6	4.43

Rated power of the PM250D Power Module for high overload HO		**Filter capacitance**	**50-Hz impedance**	**Current at 400 V**	**60-Hz impedance**	**Current at 480 V**
kW	hp	µF	Ω	A	Ω	A
0.75	1.0	8.9	357.7	0.65	298.0	0.93
1.5	2.0	8.9	357.7	0.65	298.0	0.93
3.0	4.0	32.4	98.2	2.35	81.9	3.38
4.0	5.4	32.4	98.2	2.35	81.9	3.38
5.5	7.5	42.4	75.1	3.08	62.6	4.43
7.5	10	42.4	75.1	3.08	62.6	4.43

In case of questions, please contact:
sdsupport.aud@siemens.com

SINAMICS infeed concepts

SINAMICS offers four design concepts for the inverter infeed circuit.

Concept	**Characteristic features**
Basic Infeed	• No regenerative feedback capability • Braking resistor required for braking operation • High harmonic content (reactor available as option) • …
Smart Infeed	• Regenerative feedback capability • Line reactor is essential • Efficiency, approx. 96 % to 97 % • …
Efficient Infeed	• Regenerative feedback capability • Line reactor not required/not permitted • Efficiency, approx. 98 % • High energy efficiency and active current component • Low harmonic component • …
Active Infeed	• Regenerative feedback capability • Sinusoidal current when motoring and generating • High DC link voltage, line supply fluctuations can be compensated • …

The following inverters are equipped with Basic Infeed:

- SINAMICS G110
- SINAMICS G120 (integrated in Power Modules PM240)
- SINAMICS G110D

These inverters are equipped with Efficient Infeed:

- SINAMICS G120 (integrated in PM250 and PM260 Power Modules)
- SINAMICS G120D

For information on SINAMICS products with Smart Infeed and Active Infeed, refer to Catalogs D 11, PM 21 and PM 22.

Additional information

Example of an application with a hoist drive of a stacker crane

The following example shows the total cost calculation for a hoist drive of a stacker crane. A generally available compact inverter without regenerative feedback is compared to an inverter with Efficient Infeed Technology (e.g. SINAMICS G120 with PM250 and regenerative feedback). The engineering and installation costs must still be considered separately. This results in additional savings in time and costs by using Efficient Infeed Technology.

	Price example	**Space requirement (equipment only)**
	Euro	cm^3
Standard technology		
Standard inverter without PROFIBUS or encoder without regenerative feedback, 22 kW high overload	2900.–	35035
Braking resistor (2 in series, 2 in parallel)	1504.–	80100
Line reactor	253.–	12155
Energy costs [1]	8850.–	-
Total	**13507.–**	**127290**
Efficient Infeed Technology		
SINAMICS G120 with PM250 and CU240E with regenerative feedback, 22 kW high overload	3600.– 225.–	29610
Energy costs [1]	4220.–	-
Total	**8045.–**	**29610**
	40 % cost saving	**77 % space saving**

This application example is based on the following data:

Hoist drive (technical specifications)

m_{total} = 1900 kg

m_{load} = 1000 kg

$m_{intrinsic}$ = 900 kg

v_{hoist} = 60 m/min = 1 m/s

$a_{starting/braking}$ = ± 0.5 m/s^2 ($t_{starting/braking}$ = 2 s)

η_{total} = 0.85

Total height = 24 m

Hoisting height = 18 m

Motor (technical specifications):

P_{rated} = 11.0 kW (14.8 hp)

$n_{50\ Hz}$ = 1460 rpm

n_{max} = 2980 rpm (102 Hz)

M_{rated} = 71.9 Nm

η = 0.89

I_{rated} = 37.2 A (at 230 V)

87-Hz-characteristic

Gear unit (technical specifications):

Helical bevel gear unit with i = 40.5

η = 0.96

[1] For a total service life of 12500 h, FEM 9.512 calculation basis for stacker cranes.

Notes

SINAMICS G110
Standard inverters
0.12 kW to 3 kW (0.16 hp to 4.0 hp)

3

Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

SINAMICS G110 standard inverters

Overview

SINAMICS G110, frame size FSA (right with flat heat sink)

SINAMICS G110, frame sizes FSB and FSC

SINAMICS G110 is a frequency inverter with basic functions for a wide range of industrial drive applications with variable speeds.

The extremely compact SINAMICS G110 inverter operates with voltage-frequency control at 200 V to 240 V on single-phase line supply systems.

It is the ideal "price-conscious" frequency inverter solution in the lower power range of the SINAMICS product family.

The following **line-side power components** are available for SINAMICS G110 inverters:

- EMC filter
- Line reactors
- Fuses
- Circuit breaker

The **accessories** listed below are also available:

- Operator panel
- Mounting accessories
- Commissioning tool

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions), are available on the Internet under:
http://www.siemens.com/sinamics-g110/documentation

and offline on the DVD CA 01 in the SD Configurator. In addition, the SD Configurator can be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

Benefits

- Simple installation, parameterization and commissioning
- Robust EMC design
- Extensive parameter range enables configurations for a wide range of applications
- Simple cable connection
- Scaleable functionality with analog and USS versions
- Quiet motor operation as a result of the high pulse frequency
- Status information and alarms via the optional BOP (Basic Operator Panel)
- Rapid copying of parameters via the optional BOP
- External options for PC communication and BOP
- Fast response time of the digital inputs with a high degree of reproducibility for applications demanding fast responses
- Precise setpoint input using a high-resolution 10-bit analog input (analog versions only)
- LED for status information
- Versions with integrated EMC filter, class A or B
- DIP switches for easy adaptation to 50 Hz or 60 Hz applications
- DIP switches for simple bus termination for the USS version (RS 485)
- Bus-capable serial RS485 interface (USS versions only) enables integration into a networked drive system
- 2/3-wire method (static/pulsed signals) for universal control via digital inputs
- Adjustable lower voltage limit in DC link to ensure controlled motor braking if the power fails

Accessories (overview)

- BOP operator panel
- Adapter for mounting on DIN rails (frame sizes FSA and FSB)
- PC Inverter Connection Kit
- STARTER commissioning tool

Line-side power components (overview)

- EMC filter, class B with low leakage currents (additionally available for inverters with integrated filter)
- EMC filter, class B (additionally available for inverters with integrated filter)
- Line reactors

International standards

- Fulfills the requirements of the EU Low-Voltage Directive
- CE mark
- Certified to UL and cUL
- c-tick

Applications

The SINAMICS G110 inverter is especially suited for applications with pumps and fans, as a drive in various sectors, e.g. food and beverages, textiles, packaging, as well as conveyor technology, with factory gate and garage door drives and as a universal drive for moving advertising media.

Design

The SINAMICS G110 standard inverters include a control and power module and for inverters in the CPM 110 version (Controlled Power Module) results in a compact and efficient design. They operate with the latest IGBT technology and digital microprocessor control.

The SINAMICS G110 inverter product range consists of the following versions:

- The **analog type** is available in the following versions:
  - without EMC filter, with heat sink
  - integrated EMC filter, class A/B, with heat sink
  - without EMC filter, with flat heat sink (frame size FSA only)
  - integrated EMC filter, class B, with flat heat sink (frame size FSA only)
- The **USS type** (RS485) is available in the following versions:
  - without EMC filter, with heat sink
  - integrated EMC filter, class A/B, with heat sink
  - without EMC filter, with flat heat sink (frame size FSA only)
  - integrated EMC filter, class B, with flat heat sink (frame size FSA only)

From frame size FSA, cooling is achieved through a heat sink and natural convection. Frame size FSA with flat heat sink offers space-saving and favorable heat dissipation since an additional heat sink can be installed outside the control cabinet. For frame sizes FSB and FSC, an integrated fan is used to cool the heat sink which has resulted in the compact design.

For all of the inverter versions, the connections are easy to access and they all have the same standard position. To ensure optimum electromagnetic compatibility and easy connection, the line and motor connections are separated and located on opposite sides (the same as for contactors). The control terminal block has screwless terminals.

The optional BOP (Basic Operator Panel) can be installed without the use of tools.

Function

- The stress on the machine mechanical system is reduced by using a skippable frequency range to avoid resonance effects, parameterizable ramp-up/ramp-down times up to 650 s, ramp rounding-off as well as being able to switch the inverter to a spinning motor (flying restart circuit)
- Increased plant availability as a result of automatic restarting following a power failure or stoppage
- Fast current limiting (FCL) for fault-free operation in the event of sudden load surges
- Parameterizable *V*/*f* characteristic (e.g. for synchronous motors)
- DC braking as well as compound braking for fast braking without an external braking resistor
- DC link voltage limiting using V_{DCmax} controller
- Slip compensation, electronic motorized potentiometer function and three fixed speed setpoints
- Parameterizable voltage boost for a higher dynamic performance when starting and accelerating
- Motor holding brake function to control an external mechanical brake

3

Selection and ordering data

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix for further information).

The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Controlled Power Modules.

Power		Rated input current (at 230 V)	Rated output current	Frame size	Version	**SINAMICS G110 without filter**	**SINAMICS G110 with integrated filter**	Filter class [1] when using shielded cables with a max. cable length of		
kW	hp	A	A			Order No.	Order No.	5 m	10 m	25 m
0.12	0.16	2.3	0.9	FSA	Analog	**6SL3211-0AB11-2UA1**	**6SL3211-0AB11-2BA1**	**B**	A [2]	[2]
					USS	**6SL3211-0AB11-2UB1**	**6SL3211-0AB11-2BB1**	**B**	A [2]	[2]
					Analog (with flat heat sink)	**6SL3211-0KB11-2UA1**	**6SL3211-0KB11-2BA1**	**B**	A [2]	[2]
					USS (with flat heat sink)	**6SL3211-0KB11-2UB1**	**6SL3211-0KB11-2BB1**	**B**	A [2]	[2]
0.25	0.33	4.5	1.7	FSA	Analog	**6SL3211-0AB12-5UA1**	**6SL3211-0AB12-5BA1**	**B**	A [2]	[2]
					USS	**6SL3211-0AB12-5UB1**	**6SL3211-0AB12-5BB1**	**B**	A [2]	[2]
					Analog (with flat heat sink)	**6SL3211-0KB12-5UA1**	**6SL3211-0KB12-5BA1**	**B**	A [2]	[2]
					USS (with flat heat sink)	**6SL3211-0KB12-5UB1**	**6SL3211-0KB12-5BB1**	**B**	A [2]	[2]
0.37	0.5	6.2	2.3	FSA	Analog	**6SL3211-0AB13-7UA1**	**6SL3211-0AB13-7BA1**	**B**	A [2]	[2]
					USS	**6SL3211-0AB13-7UB1**	**6SL3211-0AB13-7BB1**	**B**	A [2]	[2]
					Analog (with flat heat sink)	**6SL3211-0KB13-7UA1**	**6SL3211-0KB13-7BA1**	**B**	A [2]	[2]
					USS (with flat heat sink)	**6SL3211-0KB13-7UB1**	**6SL3211-0KB13-7BB1**	**B**	A [2]	[2]
0.55	0.75	7.7	3.2	FSA	Analog	**6SL3211-0AB15-5UA1**	**6SL3211-0AB15-5BA1**	**B**	A [2]	[2]
					USS	**6SL3211-0AB15-5UB1**	**6SL3211-0AB15-5BB1**	**B**	A [2]	[2]
					Analog (with flat heat sink)	**6SL3211-0KB15-5UA1**	**6SL3211-0KB15-5BA1**	**B**	A [2]	[2]
					USS (with flat heat sink)	**6SL3211-0KB15-5UB1**	**6SL3211-0KB15-5BB1**	**B**	A [2]	[2]
0.75	1.0	10.0	3.9 (at 40 °C)	FSA	Analog	**6SL3211-0AB17-5UA1**	**6SL3211-0AB17-5BA1**	**B**	A [2]	[2]
					USS	**6SL3211-0AB17-5UB1**	**6SL3211-0AB17-5BB1**	**B**	A [2]	[2]
					Analog (with flat heat sink)	**6SL3211-0KB17-5UA1**	**6SL3211-0KB17-5BA1**	**B**	A [2]	[2]
					USS (with flat heat sink)	**6SL3211-0KB17-5UB1**	**6SL3211-0KB17-5BB1**	**B**	A [2]	[2]
1.1	1.5	14.7	6.0	FSB	Analog	**6SL3211-0AB21-1UA1**	**6SL3211-0AB21-1AA1**	B	**A** [2]	**A** [2]
					USS	**6SL3211-0AB21-1UB1**	**6SL3211-0AB21-1AB1**	B	**A** [2]	**A** [2]
1.5	2.0	19.7	7.8 (at 40 °C)	FSB	Analog	**6SL3211-0AB21-5UA1**	**6SL3211-0AB21-5AA1**	B	**A** [2]	**A** [2]
					USS	**6SL3211-0AB21-5UB1**	**6SL3211-0AB21-5AB1**	B	**A** [2]	**A** [2]
2.2	3.0	27.2	11.0	FSC	Analog	**6SL3211-0AB22-2UA1**	**6SL3211-0AB22-2AA1**	B	**A** [2]	**A** [2]
					USS	**6SL3211-0AB22-2UB1**	**6SL3211-0AB22-2AB1**	B	**A** [2]	**A** [2]
3.0	4.0	35.6	13.6 (at 40 °C)	FSC	Analog	**6SL3211-0AB23-0UA1**	**6SL3211-0AB23-0AA1**	B	**A** [2]	**A** [2]
					USS	**6SL3211-0AB23-0UB1**	**6SL3211-0AB23-0AB1**	B	**A** [2]	**A** [2]

The current data apply to an ambient temperature of 50 °C unless specified otherwise.

The last digit of the complete order number for the SINAMICS G110 inverters represents the release version. When ordering, a different digit from the one specified may be present as a result of further technical development.

All SINAMICS G110 inverters are supplied without an operator panel (BOP). A BOP or other accessories must be ordered separately.

[1] The filter class **in bold** is stamped on the inverter rating plate.

[2] Class B also with additional filter.

Technical specifications

	Controlled Power Modules
Power range	0.12 … 3.0 kW (0.16 ... 4.0 hp)
Line voltage	200 … 240 V 1 AC ±10 %
Line supply frequency	47 … 63 Hz
Output frequency	0 … 650 Hz
cos φ	≥ 0.95
Inverter efficiency • for units < 0.75 kW (1.0 hp) • for units ≥ 0.75 kW (1.0 hp)	 90 … 94 % ≥ 95 %
Overload capability	Overload current 1.5 × rated output current (i.e. 150 % overload) for 60 s, then 0.85 × rated output current for 240 s, cycle time 300 s
Pre-charging current	Not higher than the rated input current
Control methods	Linear *V/f* characteristic (with parameterizable voltage boost); square *V/f* characteristic; multipoint characteristic (parameterizable *V/f* characteristic)
Pulse frequency	8 kHz (standard) 2 … 16 kHz (in 2-kHz increments)
Fixed frequencies	3, parameterizable
Skippable frequency range	1, parameterizable
Setpoint resolution	0.01 Hz digital 0.01 Hz serial 10 bit analog (motorized potentiometer 0.1 Hz)
Digital inputs	3 parameterizable digital inputs, non-isolated, PNP, SIMATIC-compatible
Analog input (analog version)	1, for setpoint (0 ... 10 V, scalable or can be used as 4th digital input)
Digital output	1 isolated optocoupler output (24 V DC, 50 mA, ohmic, NPN type)
Serial interface (USS version)	RS485, for operation with USS protocol
Motor cable length, max. • Shielded • Unshielded	 25 m 50 m
Electromagnetic compatibility	All devices with integrated EMC filter for drive systems in category C2 installations (limit value in accordance with EN 55011, class A, group 1) and category C3 installations (limit value in accordance with EN 55011, class A, group 2). All devices with an integrated EMC filter and shielded cables with a maximum length of 5 m also fulfill the limit values of EN 55011, class B for conducted interference.
Braking	DC braking, compound braking
Degree of protection	IP20
Operating temperature	–10 … +40 °C to +50 °C with derating
Storage temperature	–40 … +70 °C
Relative humidity	95 % (condensation not permissible)
Installation altitude	Up to 1000 m above sea level without power reduction • Rated output current at 4000 m above sea level: 90 % • Line supply voltage up to 2000 m above sea level: 100 % at 4000 m above sea level: 75 %
Standard SCCR (Short Circuit Current Rating) [1]	10 kA
Protection features for	• Undervoltage • Overvoltage • Ground fault • Short circuit • Stall protection • Thermal motor protection I^2t • Inverter overtemperature • Motor overtemperature
Compliance with standards	UL, cUL, CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at:
http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

	Controlled Power Modules						
	FSA ≤ 0.37 kW (0.5 hp)	**FSA** 0.55 kW (0.75 hp) and 0.75 kW (1.0 hp)	**FSA** ≤ 0.37 kW (0.5 hp) with flat heat sink	**FSA** 0.55 kW (0.75 hp) and 0.75 kW (1.0 hp) with flat heat sink	**FSB** 1.1 kW (1.5 hp) and 1.5 kW (2.0 hp)	**FSC** 2.2 kW (3.0 hp)	**FSC** 3.0 kW (4.0 hp)
Dimensions (without accessories)							
• Width	90	90	90	90	140	184	184
• Height	150	150	150	150	160	181	181
• Depth	116	131	101	101	142	152	152
Weight, approx.							
• Without filter	0.7	0.8	0.6	0.7	1.4	1.9	2.0
• With filter	0.8	0.9	0.7	0.8	1.5	2.1	2.2

Technical specifications for version with flat heat sink

The design with flat heat sink offers space-saving and favorable heat dissipation since an additional heat sink can be installed outside the control cabinet.

	Controlled Power Modules frame size FSA with flat heat sink				
	0.12 kW (0.16 hp)	**0.25 kW (0.33 hp)**	**0.37 kW (0.5 hp)**	**0.55 kW (0.75 hp)**	**0.75 kW (1.0 hp)**
Operating temperature	–10 … +50 °C	–10 … +50 °C	–10 … +50 °C	–10 … +50 °C	–10 … +40 °C
Total power losses at full load and maximum operating temperature as specified	22 W	28 W	36 W	43 W	54 W
Line-side and control electronics losses	9 W	10 W	12 W	13 W	15 W
Recommended thermal resistance of heat sink	3.0 K/W	2.2 K/W	1.6 K/W	1.2 K/W	1.2 K/W
Recommended output current	0.9 A	1.7 A	2.3 A	3.2 A	3.9 A

Derating data and power loss

Pulse frequency

Power		**Power loss**	**Rated output current in A** for a pulse frequency of							
kW	hp	W	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.12	0.16	22	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
0.25	0.33	28	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
0.37	0.5	36	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
0.55	0.75	43	3.2	3.2	3.2	3.2	3.0	2.7	2.5	2.2
0.75 (at 40 °C)	1.0 (at 40 °C)	54	3.9	3.9	3.9	3.9	3.6	3.3	3.0	2.7
0.75	1.0	54	3.2	3.2	3.2	3.2	3.0	2.7	2.5	2.2
1.1	1.5	86	6.0	6.0	6.0	6.0	5.9	5.7	5.6	5.4
1.5 (at 40 °C)	2.0 (at 40 °C)	118	7.8	7.8	7.8	7.8	7.6	7.4	7.2	7.0
1.5	2.0	118	6.0	6.0	6.0	6.0	5.9	5.7	5.6	5.4
2.2	3.0	174	11.0	11.0	11.0	11.0	10.8	10.5	10.2	9.9
3.0 (at 40 °C)	4.0 (at 40 °C)	210	13.6	13.6	13.6	13.6	13.3	12.9	12.6	12.3
3.0	4.0	210	11.0	11.0	11.0	11.0	10.8	10.5	10.2	9.9

The current data apply to an ambient temperature of 50 °C unless specified otherwise.

Technical specifications

Compliance with standards

CE mark

CE

The SINAMICS G110 inverters meet the requirements of the Low-Voltage Directive 73/23/EEC.

Low-Voltage Directive

The inverters comply with the following standards listed in the official journal of the EU:

- EN 60204
  Safety of Machinery, electrical equipment of machines
- EN 61800-5-1
  Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing

c UL us LISTED

Inverter devices in UL category NMMS certified to UL and cUL, in compliance with UL508C. UL list number E121068.

For use in environments with pollution degree 2.

Also see the Internet under http://www.ul.com

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 98/37/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
  Variable-speed electric drives
  Part 3: EMC product standard including specific test methods

The EMC product standard EN 61800-3 has been valid for electric drive systems since 07/01/2005. The transition period for the predecessor standard EN 61800-3/A11 from February 2001 ended on October 1, 2007. The following information applies to SINAMICS G110 frequency inverters from Siemens:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.
- In the standard EN 61800-3 from July 2005, a distinction is no longer made between “general availability” and “restricted availability”. Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
  - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
  - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
  - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
  - **Category C4:** Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be generated.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the so-called “second environment” (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G110, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation. The table “Overview of SINAMICS G110 components and PDS categories” and the SINAMICS G110 ordering documentation show which of the components can be installed directly in a PDS.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G110 and its components, the machine construction company (OEM) can also implement other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

Technical specifications

Overview of SINAMICS G110 components and PDS categories

<table>
<tr><td rowspan="4">First environment
(Residential, commercial)</td><td colspan="2">Category C1
Unfiltered devices and external filter class B with low leakage currents (shielded motor cable up to 5 m)</td><td rowspan="4">Second environment
(Industry)</td></tr>
<tr><td>Category C2
All devices with integrated filter
(shielded motor cable up to 5 m)
or
All devices with integrated filter
(frame size FSA: up to 10 m;
frame sizes FSB and FSC: shielded motor cable up to 25 m)
plus warning note
or
All devices with integrated filter plus external filter, class B
(shielded motor cable up to 25 m)</td><td>Category C2
All devices with integrated filter
(shielded motor cable up to 5 m)
or
All devices with integrated filter
(frame size FSA: up to 10 m;
frame sizes FSB and FSC: shielded motor cable up to 25 m)
or
All devices with integrated filter plus external filter, class B
(shielded motor cable up to 25 m)

Note: When devices with an integrated filter and a max. motor cable length of 5 m or external class B filters are used, this exceeds the requirements of EN 61800-3 by a considerable margin!</td></tr>
<tr><td colspan="2">Category C3
All devices with integrated filter (frame size FSA: up to 10 m; frame sizes FSB and FSC: shielded motor cable up to 25 m)
or
All devices with integrated filter plus external filter, class B (shielded motor cable up to 25 m)
A warning note is required.
Note: When devices with an integrated filter and external class B filters are used, this exceeds the requirements of EN 61800-3 by a considerable margin!</td></tr>
<tr><td colspan="2">Category C4
Does not apply to SINAMICS G110</td></tr>
</table>

Electromagnetic compatibility

No impermissible electromagnetic emission occurs if the installation guidelines specific to the product are correctly observed.

The table below lists the measured results for emission and noise immunity for the SINAMICS G110 inverters.

The inverters were installed according to the guidelines with shielded motor cables and shielded control cables.

EMC phenomenon Standard/test		Relevant criteria	Limit value
Noise emission EN 61800-3 (first environment)	Conducted via line supply cable	150 kHz up to 30 MHz	Unfiltered devices: not tested All devices with internal/external filter: Depending on the filter type and intended PDS installation: Category C1: The limit value corresponds to EN 55011, class B. Category C2: The limit value corresponds to EN 55011, class A, group 1. Further, all drive units with internal/external filter fulfill the limit value for Category C3 installations. The limit value corresponds to EN 55011, class A, group 2.
	Emitted by the drive	30 MHz to 1 GHz	All devices limit value complies with EN 55011, class A, group 1.
ESD immunity EN 61000-4-2	ESD through air discharge	Test severity level 3	8 kV
	ESD through contact discharge	Test severity level 3	6 kV
Noise immunity to electrical fields EN 61000-4-3	Electrical field applied to the device	Test severity level 3 80 MHz up to 1 GHz	10 V/m
Noise immunity to interference pulses EN 61000-4-4	Applied to all cable connections	Test severity level 4	4 kV
Impulse withstand voltage EN 61000-4-5	Applied to the line supply cable	Test severity level 3	2 kV
Noise immunity to HF interference, conducted EN 61000-4-6	Applied to line supply, motor and control cables	Test severity level 3 0.15 MHz to 80 MHz 80 % AM (1 kHz)	10 V

Accessories

Basic Operator Panel (BOP)

The BOP can be used to make individual parameter settings.

Values and units are displayed on a 5-digit display.

One BOP can be used for several inverters. It is plugged directly onto the inverter.

The BOP provides a function to quickly copy parameters. A parameter set of one inverter can be saved and then loaded to another inverter.

PC Inverter Connection Kit

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.

Isolated RS232 adapter module for a reliable point-to-point connection to a PC.

The scope of delivery includes a 9-pin Sub-D connector, an RS232 standard cable (3 m) and the STARTER commissioning tool [1] on DVD.

Commissioning tool

STARTER is a commissioning tool with a graphic user interface for commissioning SINAMICS G110 frequency inverters in Windows NT/2000/XP Professional. It can be used to read, change, store, enter and print parameter lists.

Selection and ordering data

The accessories listed here are suitable for all SINAMICS G110 inverters.

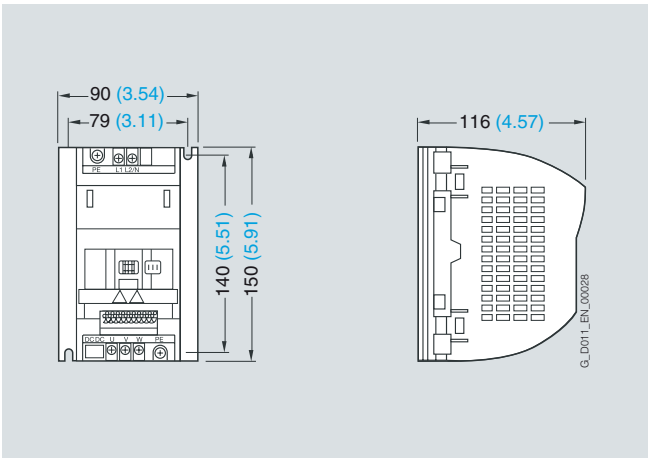
Accessories		Order No.
BOP (Basic Operator Panel)		**6SL3255-0AA00-4BA1**
PC Inverter Connection Kit including a 9-pin Sub-D connector, an RS232 standard cable (3 m), and the STARTER commissioning tool [1] on DVD		**6SL3255-0AA00-2AA1**
Adapter for mounting on DIN rails		
• Size 1 (frame size FSA)		**6SL3261-1BA00-0AA0**
• Size 2 (frame size FSB)		**6SL3261-1BB00-0AA0**
SD Manual Collection on DVD [2] **multi-language** All manuals for the low-voltage motors, geared motors and low-voltage inverters	new	**6SL3298-0CA00-0MG0**
SD Manual Collection on DVD [2] **multi-language, update service for 1 year**	new	**6SL3298-0CA10-0MG0**
STARTER commissioning tool [1] on DVD		**6SL3072-0AA00-0AG0**

[1] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

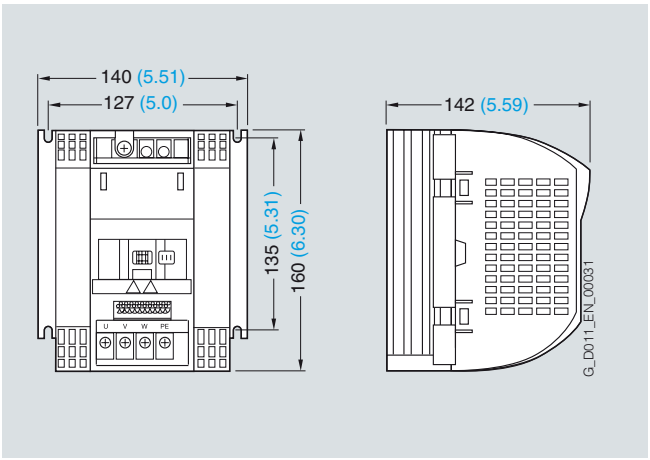
[2] Subject to export regulations: AL: N and ECCN: 5D992

3

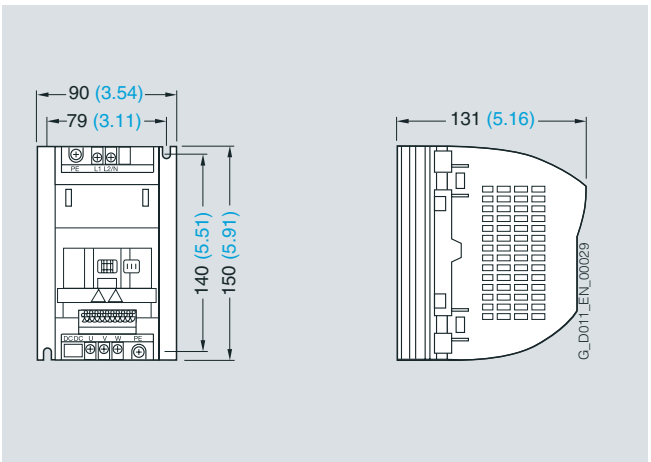
Dimensional drawings



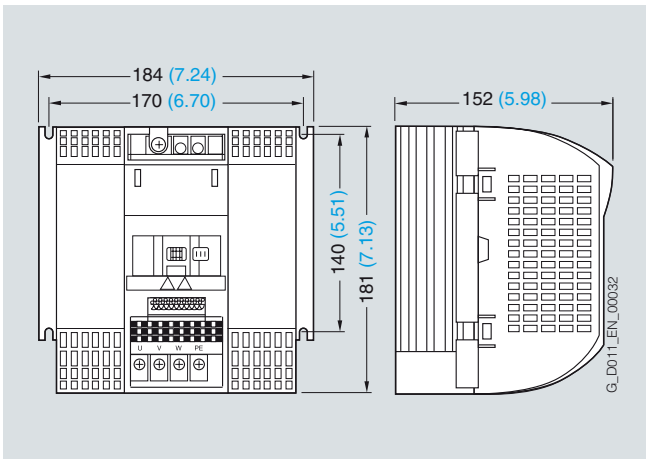
Inverter frame size FSA; 0.12 kW to 0.37 kW (0.16 hp to 0.5 hp)



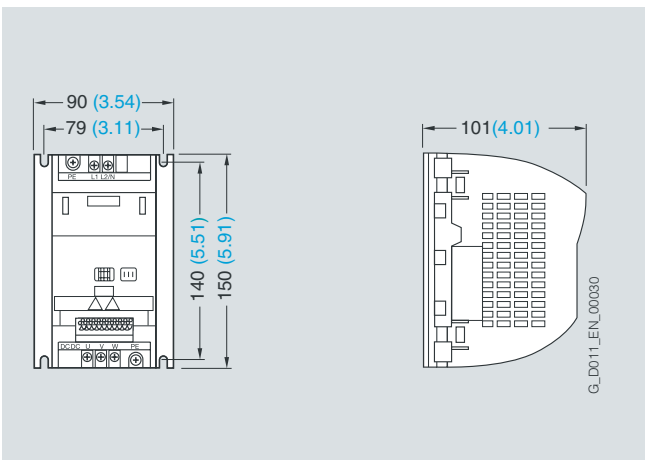
Inverter frame size FSB; 1.1 kW to 1.5 kW (1.5 hp to 2.0 hp)



Inverter frame size FSA; 0.55 kW to 0.75 kW (0.75 hp to 1.0 hp)



Inverter frame size FSC; 2.2 kW to 3.0 kW (3.0 hp to 4.0 hp)



Inverter frame size FSA with flat heat sink; 0.12 kW to 0.75 kW (0.16 hp to 1.0 hp)

Mounted using screws and washers
(not included in the scope of supply)

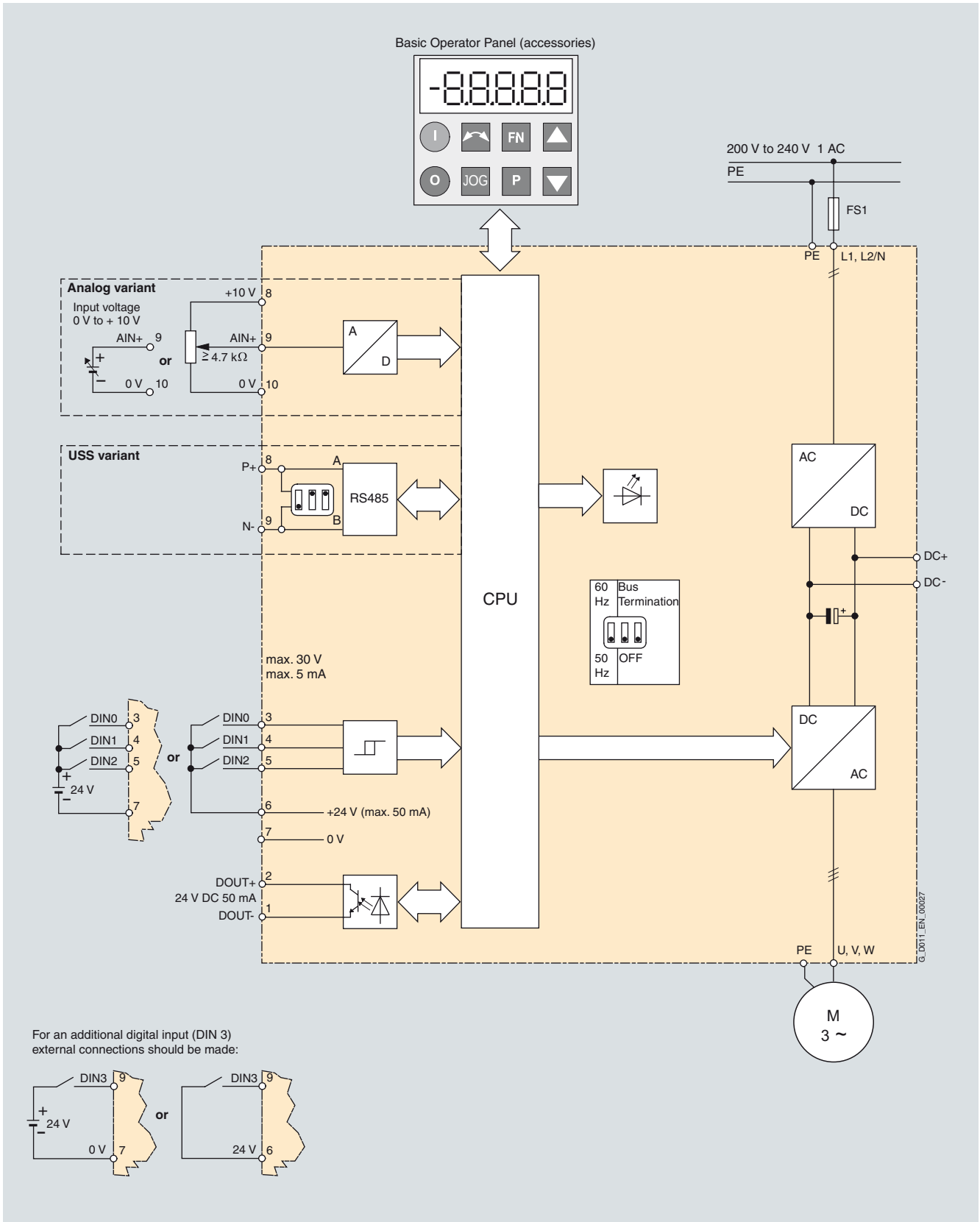
- Frame size FSA: 2 × M4
- Frame size FSB: 4 × M4
- Frame size FSC: 4 × M5

With attached operator panel (BOP), the mounting depth is increased by 8 mm (0.31 inches).

All dimensions in mm (values in brackets are in inches).

Circuit diagrams

Overview circuit diagram



Standard inverters 0.12 kW to 3 kW (0.16 hp to 4.0 hp)

Starter Kit

Overview

The SINAMICS G110 Starter Kit offers an easy introduction into the world of variable-speed drives.

Accommodated in a stackable transport case, it contains:

- Inverter (0.75 kW/1.0 hp) with analog input and integrated EMC filter
- BOP operator panel
- PC Inverter Connection Kit
- Short description, operating instructions, and parameter list (hard copy, in German)
- STARTER commissioning tool [1] on DVD (incl. operating instructions, parameter list and Getting Started guide)
- Screwdriver

Selection and ordering data

	Order No.
Starter Kit 0.75 kW (1.0 hp), German	**6SL3200-0AB10-0AA0**

[1] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Overview

Integrated EMC filter

Versions with integrated EMC filters class A and class B are available for the corresponding environments.

- **Class A**
  The requirements are fulfilled when shielded cables with a max. length of 10 m (for frame size FSA) or 25 m (for frame sizes FSB and FSC) are used. The limits comply with EN 55011 class A for conducted interference.
- **Class B**
  The requirements are fulfilled when shielded cables with a max. length of 5 m are used. The limits comply with EN 55011 class B for conducted interference.

An inverter with an integrated filter can be used with a 30 mA residual-current circuit breaker and is only suitable for installations with fixed wiring.

Inverters without filters, which are used with "EMC filter class B with low leakage currents", have a leakage current < 3.5 mA (up to 5 m shielded motor cable).

Additional EMC filter, class B

Available for inverters with an internal EMC filter.

With this filter, the inverter complies with the emission standard EN 55011, class B for conducted interference.

The requirements are fulfilled using shielded cables with a max. length of 25 m.

EMC filter, class B with low leakage currents

With this filter, the unfiltered inverter complies with the emission standard EN 55011, class B for conducted interference. The leakage currents are reduced to < 3.5 mA.

Unfiltered inverters can, therefore, be used for drive systems in Category C1 installations.

The requirements are fulfilled for

- Shielded cables with a max. length of 5 m
- Installation of the inverter in a metal housing (e.g. control cabinet)
- Pulse frequency of 16 kHz (only for frame sizes FSB and FSC)

For Category C1 installations, generally a pulse frequency of 16 kHz is recommended for inverter operation in the inaudible spectrum and for quiet motor operation.

Line reactor

Line reactors are used to smooth voltage peaks or to bridge commutating dips.

Line reactors also reduce the effects of harmonics on the inverter and the line supply.

If the ratio of the rated inverter power to the line supply short-circuit power is less than 1 %, a line reactor must be used in order to reduce the current peaks.

In line with EN 61000-3-2 regulations "Limits for harmonic currents with device input current ≤ 16 A per phase", there are special aspects for drives with 120 W to 550 W and 230-V single-phase line supplies which are used in non-industrial applications (first environment).

For devices with 120 W to 370 W, either the recommended line reactors must be installed or permission obtained from the power utility company for the connection to the public supply system.

In accordance with the specifications of EN 61000-3-12 "Limits for harmonic currents > 16 A and ≤ 75 A per phase", permission must be obtained from the power utility to operate drives connected to the public low-voltage line supply. The harmonic current values should be taken from the operating instructions.

Technical specifications

EMC filters and line reactors cannot be installed as base components.

		EMC filter, class B with low leakage currents		Additional EMC filter, class B		
		6SE6400-2FL01-0AB0	6SE6400-2FL02-6BB0	6SE6400-2FS01-0AB0	6SE6400-2FS02-6BB0	6SE6400-2FL03-5CB0
Dimensions						
• Width	mm	73	149	73	149	185
• Height	mm	200	213	200	213	245
• Depth	mm	43.5	50.5	43.5	50.5	55
Weight, approx.	kg	0.5	1	0.5	1	1.5

		Line reactor			
		6SE6400-3CC00-4AB3	6SE6400-3CC01-0AB3	6SE6400-3CC02-6BB3	6SE6400-3CC03-5CB3
Dimensions					
• Width	mm	75.5	75.5	150	185
• Height	mm	200	200	213/233 [1]	245/280 [1]
• Depth	mm	50	50	50	50
Weight, approx.	kg	1.31	1.32	2.2	3.05

[1] The 233 mm or 280 mm dimensions are valid for lateral mounting using a mounting bracket.

Line-side power components

Selection and ordering data

The line-side power components listed here must be selected in accordance with the particular inverter. EMC filters and line reactors cannot be installed as base components.

The inverter and associated line-side power components have the same rated voltage.

All line-side power components are certified to UL (with the exception of fuses). 3NA3 fuses are recommended for European countries. Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

UL-listed fuses such as the class NON fuse series from Bussmann are required for North American market.

Power		EMC filter, class B with low leakage currents	Line reactor	Additional EMC filter, class B	Fuse	Circuit breaker
kW	hp	Order No.	Order No.	Order No.	Order No.	Order No.
Line-side power components for inverters without EMC filter						
0.12	0.16	**6SE6400-2FL01-0AB0**	**6SE6400-3CC00-4AB3**	–	**3NA3803**	**3RV1021-1DA10**
0.25	0.33	**6SE6400-2FL01-0AB0**	**6SE6400-3CC00-4AB3**	–	**3NA3803**	**3RV1021-1FA10**
0.37	0.50	**6SE6400-2FL01-0AB0**	**6SE6400-3CC01-0AB3**	–	**3NA3803**	**3RV1021-1HA10**
0.55	0.75	**6SE6400-2FL01-0AB0**	**6SE6400-3CC01-0AB3**	–	**3NA3803**	**3RV1021-1JA10**
0.75	1.0	**6SE6400-2FL01-0AB0**	**6SE6400-3CC01-0AB3**	–	**3NA3805**	**3RV1021-1KA10**
1.1	1.5	**6SE6400-2FL02-6BB0**	**6SE6400-3CC02-6BB3**	–	**3NA3807**	**3RV1021-4BA10**
1.5	2.0	**6SE6400-2FL02-6BB0**	**6SE6400-3CC02-6BB3**	–	**3NA3810**	**3RV1021-4CA10**
2.2	3.0	**6SE6400-2FL02-6BB0**	**6SE6400-3CC02-6BB3**	–	**3NA3814**	**3RV1031-4EA10**
3.0	4.0	–	**6SE6400-3CC03-5CB3**	–	**3NA3820**	**3RV1031-4FA10**
Line-side power components for inverters with integrated EMC filter, class A/B						
0.12	0.16	–	**6SE6400-3CC00-4AB3**	**6SE6400-2FS01-0AB0**	**3NA3803**	**3RV1021-1DA10**
0.25	0.33	–	**6SE6400-3CC00-4AB3**	**6SE6400-2FS01-0AB0**	**3NA3803**	**3RV1021-1FA10**
0.37	0.50	–	**6SE6400-3CC01-0AB3**	**6SE6400-2FS01-0AB0**	**3NA3803**	**3RV1021-1HA10**
0.55	0.75	–	**6SE6400-3CC01-0AB3**	**6SE6400-2FS01-0AB0**	**3NA3803**	**3RV1021-1JA10**
0.75	1.0	–	**6SE6400-3CC01-0AB3**	**6SE6400-2FS01-0AB0**	**3NA3805**	**3RV1021-1KA10**
1.1	1.5	–	**6SE6400-3CC02-6BB3**	**6SE6400-2FS02-6BB0**	**3NA3807**	**3RV1021-4BA10**
1.5	2.0	–	**6SE6400-3CC02-6BB3**	**6SE6400-2FS02-6BB0**	**3NA3810**	**3RV1021-4CA10**
2.2	3.0	–	**6SE6400-3CC02-6BB3**	**6SE6400-2FS02-6BB0**	**3NA3814**	**3RV1031-4EA10**
3.0	4.0	–	**6SE6400-3CC03-5CB3**	**6SE6400-2FS03-5CB0**	**3NA3820**	**3RV1031-4FA10**

SINAMICS G120
Standard inverters
0.37 kW to 250 kW (0.5 hp to 400 hp)

4

SINAMICS G120 standard inverters

Overview

The SINAMICS G120 frequency inverter is designed to provide precise and cost-effective speed/torque control of AC motors.

With different device versions (frame sizes FSA to FSGX) in a power range from 0.37 kW to 250 kW (0.5 hp to 400 hp), it is suitable for a wide variety of drive solutions.

Examples of SINAMICS G120, frame sizes FSA, FSB and FSC; each with Power Module, Control Unit and Basic Operator Panel

Examples of SINAMICS G120, frame sizes FSD, FSE and FSF; each with Power Module, Control Unit and Basic Operator Panel

Overview

Examples of SINAMICS G120, frame size FSGX;
with Power Module

Modularity

SINAMICS G120 is a modular inverter system comprising a variety of functional units. The main units are:

- the Control Unit (CU)
- the Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different control types that can be selected. It supports communication with a local or central control and monitoring devices.

The Power Module supplies the motor in a power range 0.37 kW to 250 kW (0.5 hp to 400 hp). The Power Module is controlled by a microprocessor in the Control Unit. State-of-the-art IGBT technology with pulse-width modulation is used to achieve the highest degree of reliability and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

Furthermore, a large number of additional components are available, such as:

- Intelligent Operator Panel (IOP) for parameterizing, diagnosing, controlling and copying drive parameters
- Basic Operator Panel (BOP) for parameterizing, diagnosing, controlling and copying drive parameters
- Line filters, Classes A and B
- Line reactors
- Braking resistors
- Sine-wave filters
- Output reactors

Safety Integrated

The SINAMICS G120 standard inverters are available in a number of different versions for safety-related applications. All Power Modules are already designed for Safety Integrated. A Safety Integrated Drive can be created by combining a Power Module with the appropriate Fail-safe Control Unit.

The SINAMICS G120 fail-safe frequency inverter provides four safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- 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 when a speed limit is exceeded
- Safe Brake Control (SBC) for controlling motor brakes that are active in the de-energized state, e.g. motor holding brakes

The functions “Safe Stop 1” and “Safely Limited Speed” can both be implemented without having to use a motor sensor or encoder; the implementation cost is minimal. Existing systems in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions “Safely Limited Speed” and “Safe Stop 1” are not certified for pull-through loads as in the case of lifting gear and winders.

Additional information is provided in the part Highlights, section Safety Integrated.

Efficient Infeed Technology

The innovative Efficient Infeed Technology is used in PM250 and PM260 Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters to be fed back into the supply system. Additional cooling and additional space requirement in the control cabinet can be avoided as components such as braking resistors, brake choppers and line reactors are not required. Further, wiring and engineering costs are significantly reduced. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

Additional information is included in the part Highlights, section Efficient Infeed Technology.

Innovative cooling concept and coated electronic modules

The innovative cooling concept and coated electronic modules significantly increase the service life and usage time of the device. These features are based on the following principles:

- The power loss is exclusively dissipated using an external heat sink
- Electronic modules not located in air duct
- Standardized convection cooling of Control Unit
- All cooling air from the fan is directed through the heat sink

STARTER commissioning tool

The STARTER commissioning tool simplifies the commissioning and maintenance of SINAMICS G120 inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

SINAMICS G120 standard inverters

Benefits

- Modularity ensures flexibility for a drive concept that is fit-for-the-future
  - Modules can be replaced under voltage (hot swapping)
  - Pluggable terminals
  - The modules can be easily replaced, which makes the system extremely service friendly.
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
  - Reduced number of interfaces
  - Plantwide engineering
  - Easy to handle
- 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 supply system when Power Modules PM250 and PM260 are used. This feedback capability provides enormous potential for savings because generated energy no longer has to be converted into heat in a braking resistor
- Innovative SiC semiconductor technology ensures that when a PM260 Power Module is used, the inverter is more compact than a comparable standard converter with an optional sine-wave filter for the same power rating
- An innovative cooling concept and coated electronic modules increase robustness and service life
  - External heatsink
  - Electronic components are not located in air duct
  - Control Unit that is completely cooled by convection
  - Additional coating of the most important components
- Simple unit replacement and quick copying of parameters using the optional Basic Operator Panel or the optional MMC memory card
- Quiet motor operation as a result of the high pulse frequency
- Compact, space-saving design
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2-/3-wire control (static/pulsed signals) for universal control via digital inputs (only CU240 Control Units)
- Engineering and commissioning with uniform engineering tools such as SIZER, STARTER, 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, UL, cUL, c-tick and Safety Integrated according to IEC 61508 SIL 2

Applications

SINAMICS G120 is ideally suited

- as a universal drive in all industrial and commercial applications
- e.g. in the automotive, textile, printing and chemical industries
- for higher-level applications, e.g. in conveyor systems

Design

SINAMICS G120 standard inverters are modular frequency inverters for standard drives. Each SINAMICS G120 comprises two operative units – the Power Module and Control Unit. Each Control Unit can be combined with each Power Module.

Guidelines for module selection

The procedure to select a complete SINAMICS G120 frequency inverter should be as follows:

1.	Select a suitable Control Unit (depending on the required communication, hardware and software version and safety functionality)
2.	Select a suitable Power Module (depending on the power and technology required)
3.	Select the optional and additional components. There are a large number of components for expanding the system (e.g. line-side power components, DC link components, load-side power components, and supplementary system components). However, it should be noted that not all of the components are required for all of the Power Modules (example: Braking resistors are not required for the PM250 and PM260 Power Modules!). The precise data is provided in the technical specifications tables of the particular components.

Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization.

Two series of Control Units are available for SINAMICS G120 corresponding to their software packages (CU230 and CU240). Each Control Unit comprises a defined I/O quantity structure, a special fieldbus interface and possible additional safety functions. The following Control Units and accessories are available for standard SINAMICS G120 inverters:

CU230 Control Units

The CU230P-2 Control Units have been specifically designed for pump, fan and compressor applications. The following three versions are available:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 CAN

CU240 Control Units

Several Control Units are available in different versions:

- CU240E
- CU240S
- CU240S DP
- CU240S DP-F
- CU240S PN
- CU240S PN-F

Design

Power Modules

The following Power Modules are available for the SINAMICS G120 standard inverters:

PM240 Power Modules

PM240 Power Modules (0.37 kW to 250 kW / 0.5 hp to 400 hp) feature an integrated brake chopper (for frame size FSGX external) and are designed for drives without energy recovery capability. Generator energy produced during braking is converted to heat via externally connected braking resistors.

PM250 Power Modules

PM250 Power Modules (7.5 kW to 90 kW / 10 hp to 125 hp) have an innovative circuit design which allows line-commutated energy recovery back into the line supply. This innovative circuit permits generator energy to be fed back into the supply system and therefore saves energy.

PM260 Power Modules

PM260 Power Modules (11 kW to 55 kW / 15 hp to 75 hp) also have an innovative circuit design which allows line-commutated energy recovery back into the line supply. This innovative circuit permits generator energy to be fed back into the supply system and therefore saves energy. The PM260 Power Modules also have an integrated sine-wave filter that limits the rate of rise of voltage and the capacitive charging/discharging currents usually associated with inverter operation.

Line-side power components

The following line-side power components are available for SINAMICS G120 standard inverters:

Line filters

With one of the additional line filters, the Power Module reaches a higher radio interference class.

Line reactors (for PM240 Power Modules only)

A line reactor reduces the system perturbations caused by harmonics. This particularly applies in the case of weak line supplies (line supply short-circuit power u_K > 1 %).

Recommended line components

This is a recommendation for additional line-side components, such as fuses and circuit-breakers (line-side components must be dimensioned in accordance with IEC standards). Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

DC link components

The following DC link components are available for the SINAMICS G120 standard inverters:

Braking Modules (only for PM240 Power Modules, frame size FSGX)

A Braking Module and the matching external braking resistor are required to bring drives with a PM240 Power Module, frame size FSGX to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP Category 1) or limit the DC link voltage during a short period of generator operation. The Braking Module includes the power electronics and the associated control circuit.

Braking resistors (for PM240 Power Modules only)

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are designed for use with PM240 Power Modules. They are equipped with an integrated brake chopper (electronic switch). There is an optional plug-in Braking Module for frame size FSGX.

Load-side power components

The following load-side power components are available for the SINAMICS G120 standard inverters. This means that during operation with output reactors or sine-wave filters, longer, shielded motor cables are possible and the motor service life can be extended:

Output reactors (for PM240 and PM250 Power Modules only)

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

Sine-wave filter (not for PM260 Power Modules)

The sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. An output reactor is not required.

Design

Power and DC link components which are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Line-side power components							
Line filter, class A	U	F	F	F	F	F/S [3]	S [3]
Line filter, class B	U	U	U	–	–	–	–
Line reactor	U	U	U	U	U	S	S
DC link components							
Braking resistor	U	U	S	S	S	S	S
Braking Module	–	–	–	–	–	–	I (Option)
Load-side power components							
Output reactor	U	U	U	S	S	S	S
Sine-wave filter	U	U	U	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line filter, class A	–	–	I	F	F	F	–
Line filter, class B	–	–	U	–	–	–	–
Line reactor [1]	–	–	– [1]	– [1]	– [1]	– [1]	–
DC link components							
Braking resistor [2]	–	–	– [2]	– [2]	– [2]	– [2]	–
Load-side power components							
Output reactor	–	–	U	S	S	S	–
Sine-wave filter	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line filter, class A	–	–	–	F	–	F	–
Line filter, class B	–	–	–	–	–	–	–
Line reactor [1]	–	–	–	– [1]	–	– [1]	–
DC link components							
Braking resistor [2]	–	–	–	– [2]	–	– [2]	–
Load-side power components							
Output reactor	–	–	–	–	–	–	–
Sine-wave filter	–	–	–	I	–	I	–

U = Base component
S = Lateral mounting
I = Integrated
– = Not possible
F = Power Modules available with and without integrated class A filter

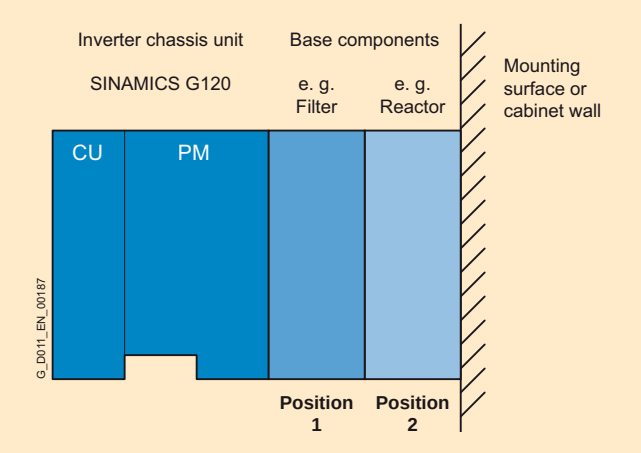
[1] A line reactor is not required and must not be used in conjunction with a PM250 or PM260 Power Module.

[2] Line-commutated energy recovery is possible in conjunction with a PM250 or PM260 Power Module. A braking resistor cannot be connected and is not necessary.

[3] PM240 FSF Power Modules, from 110 kW (150 hp) and higher and FSGX are only available without an integrated class A filter. An optional class A line filter for side mounting is available instead.

Design

General design information



Frequency inverters comprising a Power Module (PM) and a Control Unit (CU) and two base components at position 1 and position 2 (side view)

- A maximum of two base components plus inverter are possible.
- The line filter has to be mounted directly below the frequency inverter (position 1).
- With lateral mounting, the line-side components have to be mounted on the left side of the frequency inverter and the load-side components on the right side.
- Braking resistors have to be mounted directly on the control cabinet wall due to heating issues.

Recommended installation combinations of the inverter and optional power and DC link components

Power Modules	**Base**		**Lateral mounting**	
Frame size	**Position 1**	**Position 2**	left of the inverter (for line-side power components)	right of the inverter (for load-side power components and DC link components)
FSA and FSB	Line filter	Line reactor	–	Output reactor or sine-wave filter and/or braking resistor
	Line filter or line reactor	Output reactor or sine-wave filter	–	Braking resistor
	Line filter or line reactor	Braking resistor	–	–
	Line filter or line reactor or braking resistor	–	–	–
FSC	Line filter	Line reactor	–	Output reactor or sine-wave filter and/or braking resistor
	Line filter or line reactor	Output reactor or sine-wave filter	–	Braking resistor
FSD and FSE	Line reactor	–	Line filter	Output reactor or sine-wave filter and/or braking resistor
FSF	–	–	Line filter and/or line reactor	Output reactor or sine-wave filter and/or braking resistor
FSGX	–	–	Line filter and/or line reactor	Output reactor or sine-wave filter and/or braking resistor

Design

Maximum permissible cable lengths from the motor to the inverter when using output reactors or sine-wave filters depending on the voltage range and the Power Module being used

The following load-side power components in the appropriate frame sizes are optionally available for the Power Modules and result in the following maximum cable lengths:

	Maximum permissible motor cable lengths (shielded/unshielded) in m						
	Frame sizes						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Without output reactor/sine-wave filter	50/100	50/100	50/100	50/100	100/100	150/150	300/450
With optional output reactor							
• at 380 V (– 10 %) to 400 V 3 AC	150/225	150/225	150/225	200/300	200/300	200/300	300/450
• at 401 V to 480 V (+ 10 %) 3 AC	100/150	100/150	100/150	200/300	200/300	200/300	300/450
With optional sine-wave filter							
• at 380 V (– 10 %) to 400 V 3 AC	200/300	200/300	200/300	200/300	200/300	200/300	300/450
• at 401 V to 480 V (+ 10 %) 3 AC	200/300	200/300	200/300	200/300	200/300	200/300	300/450
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Without output reactor/sine-wave filter	–	–	50/100	50/100	50/100	50/100	–
With optional output reactor							
• at 380 V (– 10 %) to 400 V 3 AC	–	–	150/225	200/300	200/300	200/300	–
• at 401 V to 480 V (+ 10 %) 3 AC	–	–	100/150	200/300	200/300	200/300	–
With optional sine-wave filter							
• at 380 V (– 10 %) to 400 V 3 AC	–	–	200/300	200/300	200/300	200/300	–
• at 401 V to 480 V (+ 10 %) 3 AC	–	–	200/300	200/300	200/300	200/300	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
With integrated sine-wave filter							
• at 500 V to 690 V 3 AC (± 10 %)	–	–	–	200/300	–	200/300	–

Design

Supplementary system components

The following supplementary system components are available for the SINAMICS G120 standard inverters:

Intelligent Operator Panel IOP

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission, diagnose and locally control standard drives.

Operator Panel BOP (not for CU230P-2 Control Units)

The Basic Operator Panel BOP can be plugged onto the Control Unit and can be used to commission drives, monitor drives in operation and input individual parameter settings. The BOP also provides a function to quickly copy parameters.

MMC memory card (not for CU240E Control Units)

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter 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 top of the Control Unit.

CM240NE chemical industry module

Inverters for 400 V / 500 V and 690 V are required in the chemical industry that meet the special demands and requirements of this industry sector. The essential requirements and demands of the chemical industry are fulfilled using the SINAMICS G120 series of inverters supplemented by the CM240NE chemical industry module (with ATEX-certified PTC evaluation and a NAMUR terminal strip).

PC Inverter Connection Kit

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool) has been installed.
The STARTER commissioning tool on DVD is included in the PC Inverter Connection Kit.

Brake Relay

The Brake Relay allows the Power Module to be connected to an electromechanical motor brake, thereby allowing the motor brake to be driven directly by the Control Unit.

Safe Brake Relay

The Safe Brake Relay allows the Power Module to be connected to an electromechanical motor brake, allowing the brake to be directly and safely controlled from the Control Unit in accordance with EN 954-1 Category 3 and IEC 61508 SIL 2.

Adapter for mounting on DIN rails

The adapter for mounting on DIN rails can be used to mount inverters of the sizes FSA and FSB on DIN mounting rails (2 units with a center-to-center distance of 100 mm).

Shield Connection Kit

The Shield Connection Kit makes it easier to connect the shields of supply and control cables, offers mechanical strain relief and thus ensures optimum EMC performance.

Shield Connection Kit for CU240S and CU230P-2

The Shield Connection Kit offers optimum shield connection and strain relief for all signal and communication cables. It includes a matching shield bonding plate and all of the necessary connecting and retaining elements for mounting.

Spare parts

Spare Parts Kit for CU240

The kit includes a replacement cover for the terminals, a suitable shield bar for the CU240E Control Unit including screws, replacement connector for the CU240S Control Unit, protective element of the MMC card slot and screws to attach the shield bonding plate of the CU240S Control Unit.

Terminal Cover Kit

The kit includes a replacement cover for the terminals. The kit can be ordered for PM240 Power Modules, frame sizes FSD, FSE and FSF, as well as for the PM260, frame size FSF.

PM260 replacement connector

This spare part includes a connector for the input and output sides for the PM260 Power Module, frame size FSD.

SINAMICS G120 PM240 FSGX replacement door

A complete replacement door can be ordered for the PM240 Power Module, frame size FSGX.

Replacement fan

The Power Module fans are designed for extra long service life. Replacement fans can be ordered for special applications.

Configuration

The following electronic configuring and engineering tools are available for the SINAMICS G120 standard inverters:

Selection guide, SD Configurator

More than 100000 products with approximately 5 million possible product versions from the area of drive technology are listed in the interactive Catalog CA 01 – the Offline Mall from Siemens IA&DT. In order to make it easier to select the optimum motor and/or inverter from the wide range of Standard Drives, the SD Configurator was developed, which is integrated as “Selection guide” in this catalog on the DVD together with the selection and engineering tools.

Online SD Configurator

In addition, the SD Configurator can be used in the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

SIZER configuration tool

The SIZER PC tool makes it easy to configure the SINAMICS and MICROMASTER 4 drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER supports the configuration of the complete drive system, from simple single-motor drives up to complex multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool is used to commission, optimize and diagnose drives in a menu-prompted fashion. In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units and the frequency converters for the distributed I/O SIMATIC ET 200S FC and
SIMATIC ET 200pro FC.

Drive ES engineering system

Drive ES 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 STEP 7 Manager user interface forms the basis. Various software packages are available for SINAMICS:
Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS G120 standard inverters.

Mechanical specifications	
Vibratory load	
• Transport [1] acc. to EN 60721-3-2	
- All units and components except frame size FSGX	Class 2M3
- Units with frame size FSGX	Class 2M2
• Operation Test values acc. to EN 60068-2-6	Test Fc: 10 … 58 Hz: Constant deflection 0.075 mm 58 … 150 Hz: Constant acceleration = 9.81 m/s^2 (1 × *g*)
Shock load	
• Transport [1] acc. to EN 60721-3-2	
- All units and components except frame size FSGX	Class 2M3
- Units with frame size FSGX	Class 2M2
• Operation Test values acc. to EN 60068-2-27	Test Ea:
- Frame sizes FSA to FSC	147 m/s^2 (15 × *g*)/11 ms
- Frame sizes FSD to FSF	49 m/s^2 (5 × *g*)/30 ms
- Frame size FSGX	98 m/s^2 (10 × *g*)/20 ms
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class I (with protective conductor system) and Class III (PELV)
Touch protection acc. to EN 61800-5-1	For the intended purpose
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
• High overload (HO)	0 … 50 °C (32 … 122 °F) without derating (for PM240, frame size FSGX: 0 … 40 °C), > 50 … 60 °C see derating characteristics
• Light overload (LO)	0 … 40 °C (32 … 104 °F) without derating (for PM240, frame size FSGX: 0 … 40 °C), > 40 … 60 °C see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units, additional system components and DC-link components	–10 … +50 °C (14 … 122 °F) with CU240S DP-F: 0 … 45 °C with CU240S PN-F: 0 … 40 °C with IOP: 0 … 50 °C up to 2000 m above sea level
Climatic ambient conditions	
• Storage [1] acc. to EN 60721-3-1	Class 1K3 temperature –25 … +55 °C
• Transport [1] acc. to EN 60721-3-2	Class 2K4 temperature –40 … +70 °C max. humidity 95 % at 40 °C
• Operation acc. to EN 60721-3-3	Class 3K5 [4] Condensation, splashwater and ice formation not permitted (EN 60204, Part 1)

Ambient conditions (continued)	
Environmental class/harmful chemical substances	
• Storage [1] acc. to EN 60721-3-1	Class 1C2
• Transport [1] acc. to EN 60721-3-2	Class 2C2
• Operation acc. to EN 60721-3-3	Class 3C2
Organic/biological influences	
• Storage [1] acc. to EN 60721-3-1	Class 1B1
• Transport [1] acc. to EN 60721-3-2	Class 2B1
• Operation acc. to EN 60721-3-3	Class 3B1
Degree of pollution acc. to EN 61800-5-1	2
Certification for fail-safe versions	
Applies to CU240 DP-F and CU240 PN-F Control Units. The values include Control Unit, Power Module and Safe Brake Relay.	
• Category acc. to EN 954-1	3
• SIL Cl acc. to IEC 61508	2
• PL acc. to ISO 13849	Available soon
• PFH_D	5 × 10^{-8}
• T1	10 Years
Standards	
Standards conformance	UL, cUL, CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC
EMC Directive acc. to EN 61800-3	
• Frame sizes FSA to FSGX without integrated line filter class A	Category C3 [2]
• Frame sizes FSB to FSF with integrated line filter class A	Category C2 [3] (corresponds to class A acc. to EN 55011 for conducted interference emission)
• Frame size FSA without integrated line filter and with additional line filter class A	Category C2 [3] (corresponds to class A acc. to EN 55011 for conducted interference emission)
• Frame size FSA with additional line filter class A and with additional line filter class B	Category C2 [3] (corresponds to class B acc. to EN 55011 for conducted interference emission)
• Frame sizes FSB and FSC with additional line filter class A and with additional line filter class B	Category C2 [3] (corresponds to class B acc. to EN 55011 for conducted interference emission)

Note: The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the frequency inverters. The frequency inverters on their own do not generally require identification according to the EMC Directive.

[1] In transport packaging.

[2] Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side. As a consequence, a PDS (Power Drive System) can be installed according to C3.

[3] With shielded motor cable up to 25 m.

[4] For Intelligent Operator Panel IOP, class 3K3.

Technical specifications

Compliance with standards

CE mark

CE

The SINAMICS G120 inverters meet the requirements of the Low-Voltage Directive 73/23/EEC.

Low-Voltage Directive

The inverters comply with the following standards listed in the official journal of the EU:

- EN 60204
  Safety of Machinery, electrical equipment of machines
- EN 61800-5-1
  Electrical power drive systems with variable speed – Part 5-1: Requirements regarding safety – electrical, thermal, and energy requirements

UL listing

c UL us LISTED

Inverter devices in UL category NMMS certified to UL and cUL, in compliance with UL508C. UL list numbers E121068 and E192450.

For use in environments with pollution degree 2.

Also see the Internet under http://www.ul.com

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 98/37/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
  Variable-speed electric drives
  Part 3: EMC product standard including specific test methods

The EMC product standard EN 61800-3 has been valid for electric drive systems since 07/01/2005. The transition period for the predecessor standard EN 61800-3/A11 from February 2001 ended on October 1, 2007. The following information applies to SINAMICS G120 frequency inverters from Siemens:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.
- In the Standard EN 61800-3 from July 2005, a distinction is no longer made between “general availability” and “restricted availability”. Instead, different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
  - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
  - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
  - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
  - **Category C4:** Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be generated.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the so-called “second environment” (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G120 and its components, the machine construction company (OEM) can also apply other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

SEMI F47

SEMI F47 is an industry standard relating to the immunity to voltage dips. This includes the requirement that industrial equipment must be able to tolerate defined dips or drops of the line supply voltage. As a result, industrial equipment that fulfills this standard is more reliable and productive. In the SINAMICS G120 product family, the PM240 and PM250 Power Modules fulfill the latest SEMI F47-0706 standard. In the case of a voltage dip, defined in accordance with SEMI F47-0706, these drives either continue to supply a defined output current, or using an automatic restart function, continue to operate as expected.

CU230 Control Units

Overview

Example: CU230P-2 HVAC Control Unit with Intelligent Operator Panel IOP on the PM240 Power Module, frame size FSC

The CU230P-2 Control Units are especially suitable for drives with integrated technological functions for pump, fan and compressor applications. The I/O interface, the fieldbus interfaces and the additional software functions optimally support these applications. The integration of technological functions is a significant differentiating feature to the other Control Units of the SINAMICS G120 drive family.

Selection and ordering data

Communication	Digital inputs	Digital outputs	Analog inputs	Analog outputs	Designation		**Control Unit** Order No.
Standard							
RS485/USS; Modbus RTU	6	3	4	2	CU230P-2 HVAC	new	**6SL3243-0BA30-1HA0**
PROFIBUS DP	6	3	4	2	CU230P-2 DP	new	**6SL3243-0BA30-1PA0**
CANopen	6	3	4	2	CU230P-2 CAN	new	**6SL3243-0BA30-1CA0**

Function

Closed-loop control

- Linear and square torque characteristics for fluid flow and positive displacement machines
- ECO mode for additional energy saving
- Vector control without encoder for sophisticated control tasks

Connections

- Two analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- Two additional analog inputs to connect NI1000/PT1000 temperature sensors
- Direct control of valves and flaps using two 230 V relays

Interfaces

- PROFIBUS, USS, CANopen and Modbus RTU communication

Software functions

- Automatic restart function after power failure
- Flying restart
- Kinetic buffering ($V_{dc\ min}$ control)
- PID controller for temperature, pressure, air quality, level
- Energy saving using the “hibernation mode”
- Load check function to monitor belts and flow
- Real time clock with three time generators

IOP wizards for special applications such as e.g.

- Pumps: Positive displacement (constant load torque) and centrifugal pumps (square load torque) with and without PID controller
- Fans: Radial and axial fans (square load torque) with and without PID controller
- Compressors: Positive displacement (constant load torque) and fluid flow machines (square load torque) with and without PID controller

Design

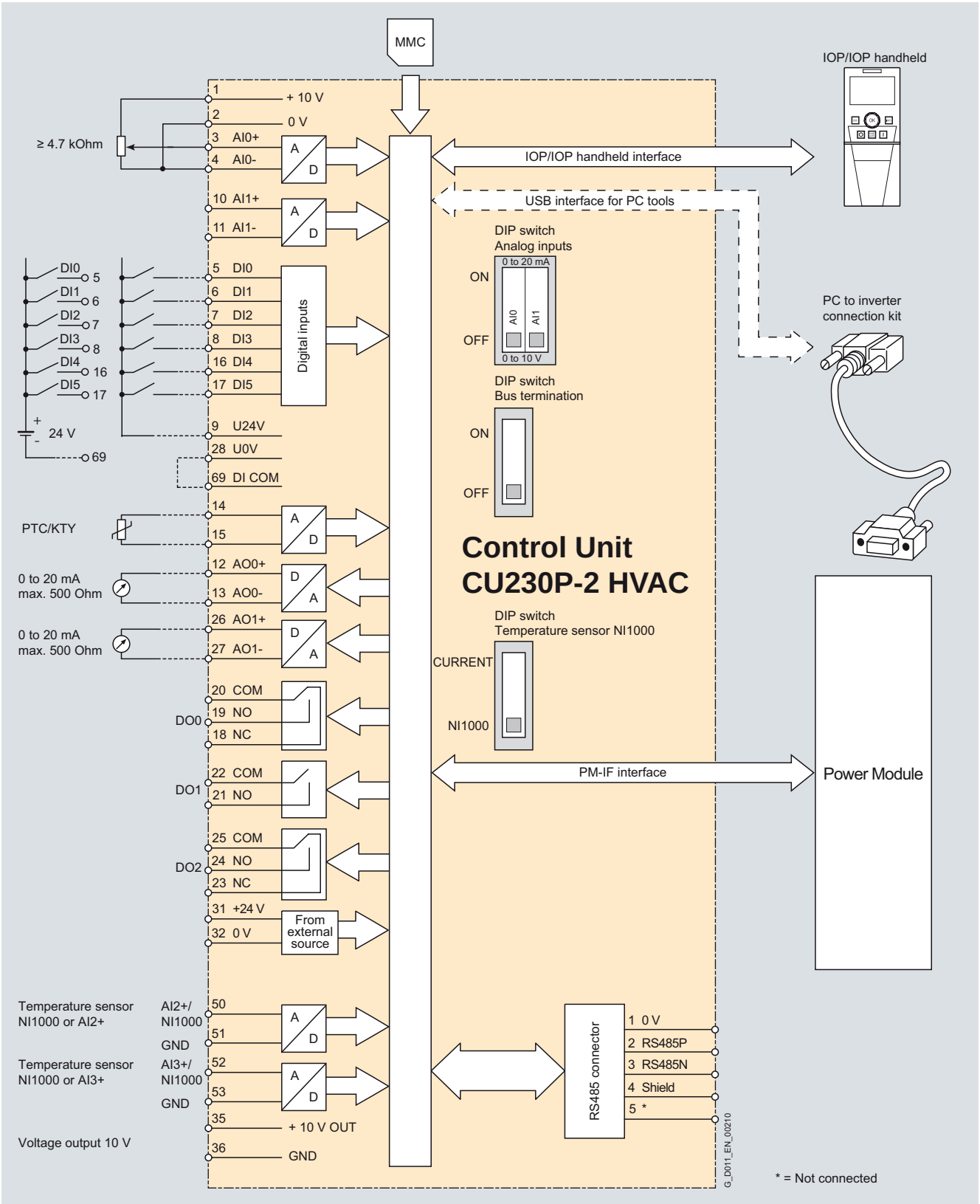
CU230P-2 HVAC, CU230P-2 DP, CU230P-2 CAN Control Units

Example: CU230P-2 DP Control Unit with open terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
69	DI Com	Reference potential for digital inputs
5 ... 8, 16.17	DI0 ... DI5	Freely programmable isolated, inputs in compliance with IEC 61131-2
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (2 A, 230 V AC)
19	DO0, NO	Relay output 1 NO contact (2 A, 230 V AC)
20	DO0, COM	Relay output 1 Common contact (2 A, 230 V AC)
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (2 A, 230 V AC)
24	DO2, NO	Relay output 3 NO contact (2 A, 230 V AC)
25	DO2, COM	Relay output 3 Common contact (2 A, 230 V AC)

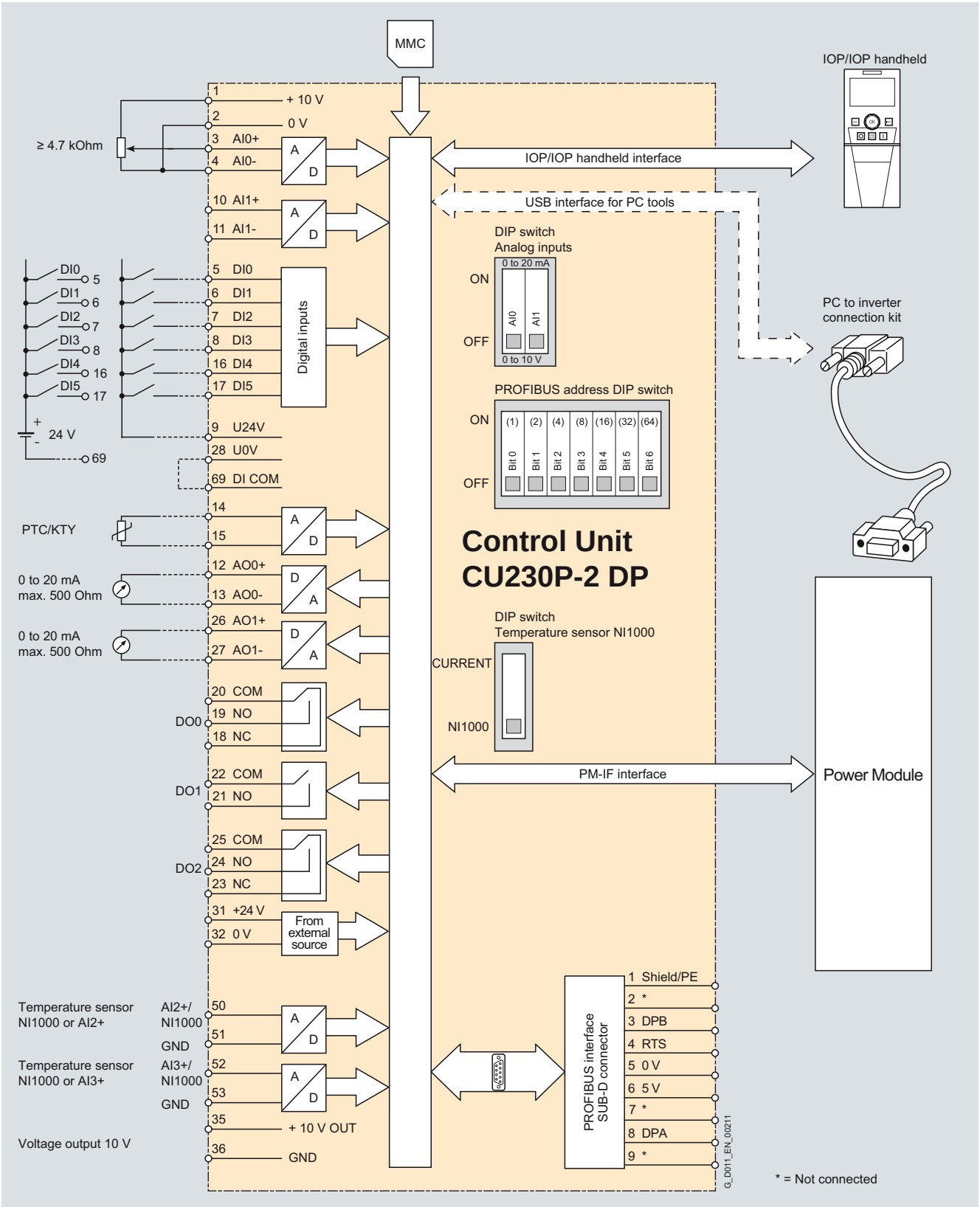
Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, –10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, –10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+/NI1000	Non-isolated input, switchable between current, temperature sensors, type PT1000, NI1000 Value range: 0/4 ... 20 mA, PT1000 –50 ... +250 °C; NI1000 –50 ... +150 °C
51	GND	Reference potential of the AI2/internal electronics ground
52	AI3+/NI1000	Non-isolated input for temperature sensors, Type PT1000, NI1000 Value range: PT1000 –50 ... +250 °C; NI1000 –50 ... +150 °C
53	GND	Reference potential of the AI3/internal electronics ground
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	AO GND	Reference potential of the AO0/internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	AO GND	Reference potential of the AO1/internal electronics ground
Motor temperature sensor interface		
14	T1 motor	Positive input for motor temperature sensor Type: PTC, KTY sensor, Thermo-Click
15	T2 motor	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/ internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/ internal electronics ground
31	+24 V IN	Power supply input 18 ... 30 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input
35	+10 V OUT	Power supply output 10 V DC ±0.5 V max. 10 mA
36	GND	Reference potential of the power supply/ internal electronics ground

Integration



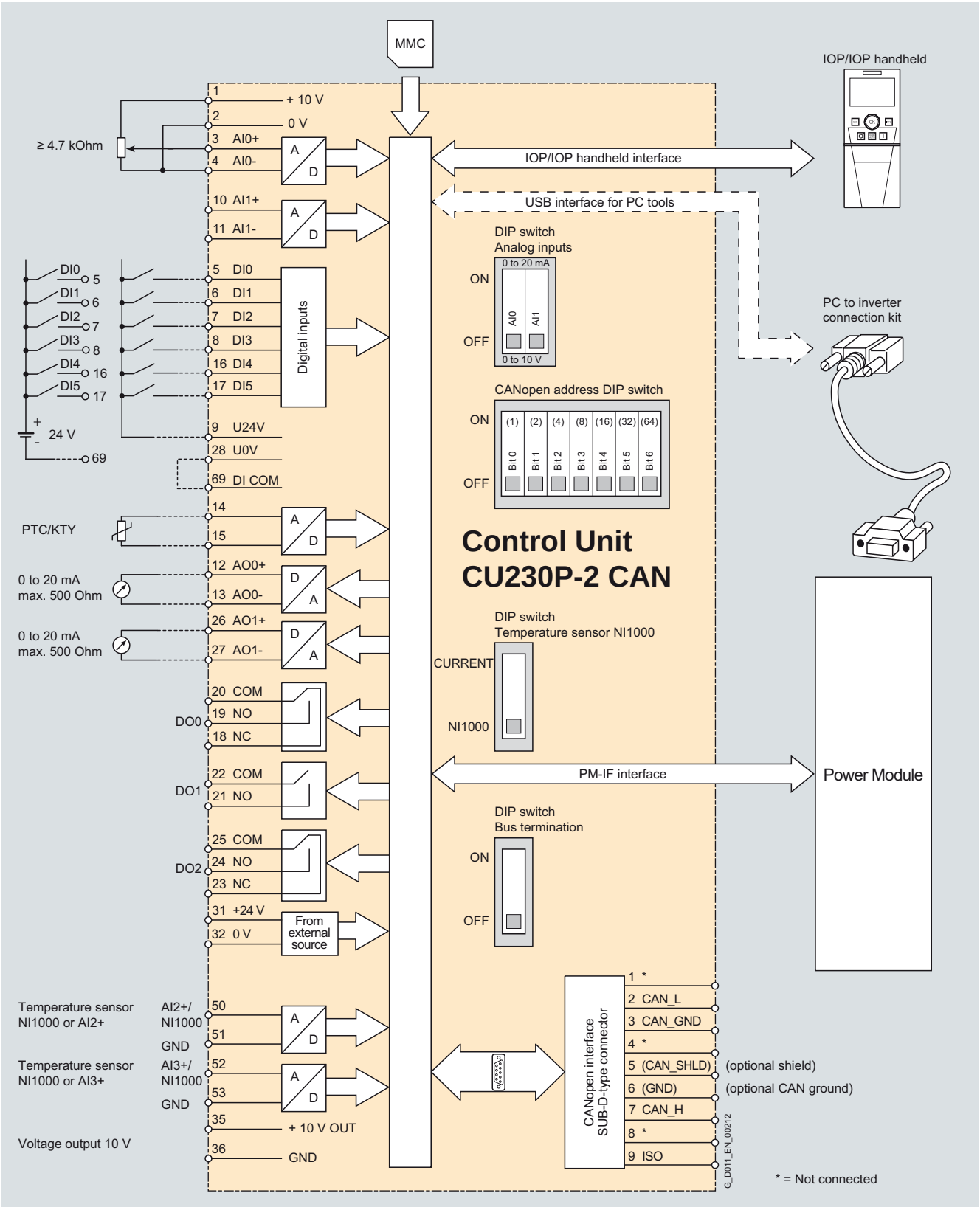
CU230P-2 HVAC Control Unit connection diagram

Integration



CU230P-2 DP Control Unit connection diagram

Integration



CU230P-2 CAN Control Unit connection diagram

Technical specifications

Control Unit	CU230P-2 HVAC 6SL3243-0BA30-1HA0	CU230P-2 DP 6SL3243-0BA30-1PA0	CU230P-2 CAN 6SL3243-0BA30-1CA0
Electrical specifications			
Operating voltage	24 V DC from the Power Module or from the connection of an external power supply 18 ... 30 V DC		
Current consumption	Max. 0.5 A		
Protective insulation	PELV according to EN 50178 Protective separation from the line supply using double/reinforced insulation		
Power loss	<5.5 W		
Interfaces			
Digital inputs – Standard	6 isolated inputs, optically isolated; free reference potential (own potential group) NPN/PNP logic can be selected using the wiring Switching level: 0 → 1: 11 V Switching level: 1 → 0: 5 V Max. input current 15 mA		
Digital outputs	2 relay change-over contacts 250 V AC 2 A (inductive load), 30 V DC 5 A (ohmic load) 1 relay NO contact 30 V DC, 0.5 A (ohmic load)		
Analog inputs	2 differential inputs, switchable between voltage and current using DIP switch: –10 ... +10 V, 0/4 ... 20 mA, 10-bit resolution 1 non-isolated input, switchable using DIP switch between current and temperature sensor, type NI1000/PT1000, 0/4 ... 20 mA; 10-bit resolution 1 non-isolated input, temperature sensor, type NI1000/PT1000, 10-bit resolution The two differential analog inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V Analog inputs are protected against inputs in a voltage range of ±30 V and have a common-mode voltage in the ±15 V range.		
Analog outputs	2 non-isolated outputs, switchable between voltage and current using parameter setting: 0 ... 10 V; 0/4 ... 20 mA Voltage mode: 10 V, min. burden 10 kΩ current mode: 20 mA, max. burden 500 Ω The analog outputs have short circuit protection		
PTC/KTY interface	1 motor temperature sensor input, sensors that can be connected PTC, KTY and Thermo-Click, accuracy ±5 °C		
Bus interface			
Type	**RS485**	**PROFIBUS DP**	**CANopen**
Protocols	USS Modbus RTU (switchable per software)	ProfiDrive profile V4.1	CANopen
Hardware	Terminal Insulated USS: max. 187.5 kBaud Modbus RTU:19.2 kBaud bus terminating resistors can be switched in	9-pin SUB-D connector Insulated Max. 12 Mbit/s Slave address can be set using DIP switches	9-pin SUB-D socket Insulated Max. 1 Mbit/s
Tool interfaces			
Memory card	1 MicroMemoryCard		
Operator panels	IOP supported connection options between CU230P and IOP: can be directly plugged on, door mounting or handheld BOP not possible		
PC interface	USB		
Open-loop/closed-loop control techniques			
***V/f* linear/square/parameterizable**	✓		
***V/f* with flux current control (FCC)**	✓		
***V/f* ECCO linear/square**	✓		
Vector control, without encoder	✓		
Vector control, with encoder	–		
Torque control, without encoder	✓		
Torque control, with encoder	–		

CU230 Control Units

Technical specifications

Control Unit	CU230P-2 HVAC 6SL3243-0BA30-1HA0	CU230P-2 DP 6SL3243-0BA30-1PA0	CU230P-2 CAN 6SL3243-0BA30-1CA0
Software functions			
Setpoint input	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing Off3)	✓		
Positioning down ramp	–		
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Free function blocks (FFB) for logic and arithmetic operations	–		
Switchable drive data sets (DDS)	✓ (4)		
Switchable command data sets (CDS)	✓ (4)		
Flying restart	✓		
Automatic restart after line supply failure or operating fault (AR)	✓		
Technology controller (internal PID)	✓		
Energy-saving function (hibernation) with internal PID controller	✓		
Energy-saving function (hibernation) with external PID controller	✓		
Belt monitoring with and without sensor (load torque monitoring)	✓		
Dry pump monitoring (load torque monitoring)	✓		
Thermal motor protection	✓ (I^2t, sensor: PTC/KTY/Thermo-Click)		
Thermal inverter protection	✓		
Motor identification	✓		
Motor holding brake	–		
Auto-ramping (V_{dcmax} controller)	✓ (only with PM240 Power Module)		
Kinetic buffering (V_{dcmax} controller)	✓ (only with PM240 Power Module)		
Braking functions for • DC braking • Compound braking • Dynamic braking with integrated brake chopper	✓ (only with PM240 Power Module)		
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section			
• min.	0.15 mm^2 (AWG28)		
• max.	1.5 mm^2 (AWG16)		
Operating temperature	–10 ... +60 °C (14 ... 140 °F)		
Storage temperature	–40 ... +70 °C (–40 ... +158 °F)		
Relative humidity	<95 % RH, condensation not permissible		
Dimensions			
• Width	73 mm		
• Height	199 mm		
• Depth	65.5 mm		
Weight, approx.	0.61 kg		

Overview

Example of CU240S DP-F Control Unit

The Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization. Several Control Units are available in different versions:

- CU240E
- CU240S
- CU240S DP
- CU240S DP-F
- CU240S PN
- CU240S PN-F

Safety Integrated functions

The following Safety Integrated functions are integrated in the CU240S DP-F and CU240S PN-F Control Units and, with the exception of the "Safe Brake Control", can be implemented without external circuit elements:

The SINAMICS G120 fail-safe frequency inverter provides four safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- 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 when a speed limit is exceeded
- Safe Brake Control (SBC) for controlling motor brakes that are active in the de-energized state, e.g. motor holding brakes

The functions "Safe Stop 1" and "Safely Limited Speed" can both be implemented without having to use a motor sensor or encoder; the implementation cost is minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The safety functions "Safely Limited Speed" and "Safe Stop 1" are not certified for pull-through loads as in the case of lifting gear and winders.

Safety functions have been extended with firmware V3.2.

Additional information is provided in the part Highlights, section Safety Integrated.

Selection and ordering data

Communication	Digital inputs Standard	Digital inputs Fail-safe	Digital outputs	Encoder interfaces	Designation	**Control Unit** Order No.
Standard						
RS485/USS	6	–	3	–	CU240E	**6SL3244-0BA10-0BA0**
RS485/USS	9	–	3	1	CU240S	**6SL3244-0BA20-1BA0**
PROFIBUS DP	9	–	3	1	CU240S DP	**6SL3244-0BA20-1PA0**
PROFINET	9	–	3	1	CU240S PN	**6SL3244-0BA20-1FA0**
Fail-safe for Safety Integrated						
PROFIBUS DP	6	2	3	1	CU240S DP-F	**6SL3244-0BA21-1PA0**
PROFINET	6	2	3	1	CU240S PN-F	**6SL3244-0BA21-1FA0**

Design

CU240E Control Unit

CU240E Control Unit without terminal cover

Terminal No.	Signal	Features
Digital inputs (DI)		
5 … 8, 16.17	DI0 … DI5	Freely programmable (isolated) 5.5 mA/24 V
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output 1 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output 1 Common contact (0.5 A, 30 V DC)
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output 3 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output 3 Common contact (0.5 A, 30 V DC)
Analog inputs (AI)		
3	AI0+	0 … 10 V, –10 … +10 V, 0/2 … 10 V or 0/4 … 20 mA
4	AI0-	
10	AI1+	0 … 10 V, 0 … 20 mA
11	AI1-	
Analog outputs (AO)		
12	AO0+	Freely programmable (0/4 … 20 mA with max. 500 Ω, 0/2 … 10 V with min. 500 Ω)
13	AO0-	M
26	AO1+	Freely programmable (0/4 … 20 mA with max. 500 Ω)
27	AO1-	M
PTC/KTY interface		
14	PTC+	Positive PTC/KTY input
15	PTC-	Negative PTC/KTY input
Serial RS485 interface		
29	P+	RS485 A, USS protocol
30	N-	RS485 B, USS protocol
Power supply		
9	U 24 V	Isolated user power supply +24 V at 100 mA
28	U 0 V	Isolated user reference voltage
1	+10 V	Non-isolated, regulated 10 V power supply for I/O – max. 10 mA
2	0 V	Power supply reference

Design

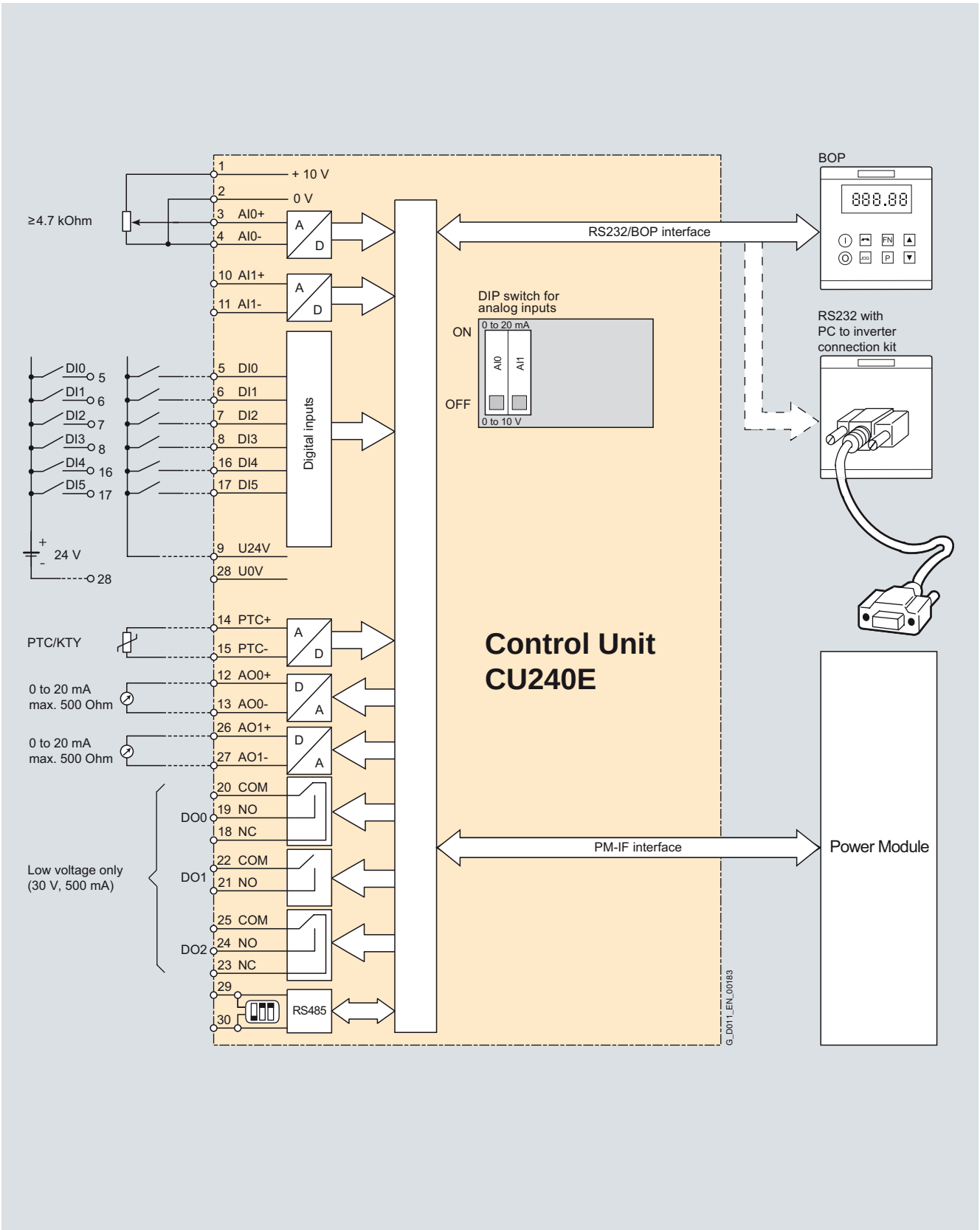
CU240S, CU240S DP, CU240S DP-F, CU240S PN and CU240S PN-F Control Units

Example: CU240S DP-F Control Unit (right without terminal cover, with pluggable terminals)

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
5 … 8, 16.17	DI0 … DI5	Freely programmable (isolated) 5.5 mA/24 V
40 … 42 (only for CU240S, CU240S DP and CU240S PN)	DI6 … DI8	Freely programmable (isolated) 5.5 mA/24 V
Digital inputs (DI) – Fail-safe (for CU240S DP-F and CU240S PN-F only)		
60 … 63 (for CU240S DP-F and CU240S PN-F only)	FDI0A FDI0B FDI1A FDI1B	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output 1 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output 1 Common contact (0.5 A, 30 V DC)
21	DO1, NO	Relay output 2 NO contact (0.5 A, 30 V DC)
22	DO1, COM	Relay output 2 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output 3 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output 3 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output 3 Common contact (0.5 A, 30 V DC)

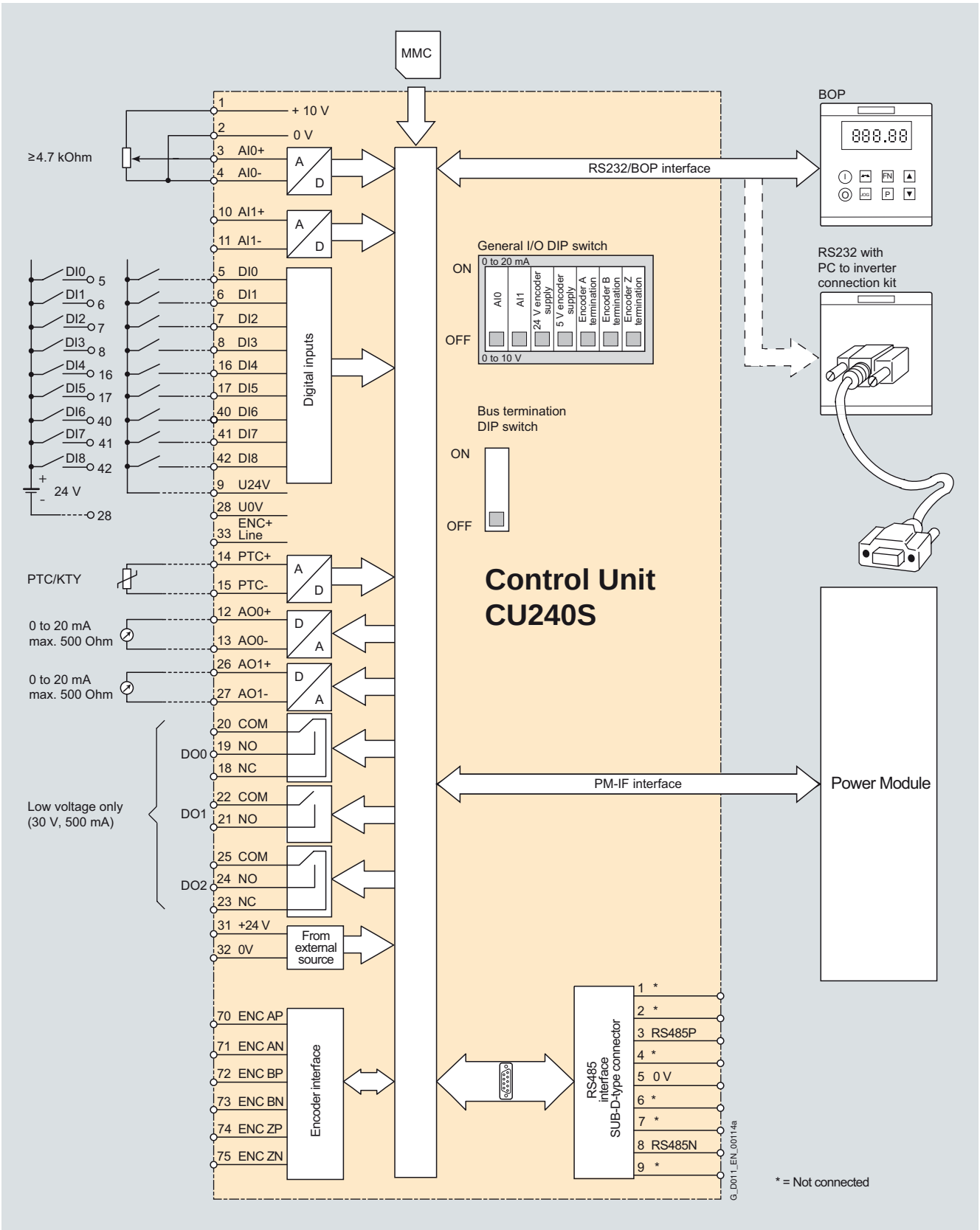
Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	0 … 10 V, –10 … +10 V, 0/2 … 10 V or 0/4 … 20 mA
4	AI0-	
10	AI1+	0 … 10 V, 0 … 20 mA
11	AI1-	
Analog outputs (AO)		
12	AO0+	Freely programmable (0/4 … 20 mA with max. 500 Ω, 0/2 … 10 V with min. 500 Ω)
13	AO0-	M
26	AO1+	Freely programmable (0/4 … 20 mA with max. 500 Ω)
27	AO1-	M
Encoder interface		
70	ENC AP	Encoder AP Channel A non-inverting input
71	ENC AN	Encoder AN Channel A inverting input
72	ENC BP	Encoder BP Channel B non-inverting input
73	ENC BN	Encoder BN Channel B inverting input
74	ENC ZP	Encoder ZP Zero pulse non-inverting input
75	ENC ZN	Encoder ZN Zero pulse inverting input
PTC/KTY interface		
14	PTC+	Positive PTC/KTY input
15	PTC-	Negative PTC/KTY input
Power supply		
33	ENC+ line supply	Isolated encoder power supply (+24 V at 100 mA, +5 V at 300 mA), configured using DIP switch
9	U 24 V	Isolated user power supply +24 V at 100 mA
28	U 0 V	Isolated encoder power supply and user reference voltage
1	+10 V	Non-isolated, regulated 10 V power supply for I/O – max. 10 mA
2	0 V	Power supply reference
31	+24 V	24 V power supply input
32	0 V	24 V power supply reference

Integration



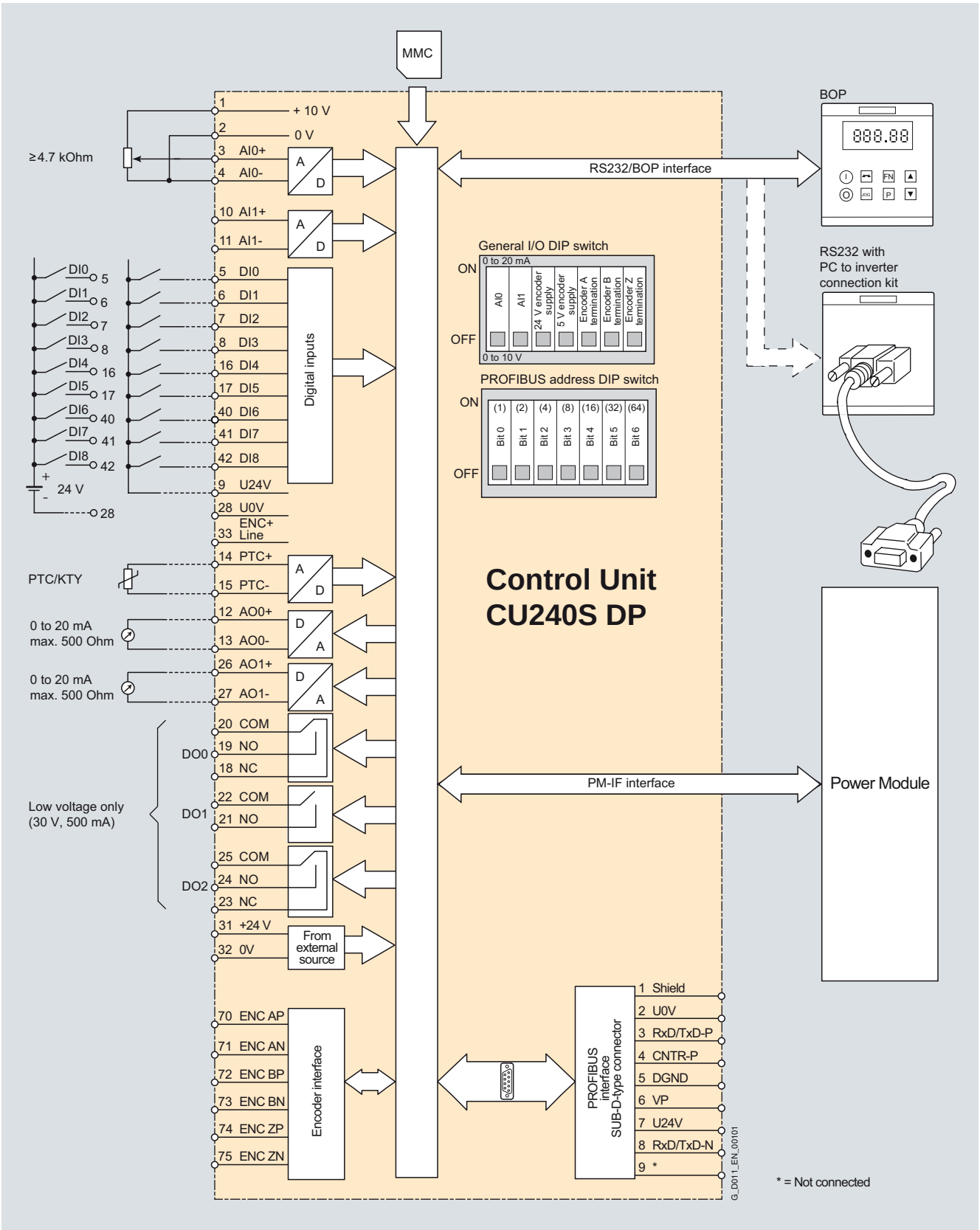
CU240E Control Unit connection diagram

Integration



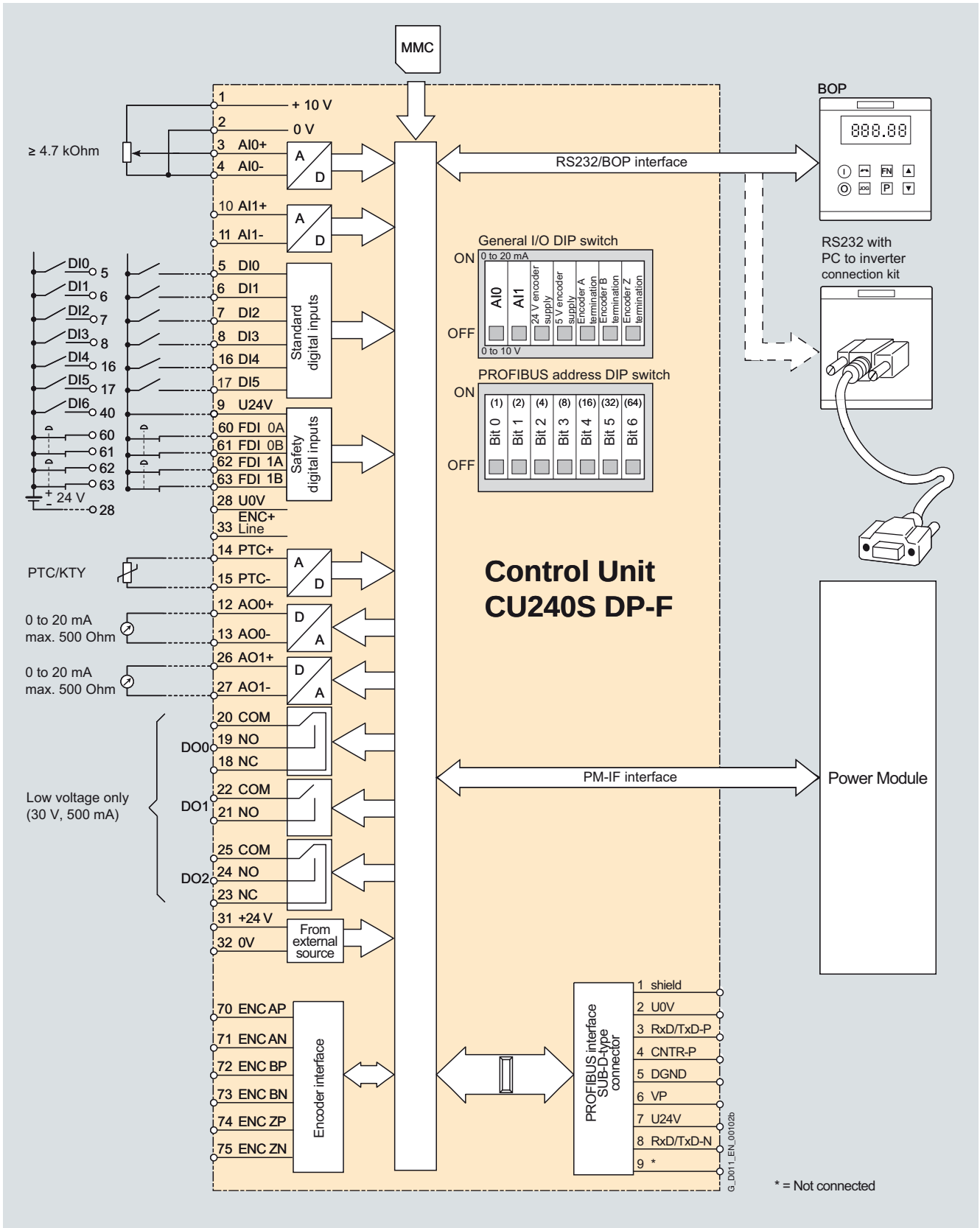
CU240S Control Unit connection diagram

Integration



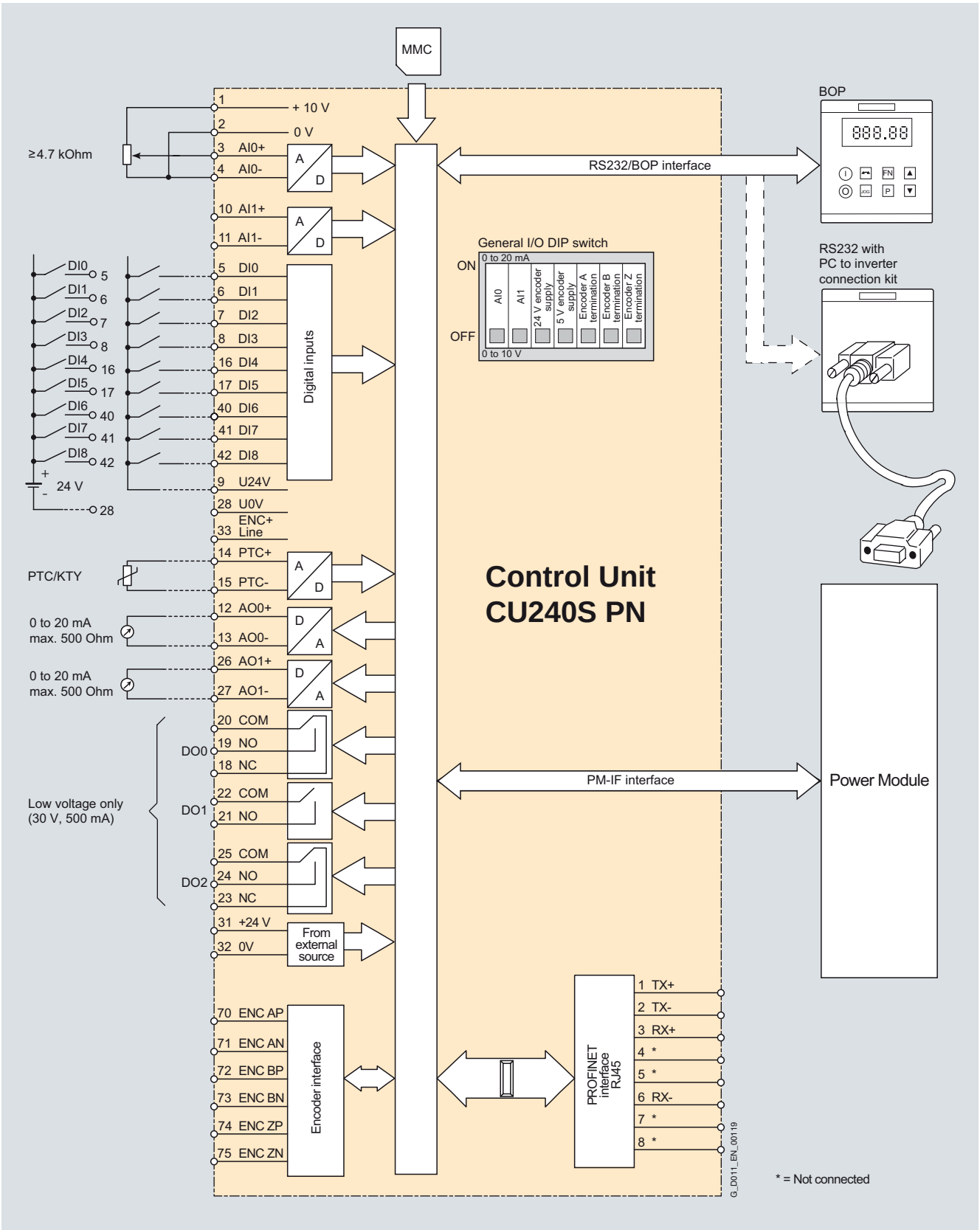
CU240S DP Control Unit connection diagram

Integration



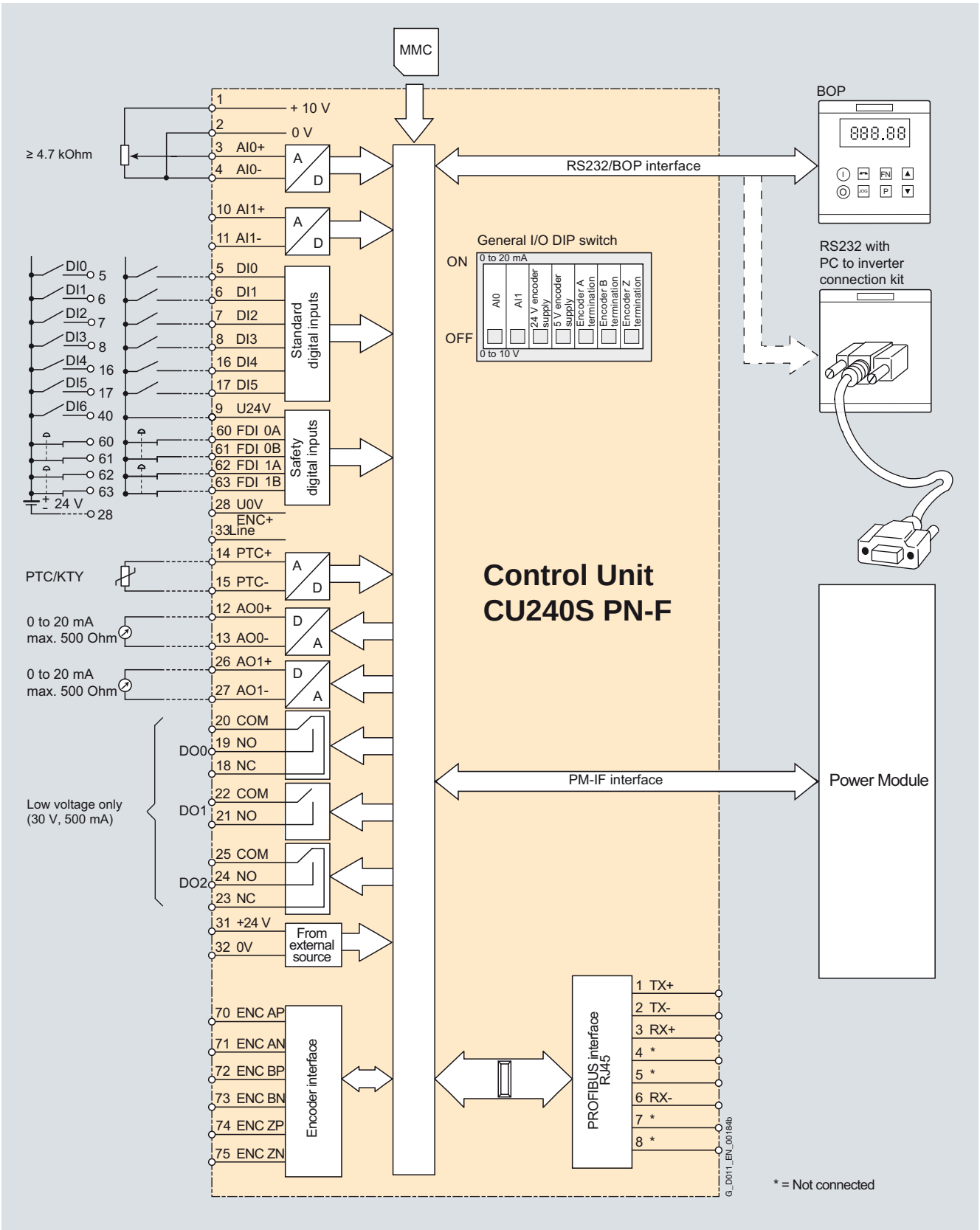
CU240S DP-F Control Unit connection diagram

Integration



CU240S PN Control Unit connection diagram

Integration



CU240S PN-F Control Unit connection diagram

CU240 Control Units

Technical specifications

Control Unit	CU240E 6SL3244-0BA10-0BA0	CU240S 6SL3244-0BA20-1BA0	CU240S DP 6SL3244-0BA20-1PA0	CU240S PN 6SL3244-0BA20-1FA0	CU240S DP-F 6SL3244-0BA21-1PA0	CU240S PN-F 6SL3244-0BA21-1FA0
Electrical specifications						
Operating voltage	24 V DC via the Power Module	24 V DC via the Power Module or external 24 V DC	24 V DC via the Power Module or external 24 V DC	24 V DC via the Power Module or external 24 V DC	24 V DC via the Power Module or external 24 V DC	24 V DC via the Power Module or external 24 V DC
Current drain from the 24 V supply	Available soon	Max. 0.5 A	Max. 0.5 A	Max. 0.7 A	Max. 0.7 A	Max. 0.7 A
Power loss (full load)	< 5.5 W	< 5.5 W	< 5.5 W	< 13 W	< 16 W	< 17 W
Interfaces						
Digital inputs – Standard	6	9	9	9	6	6
Digital inputs – Fail-safe	–	–	–	–	2	2
Digital outputs	3	3	3	3	3	3
Analog inputs	2	2	2	2	2	2
	Both analog inputs can be configured as supplementary digital inputs if an additional function is required. Switching thresholds: 0 → 1: Rated voltage 2 V 1 → 0: Rated voltage 0.8 V Analog inputs are protected against inputs in a voltage range of ±30 V and have a common-mode voltage in the ±15 V range.					
Analog outputs	2	2	2	2	2	2
	Analog outputs have short-circuit protection, but are not isolated. Maximum output voltage = 10 V in the current mode, maximum output current = 20 mA in the voltage mode. The response time should be approximately 1 ms at a load of max. 10 kΩ in the voltage mode.					
Bus interface	RS485/USS	RS485/USS	PROFIBUS DP	PROFINET	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe
Encoder interfaces	–	1	1	1	1	1
PTC/KTY interface	✓	✓	✓	✓	✓	✓
Brake Relay interface or Safe Brake Relay interface (connected via Power Module)	✓	✓	✓	✓	✓	✓
MMC memory card slot	–	✓	✓	✓	✓	✓
Operator panels that can be used	BOP, IOP Hand-held (via PC Inverter Connection Kit)	BOP, IOP Hand-held (via PC Inverter Connection Kit)	BOP, IOP Hand-held (via PC Inverter Connection Kit)	BOP, IOP Hand-held (via PC Inverter Connection Kit)	BOP, IOP Hand-held (via PC Inverter Connection Kit)	BOP, IOP Hand-held (via PC Inverter Connection Kit)
RS232/USS interface (connection via PC Inverter Connection Kit)	✓	✓	✓	✓	✓	✓
Safety functions						
Integrated safety functions acc. to Category 3 of EN 954-1 and acc. to SIL 2 of IEC 61508	–	–	–	–	• Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Brake Control (SBC) • Safe Torque Off (STO)	
Open-loop/closed-loop control techniques						
***V/f* linear/square/parameterizable**	✓	✓	✓	✓	✓	✓
***V/f* with flux current control (FCC)**	✓	✓	✓	✓	✓	✓
Vector control, without encoder	✓	✓	✓	✓	✓	✓
Vector control, with encoder	–	✓	✓	✓	✓	✓
Torque control, without encoder	✓	✓	✓	✓	✓	✓
Torque control, with encoder	–	✓	✓	✓	✓	✓

Technical specifications

Control Unit	CU240E 6SL3244-0BA10-0BA0	CU240S 6SL3244-0BA20-1BA0	CU240S DP 6SL3244-0BA20-1PA0	CU240S PN 6SL3244-0BA20-1FA0	CU240S DP-F 6SL3244-0BA21-1PA0	CU240S PN-F 6SL3244-0BA21-1FA0
Software functions						
Fixed frequencies	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	✓	✓	✓	✓	✓	✓
Positioning down ramp	✓	✓	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓	✓	✓	✓	✓
Ramp smoothing	✓	✓	✓	✓	✓	✓
3 selectable drive data sets	✓	✓	✓	✓	✓	✓
3 selectable command data sets (CDS) (manual/auto)	✓	✓	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓	✓	✓
JOG	✓	✓	✓	✓	✓	✓
Technology controller (PID)	✓	✓	✓	✓	✓	✓
Thermal motor protection	✓	✓	✓	✓	✓	✓
Thermal inverter protection	✓	✓	✓	✓	✓	✓
Setpoint input	✓	✓	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓	✓	✓
V_{dcmax} controller	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)
Kinetic buffering	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)
Braking functions for • DC braking • Compound braking • Dynamic braking with integrated brake chopper	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)	✓ (only with PM240)
Mechanical specifications and ambient conditions						
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Signal cable cross-section						
• min.	0.05 mm^2 (AWG30)	0.05 mm^2 (AWG30)	0.05 mm^2 (AWG30)	0.05 mm^2 (AWG30)	0.05 mm^2 (AWG30)	0.05 mm^2 (AWG30)
• max.	2 mm^2 (AWG14)	2 mm^2 (AWG14)	2 mm^2 (AWG14)	2 mm^2 (AWG14)	2 mm^2 (AWG14)	2 mm^2 (AWG14)
Operating temperature	–10 … +50 °C (14 … 122 °F)	–10 … +50 °C (14 … 122 °F)	–10 … +50 °C (14 … 122 °F)	–10 … +50 °C (14 … 122 °F)	0 … 45 °C (32 … 113 °F)	0 … 40 °C (32 … 104 °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	73 mm	73 mm	73 mm	73 mm	73 mm	73 mm
• Height	195 mm	177 mm	177 mm	177 mm	177 mm	177 mm
• Depth	31 mm	63 mm	63 mm	63 mm	63 mm	63 mm
Weight, approx.	0.21 kg	0.52 kg	0.52 kg	0.52 kg	0.52 kg	0.52 kg

PM240 Power Modules – 0.37 kW to 250 kW (0.5 hp to 400 hp)

Overview

Example: SINAMICS G120, frame sizes FSA to FSF

Example: SINAMICS G120, frame size FSGX

PM240 Power Modules, frame sizes FSA to FSF have an integrated brake chopper to which an external braking resistor can be connected via terminals DCP/R1 and R2 (see DC link components).

PM240 Power Modules, frame size FSGX do not have an integrated brake chopper. For these devices, there is an optional pluggable braking module to connect a braking resistor.

The PM240 Power Module can be used to couple the DC links of up to 10 Power Modules. This functionality is used for applications such as safe power-down after power failure or kinetic buffering (the DC link is supplied in the generator mode with the kinetic energy of the load so that the DC link voltage can be maintained).

The PM240 Power Module is also designed for safety-oriented applications. In conjunction with a Fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive (see Control Units).

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected (see load-side power components).

Line reactors are available to minimize line harmonics (see line-side components).

Frame size FSA of the PM240 Power Module is available only without integrated line filter to class A. A base filter is therefore available so that class A can be achieved. A class B base filter is also available so that class B can be achieved (see line-side power components).

Frame sizes FSB and FSC of the PM240 Power Module are available both with and without integrated class A line filter. For compliance with class B, PM240 Power Modules with integrated class A line filter must be fitted additionally with a class B base filter (see line-side components).

Power Modules with integrated class A line filter are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded (TN, TT) and non-grounded (IT) supply systems.

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **rated output current for applications with light overload (LO)**
- **base load current for applications with high overload (HO)**

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix for further information). The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

Rated power [1]		Rated output current [2] I_{rated}	Power based on the base load current [3]		Base load current [3] I_H	Frame size	**SINAMICS G120 PM240 Power Module without integrated line filter**	**SINAMICS G120 PM240 Power Module with integrated class A line filter**
kW	hp	A	**kW**	hp	A		Order No.	Order No.
380 ... 480 V 3 AC								
0.37	0.50	1.3	**0.37**	0.50	1.3	FSA	**6SL3224-0BE13-7UA0**	–
0.55	0.75	1.7	**0.55**	0.75	1.7	FSA	**6SL3224-0BE15-5UA0**	–
0.75	1.0	2.2	**0.75**	1.0	2.2	FSA	**6SL3224-0BE17-5UA0**	–
1.1	1.5	3.1	**1.1**	1.5	3.1	FSA	**6SL3224-0BE21-1UA0**	–
1.5	2.0	4.1	**1.5**	2.0	4.1	FSA	**6SL3224-0BE21-5UA0**	–
2.2	3.0	5.9	**2.2**	3.0	5.9	FSB	**6SL3224-0BE22-2UA0**	**6SL3224-0BE22-2AA0**
3.0	4.0	7.7	**3.0**	4.0	7.7	FSB	**6SL3224-0BE23-0UA0**	**6SL3224-0BE23-0AA0**
4.0	5.0	10.2	**4.0**	5.0	10.2	FSB	**6SL3224-0BE24-0UA0**	**6SL3224-0BE24-0AA0**
7.5	10	18	**5.5**	7.5	13.2	FSC	**6SL3224-0BE25-5UA0**	**6SL3224-0BE25-5AA0**
11.0	15	25	**7.5**	10	19	FSC	**6SL3224-0BE27-5UA0**	**6SL3224-0BE27-5AA0**
15.0	20	32	**11.0**	15	26	FSC	**6SL3224-0BE31-1UA0**	**6SL3224-0BE31-1AA0**
18.5	25	38	**15.0**	20	32	FSD	**6SL3224-0BE31-5UA0**	**6SL3224-0BE31-5AA0**
22	30	45	**18.5**	25	38	FSD	**6SL3224-0BE31-8UA0**	**6SL3224-0BE31-8AA0**
30	40	60	**22**	30	45	FSD	**6SL3224-0BE32-2UA0**	**6SL3224-0BE32-2AA0**
37	50	75	**30**	40	60	FSE	**6SL3224-0BE33-0UA0**	**6SL3224-0BE33-0AA0**
45	60	90	**37**	50	75	FSE	**6SL3224-0BE33-7UA0**	**6SL3224-0BE33-7AA0**
55	75	110	**45**	60	90	FSF	**6SL3224-0BE34-5UA0**	**6SL3224-0BE34-5AA0**
75	100	145	**55**	75	110	FSF	**6SL3224-0BE35-5UA0**	**6SL3224-0BE35-5AA0**
90	125	178	**75**	100	145	FSF	**6SL3224-0BE37-5UA0**	**6SL3224-0BE37-5AA0**
110	150	205	**90**	125	178	FSF	**6SL3224-0BE38-8UA0**	–
132	200	250	**110**	150	205	FSF	**6SL3224-0BE41-1UA0**	–
160	250	302	**132**	200	250	FSGX	new **6SL3224-0XE41-3UA0**	–
200	300	370	**160**	250	302	FSGX	new **6SL3224-0XE41-6UA0**	–
250	400	477	**200**	300	370	FSGX	new **6SL3224-0XE42-0UA0**	–

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for light overload (LO).

[2] The rated output current I_{rated} is based on the duty cycle for light overload (LO). These current values are valid for 400 V and are stamped on the rating plate of the Power Module.

[3] The base load current I_H is based on the duty cycle for high overload (HO).

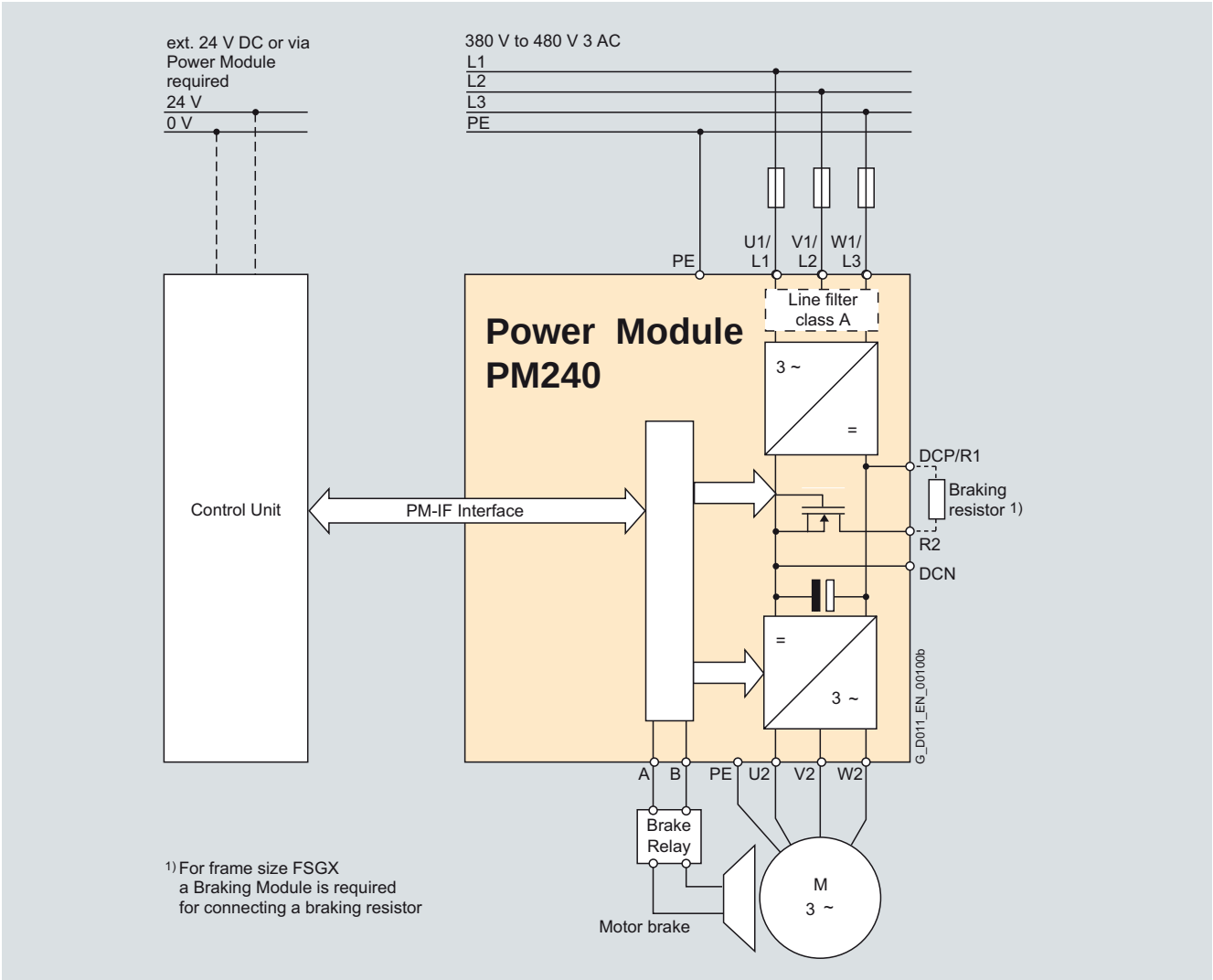
4

Integration

PM240 Power Modules communicate with the Control Unit via the PM-IF interface.

PM240 Power Modules have the following interfaces as standard:

- PM-IF interface to connect the PM240 Power Module to the Control Unit. The PM240 Power Module also supplies power to the Control Unit using an integrated power supply
- Terminals DCP/R1 and R2 for connection of an external braking resistor, valid up to frame size FSF. For frame size FSGX, an external plug-in braking unit (Braking Module) is required to connect a braking resistor
- Motor connection using screw terminals or screw studs
- Control for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 PE/protective conductor connections



PM240 Power Module connection diagram with or without integrated class A line filter

Integration

Power and DC link components which are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Line-side power components							
Line filter, class A	U	F	F	F	F	F/S [1]	S [1]
Line filter, class B	U	U	U	–	–	–	–
Line reactor	U	U	U	U	U	S	S
DC link components							
Braking resistor	U	U	S	S	S	S	S
Braking Module	–	–	–	–	–	–	I (Option)
Load-side power components							
Output reactor	U	U	U	S	S	S	S
Sine-wave filter	U	U	U	S	S	S	S

U = Base component
S = Lateral mounting
I = Integrated
– = Not possible
F = Power Modules available with and without integrated class A filter

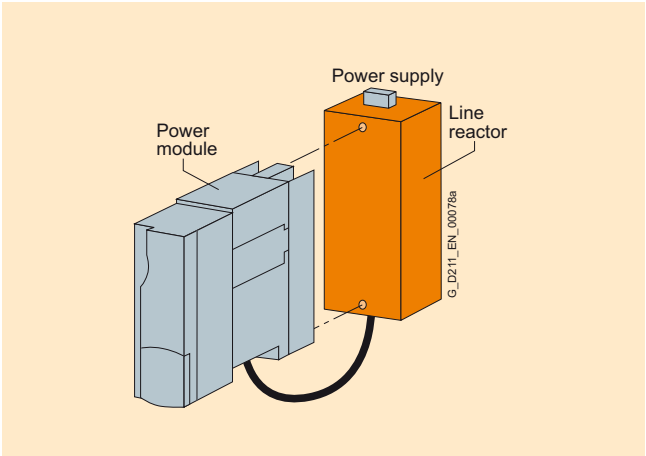
[1] PM240 FSF Power Modules from 110 kW (150 hp) and higher and FSGX are only available without an integrated class A filter. An optional class A line filter for side mounting is available instead.

4

Integration

Many system components for PM240 Power Modules are designed as base components, that is, the component is mounted on the baseplate and the PM240 Power Module above it in a space-saving design. Up to two base components can be mounted above one another.

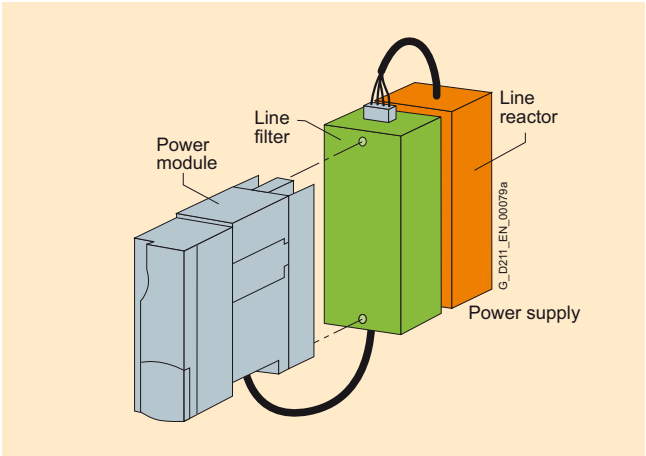
The following diagram shows the basic layout of a PM240 Power Module with line reactor as base component. On the line side, the line-side reactors have terminals and on the Power Module side, they have a pre-fabricated cable. For frame sizes FSA to FSC, when installed, the line terminals are at the top, for frame sizes FSD to FSE they are at the bottom.



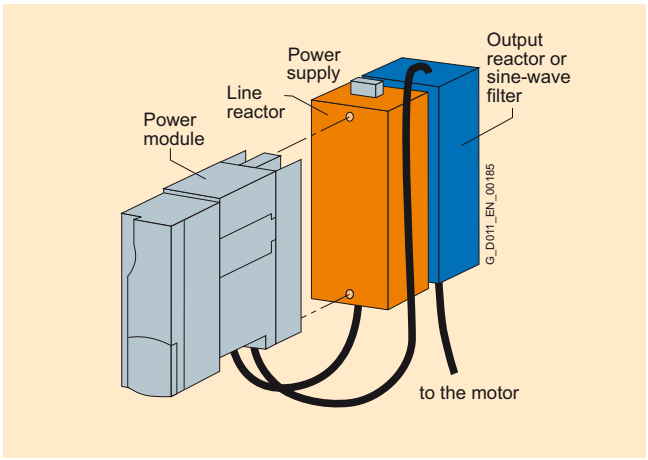
Basic layout of a PM240 Power Module with line reactor as base component

If a class A line filter is installed in addition to the line reactor on frame size FSA, the components must be arranged as shown in the diagram below. In this case, the line connection is from below.

Power Modules, from frame size FSB and higher are available with integrated class A line filters (an external class A line filter is not required in this case).

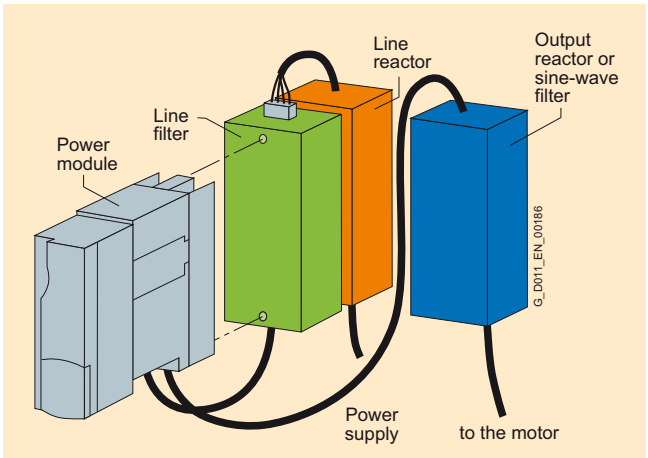


PM240 Power Module frame size FSA with line reactor and class A line filter



PM240 Power Module frame size FSA with line reactor and output reactor or sine-wave filter

For configurations involving more than two base-type system components, e.g. line filter + line reactor + output reactor, individual components must be mounted to the side of the Power Modules. In this case, the line reactor and line filter must be installed under the Power Module and the output reactor to the righthand side.



PM240 Power Module frame size FSA with line reactor, line filter and output reactor or sine-wave filter

Integration

Maximum permissible cable lengths from the motor to the inverter when using output reactors or sine-wave filters depending on the voltage range

The following load-side power components are optionally available in the appropriate frame sizes and result in the following maximum cable lengths:

	Maximum permissible motor cable lengths (shielded/unshielded) in m						
	Frame sizes						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Without output reactor/sine-wave filter	50/100	50/100	50/100	50/100	100/100	150/150	300/450
With optional output reactor							
• at 380 V (–10 %) to 400 V 3 AC	150/225	150/225	150/225	200/300	200/300	200/300	300/450
• at 401 V to 480 V (+10 %) 3 AC	100/150	100/150	100/150	200/300	200/300	200/300	300/450
With optional sine-wave filter							
• at 380 V (–10 %) to 400 V 3 AC	150/225	150/225	150/225	200/300	200/300	200/300	300/450
• at 401 V to 480 V (+10 %) 3 AC	100/150	100/150	100/150	200/300	200/300	200/300	300/450

Derating data

The following inverter output currents can still be implemented for long motor cables without output reactor and sine-wave filter.

Derating for PM240 Power Modules, frame sizes FSA to FSF for shielded motor cables. From frame size FSD and higher, only the particular main Power Module types were tested. The values also apply to the other Power Modules of the particular frame size.

Rated power (at I_H)		Frame size	Base load current I_H	Rated current I_{rated}	Motor connection cross-section	**Current derating** of the output current as a % of the base load current for the cable lengths (MOTION-CONNECT)			
kW	hp		A	A	mm^2	50 m	100 m	150 m	200 m
0.37	0.50	FSA	1.3	1.3	2.5	100 %	–	–	–
0.55	0.75	FSA	1.7	1.7	2.5	100 %	–	–	–
0.75	1.0	FSA	2.2	2.2	2.5	100 %	–	–	–
1.1	1.5	FSA	3.1	3.1	2.5	100 %	–	–	–
1.5	2.0	FSA	4.1	4.1	2.5	100 %	–	–	–
2.2	3.0	FSB	5.9	5.9	6	100 %	60 %	–	–
3.0	4.0	FSB	7.7	7.7	6	100 %	60 %	–	–
4.0	5.0	FSB	10.2	10.2	6	100 %	70 %	–	–
5.5	7.5	FSC	13.2	18	10	100 %	70 %	45 %	–
7.5	10	FSC	19	25	10	100 %	90 %	80 %	–
11.0	15	FSC	26	32	10	100 %	90 %	80 %	–
22.0	30	FSD	45	60	35	100 %	95 %	90 %	85 %
37.0	50	FSE	75	90	35	100 %	100 %	95 %	90 %
75.0	100	FSF	145	178	95	100 %	100 %	100 %	95 %

– Not possible

Technical specifications

General technical specifications

	PM240 Power Modules
System operating voltage	380 … 480 V 3 AC ±10 %
Line supply requirements **Line short circuit voltage u_K**	at u_K > 1 %, a line reactor is recommended
Input frequency	47 … 63 Hz
Output frequency	
• Control type *V/f*	0 … 650 Hz
• Control type Vector	0 … 200 Hz
Pulse frequency	to 75 kW HO: 4 kHz from 90 kW HO: 2 kHz for higher pulse frequencies up to 16 kHz see the derating data
Power factor	0.7 … 0.85
Inverter efficiency	95 … 97 %
Modulation depth	93 %
Overload capability	
• High overload (HO)	
- 0.37 ... 75 kW	1.5 × rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 × rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
- 90 ... 200 kW	1.36 × rated output current (i.e. 136 % overload) for 57 s with a cycle time of 300 s 1.6 × rated output current (i.e. 160 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	
- 0.37 ... 250 kW	1.1 × rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.5 × rated output current (i.e. 150 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Optional class A or B line filter acc. to EN 55011 is available
Possible braking methods	• DC braking • Compound braking • Dynamic braking with integrated brake chopper (optional for frame size FSGX)
Degree of protection	IP20
Operating temperature	
• High overload (HO)	
- Frame sizes FSD to FSF	0 … 50 °C (32 … 122 °F) without derating, > 50 … 60 °C see derating characteristics
- Frame size FSGX	0 … 40 °C (32 … 104 °F) without derating, > 40 … 55 °C see derating characteristics
• Light overload (LO)	0 … 40 °C (32 … 104 °F) without derating, > 40 … 60 °C (> 40 … 55 °C for frame size FSGX) see derating characteristics
Storage temperature	–40 … +70 °C (–40 … +158 °F)
Relative humidity	< 95 % RH, condensation not permissible
Cooling	Internal air cooling, power units with increased air cooling using integrated fans
Installation altitude	up to 1000 m above sea level without power reduction, > 1000 m see derating characteristics
Standard SCCR (Short Circuit Current Rating) [1]	FSA, FSB, FSC: 10 kA FSD, FSE, FSF, FSGX: 42 kA
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Standards conformance	UL, cUL, CE, c-tick, SEMI F47
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at: http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224-0BE13-7UA0	6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0	6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	1.3	1.7	2.2	3.1	4.1
• Base load current I_L [1]	A	1.3	1.7	2.2	3.1	4.1
• Base load current I_H [2]	A	1.3	1.7	2.2	3.1	4.1
• I_{max}	A	2.6	3.4	4.4	6.2	8.2
Rated power						
• based on I_L	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
• based on I_H	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.97	0.97	0.97	0.97	0.97
Power loss (at rated current)	kW	0.09	0.1	0.1	0.1	0.11
Cooling air requirement	m^3/s	0.005	0.005	0.005	0.005	0.005
Sound pressure level L_{pA} (1 m)	dB	< 45	< 45	< 45	< 45	< 45
24 V DC power supply for Control Unit	A	1	1	1	1	1
Rated input current [3]						
• with line reactor	A	1.4	1.8	2.3	3.2	4.3
• without line reactor	A	1.7	2.1	2.6	3.9	4.9
Max. length of cable to brake resistor	m	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5	1 … 2.5
PE connection		On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw	On housing with M4 screw
Motor cable length [4], **max.**						
• Shielded	m	50	50	50	50	50
• Unshielded	m	100	100	100	100	100
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	73	73	73	73	73
• Height	mm	173	173	173	173	173
• Depth						
- without Control Unit	mm	145	145	145	145	145
- with Control Unit	mm	210	210	210	210	210
Frame size		FSA	FSA	FSA	FSA	FSA
Weight, approx.	kg	1.1	1.1	1.1	1.1	1.1

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. These current values without line reactor are stamped on the rating plate of the Power Module.

[4] Max. motor cable length 25 m (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224-0BE22-2UA0	6SL3224-0BE23-0UA0	6SL3224-0BE24-0UA0	6SL3224-0BE25-5UA0	6SL3224-0BE27-5UA0
With integrated line filter		6SL3224-0BE22-2AA0	6SL3224-0BE23-0AA0	6SL3224-0BE24-0AA0	6SL3224-0BE25-5AA0	6SL3224-0BE27-5AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	5.9	7.7	10.2	18	25
• Base load current I_L [1]	A	5.9	7.7	10.2	18	25
• Base load current I_H [2]	A	5.9	7.7	10.2	13.2	19
• I_{max}	A	11.8	15.4	20.4	26.4	38
Rated power						
• based on I_L	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	7.5 (10)	11 (15)
• based on I_H	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	5.5 (7.5)	7.5 (10)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		0.95	0.95	0.95	0.95	0.95
Power loss (at rated current)	kW	0.14	0.16	0.18	0.24	0.30
Cooling air requirement	m^3/s	0.024	0.024	0.024	0.055	0.055
Sound pressure level L_{pA} (1 m)	dB	< 50	< 50	< 50	< 60	< 60
24 V DC power supply for Control Unit	A	1	1	1	1	1
Rated input current [3]						
• with line reactor	A	6.1	8	10.4	18.7	26
• without line reactor	A	7.6	10.2	13.4	21.9	31.5
Max. length of cable to braking resistor	m	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 6	1 … 6	1 … 6	2.5 … 10	2.5 … 10
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 6	1 … 6	1 … 6	2.5 … 10	2.5 … 10
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 … 6	1 … 6	1 … 6	2.5 … 10	2.5 … 10
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor cable length [4], **max.**						
• Shielded	m	50	50	50	50	50
• Unshielded	m	100	100	100	100	100
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	153	153	153	189	189
• Height	mm	270	270	270	334	334
• Depth						
- without Control Unit	mm	165	165	165	185	185
- with Control Unit	mm	230	230	230	250	250
Frame size		FSB	FSB	FSB	FSC	FSC
Weight, approx.	kg	4	4	4	7	7

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. These current values without line reactor are stamped on the rating plate of the Power Module.

[4] Max. motor cable length 25 m (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM240 Power Modules				
Without integrated line filter		6SL3224-0BE31-1UA0	6SL3224-0BE31-5UA0	6SL3224-0BE31-8UA0	6SL3224-0BE32-2UA0	6SL3224-0BE33-0UA0
With integrated line filter		6SL3224-0BE31-1AA0	6SL3224-0BE31-5AA0	6SL3224-0BE31-8AA0	6SL3224-0BE32-2AA0	6SL3224-0BE33-0AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	32	38	45	60	75
• Base load current I_L [1]	A	32	38	45	60	75
• Base load current I_H [2]	A	26	32	38	45	60
• I_{max}	A	52	64	76	90	124
Rated power						
• based on I_L	kW (hp)	15 (20)	18.5 (25)	22 (30)	30 (40)	37 (50)
• based on I_H	kW (hp)	11 (15)	15 (20)	18.5 (25)	22 (30)	30 (40)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		> 0.97	> 0.97	> 0.97	> 0.97	> 0.97
Power loss (at rated current)	kW	0.4	0.42	0.52	0.69	0.99
Cooling air requirement	m^3/s	0.055	0.055	0.055	0.055	0.055
Sound pressure level L_{pA} (1 m)	dB	< 60	< 60	< 60	< 61	< 60
24 V DC power supply for Control Unit	A	1	1	1	1	1
Rated input current [3]						
• with line reactor	A	33	40	47	63	78
• without line reactor	A	39	46	53	72	88
Max. length of cable to braking resistor	m	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	M6 screw studs	M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	2.5 … 10	10 … 50	10 … 50	10 … 50	10 … 50
Motor connection U2, V2, W2		Screw terminals	M6 screw studs	M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	2.5 … 10	10 … 50	10 … 50	10 … 50	10 … 50
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		Screw terminals	M6 screw studs	M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	2.5 … 10	10 … 50	10 … 50	10 … 50	10 … 50
PE connection		On housing with M5 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length [4], **max.**						
• Shielded	m	50	50	50	50	100
• Unshielded	m	100	100	100	100	100
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	189	275	275	275	275
• Height						
- without integrated filter	mm	334	419	419	419	499
- with integrated filter	mm	334	512	512	512	635
• Depth						
- without Control Unit	mm	185	204	204	204	204
- with Control Unit	mm	250	260	260	260	260
Frame size		FSC	FSD	FSD	FSD	FSE
Weight, approx.						
• without integrated filter	kg	7	13	13	13	16
• with integrated filter	kg	7	16	16	16	23

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. These current values without line reactor are stamped on the rating plate of the Power Module.

[4] Max. motor cable length 25 m (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM240 Power Modules					
Without integrated line filter		6SL3224-0BE33-7UA0	6SL3224-0BE34-5UA0	6SL3224-0BE35-5UA0	6SL3224-0BE37-5UA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
With integrated line filter		6SL3224-0BE33-7AA0	6SL3224-0BE34-5AA0	6SL3224-0BE35-5AA0	6SL3224-0BE37-5AA0	–	–
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} [1]	A	90	110	145	178	205	250
• Base load current I_L [1]	A	90	110	145	178	205	250
• Base load current I_H [2]	A	75	90	110	145	178	205
• I_{max}	A	150	180	220	290	308	375
Rated power							
• based on I_L	kW (hp)	45 (60)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
• based on I_H	kW (hp)	37 (50)	45 (60)	55 (75)	75 (1oo)	90 (125)	110 (150)
Rated pulse frequency	kHz	4	4	4	4	2	2
Efficiency η		> 0.97	> 0.97	> 0.97	> 0.97	> 0.97	> 0.97
Power loss (at rated current)	kW	1.21	1.42	1.93	2.31	2.43	2.53
Cooling air requirement	m^3/s	2 × 0.055	0.15	0.15	0.15	0.15	0.15
Sound pressure level L_{pA} (1 m)	dB	< 62	< 60	< 60	< 65	< 65	< 65
24 V DC power supply for Control Unit	A	1	1	1	1	1	1
Rated input current [3]							
• with line reactor	A	94	115	151	186	210	250
• without line reactor	A	105	129	168	204	245	299
Max. length of cable to braking resistor	m	15	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm^2	10 … 50	25 … 120	25 … 120	25 … 120	25 … 120	25 … 120
Motor connection U2, V2, W2		M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm^2	10 … 50	25 … 120	25 … 120	25 … 120	25 … 120	25 … 120
DC link connection, connection for the braking resistor DCP/R1, DCN, R2		M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section	mm^2	10 … 50	25 … 120	25 … 120	25 … 120	25 … 120	25 … 120
PE connection		On housing with M6 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw
Motor cable length [4], **max.**							
• Shielded	m	100	150	150	150	150	150
• Unshielded	m	100	150	150	150	150	150
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm	275	350	350	350	350	350
• Height							
- without integrated filter	mm	499	634	634	634	634	634
- with integrated filter	mm	635	934	934	934	–	–
• Depth							
- without Control Unit	mm	204	316	316	316	316	316
- with Control Unit	mm	260	372	372	372	372	372
Frame size		FSE	FSF	FSF	FSF	FSF	FSF
Weight, approx.							
• without integrated filter	kg	16	36	36	36	39	39
• with integrated filter	kg	23	52	52	52	–	–

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. These current values without line reactor are stamped on the rating plate of the Power Module.

[4] Max. motor cable length 25 m (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM240 Power Modules		
Without integrated line filter		6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	302	370	477
• Base load current I_L [1]	A	302	370	477
• Base load current I_H [2]	A	250	302	370
• I_{max}	A	400	483	592
Rated power				
• based on I_L	kW (hp)	160 (250)	200 (300)	250 (400)
• based on I_H	kW (hp)	132 (200)	160 (215)	200 (300)
Rated pulse frequency	kHz	2	2	2
Efficiency η		> 0.98	> 0.98	> 0.98
Power loss (at rated current)	kW	3.9	4.4	5.5
Cooling air requirement	m^3/s	0.36	0.36	0.36
Sound pressure level L_{pA} (1 m)	dB	< 69	< 69	< 69
24 V DC power supply for Control Unit	A	1	1	1
Rated input current [3]				
• with line reactor	A	245	297	354
• without line reactor	A	297	354	442
Max. length of cable to braking resistor	m	50	50	50
Line supply connection U1/L1, V1/L2, W1/L3		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	2 × 240	2 × 240	2 × 240
Motor connection U2, V2, W2		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	2 × 240	2 × 240	2 × 240
PE connection		On housing with M10 screw	On housing with M10 screw	On housing with M10 screw
Motor cable length [4], **max.**				
• Shielded	m	300	300	300
• Unshielded	m	450	450	450
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	326	326	326
• Height	mm	1533	1533	1533
• Depth	mm	547	547	547
Frame size		FSGX	FSGX	FSGX
Weight, approx.	kg	174	174	174

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. These current values without line reactor are stamped on the rating plate of the Power Module.

[4] Max. motor cable length 25 m (shielded) for PM240 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Characteristic curves

Derating data

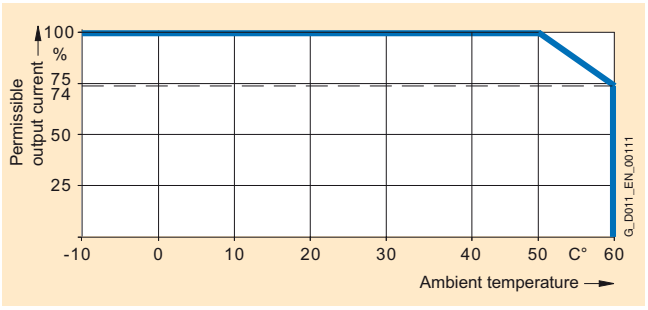
Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A at a pulse frequency of							
kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.37	0.50	–	1.3	1.1	0.9	0.8	0.7	0.6	0.5
0.55	0.75	–	1.7	1.4	1.2	1.0	0.9	0.8	0.7
0.75	1.0	–	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.1	1.5	–	3.1	2.6	2.2	1.9	1.6	1.4	1.2
1.5	2.0	–	4.1	3.5	2.9	2.5	2.1	1.8	1.6
2.2	3.0	–	5.9	5.0	4.1	3.5	3.0	2.7	2.4
3.0	4.0	–	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	–	10.2	8.7	7.1	6.1	5.1	4.6	4.1
7.5	10	–	18.0	16.2	13.3	11.4	9.5	8.6	7.6
11.0	15	–	25.0	22.1	18.2	15.6	13.0	11.7	10.4
15.0	20	–	32.0	27.2	22.4	19.2	16.0	14.4	12.8
18.5	25	–	38.0	32.3	26.6	22.8	19.0	17.1	15.2
22.0	30	–	45.0	38.3	31.5	27.0	22.5	20.3	18.0
30.0	40	–	62.0	52.7	43.4	37.2	31.0	27.9	24.8
37.0	50	–	75.0	63.8	52.5	45.0	37.5	33.8	30.0
45.0	60	–	90.0	76.5	63.0	54.0	45.0	40.5	36.0
55.0	75	–	110.0	93.5	77.0	–	–	–	–
75.0	100	–	145.0	123.3	101.5	–	–	–	–
90.0	125	–	178.0	151.3	124.6	–	–	–	–
110.0	150	205.0 [1)]	178.0	–	–	–	–	–	–
132.0	200	250.0 [1)]	202.0	–	–	–	–	–	–
160.0	250	302.0 [1)]	250.0	–	–	–	–	–	–
200.0	300	370.0 [1)]	302.0	–	–	–	–	–	–
250.0	400	477.0 [1)]	370.0	–	–	–	–	–	–

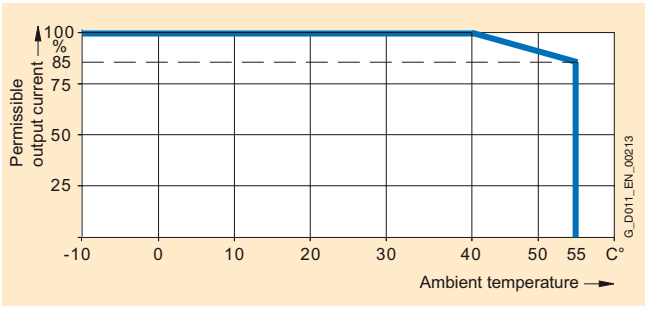
[1)] The pulse frequency can be switched over from 4 kHz (default) to 2 kHz only for the light overload (LO) duty cycle.

Characteristic curves

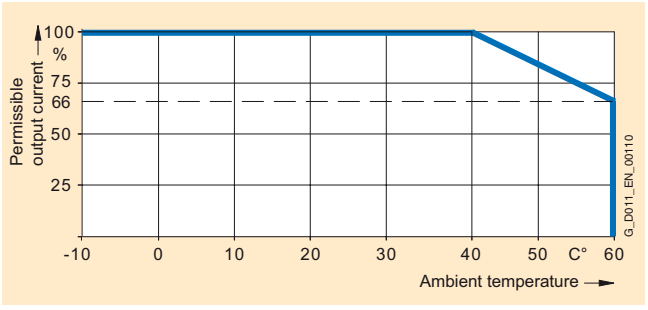
Ambient temperature



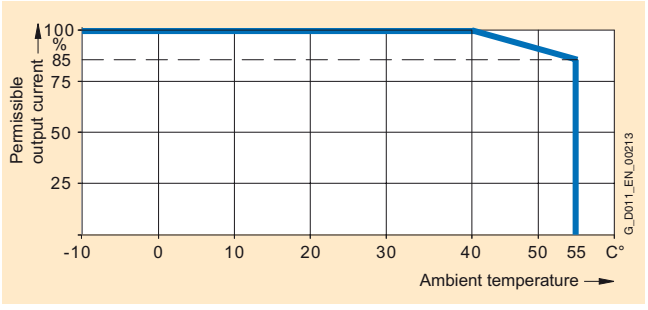
High overload (HO) PM240 Power Modules frame sizes FSD to FSF



High overload (HO) PM240 Power Modules frame size FSGX



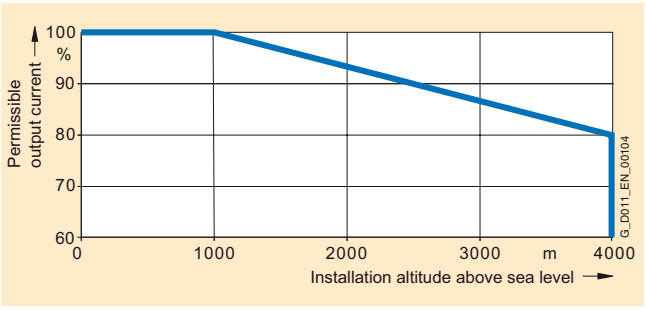
Light overload (LO) PM240 Power Modules frame sizes FSD to FSF

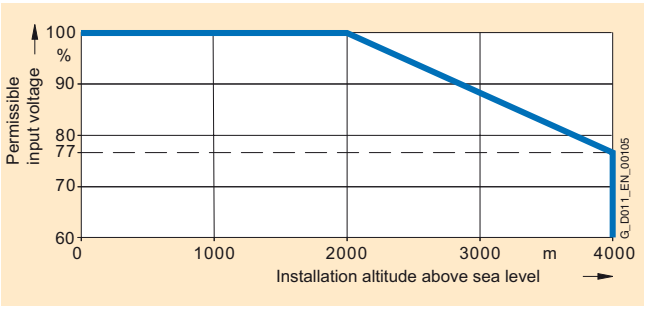


Light overload (LO) PM240 Power Modules frame size FSGX

Note: 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.

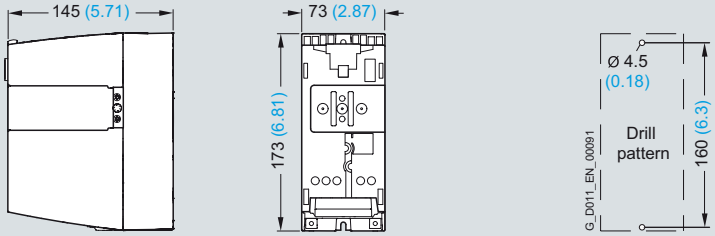
Installation altitude





4

Dimensional drawings



PM240 Power Module frame size FSA

Mounted with 2 M4 studs, 2 M4 nuts, 2 M4 washers.

Ventilation clearance required at top and bottom: 100 mm (3.94 inches).

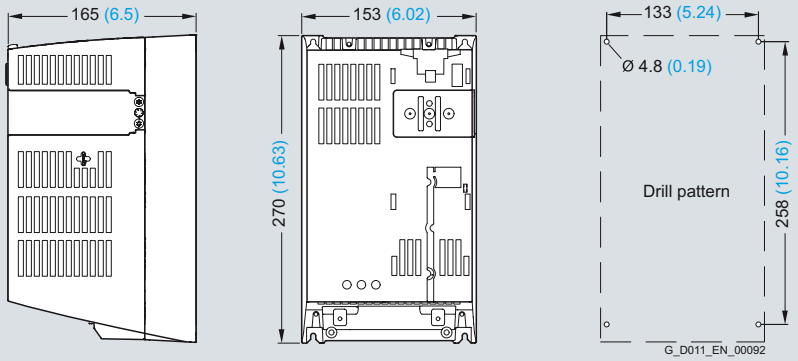
Ventilation clearance required at sides:

- Ambient temperature ≤ 40 °C: 0 mm (0 inches).
- Ambient temperature > 40 °C: 30 mm (1.18 inches).

When the Control Unit is plugged on, the mounting depth increases by 65 mm (2.56 inches) and the total height by 14 mm (0.55 inches).

Exception: for CU240E, mounting depth +31 mm (+1.22 inches), total height +32 mm (+1.26 inches).

All dimensions in mm (values in brackets are in inches).



PM240 Power Module frame size FSB

Mounted with 4 M4 studs, 4 M4 nuts, 4 M4 washers.

Ventilation clearance required at top and bottom: 100 mm (3.94 inches).

Ventilation clearance required at sides:

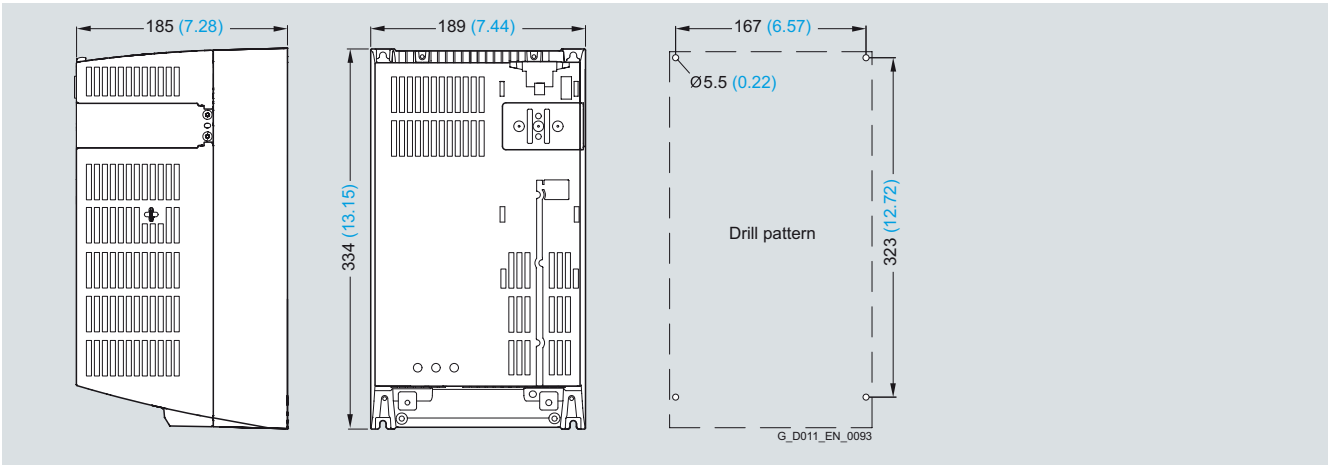
- Ambient temperature ≤ 40 °C: 0 mm (0 inches).
- Ambient temperature > 40 °C: 40 mm (1.57 inches).

When the Control Unit is plugged on, the mounting depth increases by 65 mm (2.56 inches).

Exception: for CU240E, mounting depth +31 mm (+1.22 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM240 Power Module frame size FSC

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

Ventilation clearance required at top and bottom: 100 mm (3.94 inches).

Ventilation clearance required at sides:

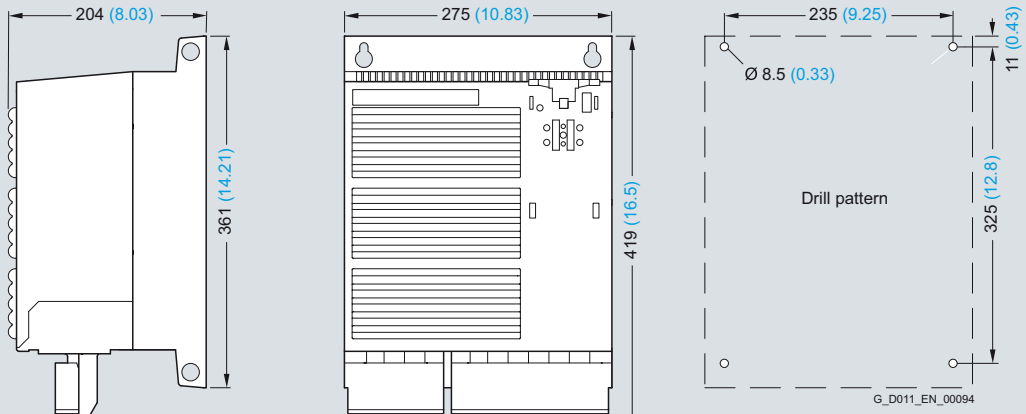
- Ambient temperature ≤ 40 °C: 0 mm (0 inches).
- Ambient temperature > 40 °C: 50 mm (1.97 inches).

When the Control Unit is plugged on, the mounting depth increases by 65 mm (2.56 inches).

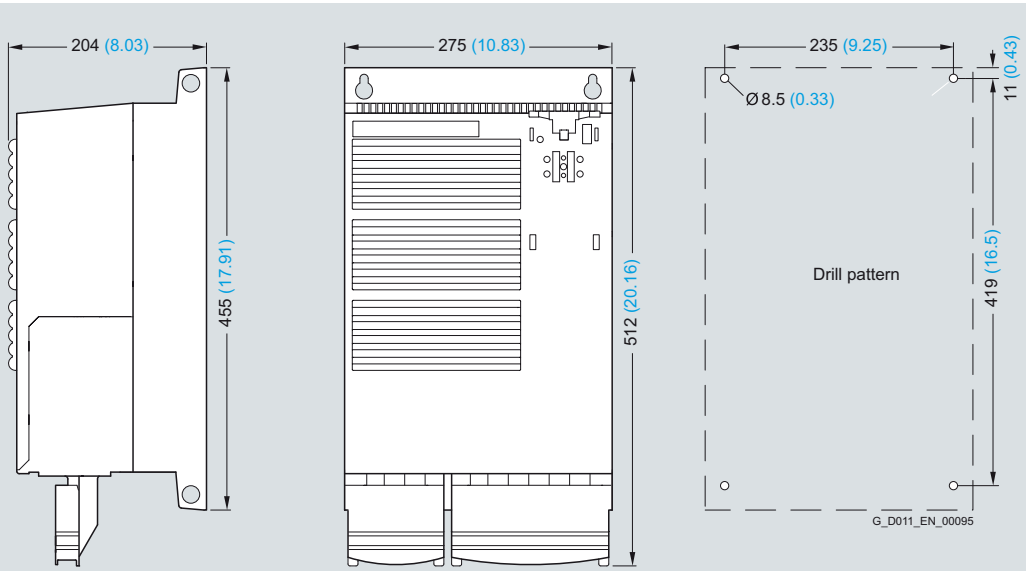
Exception: for CU240E, mounting depth +31 mm (+1.22 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM240 Power Module frame size FSD without line filter



PM240 Power Module frame size FSD with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

Ventilation clearance required at front: 28 mm (1.1 inches).

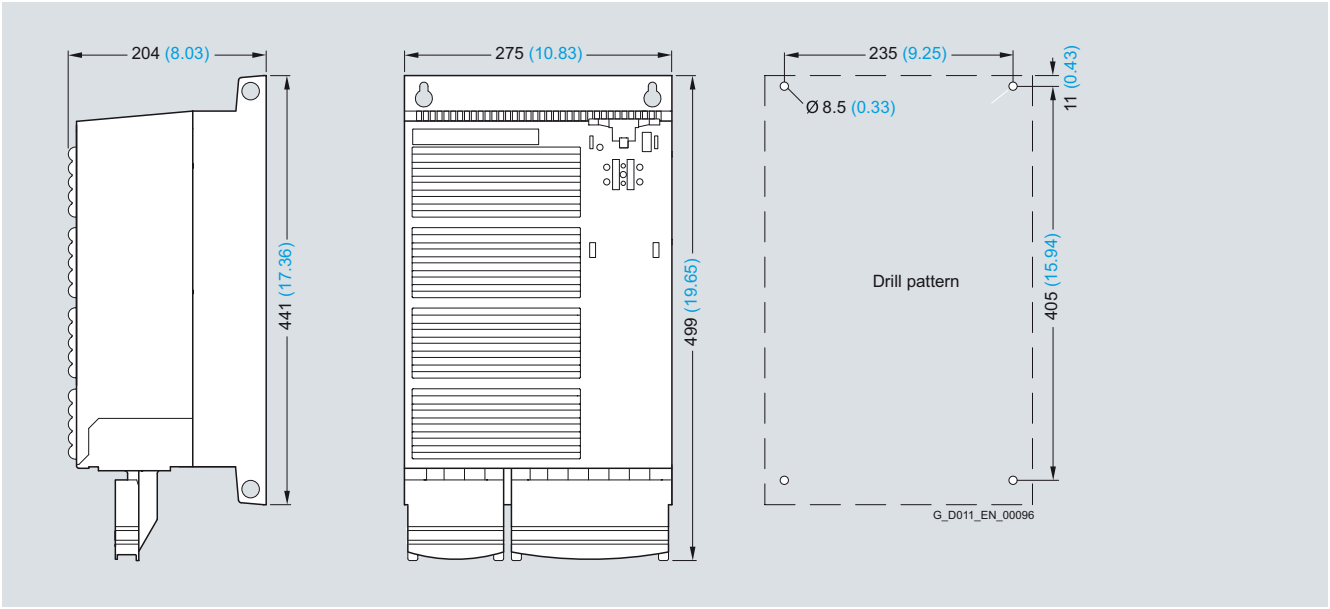
Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

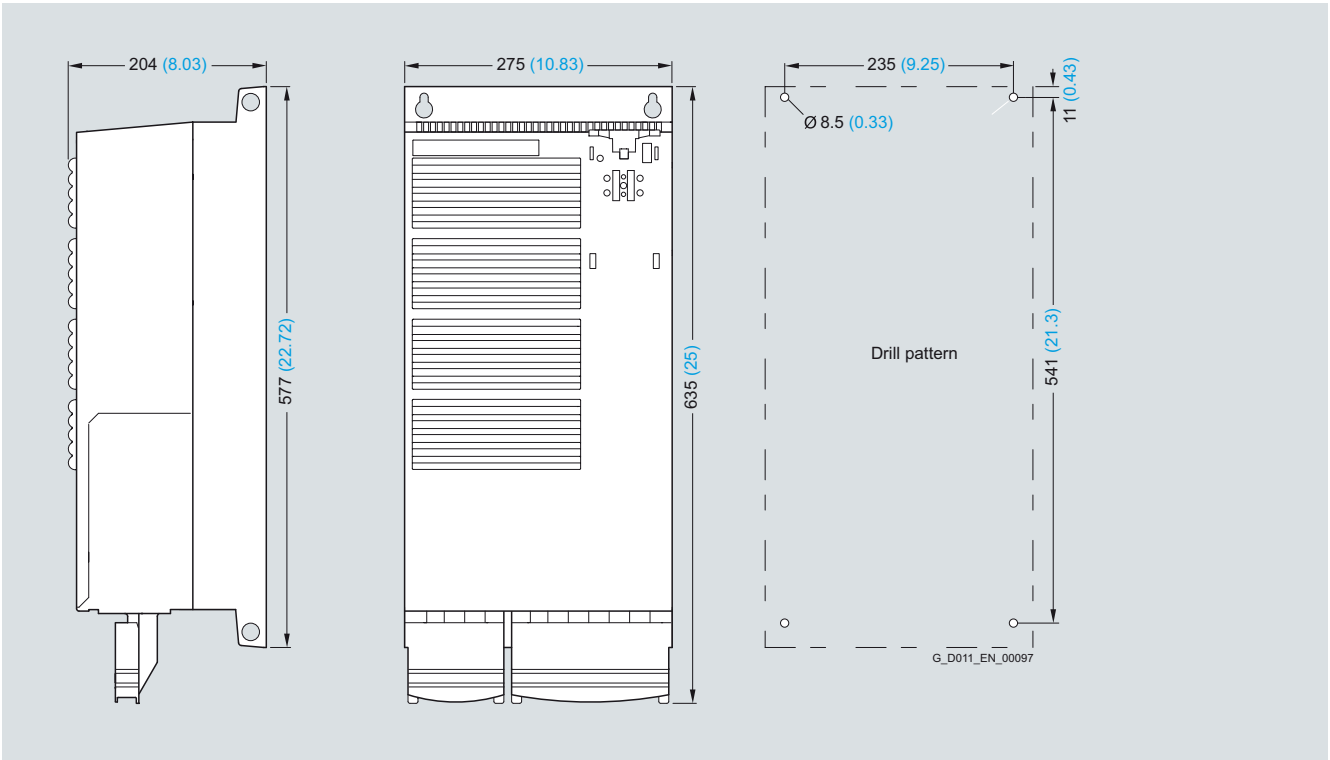
Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM240 Power Module frame size FSE without line filter



PM240 Power Module frame size FSE with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

Ventilation clearance required at front: 28 mm (1.1 inches).

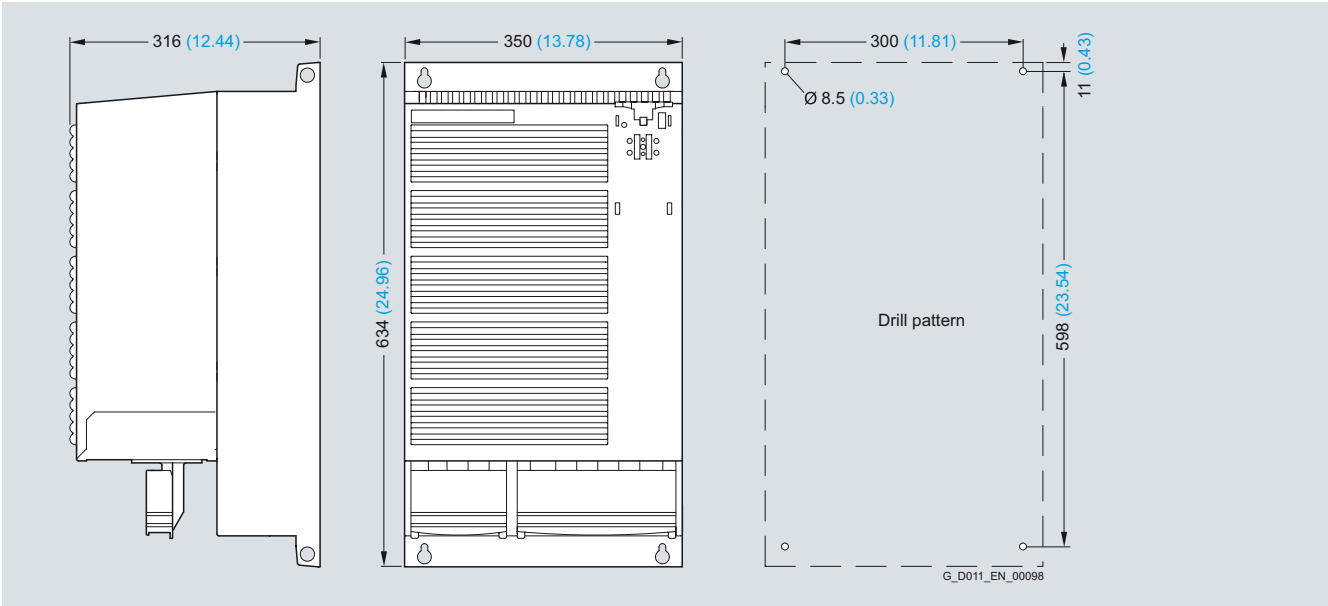
Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

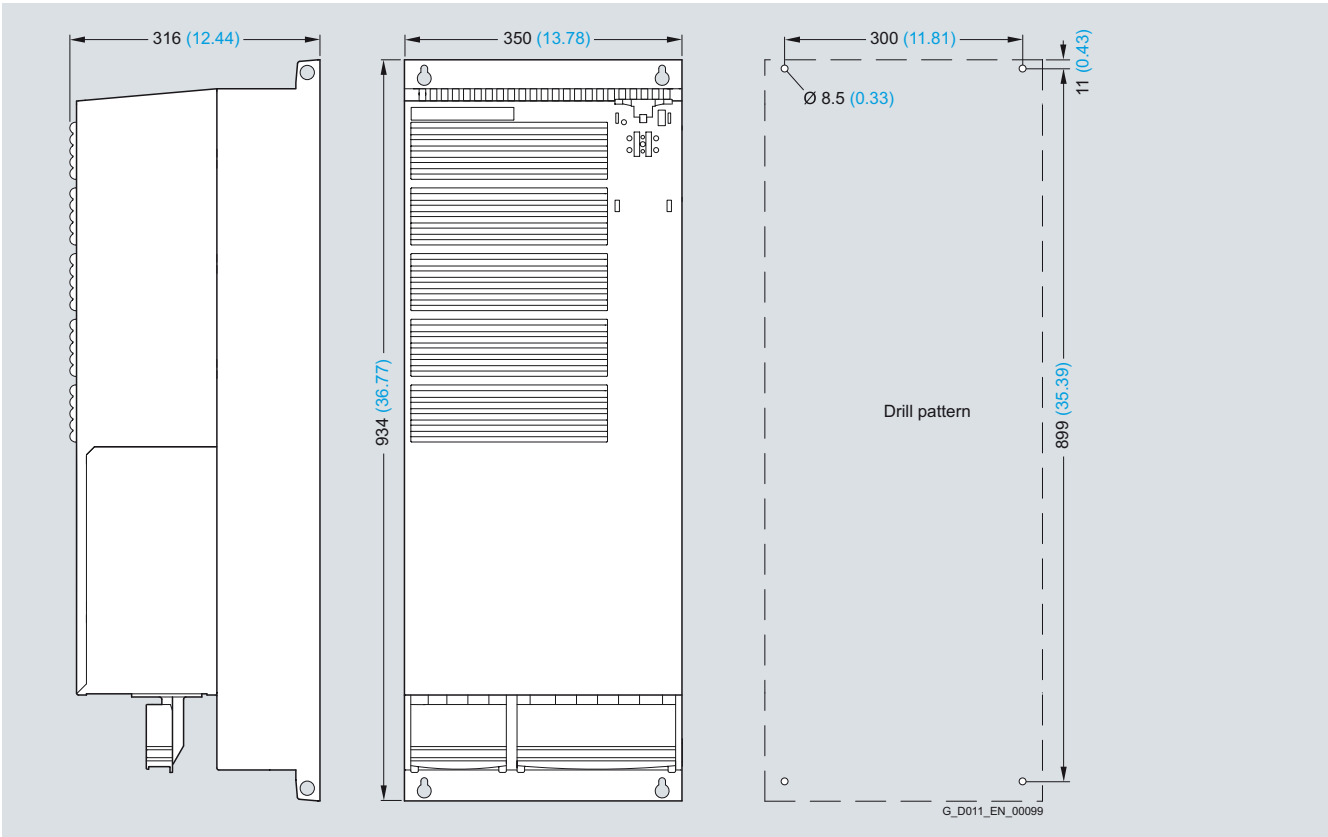
Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM240 Power Module frame size FSF without line filter



PM240 Power Module frame size FSF with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 350 mm (13.78 inches).

Ventilation clearance required at front: 28 mm (1.1 inches).

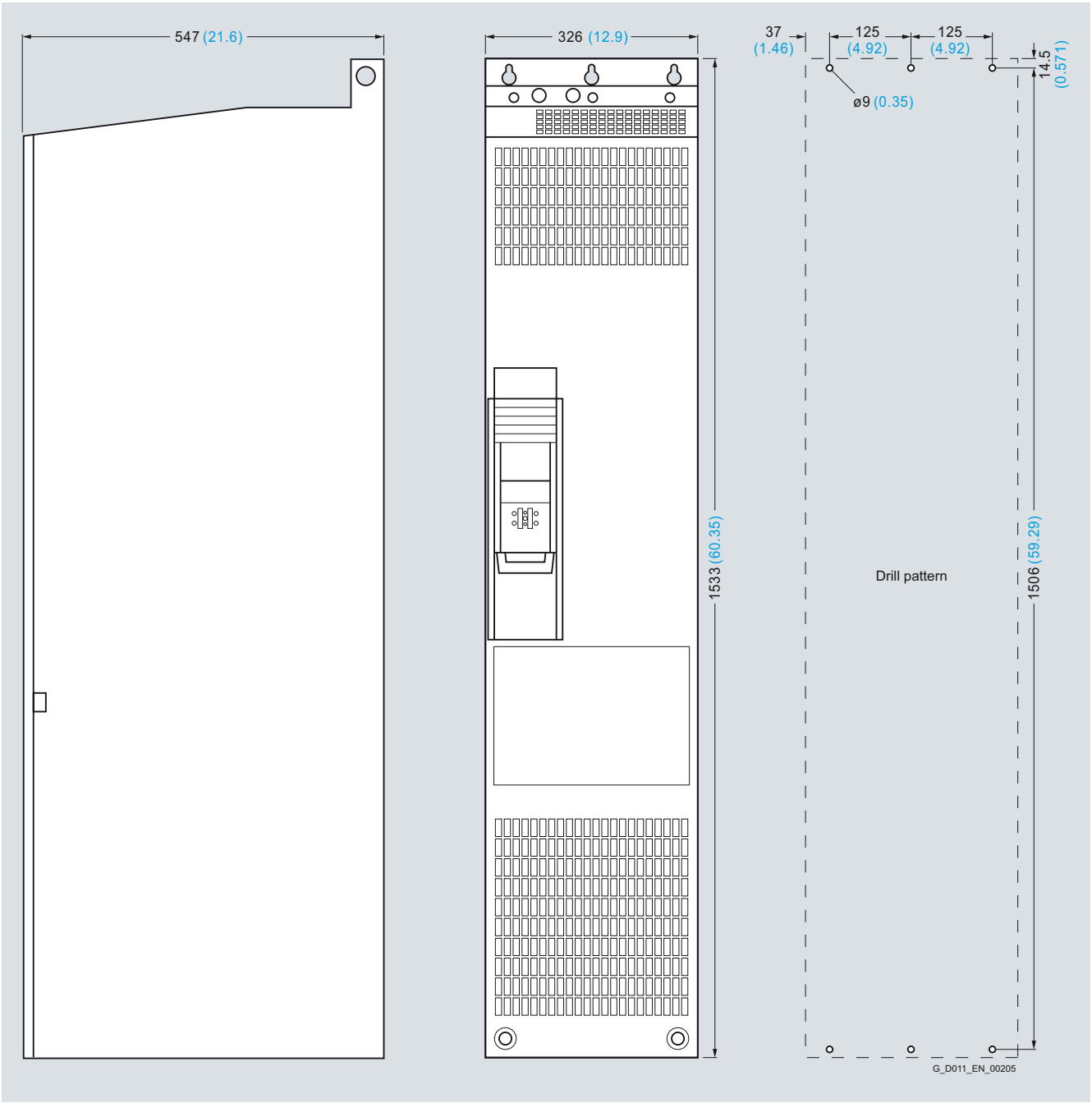
Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM240 Power Module frame size FSGX without line filter

Mounted with 6 M8 studs, 6 M8 nuts, 6 M8 washers.

Ventilation clearance required at the top: 250 mm (9.84 inches).

Ventilation clearance required at the bottom: 150 mm (5.91 inches).

Ventilation clearance required at front: 50 mm (1.97 inches).

Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth does not increase.

All dimensions in mm (values in brackets are in inches).

Overview

Example: PM250 Power Modules frame sizes FSC to FSF

The PM250 Power Module features an absolutely unique technology – Efficient Infeed Technology. This feature provides the ability to feed energy back into the supply system in the generator mode (electronic braking) so that the energy is not wasted in a braking resistor. This saves space in the control cabinet. The time-consuming process of dimensioning the braking resistor and the expense of the extra wiring are eliminated. Furthermore, heat losses in the control cabinet are reduced.

The innovative circuit design used in Efficient Infeed Technology reduces the line harmonics. There is no need to use an optional line reactor at the supply infeed. This saves space and costs for engineering and procurement.

The PM250 Power Module is also suitable for use in safety-oriented applications. In conjunction with a Fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive (see Control Units).

The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected (see load-side power components).

Frame sizes FSD to FSF of the PM250 Power Modules are available both with as well as without integrated class A line filter.

For frame size FSC of PM250 Power Module with an integrated class A line filter, an additional class B base filter is available for achieving class B (see line-side power components).

The PM250 Power Modules with integrated class A line filter are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded (TN, TT) and non-grounded (IT) supply systems.

Overview of how customers benefit from Efficient Infeed Technology

For more detailed information, please refer to the part Highlights, in section Efficient Infeed Technology.

	Standard Technology	Efficient Infeed Technology
Line reactor	Required	Not required
Braking resistor	Required	Not required
Configuration overhead	Standard	Low
Generated harmonics	Standard	Minimal
Heat generated when braking	Yes	No
Power infeed	Standard	Approx. 22% less
Power consumption	Standard	Approx. 22% less
Energy efficiency	Standard	Good
Reactive power compensation	No	Yes
Installation outlay	Standard	Low

G_D011_EN_00182

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **rated output current for applications with light overload (LO)**
- **base load current for applications with high overload (HO)**

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix for further information). The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

Rated power [1]		Rated output current[2] I_{rated}	Power based on the base load current [3]		Base load current [3] I_H	Frame size		SINAMICS G120 PM250 Power Module without integrated line filter	SINAMICS G120 PM250 Power Module with integrated class A line filter
kW	hp	A	**kW**	hp	A			Order No.	Order No.
380 … 480 V 3 AC									
7.5	10	18	**5.5**	7.5	13.2	FSC		**–**	**6SL3225-0BE25-5AA0**
11.0	15	25	**7.5**	10	19	FSC		**–**	**6SL3225-0BE27-5AA0**
15.0	20	32	**11.0**	15	26	FSC		**–**	**6SL3225-0BE31-1AA0**
18.5	25	38	**15.0**	20	32	FSD	new	**6SL3225-0BE31-5UA0**	**6SL3225-0BE31-5AA0**
22	30	45	**18.5**	25	38	FSD	new	**6SL3225-0BE31-8UA0**	**6SL3225-0BE31-8AA0**
30	40	60	**22**	30	45	FSD	new	**6SL3225-0BE32-2UA0**	**6SL3225-0BE32-2AA0**
37	50	75	**30**	40	60	FSE	new	**6SL3225-0BE33-0UA0**	**6SL3225-0BE33-0AA0**
45	60	90	**37**	50	75	FSE	new	**6SL3225-0BE33-7UA0**	**6SL3225-0BE33-7AA0**
55	75	110	**45**	60	90	FSF	new	**6SL3225-0BE34-5UA0**	**6SL3225-0BE34-5AA0**
75	100	145	**55**	75	110	FSF	new	**6SL3225-0BE35-5UA0**	**6SL3225-0BE35-5AA0**
90	125	178	**75**	100	145	FSF	new	**6SL3225-0BE37-5UA0**	**6SL3225-0BE37-5AA0**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for light overload (LO).

[2] The rated output current I_{rated} is based on the duty cycle for light overload (LO). These current values are valid for 400 V and are stamped on the rating plate of the Power Module.

[3] The base load current I_H is based on the duty cycle for high overload (HO).

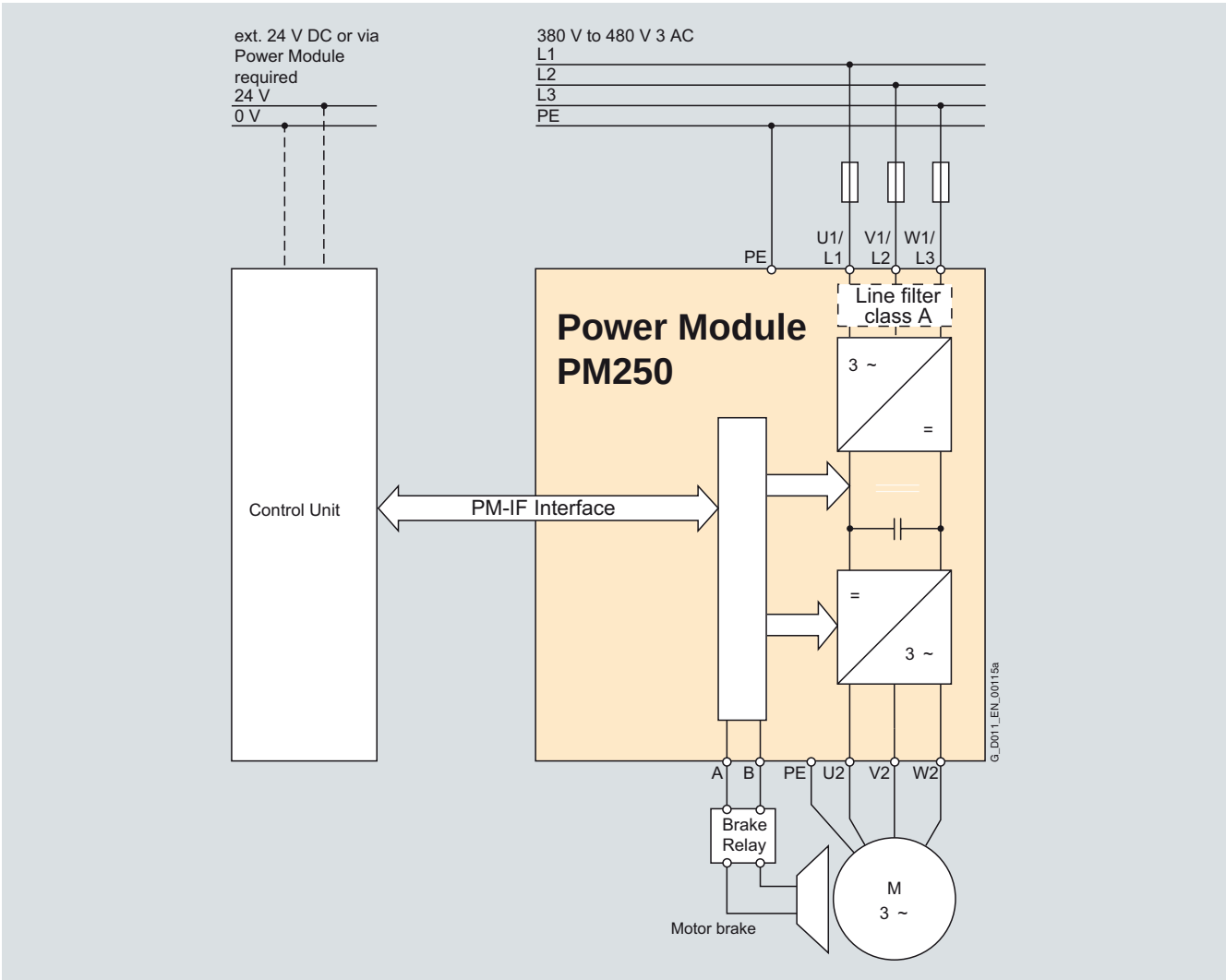
4

Integration

PM250 Power Modules communicate with the Control Unit via the PM-IF interface.

PM250 Power Modules feature the following interfaces as standard:

- PM-IF interface to connect the PM250 Power Module to the Control Unit. The PM250 Power Module also supplies power to the Control Unit using an integrated power supply
- Motor connected using screw terminals or screw studs
- Control for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 PE/protective conductor connections



PM250 Power Module connection diagram with or without integrated class A line filter

Integration

Power and DC link components which are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

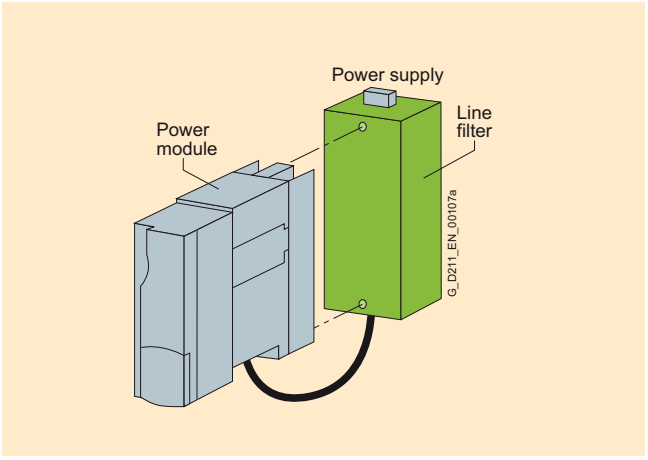
	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line filter, class A	–	–	I	F	F	F	–
Line filter, class B	–	–	U	–	–	–	–
Line reactor [1]	–	–	– [1]	– [1]	– [1]	– [1]	–
DC link components							
Braking resistor [2]	–	–	– [2]	– [2]	– [2]	– [2]	–
Load-side power components							
Output reactor	–	–	U	S	S	S	–
Sine-wave filter	–	–	U	S	S	S	–

U = Base component
S = Lateral mounting
I = Integrated
– = Not possible
F = Power Modules available with and without integrated class A filter

Available as base components

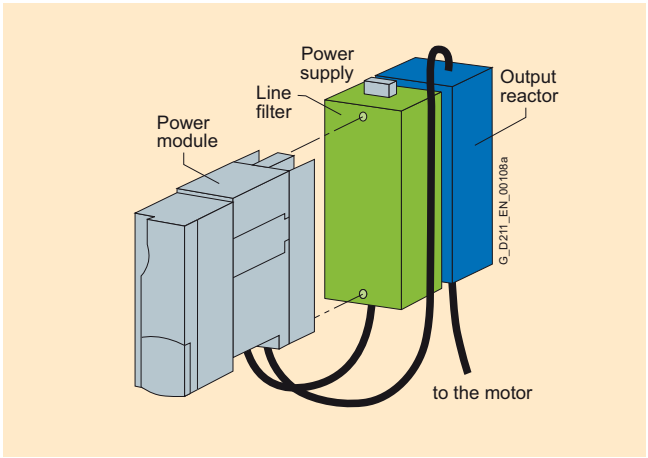
Many system components for PM250 Power Modules are designed as base components, that is, the component is mounted on the baseplate and the PM250 Power Module above it in a space-saving design. Up to two base components can be mounted above one another.

The following diagram shows the basic layout of a PM250 Power Module with additional class B line filter as base component:



Basic layout of a PM250 Power Module with class B line filter as base component

The following example shows the structure for two base components:



Basic layout of a PM250 Power Module with class B line filter as base component and output reactor

[1] A line reactor is not required and must not be used in conjunction with a PM250 or PM260 Power Module.

[2] Line-commutated energy recovery is possible in conjunction with a PM250 or PM260 Power Module. A braking resistor cannot be connected and is not necessary.

Integration

Maximum permissible cable lengths from the motor to the inverter when using output reactors or sine-wave filters depending on the voltage range

The following load-side power components in the appropriate frame sizes are optionally available for the Power Modules and result in the following maximum cable lengths:

	Maximum permissible motor cable lengths (shielded/unshielded) in m						
	Frame sizes						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Without output reactor/sine-wave filter	–	–	50/100	50/100	50/100	50/100	–
With optional output reactor							
• at 380 V (–10 %) to 400 V 3 AC	–	–	150/225	200/300	200/300	200/300	–
• at 401 V to 480 V (+10 %) 3 AC	–	–	100/150	200/300	200/300	200/300	–
With optional sine-wave filter							
• at 380 V (–10 %) to 400 V 3 AC	–	–	200/300	200/300	200/300	200/300	–
• at 401 V to 480 V (+10 %) 3 AC	–	–	200/300	200/300	200/300	200/300	–

Derating data

The following inverter output currents can still be implemented for long motor cables without output reactor and sine-wave filter.

Derating for PM250 Power Modules, frame sizes FSC to FSF for shielded motor cables. From frame size FSD and higher, only the particular main Power Module types were tested. The values also apply to the other Power Modules of the particular frame size.

Rated power (at I_H)		Frame size	Base load current I_H	Rated output current I_{rated}	Motor connection cross-section	**Current derating** of the output current as a % of the base load current for the cable lengths (MOTION-CONNECT)			
kW	hp		A	A	mm^2	50 m	100 m	150 m	200 m
5.5	7.5	FSC	13.2	18	10	100 %	70 %	45 %	–
7.5	10	FSC	19	25	10	100 %	90 %	80 %	–
11.0	15	FSC	26	32	10	100 %	90 %	80 %	–
22.0	30	FSD	45	60	35	100 %	95 %	90 %	85 %
37.0	50	FSE	75	90	35	100 %	100 %	95 %	90 %
75.0	100	FSF	145	178	95	100 %	100 %	100 %	95 %

– Not possible

Technical specifications

General technical specifications

	PM250 Power Modules
System operating voltage	380 … 480 V 3 AC ±10 %
Line supply requirements **Line short circuit voltage u_K**	≤ 1 %
Input frequency	47 … 63 Hz
Output frequency	
• Control type *V/f*	0 … 650 Hz
• Control type Vector	0 … 200 Hz
Pulse frequency	4 kHz (standard), higher pulse frequencies up to 16 kHz, see the derating data
Power factor	0.9
Inverter efficiency	95 … 97 %
Modulation depth	87 %
Overload capability	
• High overload (HO)	1.5 × rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 × rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	1.1 × rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.5 × rated output current (i.e. 150 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Optional class A or B line filter acc. to EN 55011 is available
Possible braking methods	Energy recovery in the generator mode
Degree of protection	IP20
Operating temperature	
• High overload (HO)	0 … 50 °C (32 … 122 °F) without derating, > 50 … 60 °C see derating characteristics
• Light overload (LO)	0 … 40 °C (32 … 104 °F) without derating, > 40 … 60 °C see derating characteristics
Storage temperature	–40 … +70 °C (–40 … +158 °F)
Relative humidity	< 95 % RH, condensation not permissible
Cooling	Internal air cooling, power units with increased air cooling using integrated fans
Installation altitude	up to 1000 m above sea level without power reduction, > 1000 m see derating characteristics
Standard SCCR **(Short Circuit Current Rating)** [1]	FSC: 10 kA FSD, FSE, FSF: 42 kA
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Standards conformance	UL, cUL, CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at: http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM250 Power Modules		
With integrated line filter		6SL3225-0BE25-5AA0	6SL3225-0BE27-5AA0	6SL3225-0BE31-1AA0
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	18	25	32
• Base load current I_L [1]	A	18	25	32
• Base load current I_H [2]	A	13.2	19	26
• I_{max}	A	26.4	38	52
Rated power				
• based on I_L	kW (hp)	7.5 (10)	11 (15)	15 (20)
• based on I_H	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)
Rated pulse frequency	kHz	4	4	4
Efficiency η		0.95	0.95	0.95
Power loss (at rated current)	kW	0.26	0.28	0.31
Cooling air requirement	m^3/s	0.038	0.038	0.038
Sound pressure level L_{pA} (1 m)	dB	Available soon	Available soon	Available soon
24 V DC power supply for Control Unit	A	1	1	1
Input current [3]				
• Rated current	A	18	25	32
• Current based on I_H	A	13.2	19	26
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	2.5 … 10	2.5 … 10	2.5 … 10
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	2.5 … 10	2.5 … 10	2.5 … 10
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor cable length, max. [4]				
• Shielded	m	50	50	50
• Unshielded	m	100	100	100
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	189	189	189
• Height	mm	334	334	334
• Depth				
- without Control Unit	mm	185	185	185
- with Control Unit	mm	250	250	250
Frame size		FSC	FSC	FSC
Weight, approx.	kg	7.5	7.5	7.5

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and is valid for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at the rated power (based on I_{rated}) – these current values are specified on the rating plate.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM250 Power Modules		
Without integrated line filter		6SL3225-0BE31-5UA0	6SL3225-0BE31-8UA0	6SL3225-0BE32-2UA0
With integrated line filter		6SL3225-0BE31-5AA0	6SL3225-0BE31-8AA0	6SL3225-0BE32-2AA0
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	38	45	60
• Base load current I_L [1]	A	38	45	60
• Base load current I_H [2]	A	32	38	45
• I_{max}	A	64	76	90
Rated power				
• based on I_L	kW (hp)	18.5 (25)	22 (30)	30 (40)
• based on I_H	kW (hp)	15 (20)	18.5 (25)	22 (30)
Rated pulse frequency	kHz	4	4	4
Efficiency η		> 0.97	> 0.97	> 0.97
Power loss (at rated current)	kW	0.42	0.52	0.68
Cooling air requirement	m^3/s	0.022	0.022	0.039
Sound pressure level L_{pA} (1 m)	dB	< 60	< 60	< 61
24 V DC power supply for Control Unit	A	1	1	1
Input current [3]				
• Rated current	A	36	42	56
• based on I_H	A	30	36	42
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 … 35	10 … 35	10 … 35
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 … 35	10 … 35	10 … 35
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length, max. [4]				
• Shielded	m	50	50	50
• Unshielded	m	100	100	100
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	275	275	275
• Height				
- without integrated line filter	mm	419	419	419
- With integrated line filter	mm	512	512	512
• Depth				
- without Control Unit	mm	204	204	204
- with Control Unit	mm	260	260	260
Frame size		FSD	FSD	FSD
Weight, approx.				
• Without integrated line filter	kg	13	13	13
• With integrated line filter	kg	15	15	16

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and is valid for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at the rated power (based on I_{rated}) – these current values are specified on the rating plate.

[4] Max motor cable length 25 m (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		PM250 Power Modules				
Without integrated line filter		6SL3225-0BE33-0UA0	6SL3225-0BE33-7UA0	6SL3225-0BE34-5UA0	6SL3225-0BE35-5UA0	6SL3225-0BE37-5UA0
With integrated line filter		6SL3225-0BE33-0AA0	6SL3225-0BE33-7AA0	6SL3225-0BE34-5AA0	6SL3225-0BE35-5AA0	6SL3225-0BE37-5AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	75	90	110	145	178
• Base load current I_L [1]	A	75	90	110	145	178
• Base load current I_H [2]	A	60	75	90	110	145
• I_{max}	A	120	150	180	220	290
Rated power						
• based on I_L	kW (hp)	37 (50)	45 (60)	55 (75)	75 (100)	90 (125)
• based on I_H	kW (hp)	30 (40)	37 (50)	45 (60)	55 (75)	75 (100)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η		> 0.97	> 0.97	> 0.97	> 0.97	> 0.97
Power loss (at rated current)	kW	0.99	1.21	1.42	1.93	2.31
Cooling air requirement	m^3/s	0.022	0.039	0.094	0.094	0.117
Sound pressure level L_{pA} (1 m)	dB	< 60	< 62	< 60	< 60	< 65
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current [3]						
• Rated current	A	70	84	102	135	166
• based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Max. conductor cross-sect.	mm^2	10 … 50	10 … 50	25 … 120	25 … 120	25 … 120
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Max. conductor cross-sect.	mm^2	10 … 50	10 … 50	25 … 120	25 … 120	25 … 120
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw
Motor cable length, max. [4]						
• Shielded	m	50	50	50	50	50
• Unshielded	m	100	100	100	100	100
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	275	275	350	350	350
• Height						
- without integrated line filter	mm	499	499	634	634	634
- With integrated line filter	mm	635	635	934	934	934
• Depth						
- without Control Unit	mm	204	204	316	316	316
- with Control Unit	mm	260	260	372	372	372
Frame size		FSE	FSE	FSF	FSF	FSF
Weight, approx.						
• Without integrated line filter	kg	14	14	35	35	35
• With integrated line filter	kg	21	21	51	51	51

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and is valid for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at the rated power (based on I_{rated}) – these current values are specified on the rating plate.

[4] Max motor cable length 25 m (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

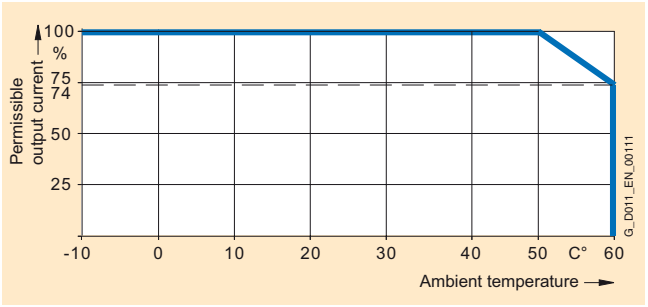
Characteristic curves

Derating data

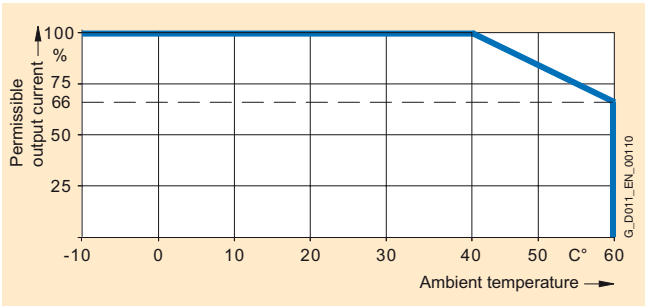
Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A at a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
7.5	10	18	12.5	11.9	10.6	9.2	7.9	6.6
11.0	15	25	18.1	17.1	15.2	13.3	11.4	9.5
15.0	20	32	24.7	23.4	20.8	18.2	15.6	13
18.5	25	38	32	27	23	19	17	15
22.0	30	45	38	32	27	23	20	18
30.0	40	60	51	42	36	30	27	24
37.0	50	75	64	53	45	38	34	30
45.0	60	90	77	63	54	45	41	36
55.0	75	110	94	77	–	–	–	–
75.0	100	145	123	102	–	–	–	–
90.0	125	178	151	125	–	–	–	–

Ambient temperature

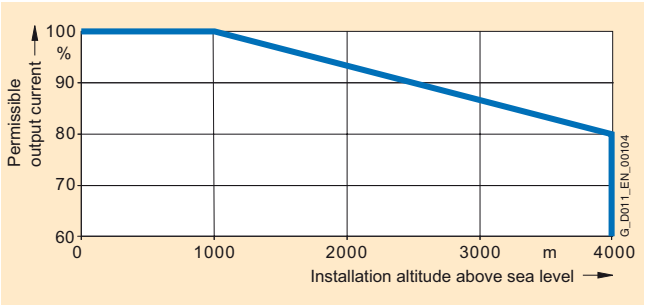


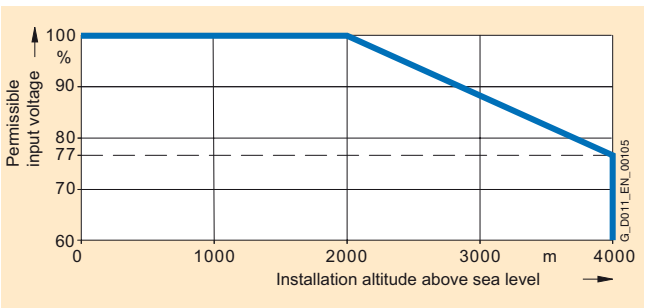
High overload (HO)



Light overload (LO)

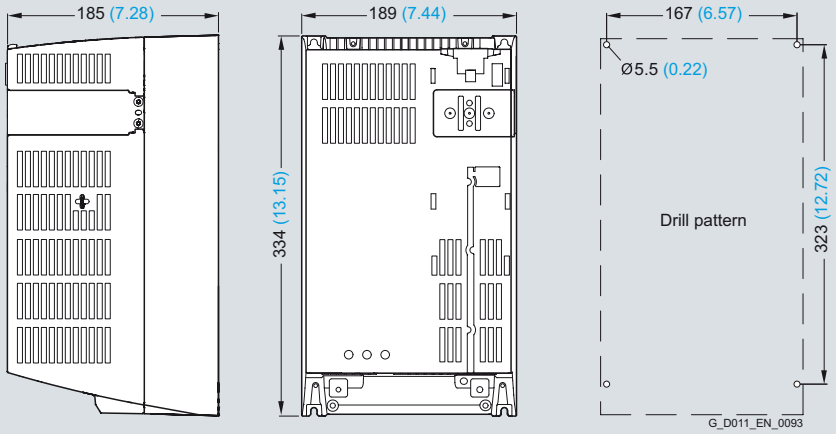
Installation altitude





Note: 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.

Dimensional drawings



PM250 Power Module frame size FSC with integrated class A line filter

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

Ventilation clearance required at top and bottom: 125 mm (4.92 inches).

Ventilation clearance required at sides:

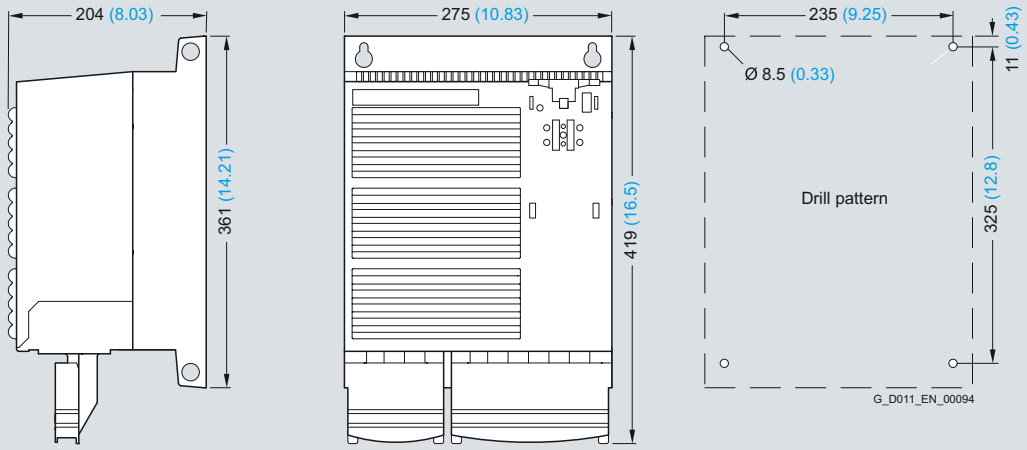
- Ambient temperature ≤ 40 °C: 0 mm (0 inches).
- Ambient temperature > 40 °C: 50 mm (1.97 inches).

When the Control Unit is plugged on, the mounting depth increases by 65 mm (2.56 inches).

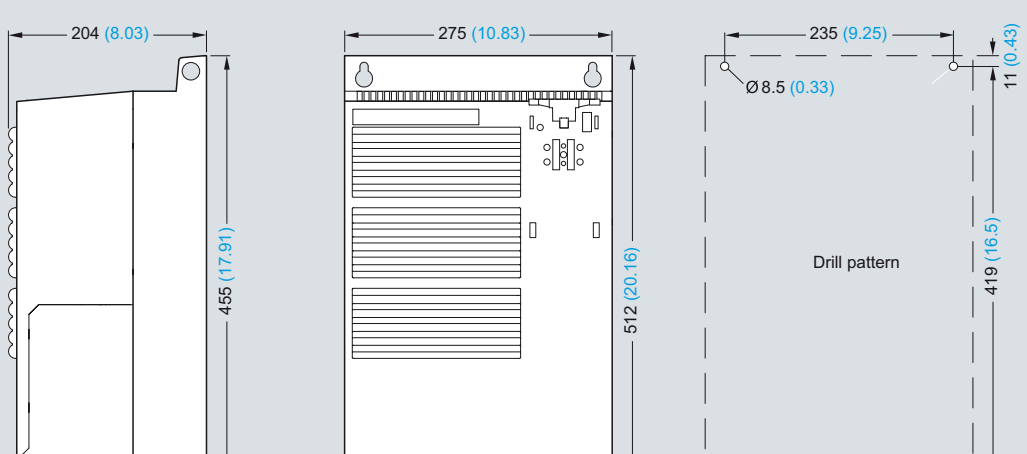
Exception: for CU240E, mounting depth +31 mm (+1.22 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM250 Power Module frame size FSD without line filter



PM250 Power Module frame size FSD with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

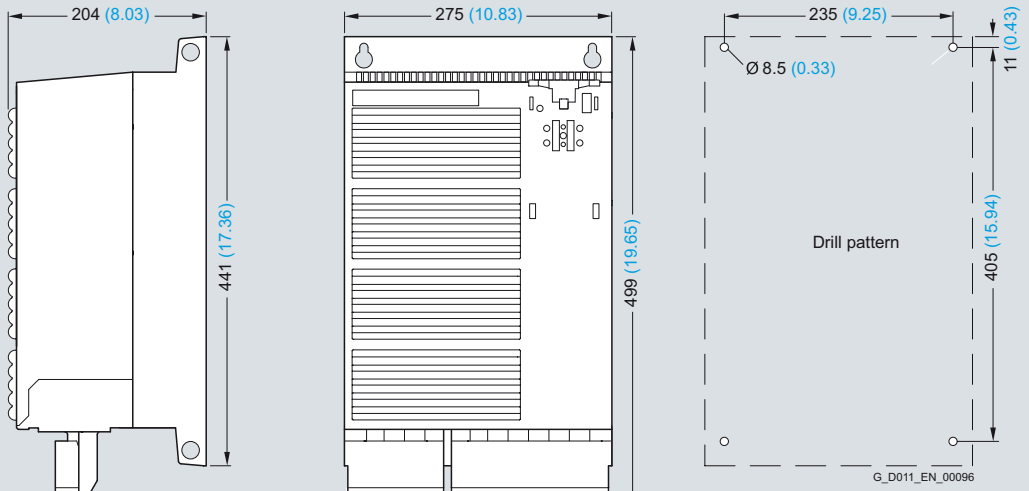
Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

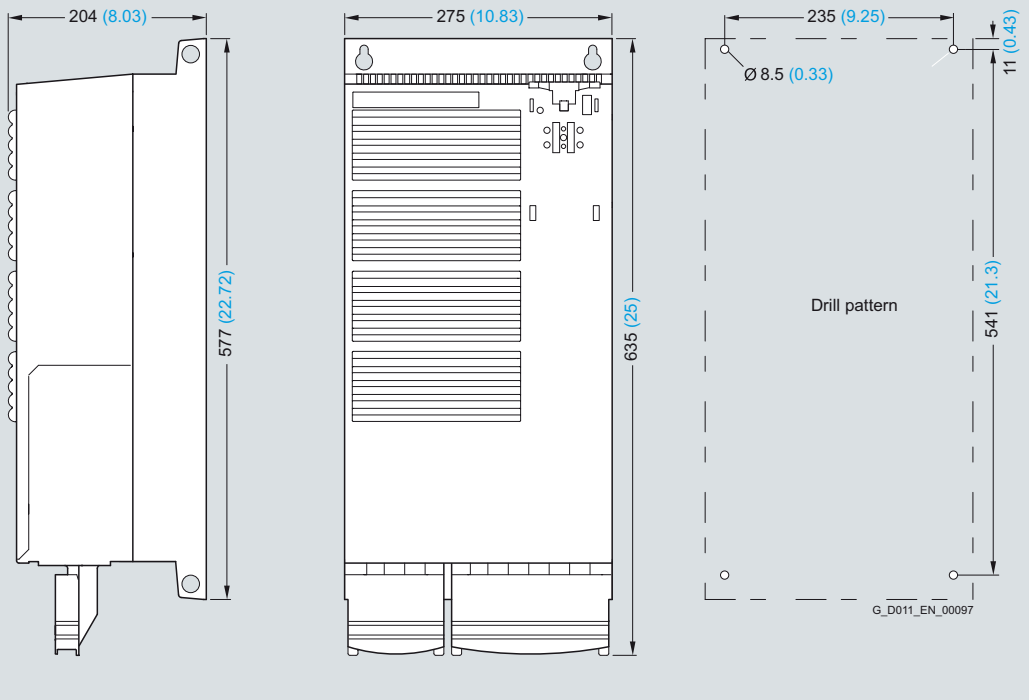
Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM250 Power Module frame size FSE without line filter



PM250 Power Module frame size FSE with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

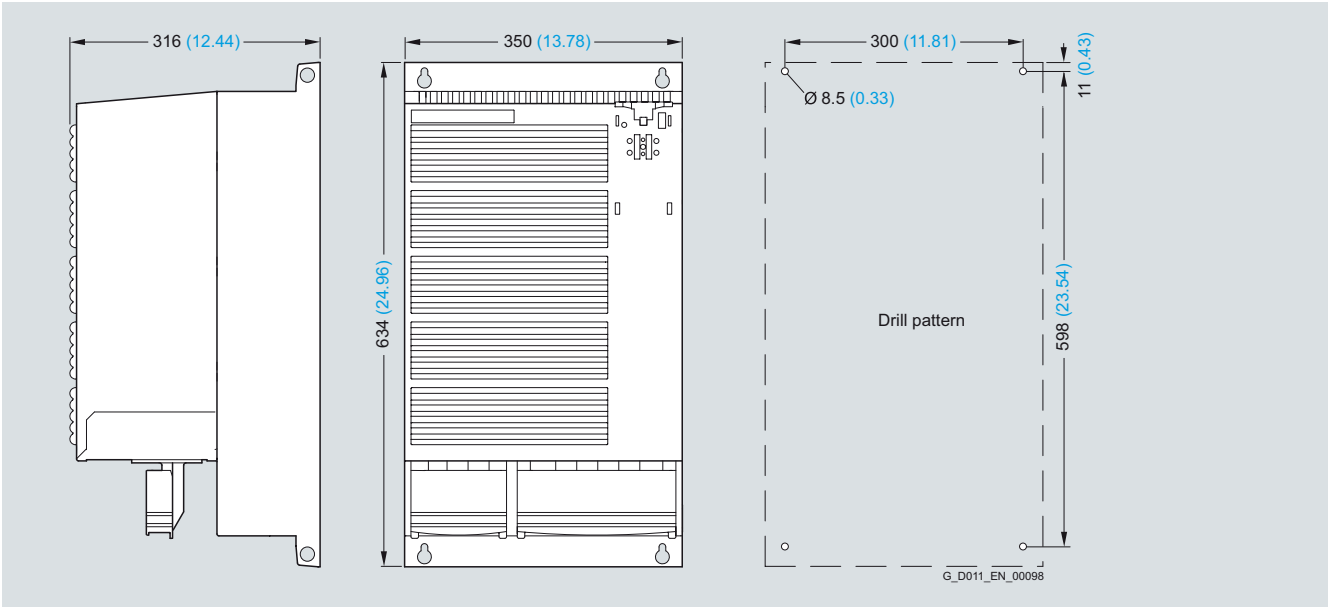
Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

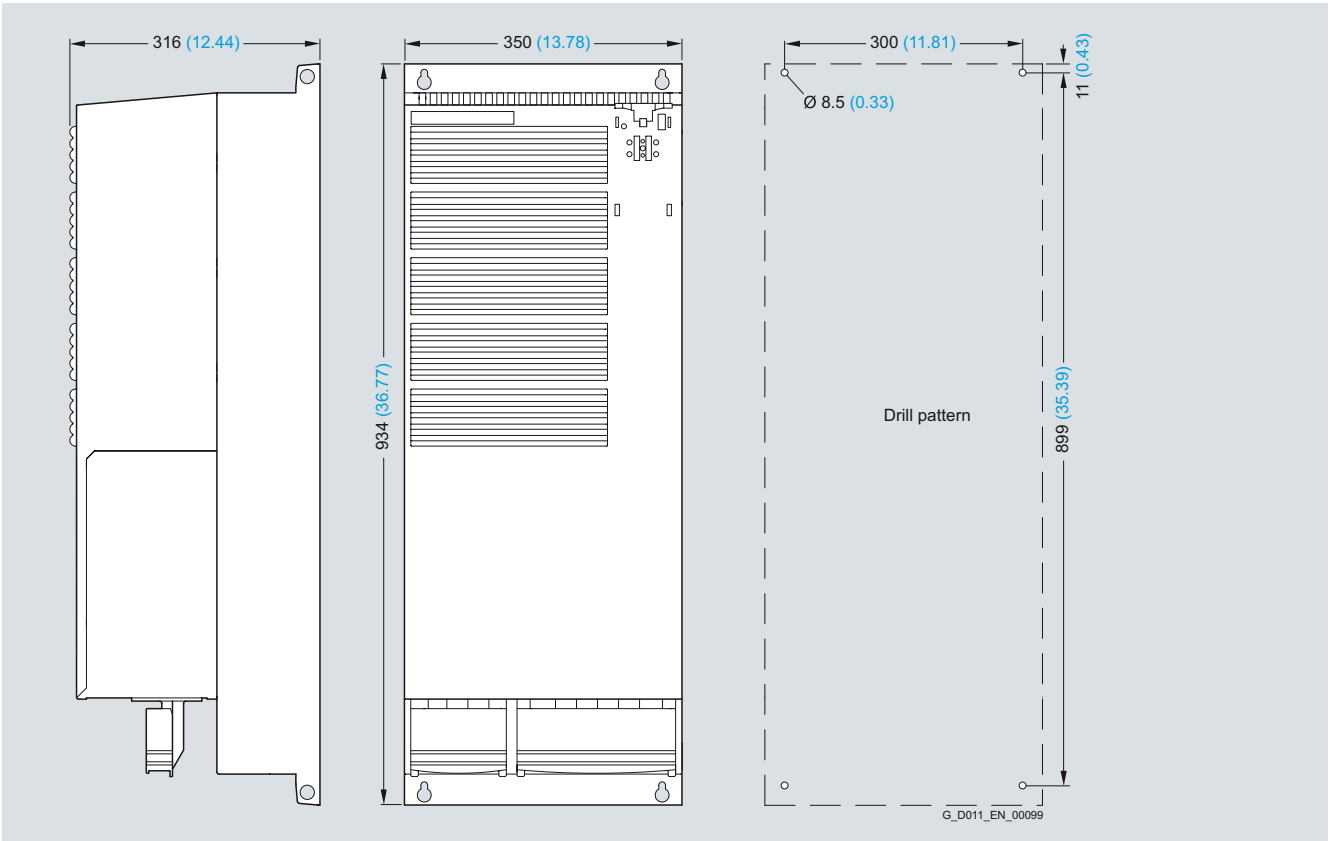
Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Dimensional drawings



PM250 Power Module frame size FSF without line filter



PM250 Power Module frame size FSF with integrated class A line filter

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 350 mm (13.78 inches).

Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Overview

Example: PM260 FSD Power Module

The PM260 Power Module features an absolutely unique technology – Efficient Infeed Technology. This feature provides the ability to feed energy back into the supply system in the generator mode (electronic braking) so that the energy is not wasted in a braking resistor. This saves space in the control cabinet. The time-consuming process of dimensioning the braking resistor and the expense of the extra wiring are eliminated. Furthermore, heat losses in the control cabinet are reduced.

The innovative circuit design used in Efficient Infeed Technology reduces the line harmonics. There is no need to use an optional line reactor at the supply infeed. This saves space and costs for engineering and procurement.

The PM260 Power Modules are also characterized by a higher rated pulse frequency combined with a high efficiency and an integrated sine-wave filter. The integrated sine-wave filter ensures that the inverter output current is sinusoidal and supports cable lengths of up to 200 m shielded and 300 m unshielded. An output reactor is therefore not required. Furthermore, lower bearing currents and voltage stress are generated that reduces the overall stress on the motor.

The use of SiC free-wheeling diodes – an absolutely unique innovation – makes the PM260 Power Module extremely compact. It is also highly resistant to thermal loading and operates very quietly as a result of the high clock frequencies.

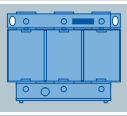
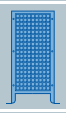
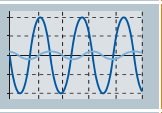
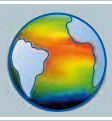
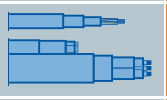
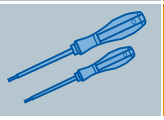
Standard motors can be used in conjunction with the PM260 Power Module. The winding system insulation strength does not have to be increased.

The PM260 Power Module is suitable for safety-oriented applications. In conjunction with a Fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive (see Control Units).

The PM260 Power Modules with integrated class A line filter are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded (TN, TT) and non-grounded (IT) supply systems.

Overview of how customers benefit from Efficient Infeed Technology

For more detailed information, please refer to the part Highlights, in section Efficient Infeed Technology.

	Standard Technology	Efficient Infeed Technology
Line reactor 	Required	Not required
Braking resistor 	Required	Not required
Configuration overhead 	Standard	Low
Generated harmonics 	Standard	Minimal
Heat generated when braking 	Yes	No
Power infeed 	Standard	Approx. 22% less
Power consumption 	Standard	Approx. 22% less
Energy efficiency 	Standard	Good
Reactive power compensation 	No	Yes
Installation outlay 	Standard	Low

G_D011_EN_00182

Overview of how customers benefit from SiC free-wheeling diodes

- Low switching losses at high fundamental frequency
- High speeds possible
- Quiet operation thanks to pulse frequency = 16 kHz
- High thermal load capacity (small heatsinks)
- Very compact units
- Increased ruggedness
- High efficiency
- Low forward losses
- Power unit with regenerative feedback capability
- Integrated sine-wave filter, long unshielded cables can be used
- Can be used with motors without a special insulation
- Very low bearing currents, no bearing insulation required

Selection and ordering data

To ensure that a suitable Power Module is selected, the following currents should be used for applications:

- **rated output current for applications with light overload (LO)**
- **base load current for applications with high overload (HO)**

With reference to the rated output current, the modules support at least 2-pole to 6-pole low-voltage motors, e.g. the new 1LE1 motor series (please refer to the Appendix for further information). The rated power is merely a guide value. For a description of the overload performance, please refer to the general technical specifications of the Power Modules.

Rated power [1]		Rated output current [2] I_{rated}	Power based on the base load current [3]		Base load current [3] I_H	Frame size		SINAMICS G120 PM260 Power Module without integrated line filter		SINAMICS G120 PM260 Power Module with integrated class A line filter
kW	hp	A	**kW**	hp	A			Order No.		Order No.
500 … 690 V 3 AC										
11.0	15	14	**7.5**	10	10	FSD	new	**6SL3225-0BH27-5UA1**	new	**6SL3225-0BH27-5AA1**
15.0	20	19	**11**	15	14	FSD	new	**6SL3225-0BH31-1UA1**	new	**6SL3225-0BH31-1AA1**
18.5	25	23	**15**	20	19	FSD	new	**6SL3225-0BH31-5UA1**	new	**6SL3225-0BH31-5AA1**
30	40	35	**22**	30	26	FSF	new	**6SL3225-0BH32-2UA1**	new	**6SL3225-0BH32-2AA1**
37	50	42	**30**	40	35	FSF	new	**6SL3225-0BH33-0UA1**	new	**6SL3225-0BH33-0AA1**
55	75	62	**37**	50	42	FSF	new	**6SL3225-0BH33-7UA1**	new	**6SL3225-0BH33-7AA1**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for light overload (LO).

[2] The rated output current I_{rated} is based on the duty cycle for light overload (LO). These current values are valid for 690 V and are stamped on the rating plate of the Power Module.

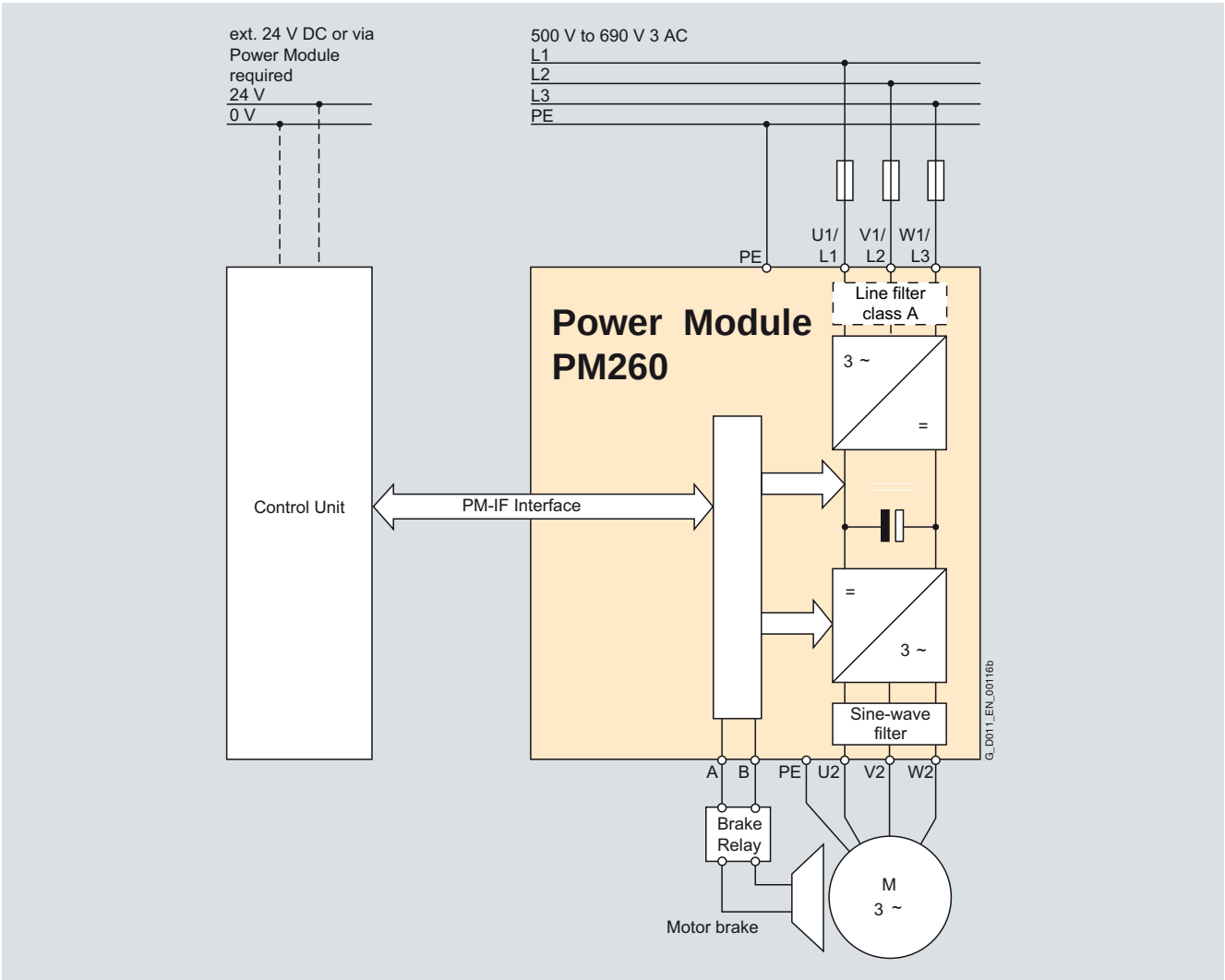
[3] The base load current I_H is based on the duty cycle for high overload (HO).

Integration

PM260 Power Modules communicate with the Control Unit via the PM-IF interface.

PM260 Power Modules feature the following interfaces as standard:

- PM-IF interface to connect the PM260 Power Module to the Control Unit. The PM260 Power Module also supplies power to the Control Unit using the integrated power supply
- Motor connected using screw terminals or screw studs
- Control for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 PE/protective conductor connections



PM260 Power Module connection diagram with or without integrated class A line filter

Integration

Power and DC link components which are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frame sizes for the Power Modules:

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line filter, class A	–	–	–	F	–	F	–
Line filter, class B	–	–	–	–	–	–	–
Line reactor [1]	–	–	–	– [1]	–	– [1]	–
DC link components							
Braking resistor [2]	–	–	–	– [2]	–	– [2]	–
Load-side power components							
Output reactor	–	–	–	–	–	–	–
Sine-wave filter	–	–	–	I	–	I	–

I = Integrated
– = Not possible
F = Power Modules available with and without integrated class A filter

Maximum permissible cable lengths from the motor to the inverter when using output reactors or sine-wave filters depending on the voltage range

The following load-side power components in the appropriate frame sizes are optionally available for the Power Modules and result in the following maximum cable lengths:

	Maximum permissible motor cable lengths (shielded/unshielded) in m						
	Frame sizes						
	FSA	FSB	FSC	FSD	FSE	FSF	FSGX
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
With integrated sine-wave filter							
• at 500 V to 690 V 3 AC (±10 %)	–	–	–	200/300	–	200/300	–

[1] A line reactor is not required and must not be used in conjunction with a PM250 or PM260 Power Module.

[2] Line-commutated energy recovery is possible in conjunction with a PM250 or PM260 Power Module. A braking resistor cannot be connected and is not necessary.

Technical specifications

General technical specifications

	PM260 Power Modules
System operating voltage	500 … 690 V 3 AC ±10 % For operation from 500 V –10 % linearly reduced – see derating characteristics
Line supply requirements **Line short circuit voltage u_K**	≤ 1 %
Input frequency	47 … 63 Hz
Output frequency	
• Control type *V/f*	0 … 200 Hz
• Control type Vector	0 … 200 Hz
Pulse frequency	16 kHz (standard)
Power factor	0.95
Inverter efficiency	95 … 97 %
Modulation depth	87 %
Overload capability	
• High overload (HO)	1.5 × rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 × rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	1.1 × rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.4 × rated output current (i.e. 140 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Optional class A line filter according to EN 55011 is available
Possible braking methods	Energy recovery in the generator mode
Degree of protection	IP20
Operating temperature	
• High overload (HO)	0 … 50 °C (32 … 122 °F) without derating, > 50 … 60 °C see derating characteristics
• Light overload (LO)	0 … 40 °C (32 … 104 °F) without derating, > 40 … 60 °C see derating characteristics
Storage temperature	–40 … +70 °C (–40 … +158 °F)
Relative humidity	< 95 % RH, condensation not permissible
Cooling	Internal air cooling, power units with increased air cooling using integrated fans
Installation altitude	up to 1000 m above sea level without power reduction, > 1000 m see derating characteristics
Standard SCCR (Short Circuit Current Rating) [1]	42 kA
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Standards conformance	CE
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at: http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

Line supply voltage 500 … 690 V 3 AC		PM260 Power Modules		
Without integrated line filter		6SL3225-0BH27-5UA1	6SL3225-0BH31-1UA1	6SL3225-0BH31-5UA1
With integrated line filter		6SL3225-0BH27-5AA1	6SL3225-0BH31-1AA1	6SL3225-0BH31-5AA1
Output current at 50 Hz 690 V 3 AC				
• Rated current I_{rated} [1]	A	14	19	23
• Base load current I_L [1]	A	14	19	23
• Base load current I_H [2]	A	10	14	19
• I_{max}	A	20	28	38
Rated power				
• based on I_L	kW (hp)	11 (15)	15 (20)	18.5 (25)
• based on I_H	kW (hp)	7.5 (10)	11 (15)	15 (20)
Rated pulse frequency	kHz	16	16	16
Efficiency η		0.95	0.95	0.95
Power loss (at rated current)	kW	0.58	0.72	0.82
Cooling air requirement	m^3/s	0.044	0.044	0.044
Sound pressure level L_{pA} (1 m)	dB	< 64	< 64	< 64
24 V DC power supply for Control Unit	A	1	1	1
Input current [3]				
• Rated current	A	13	18	22
• based on I_H	A	10	13	18
Line supply connection U1/L1, V1/L2, W1/L3		Terminal strip	Terminal strip	Terminal strip
• Conductor cross-section	mm^2	2.5 … 16	2.5 … 16	2.5 … 16
Motor connection U2, V2, W2		Terminal block	Terminal block	Terminal block
• Conductor cross-section	mm^2	2.5 … 16	2.5 … 16	2.5 … 16
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length, max. [4]				
• Shielded	m	200	200	200
• Unshielded	m	300	300	300
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	275	275	275
• Height	mm	512	512	512
• Depth				
- without Control Unit	mm	204	204	204
- with Control Unit	mm	260	260	260
Frame size		FSD	FSD	FSD
Weight, approx.				
• without integrated filter	kg	22	22	22
• with integrated filter	kg	23	23	23

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

[3] The input current depends on the motor load and is valid for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at the rated power (based on I_{rated}) – these current values are specified on the rating plate.

[4] Shielded motor cables must be used in order to maintain the limit values for field-conducted disturbances according to EN 61800-3 Class C2.

Technical specifications

Line supply voltage 500 … 690 V 3 AC		PM260 Power Modules		
Without integrated line filter		6SL3225-0BH32-2UA1	6SL3225-0BH33-0UA1	6SL3225-0BH33-7UA1
With integrated line filter		6SL3225-0BH32-2AA1	6SL3225-0BH33-0AA1	6SL3225-0BH33-7AA1
Output current at 50 Hz 690 V 3 AC				
• Rated current I_{rated} [1]	A	35	42	62
• Base load current I_L [1]	A	35	42	62
• Base load current I_H [2]	A	26	35	42
• I_{max}	A	52	70	84
Rated power				
• based on I_L	kW (hp)	30 (40)	37 (50)	55 (75)
• based on I_H	kW (hp)	22 (30)	30 (40)	37 (50)
Rated pulse frequency	kHz	16	16	16
Efficiency η		0.95	0.95	0.95
Power loss (at rated current)	kW	1.13	1.29	1.73
Cooling air requirement	m^3/s	0.131	0.131	0.131
Sound pressure level L_{pA} (1 m)	dB	< 70	< 70	< 70
24 V DC power supply for Control Unit	A	1	1	1
Input current [3]				
• Rated current	A	34	41	60
• based on I_H	A	26	34	41
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 … 50	10 … 50	10 … 50
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 … 50	10 … 50	10 … 50
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length, max. [4]				
• Shielded	m	200	200	200
• Unshielded	m	300	300	300
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	350	350	350
• Height	mm	634	634	634
• Depth				
- without Control Unit	mm	316	316	316
- with Control Unit	mm	372	372	372
Frame size		FSF	FSF	FSF
Weight, approx.				
• without integrated filter	kg	56	56	56
• with integrated filter	kg	58	58	58

[1] The rated output current I_{rated} and the base load current I_L are based on the duty cycle for light overload (LO).

[2] The base load current I_H is based on the duty cycle for high overload (HO).

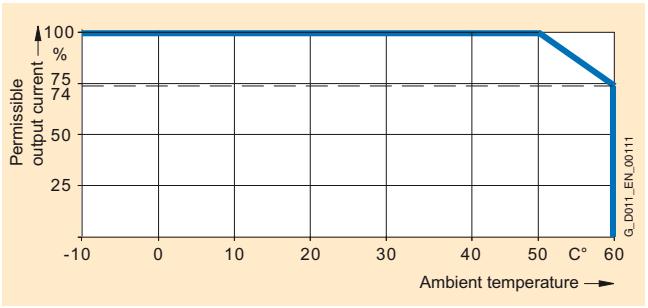
[3] The input current depends on the motor load and is valid for a line impedance corresponding to u_K = 1 %. The rated input currents apply for a load at the rated power (based on I_{rated}) – these current values are specified on the rating plate.

[4] Shielded motor cables must be used in order to maintain the limit values for field-conducted disturbances according to EN 61800-3 Class C2.

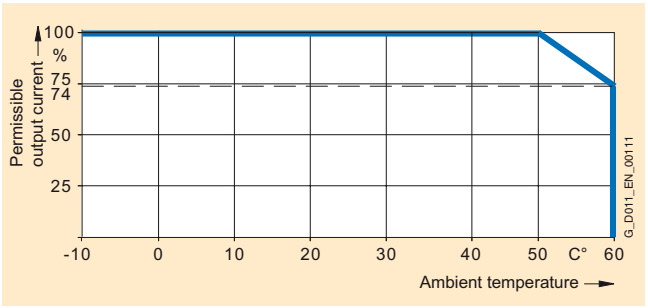
Characteristic curves

Derating data

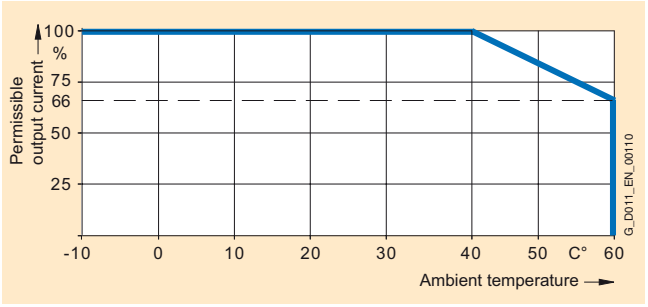
Ambient temperature



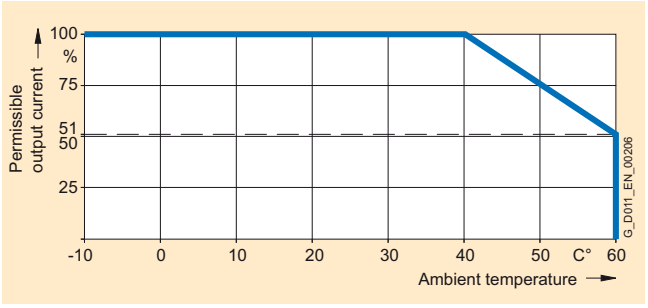
High overload (HO) PM260 frame size FSD



High overload (HO) PM260 frame size FSF



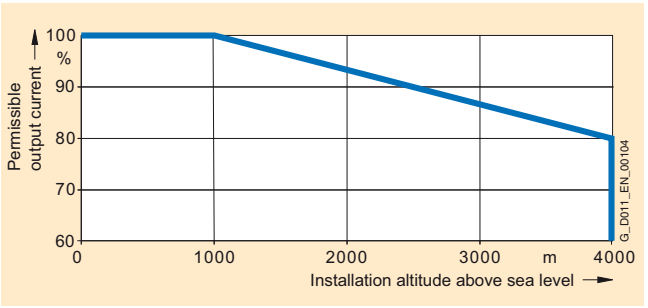
Light overload (LO) PM260 frame size FSD

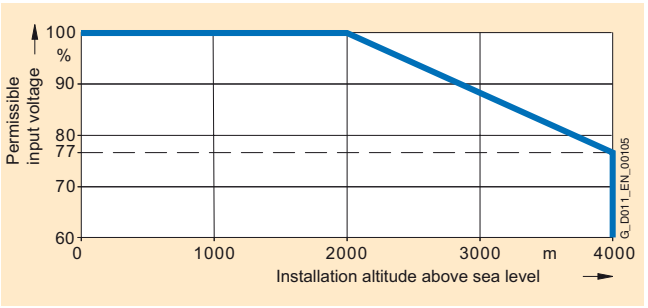


Light overload (LO) PM260 frame size FSF

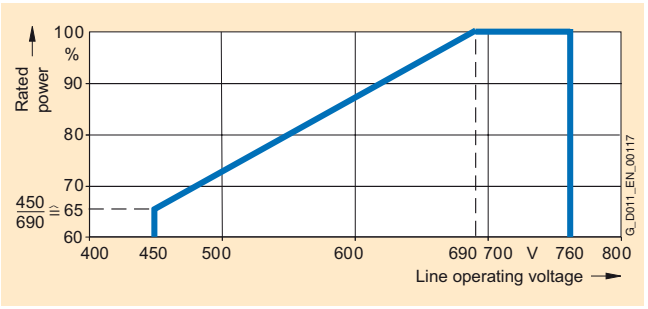
Note: The operating temperature ranges of the Control Units should be taken into account. The temperature ranges are specified in the technical specifications under Control Units.

Installation altitude



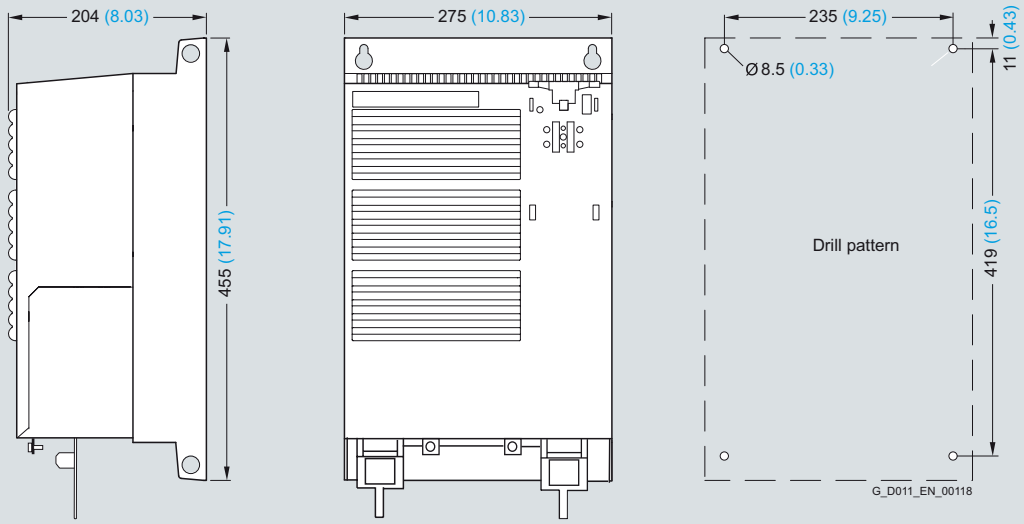


System operating voltage



The power units can be operated with 500 V –10 %. In this case, the power is reduced linearly as required.

Dimensional drawings



PM260 Power Module frame size FSD with and without integrated class A line filter

Mounted with 4 M6 studs, 4 M6 nuts, 4 M6 washers.

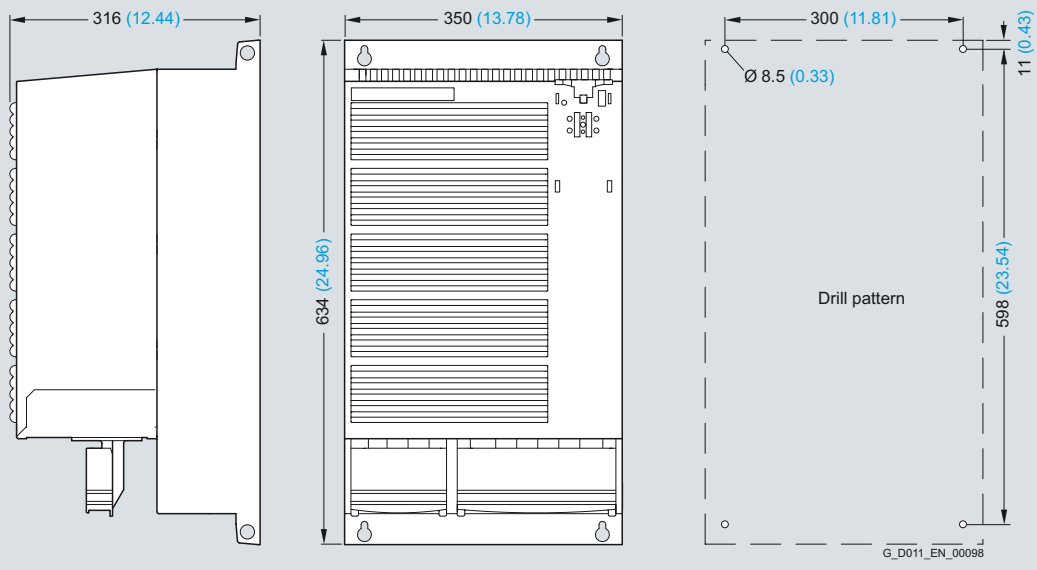
Ventilation clearance required at top and bottom: 300 mm (11.81 inches).

Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).



PM260 Power Module frame size FSF with and without integrated line filter class A

Mounted with 4 M8 studs, 4 M8 nuts, 4 M8 washers.

Ventilation clearance required at top and bottom: 350 mm (13.78 inches).

Ventilation clearance required at sides: 0 mm (0 inches).

When the Control Unit is plugged on, the mounting depth increases by 56 mm (2.2 inches).

Exception: for CU240E, mounting depth +22 mm (+0.87 inches).

All dimensions in mm (values in brackets are in inches).

Overview

Example: Compact inverters, SINAMICS G120 with PM240 Power Module frame size FSB, CU240E Control Unit and BOP

The entry into SINAMICS G120 with an already assembled compact inverter

Three components can be ordered, completely assembled, with one Order No.: The PM240 Power Module with integrated brake choppers, the CU240E Control Unit and the BOP operator panel.

The compact inverter is suitable for applications in which the advantages of a compact inverter prevail (only one Order No., simpler to order). In this case, the advantages of a consistently modular system no longer apply (lower stockkeeping, high degree of flexibility).

The individual components of the compact inverter still remain completely modular. After they have been received, they can be separated at any time.

Selection and ordering data

Rated power [1]		Power based on the base load current I_H [2]		Frame size and dimensions (H × W × D)	SINAMICS G120 compact inverter without integrated line filter	SINAMICS G120 compact inverter with integrated class A line filter
kW	hp	kW	hp	mm	Order No.	Order No.
47 … 63 Hz 380 … 480 V 3 AC ±10 %						
0.37	0.50	0.37	0.50	FSA 173 × 73 × 177	new **6SL3214-3AE13-7UB0**	-
0.55	0.75	0.55	0.75		new **6SL3214-3AE15-5UB0**	-
0.75	1.0	0.75	1.0		new **6SL3214-3AE17-5UB0**	-
1.1	1.5	1.1	1.5		new **6SL3214-3AE21-1UB0**	-
1.5	2.0	1.5	2.0		new **6SL3214-3AE21-5UB0**	-
2.2	3.0	2.2	3.0	FSB 270 × 153 × 204	new **6SL3214-3AE22-2UB0**	new **6SL3214-3AE22-2AB0**
3.0	4.0	3.0	4.0		new **6SL3214-3AE23-0UB0**	new **6SL3214-3AE23-0AB0**
4.0	5.0	4.0	5.0		new **6SL3214-3AE24-0UB0**	new **6SL3214-3AE24-0AB0**
7.5	10	5.5	7.5	FSC 334 × 189 × 224	new **6SL3214-3AE25-5UB0**	new **6SL3214-3AE25-5AB0**
11.0	15	7.5	10		new **6SL3214-3AE27-5UB0**	new **6SL3214-3AE27-5AB0**
15.0	20	11.0	15		new **6SL3214-3AE31-1UB0**	new **6SL3214-3AE31-1AB0**

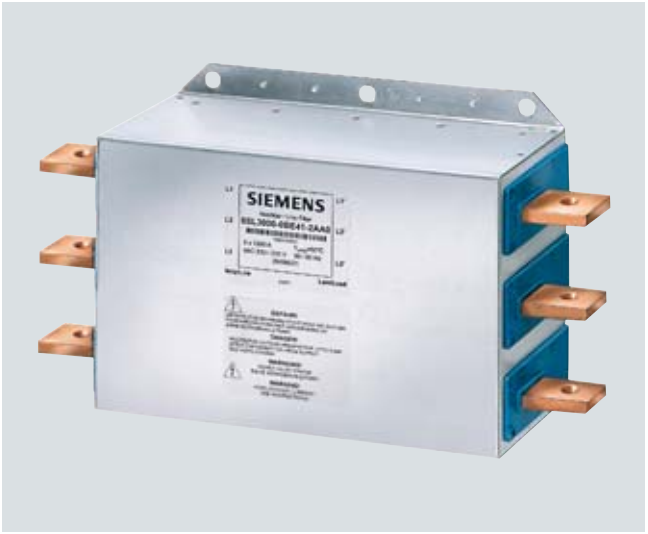
[1] Rated power based on the rated output current I_{rated}.
The rated output current I_{rated} is based on the duty cycle for light overload (LO).
These current values are stamped on the rating plate of the Power Module.

[2] The base load current I_H is based on the duty cycle for high overload (HO).

Overview

With one of the additional line filters, the Power Module reaches a higher radio interference class.

Example: Line filter for Power Modules frame size FSA



Example: Line filter for PM240 Power Modules frame size FSGX

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module			Class A line filter acc. to EN 55011
kW	hp	Type 6SL3224-...	Frame size		Order No.
380 … 480 V 3 AC					
0.37	0.50	0BE13-7UA0	FSA		**6SE6400-2FA00-6AD0**
0.55	0.75	0BE15-5UA0	FSA		
0.75	1.0	0BE17-5UA0	FSA		
1.1	1.5	0BE21-1UA0	FSA		
1.5	2.0	0BE21-5UA0	FSA		
110	150	0BE38-8UA0	FSF		**6SL3203-0BE32-5AA0**
132	200	0BE41-1UA0	FSF		
160	250	0XE41-3UA0	FSGX	new	**6SL3000-0BE34-4AA0**
200	300	0XE41-6UA0	FSGX		
250	400	0XE42-0UA0	FSGX	new	**6SL3000-0BE36-0AA0**

Rated power		SINAMICS G120 PM240 Power Module		Class B line filter acc. to EN 55011
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 … 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA	**6SE6400-2FB00-6AD0**
0.55	0.75	0BE15-5UA0	FSA	
0.75	1.0	0BE17-5UA0	FSA	
1.1	1.5	0BE21-1UA0	FSA	
1.5	2	0BE21-5UA0	FSA	
2.2	3	0BE22-2AA0	FSB	**6SL3203-0BE21-6SA0**
3.0	4	0BE23-0AA0	FSB	
4.0	5	0BE24-0AA0	FSB	
7.5	10	0BE25-5AA0	FSC	**6SL3203-0BD23-8SA0**
11	15	0BE27-5AA0	FSC	
15	20	0BE31-1AA0	FSC	

Rated power		SINAMICS G120 PM250 Power Module		Class B line filter acc. to EN 55011
kW	hp	Type 6SL3225-...	Frame size	Order No.
380 … 480 V 3 AC				
7.5	10	0BE25-5AA0	FSC	**6SL3203-0BD23-8SA0**
11	15	0BE27-5AA0	FSC	
15	20	0BE31-1AA0	FSC	

Integration

Frame size FSA of the PM240 Power Module is available only without integrated class A line filter. A base filter is therefore available so that class A can be achieved. A class B base filter is also available so that class B can be achieved.

Frame sizes FSB and FSC of the PM240 Power Module are available both with and without integrated class A line filter. For compliance with class B, PM240 Power Modules with integrated class A line filter must be fitted additionally with a base filter to class B.

An external class A line filter is available for frame size FSGX of the PM240 Power Module.

Frame sizes FSC of the PM250 Power Module are available only with integrated class A line filter. For compliance with class B, PM250 Power Modules must be fitted additionally with a class B base filter.

No additional Class B line filters are available for the PM260 Power Module.

Line filters which are optionally available depending on the Power Module used

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Line-side power components							
Line filter, class A	U	F	F	F	F	F/S [1]	S [1]
Line filter, class B	U	U	U	–	–	–	–
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line filter, class A	–	–	I	F	F	F	–
Line filter, class B	–	–	U	–	–	–	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line filter, class A	–	–	–	F	–	F	–
Line filter, class B	–	–	–	–	–	–	–

U = Base component
S = Lateral mounting
I = Integrated
– = Not possible
F = Power Modules available with and without integrated class A filter

[1] PM240 FSF Power Modules, from 110 kW (150 hp) and higher and FSGX are available only without an integrated class A filter. An optional class A line filter for side mounting is available instead.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line filter class A			
		6SE6400-2FA00-6AD0	**6SL3203-0BE32-5AA0**	**6SL3000-0BE34-4AA0**	**6SL3000-0BE36-0AA0**
Rated current	A	6	250	440	600
Line supply connection L1, L2, L3		Screw terminals	On housing with M8 screw studs	1 × hole for M10 Provided for busbar connection	1 × hole for M10 Provided for busbar connection
• Conductor cross-section	mm^2	2.5	–	–	–
Load connection U, V, W		Shielded cable	On housing with M8 screw studs	On housing with M10 screw studs	On housing with M10 screw studs
• Conductor cross-section	mm^2	3 × 2.5	–	–	–
• Length	m	0.4	–	–	–
PE connection		On housing with M4 screw studs	Flat connector for M10 screw	1 × hole for M8	1 × hole for M10
Degree of protection		IP20	IP00	IP00	IP00
Dimensions					
• Width	mm	73	240	360	400
• Height	mm	200	360	240	265
• Depth	mm	42.5	116	116	140
Possible as base component		yes	no	no	no
Weight, approx.	kg	0.5	12.4	12.3	19
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE38-8UA0 6SL3224-0BE41-1UA0	6SL3224-0XE41-3UA0 6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module		–	–	–	–
Frame size		FSA	FSF	FSGX	FSGX

Line supply voltage 380 … 480 V 3 AC		Line filter class B		
		6SE6400-2FB00-6AD0	**6SL3203-0BE21-6SA0**	**6SL3203-0BD23-8SA0**
Rated current	A	6	10.2	39.4
Line supply connection L1, L2, L3		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	2.5	2.5	4
Load connection U, V, W		Shielded cable	Shielded cable	Shielded cable
• Conductor cross-section	mm^2	3 × 2.5	3 × 2.5	3 × 4
• Length	m	0.4	0.4	0.4
PE connection		On housing with M4 screw studs	On housing with M4 screw studs	On housing with M4 screw studs
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm	73	153	190
• Height	mm	200	296	362
• Depth	mm	42.5	50	55
Possible as base component		yes	yes	yes
Weight, approx.	kg	0.5	1.5	2.3
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE22-2AA0 6SL3224-0BE23-0AA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5AA0 6SL3224-0BE27-5AA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module		–	–	6SL3225-0BE25-5AA0 6SL3225-0BE27-5AA0 6SL3225-0BE31-1AA0
Frame size		FSA	FSB	FSC

Overview

A line reactor reduces the system perturbations caused by harmonics. This particularly applies in the case of weak line supplies (line supply short-circuit power u_K > 1 %).

Example: Line reactors for Power Modules frame sizes FSA to FSE

Example: Line reactor for PM240 Power Modules frame size FSGX

Example: Power Module frame size FSB with base line reactor and shield bonding plate

Note: A line reactor must not be used in combination with a PM250 or PM260 Power Module.

Benefits

Only AC reactors are available as reactors for the inverter.

- Only an AC reactor provides protection for the input rectifier of the inverter.
- The capacitor lifetime of the inverter increases when using an AC reactor by a factor of 2 when compared to the lifetime when using a DC reactor.
- The harmonic behavior of AC reactors remain almost constant over the complete lifetime. Over time (months), the harmonic behavior of DC reactors changes.
- An AC reactor reduces possible dissymmetries between the current phases. In this case, a DC reactor would not be effective.

Standard inverters 0.37 kW to 250 kW (0.5 hp to 400 hp)

Line-side power components
Line reactors

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module			Line reactor
kW	hp	Type 6SL3224-...	Frame size		Order No.
380 … 480 V 3 AC					
0.37	0.50	0BE13-7UA0	FSA		**6SE6400-3CC00-2AD3**
0.55	0.75	0BE15-5UA0	FSA		
0.75	1.0	0BE17-5UA0	FSA		**6SE6400-3CC00-4AD3**
1.1	1.5	0BE21-1UA0	FSA		
1.5	2	0BE21-5UA0	FSA		**6SE6400-3CC00-6AD3**
2.2	3	0BE22-2 . A0	FSB		**6SL3203-0CD21-0AA0**
3.0	4	0BE23-0 . A0	FSB		
4.0	5	0BE24-0 . A0	FSB		**6SL3203-0CD21-4AA0**
7.5	10	0BE25-5 . A0	FSC		**6SL3203-0CD22-2AA0**
11.0	15	0BE27-5 . A0	FSC		
15.0	20	0BE31-1 . A0	FSC		**6SL3203-0CD23-5AA0**
18.5	25	0BE31-5 . A0	FSD		**6SL3203-0CJ24-5AA0**
22	30	0BE31-8 . A0	FSD		
30	40	0BE32-2 . A0	FSD		**6SL3203-0CD25-3AA0**
37	50	0BE33-0 . A0	FSE		**6SL3203-0CJ28-6AA0**
45	60	0BE33-7 . A0	FSE		
55	75	0BE34-5 . A0	FSF		**6SE6400-3CC11-2FD0**
75	100	0BE35-5 . A0	FSF		
90	125	0BE37-5 . A0	FSF		**6SE6400-3CC11-7FD0**
110	150	0BE38-8UA0	FSF		**6SL3000-0CE32-3AA0**
132	200	0BE41-1UA0	FSF		**6SL3000-0CE32-8AA0**
160	250	0XE41-3UA0	FSGX	new	**6SL3000-0CE33-3AA0**
200	300	0XE41-6UA0	FSGX	new	**6SL3000-0CE35-1AA0**
250	400	0XE42-0UA0	FSGX		

Integration

The line reactors for PM240 Power Modules, frame sizes FSA to FSE, are designed as base components. The line reactor is attached to the mounting surface and the Power Module is mounted directly on the line reactor in a space-saving fashion.

The cables to the Power Module are already connected at the line reactor.

The line reactor is connected to the line supply through terminals.

Line reactors which are optionally available depending on the Power Module used

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Line-side power components							
Line reactor	U	U	U	U	U	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side power components							
Line reactor [1]	–	–	– [1]	– [1]	– [1]	– [1]	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Line-side power components							
Line reactor [1]	–	–	–	– [1]	–	– [1]	–

U = Base component
S = Lateral mounting
– = Not possible

[1] A line reactor is not required and must not be used in conjunction with a PM250 or PM260 Power Module.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line reactor			
		6SE6400-3CC00-2AD3	**6SE6400-3CC00-4AD3**	**6SE6400-3CC00-6AD3**	**6SL3203-0CD21-0AA0**
Rated current	A	1.9	3.5	4.8	9
Power loss at 50/60 Hz, approx.	W	6/7	12.5/15	7.5/9	9/11
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	6
Load connection		Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)
• Length, approx.	m	0.38	0.38	0.38	0.46
PE connection		On housing with M5 screw studs	On housing with M5 screw studs	On housing with M5 screw studs	On housing with M5 screw studs
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	75.5	75.5	75.5	153
• Height	mm	200	200	200	290
• Depth	mm	50	50	50	50
Possible as base component		yes	yes	yes	yes
Weight, approx.	kg	0.6	0.8	0.6	3.4
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0	6SL3224-0BE22-2 . A0 6SL3224-0BE23-0 . A0
Frame size		FSA	FSA	FSA	FSB

Line supply voltage 380 … 480 V 3 AC		Line reactor			
		6SL3203-0CD21-4AA0	**6SL3203-0CD22-2AA0**	**6SL3203-0CD23-5AA0**	**6SL3203-0CJ24-5AA0**
Rated current	A	11.6	25	31.3	47
Power loss at 50/60 Hz, approx.	W	27/32	98/118	37/44	90/115
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	16	16
Load connection		Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm^2)	4 × AWG10 (2.5 mm^2)	4 × AWG10 (2.5 mm^2)	4 × 16 mm^2
• Length, approx.	m	0.46	0.49	0.49	0.7
PE connection		On housing with M5 screw studs	On housing with M5 screw studs	On housing with M5 screw studs	On housing with M8 screw
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm	153	189	189	275
• Height	mm	290	371	371	455
• Depth	mm	50	50	50	84
Possible as base component		yes	yes	yes	yes
Weight, approx.	kg	3.4	5.2	5.9	13
Suitable for PM240 Power Module	Type	6SL3224-0BE24-0 . A0	6SL3224-0BE25-5 . A0 6SL3224-0BE27-5 . A0	6SL3224-0BE31-1 . A0	6SL3224-0BE31-5 . A0 6SL3224-0BE31-8 . A0
Frame size		FSB	FSC	FSC	FSD

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Line reactor					
		6SL3203-0CD25-3AA0	6SL3203-0CJ28-6AA0	6SE6400-3CC11-2FD0	6SE6400-3CC11-7FD0	6SL3000-0CE32-3AA0	6SL3000-0CE32-8AA0
Rated current	A	63	94	151	186	224	278
Power loss at 50/60 Hz, approx.	W	90/115	170/215	280/360	280/360	240/270	210/250
Line supply connection U1, V1, W1		Screw terminals	Screw terminals	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm^2	16	50	–	–	–	–
Load connection		Cable	Cable	Flat connector for M10 cable lug	Flat connector for M10 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
• Conductor cross-section	mm^2	4 × 16	4 × 35	–	–	–	–
• Length, approx.	m	0.7	0.7	–	–	–	–
PE connection		On housing with M8 screw	On housing with M8 screw	On housing with M8 screw stud	On housing with M8 screw stud	M6 screw	M6 screw
Degree of protection		IP20	IP20	IP00	IP00	IP00	IP00
Dimensions							
• Width	mm	275	275	240	240	270	270
• Height	mm	455	577	228	228	248	248
• Depth	mm	84	94	141	141	200	200
Possible as base component		yes	yes	no	no	no	no
Weight, approx.	kg	13	19	25	25	24	24
Suitable for PM240 Power Module	Type	6SL3224-0BE32-2 . A0	6SL3224-0BE33-0 . A0 6SL3224-0BE33-7 . A0	6SL3224-0BE34-5 . A0 6SL3224-0BE35-5 . A0	6SL3224-0BE37-5 . A0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
Frame size		FSD	FSE	FSF	FSF	FSF	FSF

Line supply voltage 380 … 480 V 3 AC		Line reactor	
		6SL3000-0CE33-3AA0	6SL3000-0CE33-5AA0
Rated current	A	331	508
Power loss at 50/60 Hz, approx.	W	0.267	0.365
Line supply connection U1, V1, W1		1 × hole for M10	1 × hole for M12
• Conductor cross-section	mm^2	provided for busbar connection	provided for busbar connection
Load connection			
• Conductor cross-section	mm^2	provided for busbar connection	provided for busbar connection
PE connection		M6 screw	M6 screw
Degree of protection		IP00	IP00
Dimensions			
• Width	mm	270	300
• Height	mm	248	269
• Depth	mm	200	212
Possible as base component		no	no
Weight, approx.	kg	27.8	38.0
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0 6SL3224-0XE42-0UA0
Frame size		FSGX	FSGX

Overview

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers (line-side components dimensioned in accordance with IEC standards). The specified circuit breakers are UL-certified.

3NA3 fuses are recommended for European countries. The 3NE1 fuses are UL-compliant (corresponds to RU). The values in the table take into account the overload capability of the inverter.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Modules		Fuse			Circuit breaker
				Type 3NA3		Type 3NE1 (RU)	
kW	hp	Type 6SL3224-...	Frame size	Order No.		Order No.	Order No.
380 … 480 V 3 AC							
0.37	0.50	0BE13-7UA0	FSA	**3NA3803**		UL-listed fuses such as the Class NON fuse series from Bussmann are required for North America.	**3RV1021-1CA10**
0.55	0.75	0BE15-5UA0	FSA				**3RV1021-1DA10**
0.75	1.0	0BE17-5UA0	FSA				**3RV1021-1FA10**
1.1	1.5	0BE21-1UA0	FSA				**3RV1021-1GA10**
1.5	2	0BE21-5UA0	FSA				**3RV1021-1JA10**
2.2	3	0BE22-2 . A0	FSB	**3NA3805**			**3RV1021-1KA10**
3.0	4	0BE23-0 . A0	FSB				**3RV1021-4AA10**
4.0	5	0BE24-0 . A0	FSB	**3NA3807**			**3RV1021-4BA10**
7.5	10	0BE25-5 . A0	FSC				**3RV1031-4EA10**
11.0	15	0BE27-5 . A0	FSC	**3NA3812**			**3RV1031-4FA10**
15.0	20	0BE31-1 . A0	FSC	**3NA3814**			**3RV1031-4HA10**
18.5	25	0BE31-5 . A0	FSD	**3NA3820**		**3NE1817-0**	**3RV1042-4KA10**
22	30	0BE31-8 . A0	FSD	**3NA3822**		**3NE1818-0**	
30	40	0BE32-2 . A0	FSD	**3NA3824**		**3NE1820-0**	**3RV1042-4MA10**
37	50	0BE33-0 . A0	FSE	**3NA3830**		**3NE1021-0**	**3VL1712-.DD33-....**
45	60	0BE33-7 . A0	FSE	**3NA3832**		**3NE1022-0**	**3VL1716-.DD33-....**
55	75	0BE34-5 . A0	FSF	**3NA3836**		**3NE1224-0**	**3VL3720-.DC36-....**
75	100	0BE35-5 . A0	FSF	**3NA3140**		**3NE1225-0**	**3VL3725-.DC36-....**
90	125	0BE37-5 . A0	FSF	**3NA3144**		**3NE1227-0**	**3VL4731-.DC36-....**
110	150	0BE38-8UA0	FSF	**–**			
132	200	0BE41-1UA0	FSF	**–**		**3NE1230-0**	
160	250	0XE41-3UA0	FSGX	new **3NA3254**	new	**3NE1333-2**	new **3VL4740-.DC36-....**
200	300	0BE41-6UA0	FSGX	new **3NA3260**			new **3VL5750-.DC36-....**
250	400	0BE42-0UA0	FSGX	new **3NA3372**	new	**3NE1436-2**	

Selection and ordering data

Rated power		SINAMICS G120 PM250 Power Modules		**Fuse**		**Circuit breaker**
				Type 3NA3	Type 3NE1 (RU)	
kW	hp	Type 6SL3225-...	Frame size	Order No.	Order No.	Order No.
380 … 480 V 3 AC						
7.5	10	0BE25-5AA0	FSC	**3NA3807**	UL-listed fuses such as the Class NON fuse series from Bussmann are required for North America.	**3RV1031-4EA10**
11.0	15	0BE27-5AA0	FSC	**3NA3812**		**3RV1031-4FA10**
15.0	20	0BE31-1AA0	FSC	**3NA3814**		**3RV1031-4HA10**
18.5	25	0BE31-5 . A0	FSD	**3NA3820**	**3NE1817-0**	**3RV1042-4KA10**
22	30	0BE31-8 . A0	FSD	**3NA3822**	**3NE1818-0**	
30	40	0BE32-2 . A0	FSD	**3NA3824**	**3NE1820-0**	**3RV1042-4MA10**
37	50	0BE33-0 . A0	FSE	**3NA3830**	**3NE1021-0**	**3VL1712-.DD33-....**
45	60	0BE33-7 . A0	FSE	**3NA3832**	**3NE1022-0**	**3VL1716-.DD33-....**
55	75	0BE34-5 . A0	FSF	**3NA3836**	**3NE1224-0**	**3VL3720-.DC36-....**
75	100	0BE35-5 . A0	FSF	**3NA3140**	**3NE1225-0**	**3VL3725-.DC36-....**
90	125	0BE37-5 . A0	FSF	**3NA3144**	**3NE1227-0**	**3VL4731-.DC36-....**

Rated power		SINAMICS G120 PM260 Power Modules		**Fuse**		**Circuit breaker**
				Type 3NA3	Type 3NE1 (RU)	
kW	hp	Type 6SL3225-...	Frame size	Order No.	Order No.	Order No.
500 … 690 V 3 AC						
11.0	15	0BH27-5 . A1	FSD	**3NA3120-6**	–	**3RV1041-4FA10**
15.0	20	0BH31-1 . A1	FSD			
18.5	25	0BH31-5 . A1	FSD			
30	40	0BH32-2 . A1	FSF	**3NA3122-6**		**3RV1041-4JA10**
37	50	0BH33-0 . A1	FSE			**3RV1041-4KA10**
55	75	0BH33-7 . A1	FSF	**3NA3130-6**		**3RV1041-4MA10**

Overview

Example: Braking resistors for Power Modules, frame sizes FSA and FSC

Example: Braking resistor for PM240 Power Modules frame size FSGX

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are intended for use with PM240 Power Modules which feature an integrated brake chopper, but cannot regenerate energy to the supply system. There is an optional plug-in Braking Module for frame size FSGX. For generator operation, e.g. the braking of a rotating mass with high moment of inertia, a braking resistor must be connected to convert the resulting energy into heat.

The braking resistors can be installed at the side of the PM240 Power Modules. The braking resistors for the FSA and FSB frame sizes are designed as base components. If the PM240 Power Modules, frame size FSA or FSB, are operated without line reactor, the braking resistors can also be installed under the Power Modules.

The braking resistors for the Power Modules, frame sizes FSC to FSGX, should be placed outside the control cabinet or outside the switchgear room so that the heat is dissipated away from the Power Modules. The level of air conditioning required is therefore reduced.

Every braking resistor has a temperature switch (UL-listed). The temperature switch can be evaluated to prevent consequential damage if the braking resistor overheats.

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module			Braking resistor
kW	hp	Type 6SL3224-...	Frame size		Order No.
380 ... 480 V 3 AC					
0.37	0.50	0BE13-7UA0	FSA		**6SE6400-4BD11-0AA0**
0.55	0.75	0BE15-5UA0	FSA		
0.75	1.0	0BE17-5UA0	FSA		
1.1	1.5	0BE21-1UA0	FSA		
1.5	2	0BE21-5UA0	FSA		
2.2	3	0BE22-2 . A0	FSB		**6SL3201-0BE12-0AA0**
3.0	4	0BE23-0 . A0	FSB		
4.0	5	0BE24-0 . A0	FSB		
7.5	10	0BE25-5 . A0	FSC		**6SE6400-4BD16-5CA0**
11.0	15	0BE27-5 . A0	FSC		
15.0	20	0BE31-1 . A0	FSC		
18.5	25	0BE31-5 . A0	FSD		**6SE6400-4BD21-2DA0**
22	30	0BE31-8 . A0	FSD		
30	40	0BE32-2 . A0	FSD		
37	50	0BE33-0 . A0	FSE	new	**6SE6400-4BD22-2EA1**
45	60	0BE33-7 . A0	FSE		
55	75	0BE34-5 . A0	FSF		**6SE6400-4BD24-0FA0**
75	100	0BE35-5 . A0	FSF		
90	125	0BE37-5 . A0	FSF		
110	150	0BE38-8UA0	FSF		**6SE6400-4BD26-0FA0**
132	200	0BE41-1UA0	FSF		
160	250	0XE41-3UA0	FSGX [1]	new	**6SL3000-1BE31-3AA0**
200	300	0XE41-6UA0	FSGX [1]	new	**6SL3000-1BE32-5AA0**
250	400	0XE42-0UA0	FSGX [1]		

[1] A Braking Module must be additionally ordered for connection.

Integration

Braking resistors which are optionally available depending on the Power Module used

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
DC link components							
Braking resistor	U	U	S	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
DC link components							
Braking resistor [1]	–	–	– [1]	– [1]	– [1]	– [1]	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
DC link components							
Braking resistor [1]	–	–	–	– [1]	–	– [1]	–

U = Base component
S = Lateral mounting
– = Not possible

Technical specifications

Line supply voltage 380 V … 480 V 3 AC		**Braking resistor**		
		6SE6400-4BD11-0AA0	**6SL3201-0BE12-0AA0**	**6SE6400-4BD16-5CA0**
Resistor	Ω	390	160	56
Rated power P_{DB}	kW (hp)	0.1 (0.13)	0.2 (0.27)	0.65 (0.87)
Peak power P_{max} (cycle time 12 s)	kW	2	4	11
Power connections		Shielded cable	Shielded cable	Shielded cable
• Conductor cross-section	mm^2	3 × 2.5	3 × 2.5	3 × 2.5
• Length	m	0.5	0.5	0.9
Thermostatic switch (NC contact) Max. contact load		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20	IP20
Frame size		FSA	FSB	FSC
Dimensions				
• Width	mm	72	153	185
• Height	mm	230	329	285
• Depth	mm	43.5	43.5	150
Possible as base component		yes	yes	no
Weight, approx.	kg	1	2	3.8
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0 6SL3224-0BE15-5UA0 6SL3224-0BE17-5UA0 6SL3224-0BE21-1UA0 6SL3224-0BE21-5UA0	6SL3224-0BE22-2.A0 6SL3224-0BE23-0.A0 6SL3224-0BE24-0.A0	6SL3224-0BE25-5.A0 6SL3224-0BE27-5.A0 6SL3224-0BE31-1.A0
Frame size		FSA	FSB	FSC

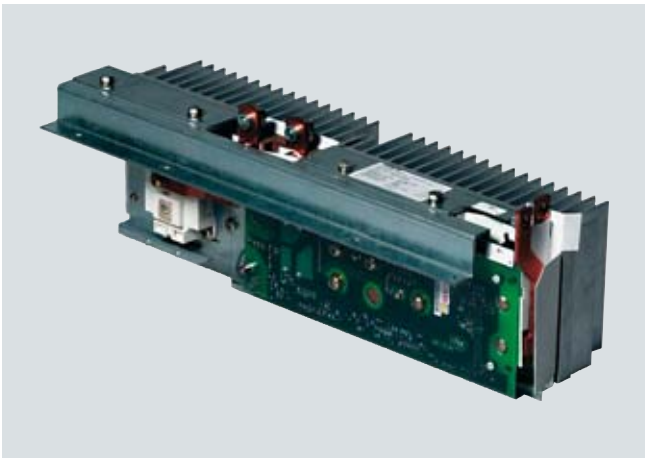
[1] Line-commutated energy recovery is possible in conjunction with a PM250 or PM260 Power Module. A braking resistor cannot be connected and is not necessary.

Technical specifications

Line supply voltage 380 V … 480 V 3 AC		Braking resistor			
		6SE6400-4BD21-2DA0	**6SE6400-4BD22-2EA1**	**6SE6400-4BD24-0FA0**	**6SE6400-4BD26-0FA0**
Resistor	Ω	27	15	8.2	5.5
Rated power P_{DB}	kW (hp)	1.2 (1.6)	2.2 (3.0)	4 (5)	5.6 (7.5)
Peak power P_{max} (cycle time 12 s)	kW	24	44	80	120
Power connections		M6 screw studs	M6 screw studs	M6 screw studs	M6 screw studs
Thermostatic switch (NC contact) Max. contact load		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20	IP20	IP20
Frame size		FSD	FSE	FSF	FSF
Dimensions					
• Width	mm	270	326	395	526
• Height	mm	515	301	650	301
• Depth	mm	175	484	315	484
Possible as base component		no	no	no	no
Weight, approx.	kg	7.4	11	16.7	17.5
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5.A0 6SL3224-0BE31-8.A0 6SL3224-0BE32-2.A0	6SL3224-0BE33-0.A0 6SL3224-0BE33-7.A0	6SL3224-0BE34-5.A0 6SL3224-0BE35-5.A0 6SL3224-0BE37-5.A0	6SL3224-0BE38-8UA0 6SL3224-0BE41-1UA0
Frame size		FSD	FSE	FSF	FSF

Line supply voltage 380 V … 480 V 3 AC		Braking resistor	
		6SL3000-1BE31-3AA0	**6SL3000-1BE32-5AA0**
Resistor	Ω	4.4	2.2
Rated power P_{DB}	kW (hp)	25 (34)	50 (67)
Peak power P_{max} (cycle time 15 s every 90 s)	kW	125	250
Power connections		M10 screw stud	M10 screw stud
Thermostatic switch (NC contact) Max. contact load		250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20
Frame size		FSGX	FSGX
Dimensions			
• Width	mm	740	810
• Height	mm	605	1325
• Depth	mm	485	485
Possible as base component		no	no
Weight, approx.	kg	50	120
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0 6SL3224-0XE42-0UA0
Frame size		FSGX	FSGX

Overview



A Braking Module and the matching external braking resistor are required to bring drives to a controlled standstill in the event of a power failure (e.g. emergency retraction or EMERGENCY STOP Category 1) or limit the DC link voltage for brief periods of generator operation. The Braking Module includes the power electronics and the associated control circuit. During operation, the DC link energy is converted to heat loss in an external braking resistor. Braking Modules function autonomously.

The Braking Module is designed for installation in PM240 Power Modules, frame size FSGX and is cooled by the Power Module fan. The supply voltage for the electronics is taken from the DC link. The Braking Module is connected to the DC link using the busbar sets included in the scope of delivery.

The activation threshold of the Braking Module can be adjusted by means of a DIP switch. The braking power values specified in the technical specifications apply to the upper activation threshold.

Selection and ordering data

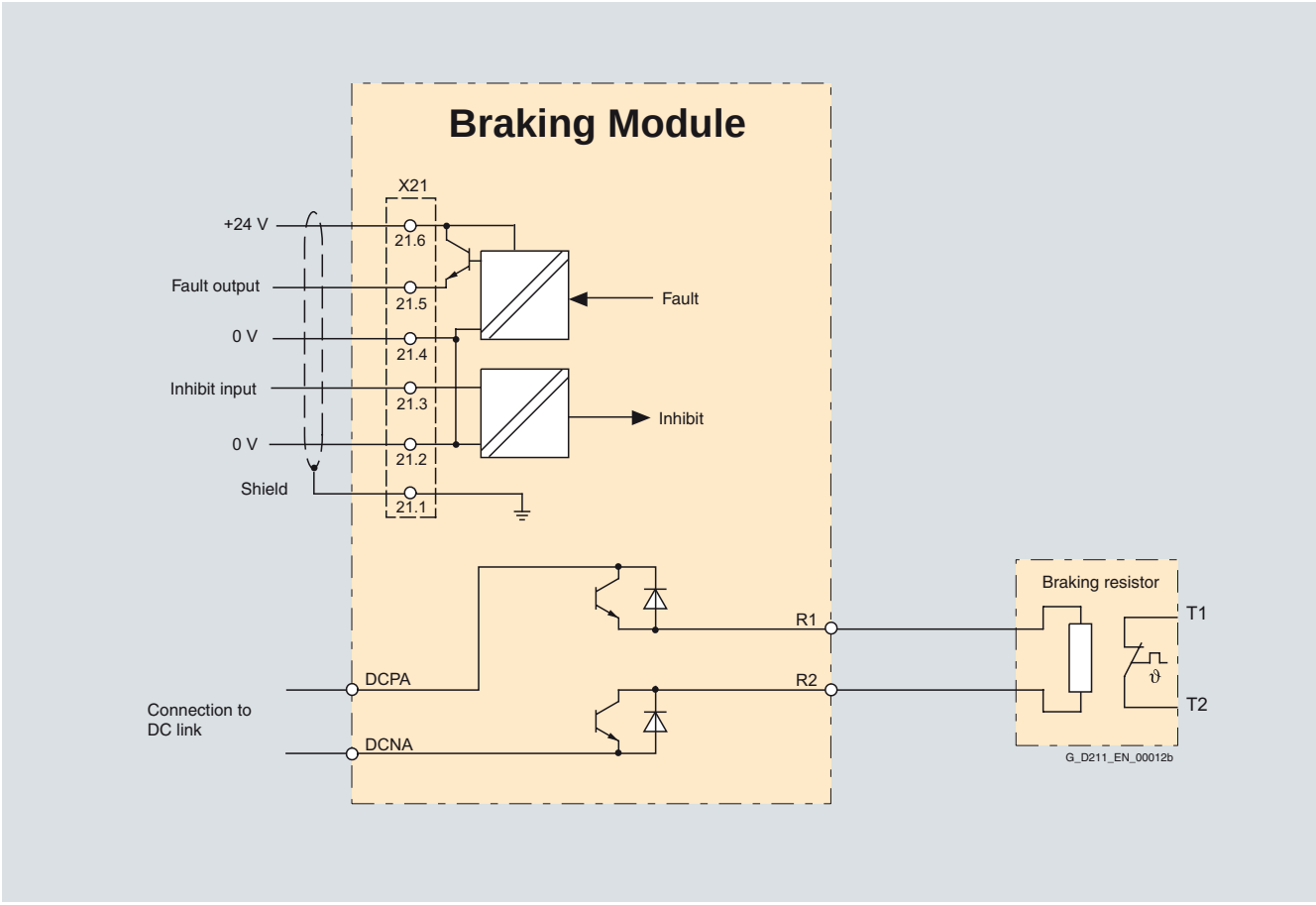
Description		Order No.
DC link voltage 510 … 720 V DC		
Braking Module 50 kW/250 kW	new	**6SL3300-1AE32-5AA0**

Design

The Braking Module has the following interfaces as standard:

- 1 DC link connection
- 1 braking resistor connection
- 1 digital input (inhibit Braking Module/acknowledge fault)
- 1 digital output (Braking Module inhibited)
- 1 DIP switch for adjusting the activation threshold

Integration



Connection example of a Braking Module

Technical specifications

DC link voltage 510 … 720 V DC	Braking Module 6SL3300-1AE32-5AA0
Power	
• Rated power P_{DB}	50 kW (67 hp)
• Peak power P_{15}	250 kW
• Power P_{20}	200 kW
• Power P_{40}	100 kW
Activation thresholds (adjustable via DIP switch)	774 V (factory setting) or 673 V
Length of cable to braking resistor, max.	50 m
Digital inputs In accordance with IEC 61131-2 Type 1	
• Voltage	–3 … +30 V
• Low level (an open-circuit digital input is interpreted as "low")	–3 … +5 V
• High Level	15 … 30 V
• Current consumption at 24 V DC, typ.	10 mA
• Max. conductor cross-section	1.5 mm^2
Digital outputs (continuously short-circuit proof)	
• Voltage	24 V DC
• Load current per digital output, max.	500 mA
• Max. conductor cross-section	1.5 mm^2
R1/R2 connection	M8 screw
• Max. conductor cross-section	50 mm^2
Weight, approx.	7.3 kg
Approvals	cURus (File No.: E192450)
Suitable for installation in a PM240 Power Module	Frame size FSGX

Load-side power components
Output reactors

Overview

Output reactors reduce the voltage stress on the motor windings. At the same time, the capacitive charging/discharging currents, which place an additional load on the power unit when long motor cables are used, are reduced.

Output reactors are only provided for the PM240 and PM250 Power Modules. An output reactor is not required for the PM260 Power Module due to its integrated sine-wave filter.

The maximum permissible output frequency is 150 Hz when an output reactor is used – the pulse frequency must not exceed 4 kHz.

The output reactor must be installed as close as possible to the Power Module.

Output reactors are approved for use only in conjunction with "Vector" and "*V/f* control" modes.

Example: Output reactors for Power Modules frame sizes FSA and FSB

Example: Output reactor for PM240 Power Modules frame size FSGX

Selection and ordering data

Rated power kW	Rated power hp	SINAMICS G120 PM240 Power Modules Type 6SL3224-...	Frame size	Output reactor Order No.
380 … 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA	**6SE6400-3TC00-4AD2**
0.55	0.75	0BE15-5UA0	FSA	
0.75	1.0	0BE17-5UA0	FSA	
1.1	1.5	0BE21-1UA0	FSA	
1.5	2	0BE21-5UA0	FSA	
2.2	3	0BE22-2 . A0	FSB	**6SL3202-0AE21-0CA0**
3.0	4	0BE23-0 . A0	FSB	
4.0	5	0BE24-0 . A0	FSB	
7.5	10	0BE25-5 . A0	FSC	**6SL3202-0AJ23-2CA0**
11.0	15	0BE27-5 . A0	FSC	
15.0	20	0BE31-1 . A0	FSC	
18.5	25	0BE31-5 . A0	FSD	**6SE6400-3TC05-4DD0**
22	30	0BE31-8 . A0	FSD	**6SE6400-3TC03-8DD0**
30	40	0BE32-2 . A0	FSD	**6SE6400-3TC05-4DD0**
37	50	0BE33-0 . A0	FSE	**6SE6400-3TC08-0ED0**
45	60	0BE33-7 . A0	FSE	**6SE6400-3TC07-5ED0**
55	75	0BE34-5 . A0	FSF	**6SE6400-3TC14-5FD0**
75	100	0BE35-5 . A0	FSF	**6SE6400-3TC15-4FD0**
90	125	0BE37-5 . A0	FSF	**6SE6400-3TC14-5FD0**
110	150	0BE38-8UA0	FSF	**6SL3000-2BE32-1AA0**
132	200	0BE41-1UA0	FSF	**6SL3000-2BE32-6AA0**
160	250	0XE41-3UA0	FSGX new	**6SL3000-2BE33-2AA0**
200	300	0XE41-6UA0	FSGX new	**6SL3000-2BE33-8AA0**
250	400	0XE42-0UA0	FSGX new	**6SL3000-2BE35-0AA0**

Rated power kW	Rated power hp	SINAMICS G120 PM250 Power Modules Type 6SL3225-...	Frame size	Output reactor Order No.
380 … 480 V 3 AC				
7.5	10	0BE25-5AA0	FSC	**6SL3202-0AJ23-2CA0**
11.0	15	0BE27-5AA0	FSC	
15.0	20	0BE31-1AA0	FSC	
18.5	25	0BE31-5 . A0	FSD	**6SE6400-3TC05-4DD0**
22	30	0BE31-8 . A0	FSD	**6SE6400-3TC03-8DD0**
30	40	0BE32-2 . A0	FSD	**6SE6400-3TC05-4DD0**
37	50	0BE33-0 . A0	FSE	**6SE6400-3TC08-0ED0**
45	60	0BE33-7 . A0	FSE	**6SE6400-3TC07-5ED0**
55	75	0BE34-5 . A0	FSF	**6SE6400-3TC14-5FD0**
75	100	0BE35-5 . A0	FSF	**6SE6400-3TC15-4FD0**
90	125	0BE37-5 . A0	FSF	**6SE6400-3TC14-5FD0**

Integration

Output reactors which are optionally available depending on the Power Module used

The following line-side power components, DC link components and load-side power components are optionally available in the appropriate frames sizes for the Power Modules:

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Load-side power components							
Output reactor	U	U	U	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Output reactor	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Load-side power components							
Output reactor [1)]	–	–	–	–	–	–	–

U = Base component
S = Lateral mounting
– = Not possible

1) PM260 Power Modules do not require output reactors as they are already equipped with sine-wave filters.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC00-4AD2				
Rated current	A	4	4	4	4	4
Power loss	kW	0.005	0.005	0.005	0.005	0.005
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)	4 × AWG16 (1.5 mm^2)
• Length, approx.	m	0.3	0.3	0.3	0.3	0.3
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between output reactor and motor						
• 380 V (– 10 %) ... 400 V 3 AC						
- Shielded	m	150	150	150	150	150
- Unshielded	m	225	225	225	225	225
• 401 V... 480 V (+ 10 %) 3 AC						
- Shielded	m	100	100	100	100	100
- Unshielded	m	150	150	150	150	150
Dimensions						
• Width	mm	75.5	75.5	75.5	75.5	75.5
• Height	mm	200	200	200	200	200
• Depth	mm	110	110	110	110	110
Possible as base component		yes	yes	yes	yes	yes
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	2	2	2	2	2
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0	6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0	6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0
Rated power of the Power Module	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
Rated current I_{rated} of the Power Module	A	1.3	1.7	2.2	3.1	4.1
Frame size		FSA	FSA	FSA	FSA	FSA

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)					
		6SL3202-0AE21-0CA0			6SL3202-0AJ23-2CA0		
Rated current	A	9.4	9.4	9.4	32	32	32
Power loss	kW	0.02	0.02	0.02	0.06	0.06	0.06
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section		4 × AWG14 (1.5 mm^2)	4 × AWG14 (1.5 mm^2)	4 × AWG14 (1.5 mm^2)	4 × AWG14 (1.5 mm^2)	4 × AWG14 (1.5 mm^2)	4 × AWG14 (1.5 mm^2)
• Length, approx.	m	0.4	0.4	0.4	0.35	0.35	0.35
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between output reactor and motor							
• 380 V (–10 %) ... 400 V 3 AC							
- Shielded	m	150	150	150	150	150	150
- Unshielded	m	225	225	225	225	225	225
• 401 V ... 480 V (+10 %) 3 AC							
- Shielded	m	100	100	100	100	100	100
- Unshielded	m	150	150	150	150	150	150
Dimensions							
• Width	mm	154	154	154	189	189	189
• Height	mm	270	270	270	334	334	334
• Depth	mm	70	70	70	80	80	80
Possible as base component		yes	yes	yes	yes	yes	yes
Degree of protection		IP00	IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	4.4	4.4	4.4	9.1	9.1	9.1
Suitable for PM240 Power Module	Type	6SL3224-0BE22-2UA0 6SL3224-0BE22-2AA0	6SL3224-0BE23-0UA0 6SL3224-0BE23-0AA0	6SL3224-0BE24-0UA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5UA0 6SL3224-0BE25-5AA0	6SL3224-0BE27-5UA0 6SL3224-0BE27-5AA0	6SL3224-0BE31-1UA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module	Type	–	–	–	6SL3225-0BE25-5AA0	6SL3225-0BE27-5AA0	6SL3225-0BE31-1AA0
Rated power of the Power Module	kW (hp)	2.2 (3.0)	3 (4)	4 (5)	7.5 (10)	11 (15)	15 (20)
Rated current I_{rated} of the Power Module	A	5.9	7.7	10.2	18	25	32
Frame size		FSB	FSB	FSB	FSC	FSC	FSC

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC05-4DD0	**6SE6400-3TC03-8DD0**	**6SE6400-3TC05-4DD0**	**6SE6400-3TC08-0ED0**	**6SE6400-3TC07-5ED0**
Rated current	A	68 [1]	45 [1]	68 [1]	104 [1]	90 [1]
Power loss	kW	0.2	0.2	0.2	0.17	0.27
Connection to the Power Module		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
Motor connection		Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug	Flat connector for M6 cable lug
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor						
• 380 V (– 10 %) ... 400 V 3 AC						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
• 401 V ... 480 V (+ 10 %) 3 AC						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
Dimensions						
• Width	mm	225	225	225	225	270
• Height	mm	210	210	210	210	248
• Depth	mm	150	179	150	150	209
Possible as base component		no	no	no	no	no
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	10.7	16.1	10.7	10.4	24.9
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5UA0 6SL3224-0BE31-5AA0	6SL3224-0BE31-8UA0 6SL3224-0BE31-8AA0	6SL3224-0BE32-2UA0 6SL3224-0BE32-2AA0	6SL3224-0BE33-0UA0 6SL3224-0BE33-0AA0	6SL3224-0BE33-7UA0 6SL3224-0BE33-7AA0
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0	6SL3225-0BE31-8 . A0	6SL3225-0BE32-2 . A0	6SL3225-0BE33-0 . A0	6SL3225-0BE33-7 . A0
Rated power of the Power Module	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
Rated current I_{rated} of the Power Module	A	38	45	60	75	90
Frame size		FSD	FSD	FSD	FSE	FSE

[1] On the rating plate of the reactor the current is displayed according to High Overload HO, which is lower than the indicated value for the Light Overload current of the Power Module.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SE6400-3TC14-5FD0	**6SE6400-3TC15-4FD0**	**6SE6400-3TC14-5FD0**	**6SL3000-2BE32-1AA0**	**6SL3000-2BE32-6AA0**
Rated current	A	178 [1]	178 [1]	178 [1]	210	260
Power loss	kW	0.47	0.25	0.47	0.49	0.5
Connection to the Power Module		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
Motor connection		Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M8 cable lug	Flat connector for M10 screw	Flat connector for M10 screw
PE connection		M8 screw	M6 screw	M8 screw	M8 screw	M8 screw
Cable length, max. between output reactor and motor						
• 380 V (– 10 %) ... 400 V 3 AC						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
• 401 V ... 480 V (+ 10 %) 3 AC						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
Dimensions						
• Width	mm	350	270	350	300	300
• Height	mm	321	248	321	285	315
• Depth	mm	288	209	288	257	277
Possible as base component		no	no	no	no	no
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	51.5	24	51.5	60	66
Suitable for PM240 Power Module	Type	6SL3224-0BE34-5UA0 6SL3224-0BE34-5AA0	6SL3224-0BE35-5UA0 6SL3224-0BE35-5AA0	6SL3224-0BE37-5UA0 6SL3224-0BE37-5AA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0	6SL3225-0BE35-5 . A0	6SL3225-0BE37-5 . A0	–	–
Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
Rated current I_{rated} of the Power Module	A	110	145	178	205	250
Frame size		FSF	FSF	FSF	FSF	FSF

[1] On the rating plate of the reactor the current is displayed according to High Overload HO, which is lower than the indicated value for the Light Overload current of the Power Module.

Technical specifications

Line supply voltage 380 … 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)		
		6SL3000-2BE33-2AA0	**6SL3000-2BE33-8AA0**	**6SL3000-2BE35-0AA0**
Rated current	A	310	380	490
Power loss	kW	0.470	0.500	0.500
Connection to the Power Module		1 × hole for M10	1 × hole for M10	1 × hole for M12
Motor connection		1 × hole for M10	1 × hole for M10	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor				
• 380 V (– 10 %) ... 400 V 3 AC				
- Shielded	m	300	300	300
- Unshielded	m	450	450	450
• 401 V ... 480 V (+ 10 %) 3 AC				
- Shielded	m	300	300	300
- Unshielded	m	450	450	450
Dimensions				
• Width	mm	300	300	300
• Height	mm	285	285	365
• Depth	mm	257	277	277
Possible as base component		no	no	no
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg	66	73	100
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module	Type	–	–	–
Rated power of the Power Module	kW (hp)	160 (250)	200 (300)	250 (400)
Rated current I_{rated} of the Power Module	A	302	370	477
Frame size		FSGX	FSGX	FSGX

Overview

Example: Sine-wave filter for PM240 Power Modules frame size FSGX

A sine-wave filter limits the rate of rise of voltage and the capacitive charging/discharging currents that usually occur with inverter operation. An output reactor is not required. Sine-wave filters are only provided for the PM240 and PM250 Power Modules. PM260 Power Modules already have an integrated sine-wave filter and an additional sine-wave filter is not required.

The sine-wave filter at the inverter output supplies almost perfect sinusoidal voltages at the motor so that standard motors can be used without special cables. Standard cables can be used. The maximum permissible motor feeder length is 300 m. The maximum output frequency is 150 Hz at 380 V to 480 V.

When using sine-wave filters, the following should be observed:

- Operation with pulse frequencies from 4 kHz to 8 kHz (sine-wave filter from 160 kW, only for 4 kHz) permissible
- It must be ensured that the automatic pulse frequency reduction functions are also deactivated
- A derating of 5 % must be observed when selecting a suitable inverter
- The output frequency is limited to 150 Hz
- Operation and commissioning may only be performed with the motor connected as the sine-wave filter is not no-load proof

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module			Sine-wave filter
kW	hp	Type 6SL3224-...	Frame size		Order No.
380 … 480 V 3 AC					
0.37	0.50	0BE13-7UA0	FSA	new	**6SL3202-0AE20-3SA0**
0.55	0.75	0BE15-5UA0	FSA		
0.75	1.0	0BE17-5UA0	FSA		
1.1	1.5	0BE21-1UA0	FSA	new	**6SL3202-0AE20-6SA0**
1.5	2.0	0BE21-5UA0	FSA		
2.2	3.0	0BE22-2 . A0	FSB	new	**6SL3202-0AE21-1SA0**
3.0	4.0	0BE23-0 . A0	FSB		
4.0	5.0	0BE24-0 . A0	FSB	new	**6SL3202-0AE21-4SA0**
7.5	10	0BE25-5 . A0	FSC	new	**6SL3202-0AE22-0SA0**
11.0	15	0BE27-5 . A0	FSC	new	**6SL3202-0AE23-3SA0**
15.0	20	0BE31-1 . A0	FSC		
18.5	25	0BE31-5 . A0	FSD	new	**6SL3202-0AE24-6SA0**
22	30	0BE31-8 . A0	FSD		
30	40	0BE32-2 . A0	FSD	new	**6SL3202-0AE26-2SA0**
37	50	0BE33-0 . A0	FSE	new	**6SL3202-0AE28-8SA0**
45	60	0BE33-7 . A0	FSE		
55	75	0BE34-5 . A0	FSF	new	**6SL3202-0AE31-5SA0**
75	100	0BE35-5 . A0	FSF		
90	125	0BE37-5 . A0	FSF	new	**6SL3202-0AE31-8SA0**
110	150	0BE38-8UA0	FSF	new	**6SL3000-2CE32-3AA0**
132	200	0BE41-1UA0	FSF		
160	250	0XE41-3UA0	FSGX	new	**6SL3000-2CE32-8AA0**
200	300	0XE41-6UA0	FSGX	new	**6SL3000-2CE33-3AA0**
250	400	0XE42-0UA0	FSGX	new	**6SL3000-2CE34-1AA0**

Rated power		SINAMICS G120 PM250 Power Module			Sine-wave filter
kW	hp	Type 6SL3225-...	Frame size		Order No.
380 … 480 V 3 AC					
7.5	10	0BE25-5AA0	FSC	new	**6SL3202-0AE22-0SA0**
11.0	15	0BE27-5AA0	FSC	new	**6SL3202-0AE23-3SA0**
15.0	20	0BE31-1AA0	FSC		
18.5	25	0BE31-5 . A0	FSD	new	**6SL3202-0AE24-6SA0**
22	30	0BE31-8 . A0	FSD		
30	40	0BE32-2 . A0	FSD	new	**6SL3202-0AE26-2SA0**
37	50	0BE33-0 . A0	FSE	new	**6SL3202-0AE28-8SA0**
45	60	0BE33-7 . A0	FSE		
55	75	0BE34-5 . A0	FSF	new	**6SL3202-0AE31-5SA0**
75	100	0BE35-5 . A0	FSF		
90	125	0BE37-5 . A0	FSF	new	**6SL3202-0AE31-8SA0**

Integration

Sine-wave filters which are optionally available depending on the Power Module used

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSGX**
PM240 Power Module with integrated brake chopper							**without integrated brake chopper**
Available frame sizes	✓	✓	✓	✓	✓	✓	✓
Load-side power components							
Sine-wave filter	U	U	U	S	S	S	S
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Sine-wave filter	–	–	U	S	S	S	–
PM260 Power Module with line-commutated energy recovery and integrated sine-wave filter							
Available frame sizes	–	–	–	✓	–	✓	–
Load-side power components							
Sine-wave filter	–	–	–	I	–	I	–

U = Base component
S = Lateral mounting
I = Integrated
– = Not possible

Technical specifications

Line supply voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 kHz ... 8 kHz)				
		6SL3202-0AE20-3SA0			**6SL3202-0AE20-6SA0**	
Rated current	A	3.5	3.5	3.5	6.0	6.0
Power loss	kW	0.005	0.005	0.005	0.005	0.005
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable
• Conductor cross-section	mm^2	6	6	6	6	6
• Length, approx.	m	0.5	0.5	0.5	0.5	0.5
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	6	6
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
Dimensions						
• Width	mm	75.5	75.5	75.5	75.5	75.5
• Height	mm	200	200	200	200	200
• Depth	mm	110	110	110	110	110
Possible as base component		yes	yes	yes	yes	yes
Degree of protection		IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg	2.6	2.6	2.6	3.0	3.0
Suitable for PM240 Power Module	Type	6SL3224-0BE13-7UA0	6SL3224-0BE15-5UA0	6SL3224-0BE17-5UA0	6SL3224-0BE21-1UA0	6SL3224-0BE21-5UA0
Rated power of the Power Module	kW (hp)	0.37 (0.5)	0.55 (0.75)	0.75 (1.0)	1.1 (1.5)	1.5 (2.0)
Rated current I_{rated} of the Power Module	A	1.3	1.7	2.2	3.1	4.1
Frame size		FSA	FSA	FSA	FSA	FSA

Technical specifications

Line supply voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 kHz ... 8 kHz)					
		6SL3202-0AE21-1SA0		**6SL3202-0AE21-4SA0**	**6SL3202-0AE22-0SA0**	**6SL3202-0AE23-3SA0**	
Rated current	A	9.0	9.0	14.0	20.0	33.0	33.0
Power loss	kW	0.02	0.02	0.02	0.06	0.06	0.06
Connection to the Power Module		Cable	Cable	Cable	Cable	Cable	Cable
• Conductor cross-section	mm^2	6	6	6	10	10	10
• Length, approx.	m	0.5	0.5	0.5	0.5	0.5	0.5
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6	6	6	10	10	10
PE connection		M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs	M5 screw studs
Cable length, max. between sine-wave filter and motor							
• 380 ... 480 V 3 AC ±10 %							
- Shielded	m	200	200	200	200	200	200
- Unshielded	m	300	300	300	300	300	300
Dimensions							
• Width	mm	153	153	153	189	189	189
• Height	mm	270	270	270	336	336	336
• Depth	mm	100	100	100	140	140	140
Possible as base component		yes	yes	yes	yes	yes	yes
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Weight, approx.	kg	6	6	10	12	23	23
Suitable for PM240 Power Module	Type	6SL3224-0BE22-2UA0 6SL3224-0BE22-2AA0	6SL3224-0BE23-0UA0 6SL3224-0BE23-0AA0	6SL3224-0BE24-0UA0 6SL3224-0BE24-0AA0	6SL3224-0BE25-5UA0 6SL3224-0BE25-5AA0	6SL3224-0BE27-5UA0 6SL3224-0BE27-5AA0	6SL3224-0BE31-1UA0 6SL3224-0BE31-1AA0
Suitable for PM250 Power Module	Type	–	–	–	6SL3225-0BE25-5AA0	6SL3225-0BE27-5AA0	6SL3225-0BE31-1AA0
Rated power of the Power Module	kW (hp)	2.2 (3)	3 (4)	4 (5)	7.5 (10)	11 (15)	15 (20)
Rated current I_{rated} of the Power Module	A	5.9	7.7	10.2	18	25	32
Frame size		FSB	FSB	FSB	FSC	FSC	FSC

Technical specifications

Line supply voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 kHz ... 8 kHz)				
		6SL3202-0AE24-6SA0		**6SL3202-0AE26-2SA0**	**6SL3202-0AE28-8SA0**	
Rated current	A	47	47	61.8	92	92
Power loss	kW	0.2	0.2	0.2	0.17	0.27
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	50	50	50	95	95
Motor connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	50	50	50	95	95
PE connection		M6 screw	M6 screw	M6 screw	M8 screw	M8 screw
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m	200	200	200	200	200
- Unshielded	m	300	300	300	300	300
Dimensions						
• Width	mm	250	250	250	275	275
• Height	mm	315	315	305	368	368
• Depth	mm	262	262	262	275	275
Possible as base component		no	no	no	no	no
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	24.0	24.0	34.0	45.0	45.0
Suitable for PM240 Power Module	Type	6SL3224-0BE31-5UA0 6SL3224-0BE31-5AA0	6SL3224-0BE31-8UA0 6SL3224-0BE31-8AA0	6SL3224-0BE32-2UA0 6SL3224-0BE32-2AA0	6SL3224-0BE33-0UA0 6SL3224-0BE33-0AA0	6SL3224-0BE33-7UA0 6SL3224-0BE33-7AA0
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0	6SL3225-0BE31-8 . A0	6SL3225-0BE32-2 . A0	6SL3225-0BE33-0 . A0	6SL3225-0BE33-7 . A0
Rated power of the Power Module	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
Rated current I_{rated} of the Power Module	A	38	45	60	75	90
Frame size		FSD	FSD	FSD	FSE	FSE

Technical specifications

Line supply voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 kHz ... 8 kHz, from 160 kW only 4 kHz)				
		6SL3202-0AE31-5SA0		**6SL3202-0AE31-8SA0**	**6SL3000-2CE32-3AA0**	
Rated current	A	150	150	182	225	225
Power loss	kW	0.47	0.25	0.47	0.6	0.6
Connection to the Power Module		Screw terminals	Screw terminals	Screw terminals	1 × hole for M10	1 × hole for M10
• Conductor cross-section	mm^2	150	150	150		
Motor connection		Screw terminals	Screw terminals	Screw terminals	1 × hole for M10	1 × hole for M10
• Conductor cross-section	mm^2	150	150	150		
PE connection		M8 screw	M6 screw	M8 screw	1 × hole for M10	1 × hole for M10
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m	200	200	200	300	300
- Unshielded	m	300	300	300	450	450
Dimensions						
• Width	mm	350	350	350	620	620
• Height	mm	440	440	468	300	300
• Depth	mm	305	305	305	320	320
Possible as base component		no	no	no	no	no
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg	63.0	63.0	80.0	124	124
Suitable for PM240 Power Module	Type	6SL3224-0BE34-5UA0 6SL3224-0BE34-5AA0	6SL3224-0BE35-5UA0 6SL3224-0BE35-5AA0	6SL3224-0BE37-5UA0 6SL3224-0BE37-5AA0	6SL3224-0BE38-8UA0	6SL3224-0BE41-1UA0
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0	6SL3225-0BE35-5 . A0	6SL3225-0BE37-5 . A0	–	–
Rated power of the Power Module	kW (hp)	55 (75)	75 (100)	90 (125)	110 (150)	132 (200)
Rated current I_{rated} of the Power Module	A	110	145	178	205	250
Frame size		FSF	FSF	FSF	FSF	FSF

Technical specifications

Line supply voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 kHz ... 8 kHz, from 160 kW only 4 kHz)		
		6SL3000-2CE32-8AA0	**6SL3000-2CE33-3AA0**	**6SL3000-2CE34-1AA0**
Rated current	A	276	333	408
Power loss	kW	0.69	0.53	0.7
Connection to the Power Module		1 × hole for M10	1 × hole for M10	1 × hole for M10
Motor connection		1 × hole for M10	1 × hole for M10	1 × hole for M10
PE connection		1 × hole for M10	1 × hole for M10	1 × hole for M10
Cable length, max. between sine-wave filter and motor				
• 380 ... 480 V 3 AC ±10 %				
- Shielded	m	300	300	300
- Unshielded	m	450	450	450
Dimensions				
• Width	mm	620	620	620
• Height	mm	300	370	370
• Depth	mm	320	360	360
Possible as base component		no	no	no
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg	127	136	198
Suitable for PM240 Power Module	Type	6SL3224-0XE41-3UA0	6SL3224-0XE41-6UA0	6SL3224-0XE42-0UA0
Suitable for PM250 Power Module	Type	–	–	–
Rated power of the Power Module	kW (hp)	160 (250)	200 (300)	250 (400)
Rated current I_{rated} of the Power Module	A	302	370	477
Frame size		FSGX	FSGX	FSGX

Overview

Intelligent Operator Panel IOP

The Intelligent Operator Panel IOP is an extremely user-friendly and powerful Operator Panel for the SINAMICS G120, SINAMICS G120D standard drives and SIMATIC ET 200 frequency converters.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting 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 due to the explanatory help texts and the parameter filtering function.

Application Wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There are quick commissioning wizards for general commissioning.

The drives are manually and simply controlled using directly assigned buttons and the navigation wheel. The IOP has a dedicated switchover button to switch over from the automatic to the manual mode.

The frequency inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can either be graphically or numerically visualized on the status screen/status display. Process values can also be displayed in technological units.

IOP supports series commissioning of identical drives. For this purpose, a parameter list can be copied from a frequency inverter into the IOP and when required, downloaded into other drive units of the same type.

The IOP includes the following language packages: English, French, German, Italian and Spanish.

The IOP can be installed in control cabinet doors using the optionally available door mounting kit.

Updating the IOP

The IOP 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 via drag & drop. Further, the USB interface allows user languages and wizards that become available in the future to be subsequently downloaded and the firmware to be updated for the IOP. The IOP is supplied with power via the USB interface during an update.

IOP Handheld

A handheld version of the IOP can be ordered for mobile use. In addition to the IOP, this includes a housing with rechargeable batteries, charging unit and RS232 interface 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 8 hours.

A PC Inverter Connection Kit 6SL3255-0AA00-2AA1 is required to connect the IOP to the CU240S and CU240E Control Units.

To connect the IOP Handheld to SINAMICS G110D and SINAMICS G120D, the RS232 interface cable with optical interface is additionally required.

Benefits

- Simple commissioning of standard applications using wizards, it is not necessary to know the parameter structure
- Diagnostics using plain text display; can be used locally on-site without documentation
- Direct manual operation of the drive – you can toggle between the automatic and manual modes
- Status display with freely selectable units; display of real physical values
- Intuitive, navigation using a wheel – just like in everyday applications
- Graphic display for e.g. status values in bar-type diagrams such as e.g. pressure, flow
- Quickly and simply mounted in the door – mechanically and electrically
- Simple local commissioning on-site using the handheld version
- Commissioning without documentation using the integrated help function
- Series commissioning using the clone function (parameter set data is saved for fast replacement)
- User-defined parameter list with a reduced number of self-selected parameters (to generate your own commissioning screens)
- 5 integrated languages
- Simple update of languages, wizards and firmware updates via USB

Selection and ordering data

Designation		Order No.
Intelligent Operator Panel IOP	new	**6SL3255-0AA00-4JA0**
IOP Handheld	new	**6SL3255-0AA00-4HA0**
For use with SINAMICS G120, SINAMICS G110D, SINAMICS G120D, SIMATIC ET 200S FC or SIMATIC ET 200pro FC Included in the scope of delivery: • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m long, can only be used for SINAMICS G120 and SIMATIC ET 200S FC) • USB cable (1 m long)		

Accessories

Designation		Order No.
IOP Door Mounting Kit	new	**6SL3256-0AP00-0JA0**
IP54 degree of protection for mounting the IOP in control cabinet doors with sheet steel thicknesses of 1 … 3 mm Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m long)		
RS232 interface cable		**3RK1922-2BP00**
With optical interface to connect the SINAMICS G110D, SINAMICS G120D or SIMATIC ET 200pro FC inverters to the IOP Handheld (2.5 m long)		

Integration

Using the IOP with the frequency inverters

IOP	SINAMICS G120 with CU230P-2 Control Unit	SINAMICS G120 with CU240E or CU240S Control Unit	SINAMICS G110D and SINAMICS G120D
Plugging the IOP onto the inverter (power supply from the Control Unit)	✓	–	–
IOP door mounting with door mounting kit (power supply from the Control Unit)	✓	–	–
Mobile use of the IOP Handheld (supplied from rechargeable batteries)	✓	✓ PC Inverter Connection Kit required, 6SL3255-0AA00-2AA1	✓ RS232 interface cable with optical interface required, 3RK1922-2BP00

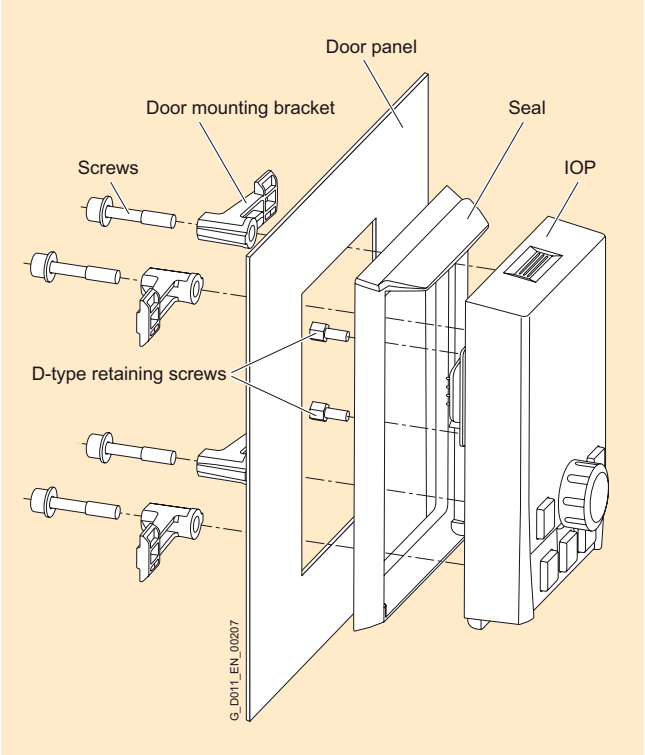
Mounting the IOP on a CU230P-2 Control Unit

The IOP can be directly plugged onto the CU230P-2 Control Unit.

CU230P-2 Control Unit with plugged on IOP

Mounting the IOP in a door

Using the optionally available door mounting kit, the IOP can be simply mounted in a control cabinet door with just a few manual operations (presently only available in conjunction with the SINAMICS G120 and CU230P-2 Control Unit). Degree of protection IP54/UL Type 12 is achieved when mounting in a door.



Overview

The Basic Operator Panel BOP can be used to commission drives, monitor drives in operation and input individual parameter settings.

Values and units are displayed on a 5-digit display.

One BOP can be used for several inverters. It is plugged directly onto the CU240 Control Unit.

The BOP provides a function to quickly copy parameters. A parameter set of an inverter can be saved in the BOP and then downloaded to another inverter.

Note: The BOP is not suitable for the CU230P-2 Control Unit. The Intelligent Operator Panel IOP is available for this purpose.

Selection and ordering data

	Order No.
Basic Operator Panel BOP (not for Control Unit CU230P-2)	**6SL3255-0AA00-4BA1**

Integration

Example: CU240E Control Unit with mounted Basic Operator Panel BOP

Overview

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

- Parameter settings can be written from the MMC memory card to the inverter or saved from the inverter to the MMC memory card.
- Up to 100 parameter sets can be stored.
- Supports series commissioning without the use of additional commissioning tools (e.g. BOP and STARTER).
- Commissioning with the MMC memory card is defined by the user:
  - Parameter p8458 = 0 → parameter set 0 is never automatically downloaded from the MMC ("never")
  - Parameter p8458 = 1 → parameter set 0 is downloaded once after PowerOn ("once")
  - Parameter p8458 = 2 → parameter set 0 is always downloaded after PowerOn ("always")

Note:
The MMC memory card is not required for operation and does not have to remain inserted.

Note:
The CU240E Control Unit does not have a slot for the MMC memory card.

Selection and ordering data

	Order No.
MMC memory card (not for the CU240E Control Unit)	**6SL3254-0AM00-0AA0**

Integration

Example: Inserting the MMC memory card into a CU240 Control Unit

Example: CU240 Control Unit with inserted MMC memory card

Supplementary system components
CM240NE chemical industry module

Applications

Inverters for 400 V, 500 V and 690 V are required in the chemical industry that meet the special demands and requirements of this industry sector. The essential requirements and demands of the chemical industry are fulfilled using the SINAMICS G120 series of inverters supplemented by the CM240NE chemical industry module (with ATEX-certified PTC evaluation and a NAMUR terminal strip).

CM240NE chemical industry module

Selection and ordering data

		Order No.
CM240NE chemical industry module	new	**6SL3255-0BT01-0PA0**

Accessories

		Order No.
Supplementary kit for rail mounting comprising • Adapter for rail mounting (acc. to DIN 50022, 35 × 15 mm) • Long cable harness	new	**6SL3260-4TA00-1AA6**

Design

- Compact, modular inverter
- Isolated analog inputs and outputs in the chemical industry module (1 setpoint / 2 measured values)
- Isolated digital inputs and outputs in the Control Unit
- Protective separation of the motor sensor cable with respect to the enclosure and other connections using reinforced insulation of the creepage and clearances (rated impulse voltage 12 kV) acc. to EN 60664 1
- Certified power disconnection (94/9/EC, ATEX) of the inverter without main contactor
- Forced inverter inhibit (EMERGENCY STOP function via STO)
- Terminal strip acc. to NE37, if fulfilled
- Sine-wave filter integrated in the PM260 Power Modules (500 V to 690 V)
- A line reactor is not required for the PM260 and PM250 Power Modules
- PM250 and PM260 Power Modules are capable of energy recovery
- A series of inverters for the complete voltage and power range
- The integrated or external sine-wave filter permits unshielded motor cables up to 300 m; shielded motor cables are possible up to 200 m (carefully observe the max. length of the temperature sensor cable!)
- An extremely compact overall drive system can be achieved when using a PM260 Power Module, frame size FSD or FSF (the line reactor and sine-wave filter are not required, the chemical industry module is directly snapped onto the Power Module).

CM240NE chemical industry module without cover

The CM240NE chemical industry module has the following interfaces:

Designation	Description
PROFIBUS	9-pin, Sub-D connector or socket to connect PROFIBUS
X11 and X12	Parallel connection of the CM240NE chemical industry module with the Control Unit
X2	Terminal strip in accordance with NAMUR recommendation NE37 (2.5 mm^2 screw terminals) • Digital inputs and outputs • Analog inputs and outputs
X3	Terminal strip in accordance with NAMUR recommendation NE37 (2.5 mm^2 screw terminals) to connect the motor temperature sensor

Function

- Thermal motor protection (TMP) using the the PTC thermistor integrated in the motor (incl. protective separation up to 690 V line supplies)
- The analog inputs and outputs are electrically isolated (MW1 to 3)
- Provision of NAMUR terminal strip (-X2; -X3)

Integration

A chemical industry inverter comprises a SINAMICS G120 inverter (Power Module and Control Unit) and the CM240NE chemical industry module.

The CU240S DP-F is suitable as Control Unit. This is a Control Unit with integrated safety-oriented functions and PROFIBUS-DP interface.

The following Power Module versions are used:

- PM240 Power Module with DC braking function and brake chopper, 400 V line supply voltage
- PM250 Power Module with energy recovery capability, 400 V line supply voltage
- PM260 Power Module with energy recovery capability, 500 V to 690 V line supply voltage

Depending on the power unit, additional components may be necessary to complete the system.

Chemical industry inverter comprising PM240 Power Module, CU240S DP-F Control Unit with BOP and CM240NE chemical industry module

Additional information

A script file to parameterize the interconnections in line with the NAMUR assignment is available as download to commission the system using the STARTER commissioning tool.

German:
http://support.automation.siemens.com/WW/view/de/30814192

English:
http://support.automation.siemens.com/WW/view/en/30814192

Supplementary system components
PC Inverter Connection Kit -2

Overview

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With these, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

A USB cable (3 m) and the STARTER commissioning tool [1] are included as scope of delivery on a DVD.

Selection and ordering data

	Order No.
PC Inverter Connection Kit -2 for CU230P-2 Control Units new Including USB cable (3 m) and STARTER commissioning tool [1] on DVD	**6SL3255-0AA00-2CA0**

4

Supplementary system components
PC Inverter Connection Kit

Overview

Example: PC Connection Kit for CU240 Control Units

For controlling and commissioning an inverter directly from a PC, if the STARTER commissioning tool has been installed on the PC. With these, the inverter can be

- parameterized (commissioning, optimization)
- monitored (diagnostics)
- controlled (master control via the STARTER commissioning tool for test purposes).

This is an isolated RS232 adapter board for a reliable point-to-point connection to a PC with a serial RS232 interface. A USB/RS232 adapter can be used as an alternative (e.g. type 12.02.1086R supplied by Roline).

The scope of delivery includes a 9-pin Sub-D connector, an RS232 standard cable (3 m) and the STARTER commissioning tool [1] on DVD.

Selection and ordering data

	Order No.
PC Inverter Connection Kit Including a 9-pin Sub-D connector, an RS232 standard cable (3 m), and the STARTER commissioning tool [1] on DVD	**6SL3255-0AA00-2AA1**

[1] The STARTER commissioning tool is also available in the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Overview

The Brake Relay allows the Power Module to be connected to an electromechanical motor brake, thereby allowing the motor brake to be driven directly by the Control Unit.

Selection and ordering data

	Order No.
Brake Relay Including cable harness for connection to the Power Module	**6SL3252-0BB00-0AA0**

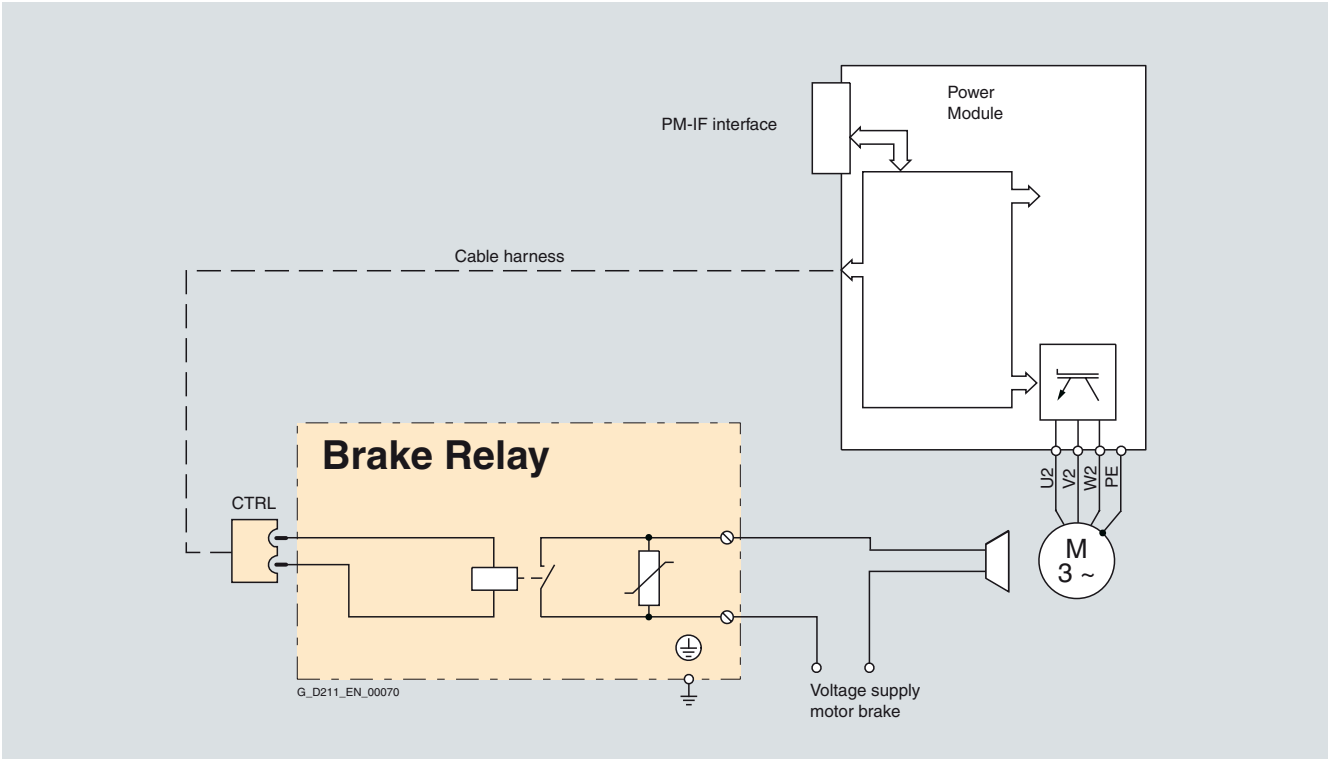
Integration

The Brake Relay has the following interfaces:

- A switch contact (NO contact) to control the motor brake solenoid
- A connection for the cable harness (CTRL) for connection to the Power Module

The Brake Relay can be installed on the shield bonding plate near the power terminals of the Power Module.

The supplied Brake Relay includes the cable harness for connection with the Power Module.



Connection example of a Brake Relay

Technical specifications

	Brake Relay
Max. switching capability of the NO contact	440 V AC / 3.5 A 30 V DC / 12 A
Max. conductor cross-section	2.5 mm^2
Degree of protection	IP20
Dimensions	
• Width	68 mm
• Height	63 mm
• Depth	33 mm
Weight, approx.	0.17 kg

Supplementary system components
Safe Brake Relay

Overview

The Safe Brake Relay allows the Power Module to be safely connected to an electromechanical motor brake, allowing the brake to be directly and safely controlled by the Control Unit in accordance with EN 954-1 Safety Category 3 and IEC 61508 SIL 2.

Selection and ordering data

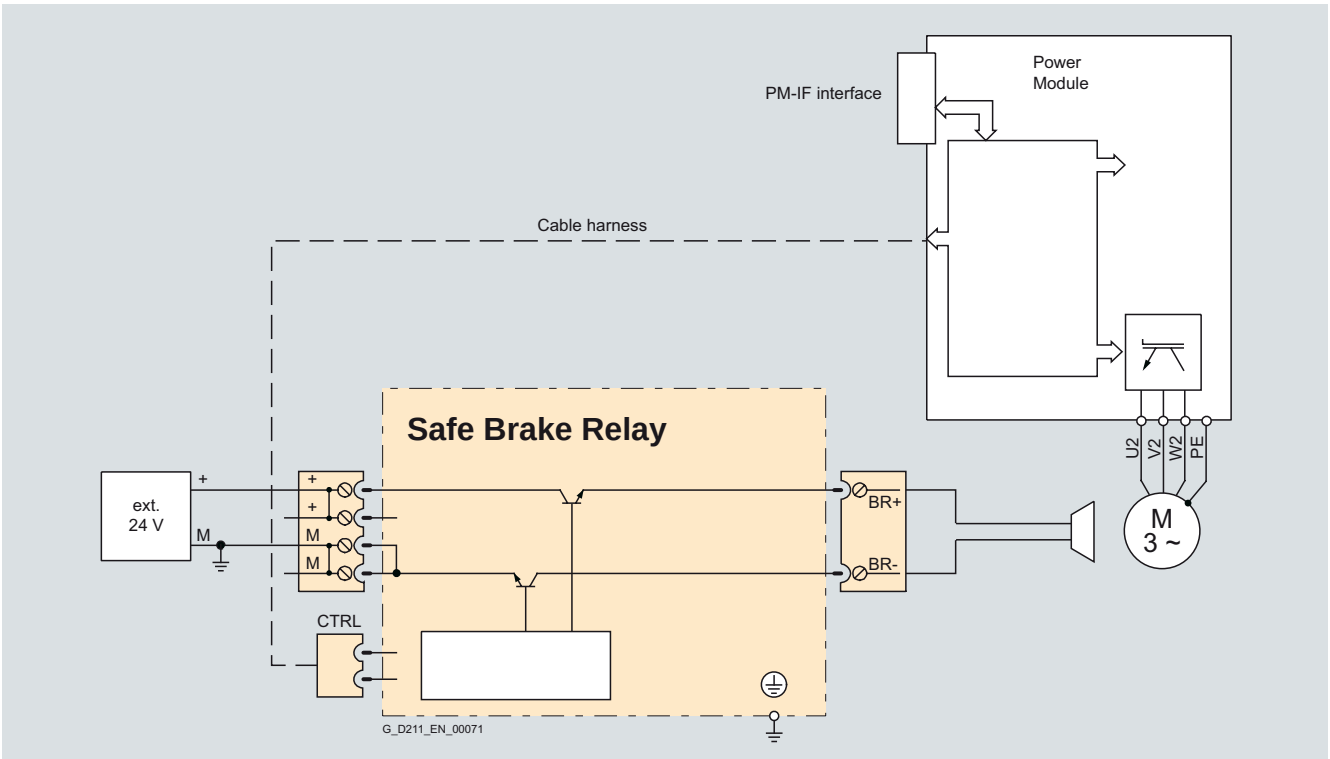
	Order No.
Safe Brake Relay Including cable harness for connection to the Power Module	**6SL3252-0BB01-0AA0**

Integration

The Safe Brake Relay has the following interfaces:

- A two-channel transistor output stage to control the motor brake solenoid
- A connection for a 24 V DC power supply
- A connection for the cable harness (CTRL) for connection to the Power Module

The Safe Brake Relay can be mounted on the shield bonding plate near the power terminals of the Power Module.
The supplied Safe Brake Relay includes the cable harness for connection with the Power Module.
The 24 V DC solenoid of the motor brake is directly connected to the Safe Brake Relay. External surge suppressors are not required.



Connection example of a Safe Brake Relay

Technical specifications

	Safe Brake Relay
Supply voltage	20.4 … 28.8 V DC Recommended rated value of the 26 V DC supply voltage (to equalize and compensate for the voltage drop along the feeder cable to the 24 V DC solenoid of the motor brake)
Max. current requirement of motor brake	2 A
Current requirement at 24 V DC, max.	0.005 A + the current requirement of motor brake

	Safe Brake Relay
Max. conductor cross-section	2.5 mm^2
Degree of protection	IP20
Dimensions	
• Width	68 mm
• Height	63 mm
• Depth	33 mm
Weight, approx.	0.17 kg

Supplementary system components
Adapter for mounting on DIN rails

Overview

The adapter for DIN rail mounting can be used to mount inverters, frame sizes FSA and FSB on DIN mounting rails (2 units with a center-to-center distance of 100 mm).

Furthermore, the motor cable shield connection and other cable shields required for mounting inverters on DIN rails comply with the same standards for emissions and conducted emissions as if the inverter were directly installed in a control cabinet.

The adapter for inverter frame size FSA can be used to mount converters singly or with matching line filter.

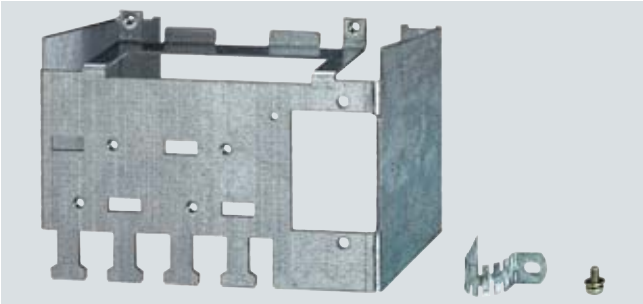
The adapter for inverter frame size FSB can be used to mount inverters with or without an integrated line filter.

Selection and ordering data

Adapter for mounting on DIN rails	Order No.
• for Power Module frame size FSA	**6SL3262-1BA00-0BA0**
• for Power Module frame size FSB	**6SL3262-1BB00-0BA0**

Supplementary system components
Shield Connection Kit

Overview



Example of Shield Connection Kit for Power Module frame size FSB

The Shield Connection Kit

- makes it easier to connect the shields of supply and control cables
- provides mechanical strain relief
- ensures optimum EMC performance
- is used to attach the Brake Relay and Safe Brake Relay

The Shield Connection Kit includes

- a shield bonding plate for the required Power Module
- a shield bonding plate for a CU240 Control Unit
- connection elements and clamps for mounting
- mounting device for Brake Relay or Safe Brake Relay – frame sizes FSB to FSF

Selection and ordering data

Shield Connection Kit	Order No.
• for PM240/PM250 Power Modules	
- Frame size FSA	**6SL3262-1AA00-0BA0**
- Frame size FSB	**6SL3262-1AB00-0DA0**
- Frame size FSC	**6SL3262-1AC00-0DA0**
- Frame sizes FSD and FSE	**6SL3262-1AD00-0DA0**
- Frame size FSF	**6SL3262-1AF00-0DA0**
• for PM260 Power Modules	
- Frame size FSD	**6SL3262-1FD00-0CA0**
- Frame size FSF	**6SL3262-1FF00-0CA0**

Supplementary system components
Shield Connection Kit 1 for CU230P-2

Overview

The Shield Connection Kit 1 for CU230P-2 Control Units offers for all signal and communication cables

- Optimum shield connection
- Strain relief

It contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The Shield Connection Kit 1 is suitable for the following SINAMICS G120 Control Units:

- CU230P-2 HVAC
- CU230P-2 DP
- CU230P-2 CAN

Selection and ordering data

		Order No.
Shield Connection Kit 1 for CU230P-2 Control Units	new	**6SL3264-1EA00-0FA0**

Supplementary system components
Shield Connection Kit for CU240S Control Units

Overview

The Shield Connection Kit for CU240S Control Units offers for all signal and communication cables

- Optimum shield connection
- Strain relief

It contains the following:

- A matching shield bonding plate
- All of the necessary connecting and retaining elements for mounting

The Shield Connection Kit is suitable for the following SINAMICS G120 Control Units:

- CU240S
- CU240S DP
- CU240S DP-F
- CU240S PN
- CU240S PN-F

Selection and ordering data

		Order No.
Shield Connection Kit For CU240S Control Units	new	**6SL3264-1EA00-0EA0**

Spare parts
CU240 Spare Parts Kit

Overview

The CU240 Spare Parts Kit includes:

- A replacement cover to cover the terminals
- A matching shield bar for the CU240E Control Unit, incl. screws
- A replacement connector for the CU240S Control Unit
- A protective element for the MMC card slot
- Screws to attach the shield bonding plate of the CU240S Control Unit

The CU240 Spare Parts Kit is suitable for the following SINAMICS G120 Control Units:

- CU240E
- CU240S
- CU240S DP
- CU240S DP-F
- CU240S PN
- CU240S PN-F

Selection and ordering data

	Order No.
CU240 Spare Parts Kit For CU240E and CU240S Control Units	new **6SL3200-0SK00-0AA0**

Spare parts
Spare door for PM240 frame size FSGX

Overview

Complete replacement door for the PM240 Power Module frame size FSGX

Selection and ordering data

	Order No.
Replacement door for PM240 Power Module frame size FSGX	new **6SL3200-0SM10-0AA0**

4

Spare parts
Terminal Cover Kit for frame sizes FSD and FSE

Overview

The Terminal Cover Kit includes a replacement cover for the connecting terminals.

The Terminal Cover Kit is suitable for the following SINAMICS G120 Power Modules:

- PM240 frame sizes FSD and FSE
- PM250 frame sizes FSD and FSE

Selection and ordering data

	Order No.
Terminal Cover Kit for frame sizes FSD and FSE	new **6SL3200-0SM11-0AA0**

Spare parts
Terminal Cover Kit for frame size FSF

Overview

The Terminal Cover Kit includes a replacement cover for the connecting terminals.

The Terminal Cover Kit is suitable for the following SINAMICS G120 Power Modules:

- PM240 frame size FSF
- PM250 frame size FSF
- PM260 frame size FSF

Selection and ordering data

	Order No.
Terminal Cover Kit for frame size FSF	new **6SL3200-0SM12-0AA0**

Overview

Replacement connector for the input and output sides.

The replacement connector is suitable for the following SINAMICS G120 PM260 Power Modules frame size FSD.

Selection and ordering data

		Order No.
Replacement connector for PM260 Power Modules frame size FSD	new	**6SL3200-0ST04-0AA1**

Spare parts
Replacement fan

Overview

The Power Module fans are designed for extra long service life.
Replacement fans can be ordered for special applications.

Selection and ordering data

Rated power		SINAMICS G120 PM240 Power Module		Replacement fan
kW	hp	Type 6SL3224-...	Frame size and number of fans	Order No.
380 ... 480 V 3 AC				
0.37	0.50	0BE13-7UA0	FSA, 1 fan	**6SL3200-0SF01-0AA0** (includes 1 replacement fan)
0.55	0.75	0BE15-5UA0		
0.75	1.0	0BE17-5UA0		
1.1	1.5	0BE21-1UA0		
1.5	2	0BE21-5UA0		
2.2	3	0BE22-2 . A0	FSB, 2 fans [1]	
3.0	4	0BE23-0 . A0		
4.0	5	0BE24-0 . A0		
7.5	10	0BE25-5 . A0	FSC, 2 fans [1]	**6SL3200-0SF03-0AA0** (includes 1 replacement fan)
11.0	15	0BE27-5 . A0		
15.0	20	0BE31-1 . A0		
18.5	25	0BE31-5 . A0	FSD, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
22	30	0BE31-8 . A0		
30	40	0BE32-2 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
37	50	0BE33-0 . A0	FSE, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
45	60	0BE33-7 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
55	75	0BE34-5 . A0	FSF, 2 fans	**6SL3200-0SF06-0AA0** (includes 2 replacement fans)
75	100	0BE35-5 . A0		
90	125	0BE37-5 . A0		**6SL3200-0SF07-0AA0** (includes 2 replacement fans)
110	150	0BE38-8UA0		**6SL3200-0SF08-0AA0** (includes 2 replacement fans)
132	200	0BE41-1UA0		
160	250	0XE41-3UA0	FSGX, 2 fans new	**6SL3362-0AG00-0AA1** (includes 2 replacement fans)
200	300	0XE41-6UA0		
250	400	0XE42-0UA0		

Rated power		SINAMICS G120 PM250 Power Module		Replacement fan
kW	hp	Type 6SL3225-...	Frame size and number of fans	Order No.
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA0	FSC, 2 fans [1]	**6SL3200-0SF03-0AA0** (includes 1 replacement fan)
11.0	15	0BE27-5AA0		
15.0	20	0BE31-1AA0		
18.5	25	0BE31-5 . A0	FSD, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
22	30	0BE31-8 . A0		
30	40	0BE32-2 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
37	50	0BE33-0 . A0	FSE, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
45	60	0BE33-7 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
55	75	0BE34-5 . A0	FSF, 2 fans	**6SL3200-0SF06-0AA0** (includes 2 replacement fans)
75	100	0BE35-5 . A0		
90	125	0BE37-5 . A0		**6SL3200-0SF08-0AA0** (includes 2 replacement fans)

Rated power		SINAMICS G120 PM260 Power Module		Replacement fan
kW	hp	Type 6SL3225-...	Frame size and number of fans	Order No.
660 ... 690 V 3 AC				
11.0	15	0BH27-5 . A1	FSD, 2 fans new	**6SL3200-0SF11-0AA0** (includes 2 replacement fans)
15.0	20	0BH31-1 . A1		
18.5	25	0BH31-5 . A1		
30	40	0BH32-2 . A1	FSF, 2 fans	**6SL3200-0SF07-0AA0** (includes 2 replacement fans)
37	50	0BH33-0 . A1		
55	75	0BH33-7 . A1		

[1] Recommended: Even if only one fan on the Power Module is defective, it is advisable to replace both. In this case, the order quantity must be doubled.

SINAMICS G110D
Distributed inverters
0.75 kW to 7.5 kW (1.0 hp to 10 hp)

5

SINAMICS G110D distributed inverters

Overview

The new SINAMICS G110D distributed frequency inverter series is the solution for basic drive tasks especially in the field of conveyor systems. The inverter allows the speed of three-phase asynchronous motors to be continually controlled and fulfills the requirements of conveyor-related applications with open-loop frequency control. It can be optimally integrated into the system thanks to its compact and low-profile design in an IP65 degree of protection. This drive can be optimally integrated into the Siemens TIA world of automation via AS-Interface.

With its wide power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp), it is suitable for a wide range of distributed drive solutions.

Example: SINAMICS G110D, frame size FSA

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 cables between the inverter and motor can be avoided (which means lower power losses, reduced noise emission and lower costs for shielded cables and 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 inverters 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
- Identical mounting dimensions for SINAMICS G110D and SINAMICS G120D
- Standard commissioning and configuration tool

Products from the family of distributed drives:

- SINAMICS G110D frequency inverters
- SINAMICS G120D frequency inverters
- SIMATIC ET 200S FC drive converters
- SIMATIC ET 200pro FC drive converters
- SIRIUS M200D motor starters

Device design

SINAMICS G110D is a compact inverter in IP65 degree of protection where the Control Unit (CU) and Power Module (PM) function units are combined in one device.

The closed-loop control electronics controls and monitors the power electronics in several different control types that can be selected. The digital inputs and analog inputs on the device mean that sensors can be simply and directly connected at the drive. The input signals can either be directly linked within the closed-loop control or they can be transferred to the central control via AS-Interface for further processing within the context of the overall system.

The power electronics supplies the motor in the power range 0.75 kW to 7.5 kW (1.0 hp to 10 hp). It is controlled (open-loop) from the microprocessor-based control. State-of-the-art IGBT technology with pulse-width-modulation is used for highly reliable and flexible motor operation. It also features an extensive range of functions offering a high degree of protection for the inverter and motor. The unusually low profile mechanical design is optimized so that the device can be directly used in the plant or system. The compact inverter has the same drilling dimensions for all of the power ratings (standard “footprint”); further, the dimensions are identical to those of the SINAMICS G120D frequency inverter. This significantly simplifies the mechanical design and retrofitting of the system.

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions), are available on the Internet under:
http://www.siemens.com/sinamics-g110d/documentation

and offline on the DVD CA 01 in the SD Configurator. In addition, the SD Configurator can be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

STARTER commissioning tool

The STARTER commissioning tool (from STARTER Version 4.1.3 and higher) supports the commissioning and maintenance of SINAMICS G110D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Applications

SINAMICS G110D is ideally suited for basic conveyor system applications in the industrial environment for which a distributed drive with communications capability is required. This is especially true for distribution logistics and for airports.

Further, SINAMICS G110D is suitable for many additional low-performance applications in many sectors, e.g. in the automobile sector, in the food and beverage industry (without tenside) and in the packaging industry.

Selection and ordering data

Rated power [1]		Rated output current [2]	Input current	Frame size	SINAMICS G110D with integrated class A line filter	SINAMICS G110D with integrated class A line filter and integrated maintenance switch
kW	hp	A	A		Order No.	Order No.
380 … 500 V 3 AC [3]						
0.75	1	2.3	2.0	FSA	new **6SL3511-0PE17-5AM0**	new **6SL3511-1PE17-5AM0**
1.5	1.5 [4]	4.3	3.8	FSA	new **6SL3511-0PE21-5AM0**	new **6SL3511-1PE21-5AM0**
3	4	7.7	7.0	FSA	new **6SL3511-0PE23-0AM0**	new **6SL3511-1PE23-0AM0**
4	5	10.2	9.1	FSB	new **6SL3511-0PE24-0AM0**	new **6SL3511-1PE24-0AM0**
5.5	7.5	13.2	12.2	FSC	new **6SL3511-0PE25-5AM0**	new **6SL3511-1PE25-5AM0**
7.5	10	19.0	17.9	FSC	new **6SL3511-0PE27-5AM0**	new **6SL3511-1PE27-5AM0**

Benefits

- Wide power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp)
- Fast commissioning and maintenance as well as extended diagnostic functions and communications capability with AS interface according to specification 3.0
  - Reduced number of interfaces
  - Plantwide engineering
  - Easy to handle
- 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; further, the dimensions are identical with those of the SINAMICS G120D inverter.
- Simple commissioning and maintenance using the same, standardized connectors for the bus, power and I/O connections (ISO 23570) for the complete power range of SINAMICS G110D and SINAMICS G120D inverters.
- The same connectors are used as for the SIRIUS M200D motor starter
- Simple, standard implementation of completely distributed plant and system concepts by using products in a scalable fashion:
  - SIRIUS M200D (motor starter)
  - SINAMICS G110D (inverter for basic, conveyor-related applications)
  - SINAMICS G120D (inverter for sophisticated, conveyor-related applications)
- High degree of operator friendliness by using the Intelligent Operator Panel (IOP) to parameterize, diagnose, control (open-loop) and copy drive parameters in the IOP
- Easy to replace using a plug-in design and the use of a memory card provides the highest degree of service friendliness
- Simple connection, configuration, data management as well as control of the inverter in complex plants and systems as a result of the consequential integration in TIA (Totally Integrated Automation)
- Using the optional maintenance switch, the inverter can be simply disconnected from the line supply when service is required, without any additional components or without additional wiring costs when configuring the system
- Using the optional manual local control, commissioning is fast and can be limited to specific areas, the application can be manually pre-tested on site and the system can be cleared or emptied without requiring complex options.
- By being able to connect up to five sensors directly at the unit, practically all of the drive-relevant information can be directly managed; local pre-processing of the signals relieves the fieldbus to achieve fast and reproducible response times
- Integrated class A EMC filter (acc. to EN 55011)
- Integrated brake control, brake voltages that are supported, 400 V AC/180 V DC and 230 V AC/205 V DC
- Integrated motor protection using a thermal motor model and evaluation of PTC, Thermo-Click or KTY 84 temperature sensors
- Simple device replacement and fast copying of parameters to the memory card using the optional memory card holder and the optional MMC memory card
- Engineering and commissioning using standard engineering tools such as SIZER (from Version 3.2 and higher), STARTER (from Version 4.1.3 and higher) and Drive ES ensures fast configuration and simple commissioning – STARTER is integrated into STEP 7 with Drive ES Basic, with all of the benefits of central data management and unified communication
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- Increased degree of ruggedness and longer service life as the electronic modules are coated
- Globally certified acc. to CE, UL, c-tick

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for high overload (HO).

[2] The rated output current I_{rated} is based on the duty cycle for high overload (HO). These current values are valid for 400 V and are stamped on the rating plate.

[3] With the exception of UL operation, 500 V +10 % is possible.

[4] It is not possible to make any assignment to a particular standard.

Design

The SINAMICS G110D distributed frequency inverters are compact frequency inverters for standard drives. Each SINAMICS G110D includes both the Control Unit as well as the Power Module in one unit.

Example: SINAMICS G110D with integrated maintenance switch and manual-local control with keyswitch

SINAMICS G110D features an integrated brake chopper and is suitable for distributed drives without energy recovery capability. If generator energy is produced then this is dissipated in the externally connected braking resistors. The communication is realized via the local inputs (digital and analog) or via the AS-Interface bus integrated as standard.

Example: SINAMICS G110D with integrated maintenance switch

The inverter is available in 2 versions: with or without maintenance switch. Using the optional maintenance switch (this cannot be retrofitted), when service is required, the inverter can be simply disconnected from the line supply without having to have any additional components or additional wiring costs when configuring.

Accessories

Braking resistors

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are designed for use with the SINAMICS G110D. This has an integrated brake chopper (electronic switch).

Intelligent Operator Panel IOP Handheld

User-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of SINAMICS G110D.

Manual-local control with keyswitch

Master control can be toggled between the automatic mode (PLC) and manual-local mode using the manual-local control. This can also be used to switch off the inverter. Additional functions include switching over between the continuous and jog mode, starting the motor including direction of rotation and deactivating the quick stop in the manual mode.

MMC memory card

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The associated memory card holder is not included with the inverter and must be separately ordered.

Card holder for the MMC memory card

To use the MMC memory card, a card holder is required that is inserted under the blanking cover or under the manual-local control operator panel on the inverter.

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool from Version 4.1.3 and higher) has been installed.

USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool from Version 4.1.3 and higher) has been installed.

Adapter to mount the SINAMICS G110D instead of a SIRIUS M200D motor starter

Connection Board Kit to mount a SINAMICS G110D inverter on the connection holes of the SIRIUS M200D motor starter (assuming that there is enough space).

Connecting cable

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

Flexible plug-in cables to transfer data between AS-Interface participants as well as to supply the Control Unit and the Power Module with power.

Spare Parts Kit

A Spare Parts Kit is available which comprises small parts such as seals, caps and screws.

Replacement fan

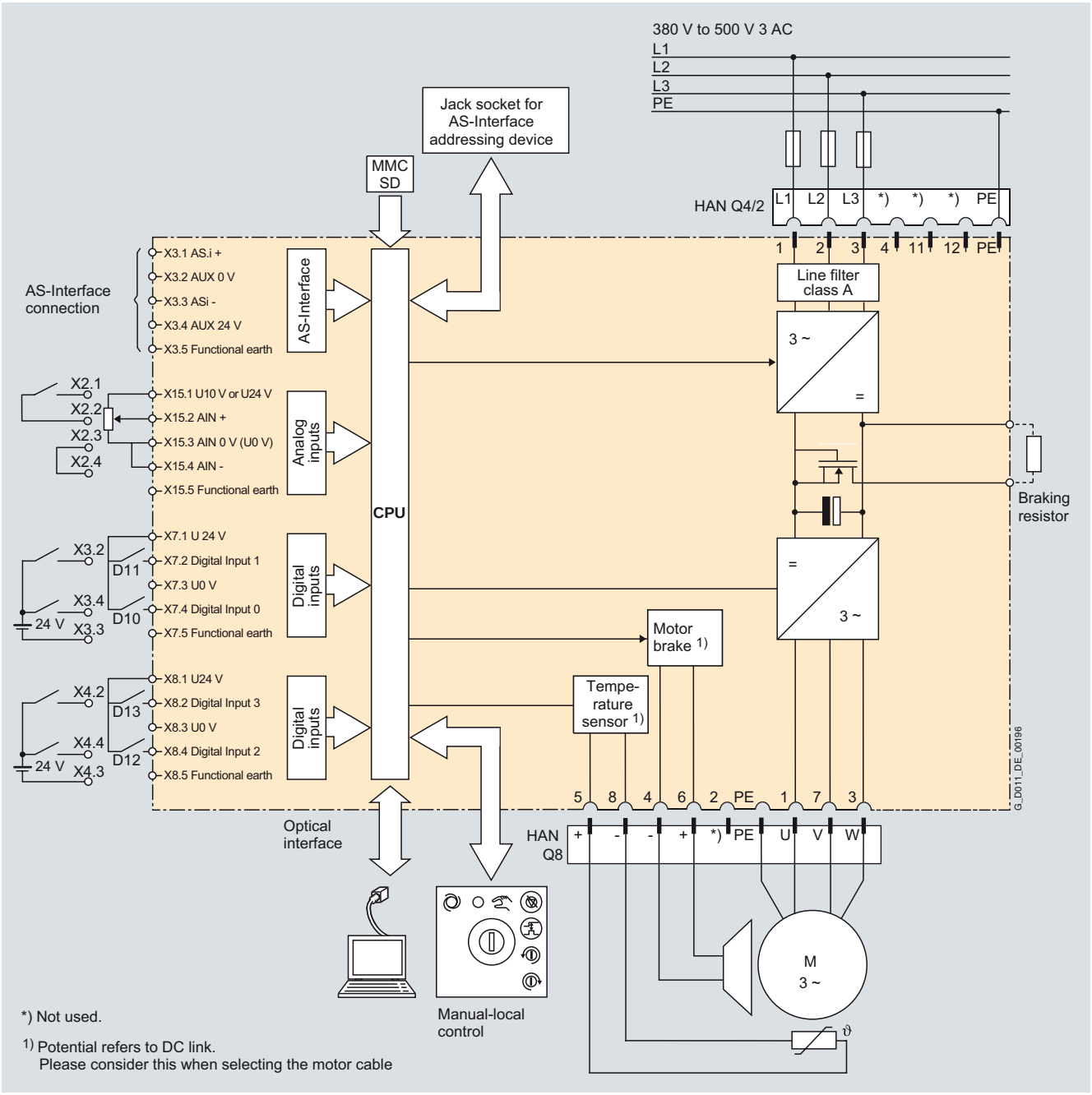
A replacement fan is available, which comprises a pre-mounted unit with cover, fan and screws.

Integration

The SINAMICS G110D distributed inverters have, as standard, the following interfaces:

- Motor connection via a HAN Q8 (connector) including control of the motor brake and temperature sensor
- Line supply connection via HAN Q4/2 (socket)
- Connection for a braking resistor in IP65 degree of protection through a three-pin connector
- AS-Interface connection via M12 (connector)
- Connection for four digital inputs via M12 (socket)
- Connection for an analog input via M12 (socket); this can also be used as digital input
- Connection for an AS-Interface addressing device via jack plug

The interfaces are identical to those of the SINAMICS G120D distributed inverter and those of the SIRIUS M200D motor starter.



SINAMICS G110D connection diagram with integrated class A line filter

Configuration

The following electronic configuring aids and engineering tools are available for the SINAMICS G110D distributed inverters:

Selection guide, SD Configurator within the CA 01

More than 100.000 products with approximately 5 million possible product versions from the area of drive technology are listed in the Interactive Catalog CA 01 – the Offline Mall from Siemens IA&DT. In order to make it easier to select the optimum motor and/or inverter from the wide range of Standard Drives, the SD Configurator was developed, which is integrated as "Selection guide" in this catalog on the DVD with the selection and configuration tools.

Online SD Configurator

In addition, the SD Configurator can now be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address: http://www.siemens.com

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics.
In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units and the drive converters for the distributed I/O SIMATIC ET 200S FC and SIMATIC ET 200pro FC. For SINAMICS G110D from STARTER Version 4.1.3 and higher.

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. Therefor the STEP 7 Manager user interface forms the basis. Various software packages are available for SINAMICS: Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all SINAMICS G110D distributed inverters.

General technical specifications	
Mechanical specifications	
Vibratory load according to EN 60068-2-6	
• Transport [1]	5 … 9 Hz: Constant deflection, 3.1 mm 9 … 200 Hz: Constant acceleration = 9.81 m/s^2 (1 × *g*)
• Operation	2 … 9 Hz: Constant deflection, 7 mm 9 … 200 Hz: Constant acceleration = 19.62 m/s^2 (2 × *g*)
Shock according to EN 60068-2-27	
• Transport [1]	147.15 m/s^2 (15 × *g*)/11 ms 3 Shocks in each axis and direction
• Operation	147.15 m/s^2 (15 × *g*)/11 ms 3 Shocks in each axis and direction
Degree of protection	IP65
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class III (PELV)
Touch protection according to EN 61800-5-1	Class I (with protective conductor system)
Max. humidity	95 % at 40 °C
Ambient temperature	
• Storage [1] acc. to EN 60068-2-1	–40 … +70 °C
• Transport [1] acc. to EN 60068-2-1	–40 … +70 °C
• Operation acc. to EN 60068-2-2	–10 … +40 °C without derating > 40 … 55 °C see derating characteristics
Environmental class/harmful chemical substances	
• Operation acc. to EN 60721-3-3	Class 3C2
Degree of pollution acc. to EN 61800-5-1	2
Standards	
Compliance with standards	UL 508C (UL list number E121068), CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC
EMC Directive [2]	
• Frame sizes FSA to FSC with integrated class A line filter	Category C2 [3] acc. to EN 61800-3 (corresponds to class A acc. to EN 55011)

Note: The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC Directive.

[1] In transport packaging.

[2] For further general information, see also SINAMICS G110 section Technical specifications, Compliance with standards.

[3] With shielded motor cables up to 15 m.

Technical specifications

Technical specifications, control electronics	
Electrical specifications	
Operating voltage	external 24 V DC necessary
Current consumption, max. [1] (from the non-switched 24 V supply, yellow AS-Interface cable)	320 mA
Current consumption, max. (from the switched 24 V supply, black AS-Interface cable)	
• Without supplementary fan	180 mA
• With supplementary fan	350 mA
Fixed frequencies	6, parameterizable
Interfaces	
Digital inputs	4
Analog inputs (0 ... 10 V)	1
Bus interface	AS-Interface
PTC/KTY interface	Connection via Power Module
• Motor temperature sensor	1 input, sensors that can be connected: PTC, KTY or Thermo-Click
Control of a mechanical motor brake	Connection via Power Modules
MMC memory card slot	Optional
RS232 interface	Connection with RS232 interface cable via the optical inverter interface
USB interface	Connection with USB interface cable via the optical inverter interface
Open-loop/closed-loop control technique and software	
***V/f* linear/square/parameterizable**	✓
***V/f* with flux current control (FCC)**	✓
Software functions	• Signal interconnection with BICO technology • Automatic restart after line supply failure or operational fault • Slip compensation • Free function blocks (FFB) for logic operations • Ramp smoothing • 3 selectable drive data sets • 3 selectable command data sets (CDS) (manual/auto) • Flying restart • JOG • Technology controller (PID) • Thermal motor protection • Thermal inverter protection • Setpoint input • Motor identification • Motor holding brake

[1] Includes the current consumption of connected sensors.
Analog input as voltage input, 0 V to 10 V.

Technical specifications

General technical specifications, power electronics	
System operating voltage	380 ... 500 V 3 AC ±10 %
Line supply requirements, line short circuit voltage u_K	no restriction
Input frequency	47 ... 63 Hz
Output frequency • Control type *V/f*	 0 ... 650 Hz
Pulse frequency	4 kHz (Standard), higher pulse frequencies up to 16 kHz, see the derating data
Power factor	0.7 ... 0.85
Inverter efficiency η	95 %
Modulation depth	95 %
Overload capability • High overload (HO)	 • Average maximum rated output current during a cycle time of 300 s • 1.5 × rated output current (i.e. 150 % overload) over 60 s at a cycle time of 300 s • 2 × rated output current (i.e. 200 % overload) over 3 s at a cycle time of 300 s
Electromagnetic compatibility	Integrated class A line filter according to EN 55011
Possible braking methods • Output current, max.	DC braking integrated brake control 180 V DC (corresponds to 400 V AC rectified) and 205 V DC (corresponds to 230 V AC rectified) Shutdown on the DC side permits "fast" braking. • 600 mA (with UL approval) • 1 A (without UL approval)
Permissible mounting position	Horizontal wall mounting and mounting in the horizontal position
Relative humidity	< 95 % RH, condensation not permissible
Cooling	• FSA: Convection • FSB and FSC: Air cooling as required using the integrated fan
Installation altitude	• Up to 1000 m above sea level without power reduction • > 1000 m see derating characteristics
Standard Short Circuit Current Rating (SCCR) [1]	10 kA
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Standards conformance	UL 508C (UL list number E121068), CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at: http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

Line supply voltage 380 ... 500 V 3 AC		SINAMICS G110D					
		6SL3511-.PE17-5AM0	6SL3511-.PE21-5AM0	6SL3511-.PE23-0AM0	6SL3511-.PE24-0AM0	6SL3511-.PE25-5AM0	6SL3511-.PE27-5AM0
Rated output current I_{rated} [1]	A	2.3	4.3	7.7	10.2	13.2	19
Output current I_{max}	A	4.6	8.6	15.4	20.4	26.4	38
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η	%	0.95	0.95	0.95	0.95	0.95	0.95
Rated power	kW (hp)	0.75 (1.0)	1.5 (1.5) [3]	3 (4.0)	4 (5.4)	5.5 (7.4)	7.5 (10)
Rated input current [2]	A	2.0	3.8	7.0	9.1	12.2	17.9
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)
• Conductor cross-section	mm^2	1.5 ... 6	1.5 ... 6	2.5 ... 6	2.5 ... 6	4 ... 6	4 ... 6
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)
• Conductor cross-section	mm^2	1 ... 4	1 ... 4	2.5 ... 4	2.5 ... 4	4	4
Motor cable length, max.	m	15	15	15	15	15	15
Degree of protection		IP65	IP65	IP65	IP65	IP65	IP65
Dimensions							
• Width	mm	450	450	450	450	450	450
• Height	mm	210	210	210	210	210	210
• Depth							
- Without maintenance switch	mm	125	125	125	165	240	240
- With maintenance switch	mm	145	145	145	165	240	240
Frame size		FSA	FSA	FSA	FSB	FSC	FSC
Weight, approx.							
• Without maintenance switch	kg	6.7	6.7	6.9	7.4	9.4	9.5
• with maintenance switch	kg	7.0	7.0	7.2	7.7	9.7	9.8

[1] The rated output current I_{rated} is based on the duty cycle for high overload (HO).

[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 = 1 %.

[3] It is not possible to make any assignment to a particular standard.

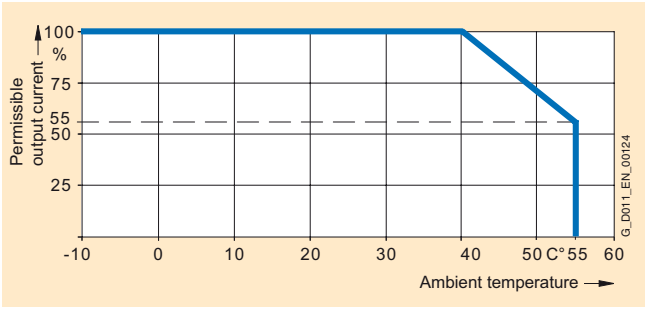
Characteristic curves

Derating data

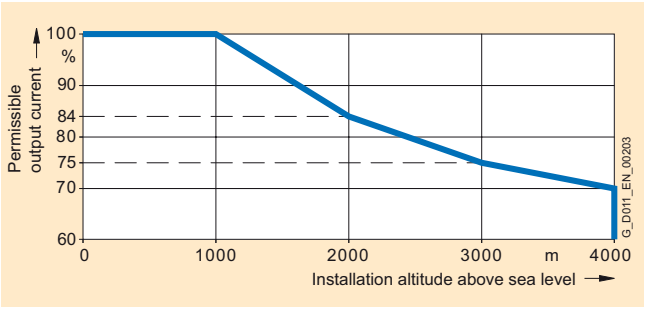
Pulse frequency

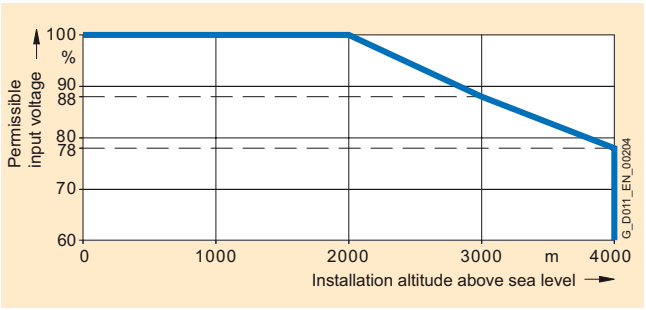
Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.75	1.0	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.5	1.5 [1)]	4.1	3.5	2.9	2.5	2.1	1.8	1.6
3.0	4.0	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	19	16.2	13.3	11.4	9.5	8.6	7.6

Ambient temperature



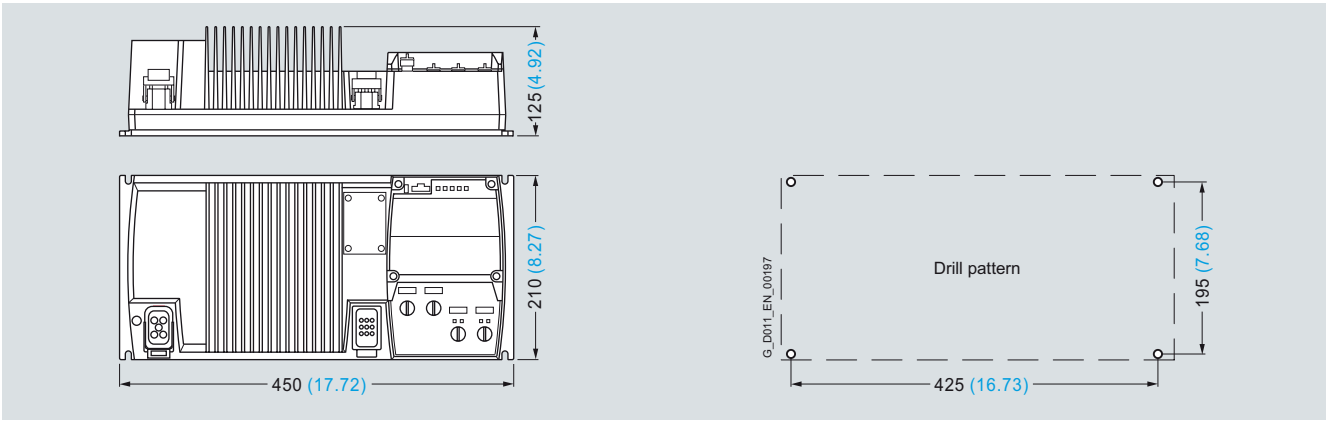
Installation altitude



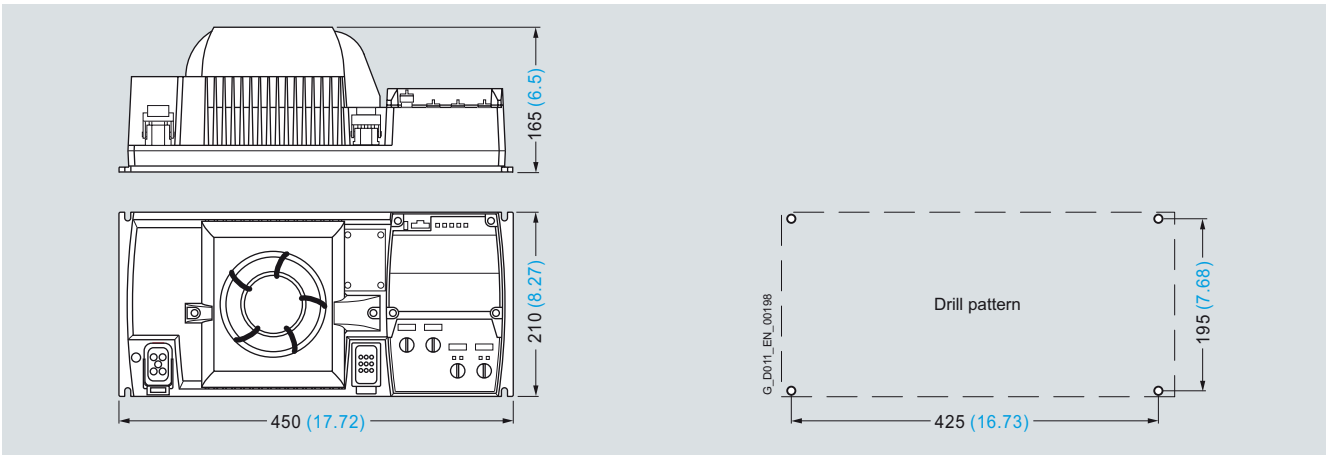


[1)] It is not possible to make any assignment to a particular standard.

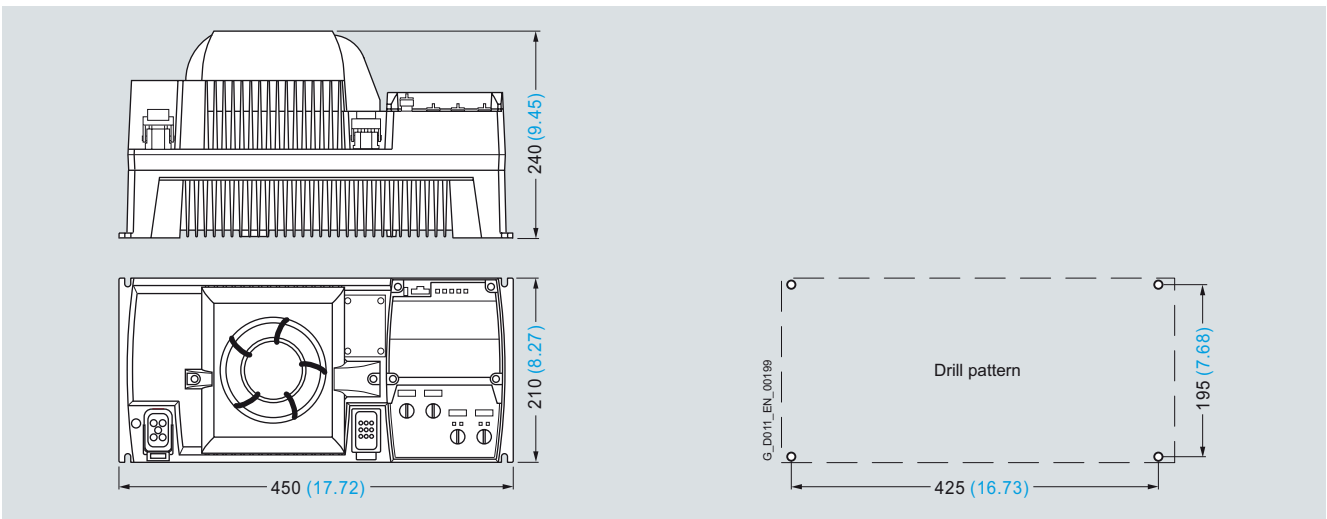
Dimensional drawings



SINAMICS G110D, frame size FSA with integrated class A line filter



SINAMICS G110D, frame size FSB with integrated class A line filter



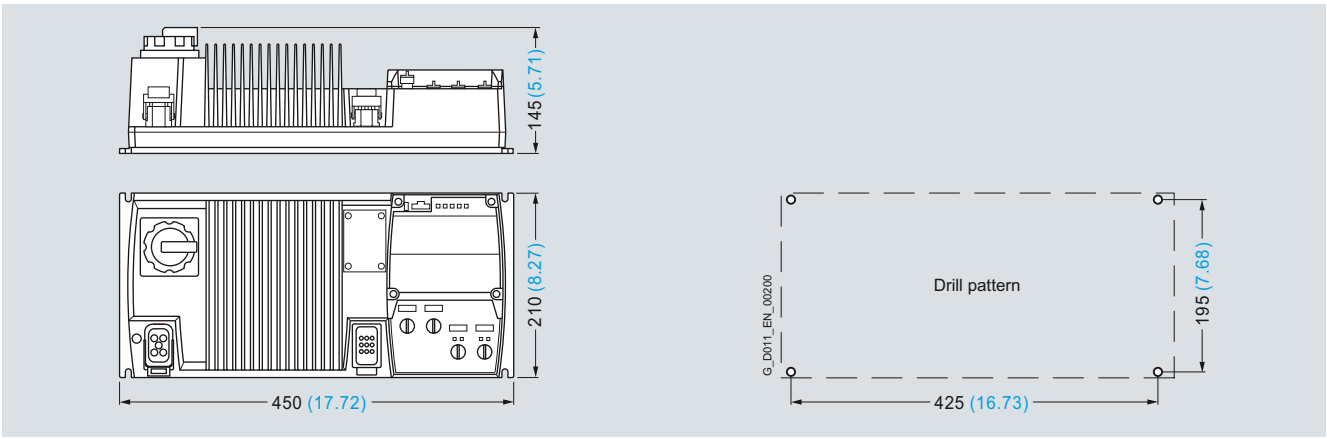
SINAMICS G110D, frame size FSC with integrated class A line filter

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

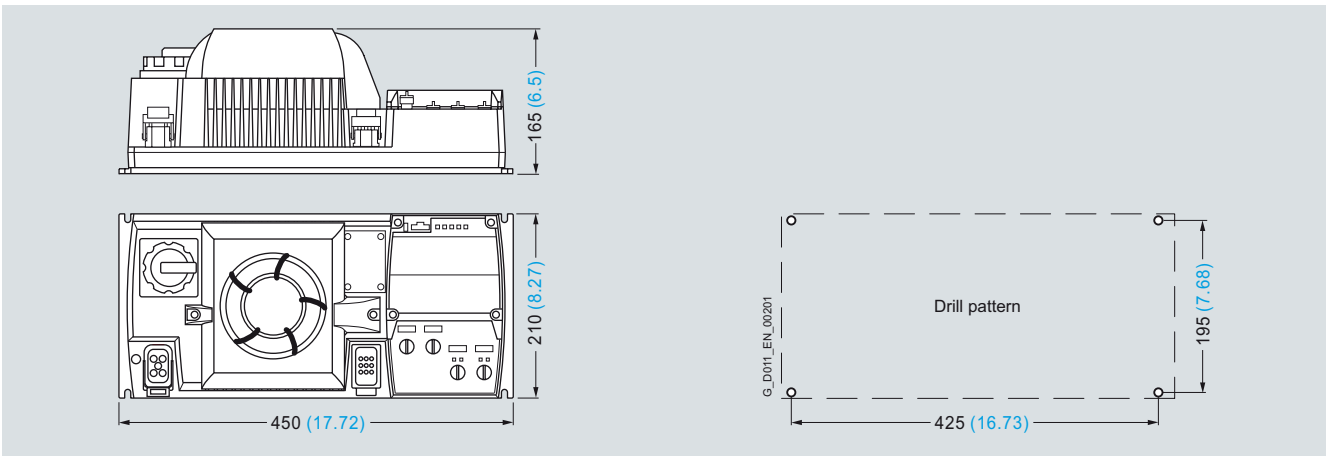
Ventilation clearance required (for wall mounting) at top and bottom: 150 mm (5.9 inches).

All dimensions in mm (values in brackets are in inches).

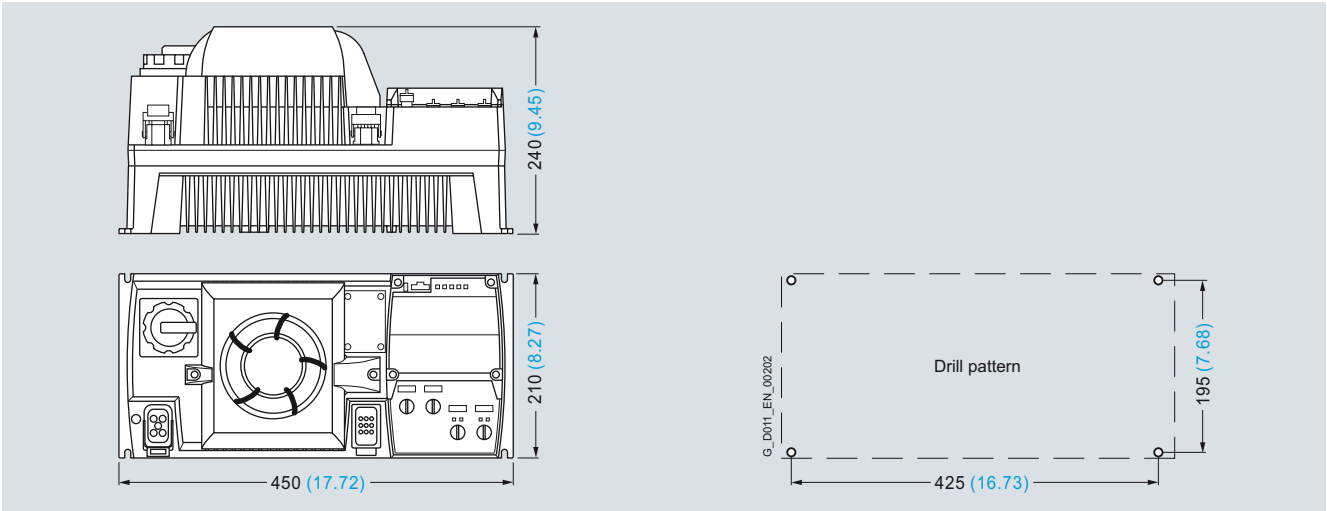
Dimensional drawings



SINAMICS G110D, frame size FSA with integrated class A line filter and maintenance switch



SINAMICS G110D, frame size FSB with integrated class A line filter and maintenance switch



SINAMICS G110D, frame size FSC with integrated class A line filter and maintenance switch

Mounted with 4 M5 studs, 4 M5 nuts, 4 M5 washers.

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).

Overview

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers (line-side components dimensioned in accordance with IEC standards). The specified circuit breakers are UL-certified. 3NA3 fuses are recommended for European countries. The values in the table take into account the overload capability of the inverter.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

Selection and ordering data

For individual protection

Rated power		SINAMICS G110D		Protection	**Fuse**	**Circuit breaker**
kW	hp	Type 6SL3511-...	Frame size	A	Order No.	Order No.
380 ... 500 V 3 AC						
0.75	1	. PE17-5AM0	FSA	10	**3NA3803**	**3RV1021-1FA10**
1.5	1.5 [1)]	. PE21-5AM0	FSA	10	**3NA3803**	**3RV1021-1JA10**
3	4	. PE23-0AM0	FSA	26	**3NA3805**	**3RV1021-4AA10**
4	5	. PE24-0AM0	FSB	20	**3NA3807**	**3RV1021-4BA10**
5.5	7.5	. PE25-5AM0	FSC	20	**3NA3807**	**3RV1031-4EA10**
7.5	10	. PE27-5AM0	FSC	32	**3NA3812**	**3RV1031-4FA10**

Group protection

The group protection designates those configurations in which a circuit-breaker or a fuse provides protection for two or several devices and their feeder cables. The protective device is known as branch protection (BCP) device.

You will find additional information on the group protection and recommended types in the FAQ:
http://support.automation.siemens.com/ww/view/en/31560253

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[1)] It is not possible to make any assignment to a particular standard.

DC link components

Overview

Braking Resistors

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are intended for use with SINAMICS G110D, which have an integrated brake chopper, but cannot feed back generated energy to the line supply. For generator mode, e.g. braking a rotating mass with high moment of inertia, a braking resistor must be connected to convert the energy into heat.

The braking resistors can be mounted above and to the side of the SINAMICS G110D distributed inverter. The heat dissipated by the braking resistor must not diminish the inverter cooling. This is the reason that a minimum clearance of 150 mm must be maintained between the inverter and braking resistor.

Every braking resistor has thermal protection (UL-listed). The thermal protection prevents the braking resistor from being thermally overloaded.

All of the braking resistors are provided as standard with a cable; this is pre-fabricated and is 500 mm long.

Selection and ordering data

Rated power		Suitable for SINAMICS G110D			Braking resistor
kW	hp	Type 6SL3511-...	Frame size		Order No.
380 ... 500 V 3 AC					
0.75	1	. PE17-5AM0	FSA	new	**6SL3501-0BE08-6AA0**
1.5	1.5 [1]	. PE21-5AM0	FSA		
3.0	10	. PE23-0AM0	FSA	new	**6SL3501-0BE12-1AA0**
4.0	4	. PE24-0AM0	FSB		
5.5	10	. PE25-5AM0	FSC	new	**6SL3501-0BE14-1AA0**
7.5	15	. PE27-5AM0	FSC		

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Technical specifications

Line supply voltage 380 ... 500 V 3 AC		Braking resistor		
		6SL3501-0BE08-6AA0	**6SL3501-0BE12-1AA0**	**6SL3501-0BE14-1AA0**
Resistor	Ω	390	160	82
Rated power P_{DB}	kW	0.086	0.21	0.41
Peak power P_{max} (cycle time 12 s)	kW	1.725	4.2	8.2
Degree of protection		IP65	IP65	IP65
Dimensions				
• Width	mm	290	340	530
• Height	mm	150 [2]	150 [2]	150 [2]
• Depth	mm	140	140	140
Weight, approx.	kg	2.5	2.9	4.3
Suitable for SINAMICS G110D	Type	6SL3511-.PE17-5AM0 6SL3511-.PE21-5AM0	6SL3511-.PE23-0AM0 6SL3511-.PE24-0AM0	6SL3511-.PE25-5AM0 6SL3511-.PE27-5AM0
Frame size		FSA	FSA/FSB	FSC

[1] It is not possible to make any assignment to a particular standard.

[2] For the specified height (150 mm) the required bending radius of the braking resistor connecting cable to the SINAMICS G110D has not been taken into account.

Accessories

Intelligent Operator Panel IOP Handheld

IOP Handheld for mobile use

The Intelligent Operator Panel IOP Handheld is a very user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of the SINAMICS G110D distributed inverter.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting 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, explanatory help texts are provided and the parameter filtering function.

Application Wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors.

There are Quick Commissioning Wizards for general commissioning.

The drives are manually and simply controlled using directly assigned buttons and the navigation wheel. The IOP Handheld has a dedicated switchover key to switch over from the automatic to the manual mode.

The inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can either be graphically or numerically visualized on the status screen/status display.

Process values can also be displayed in technological units.

The IOP Handheld supports series commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP Handheld and when required, downloaded into other drive units of the same type.

The IOP Handheld includes the following language packages: English, French, German, Italian and Spanish.

In addition to the IOP, the IOP Handheld includes a housing with the rechargeable batteries, charging unit and RS232 interface 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 8 hours.

To connect the IOP Handheld to SINAMICS G110D, the RS232 interface cable with optical interface is required in addition.

Updating the IOP Handheld

The IOP 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 Handheld via drag & drop. Further, the USB interface allows user languages and Wizards that become available in the future to be subsequently downloaded and the firmware updated for the IOP Handheld.

The IOP is supplied with power via the USB interface during an update.

Selection and ordering data

Designation		Order No.
IOP Handheld For use with SINAMICS G120, SINAMICS G110D, SINAMICS G120D, SIMATIC ET 200S FC or SIMATIC ET 200pro FC Included in the scope of delivery: • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m long, can only be used for SINAMICS G120 and SIMATIC ET 200S FC) • USB cable (1 m long)	new	**6SL3255-0AA00-4HA0**
RS232 interface cable With optical interface to connect the SINAMICS G110D, SINAMICS G120D or SIMATIC ET 200pro FC inverters to the IOP Handheld (2.5 m long)		**3RK1922-2BP00**

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Accessories

Manual-local control with keyswitch

Example: SINAMICS G110D and manual-local control with integrated keyswitch

The manual-local control is a simple method to locally control and commission the SINAMICS G110D distributed inverter.

To switch over from the automatic to the manual mode or to switch-off the inverter, there is a keyswitch that can be withdrawn in each of the three operating modes (Auto/Off/Local).

- The inverter is controlled via the PLC in the automatic mode
- In the OFF state, the device is shut down (however, the line supply voltage is still connected)
- The drive is locally and directly controlled in the “Local” setting. The device is simply controlled using directly assigned buttons. The following functions can be selected:
  - Switching over between continuous operation / jog mode
  - On/Counter-clockwise
  - On/Clockwise
  - Deactivate Quick Stop

The manual-local control is mounted on the inverter instead of the standard blanking cover. This means that it can be retrofitted at a later date.

Selection and ordering data

Designation		Order No.
Manual-local control with keyswitch	new	**6SL3555-0PL00-2AA0**

MMC memory card

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again. The card holder is not included with the inverter and must be separately ordered.

Selection and ordering data

	Order No.
MMC memory card	**6SL3254-0AM00-0AA0**

Accessories

Card holder for MMC/SD memory card

To use the MMC memory card, a card holder is required. This can be subsequently inserted under the blanking cover or under the optional manual-local control on the inverter – where it can also remain. In addition, a Secure Digital card (SD) can also be used.

SINAMICS G110D with integrated card holder (in the open state)

Selection and ordering data

		Order No.
Card holder for MMC/SD memory card	new	**6SL3555-0PM00-0AA0**

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC via a point-to-point connection if the appropriate software (STARTER commissioning tool[1], from Version 4.1.3 and higher) has been installed.

Selection and ordering data

	Order No.
RS232 interface cable for communication with a PC	**3RK1922-2BP00**

USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC via a point-to-point connection if the appropriate software (STARTER commissioning tool [1], from Version 4.1.3 and higher) has been installed.

Selection and ordering data

		Order No.
USB interface cable for communication with a PC (2.5 m long)	new	**6SL3555-0PA00-2AA0**

Adapter to mount SINAMICS G110D instead of SIRIUS M200D motor starter

For adaptation, there are connection boards that allow SINAMICS G110D to be mounted onto existing connection holes of the SIRIUS M200D motor starter (assuming that there is sufficient space). This means that a system can be correspondingly adapted to different requirements at a later stage.

Selection and ordering data

		Order No.
Adapter to mount SINAMICS G110D instead of SIRIUS M200D motor starter	new	**6SL3263-1GA20-0GA0**

STARTER commissioning tool

The STARTER commissioning tool (STARTER Version from 4.1.3 and higher) supports the commissioning and maintenance of SINAMICS G110D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Selection and ordering data

	Order No.
STARTER commissioning tool [1)] on DVD	**6SL3072-0AA00-0AG0**

[1)] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Accessories

AS-Interface connecting cables

Selection and ordering data

		Order No.
AS-Interface M12 branch		
To connect the AS-Interface and V_{Aux} cable to an M12 socket Length:		
• 1.0 m	new	**3RK1901-1NR21**
• 2.0 m	new	**3RK1901-1NR22**

Connecting cables for digital inputs

Selection and ordering data

		Order No.
M12 plug-in cables		
With PUR sheath, to connect digital sensors and actuators, pre-fabricated at one end, angled, plug connector, 5-pole, 5 × 0.34 mm^2 length:		
• 1.5 m	new	**3RX8000-1CE52-1AB5**
• 5 m	new	**3RX8000-1CE52-1AF0**
• 10 m	new	**3RX8000-1CE52-1AL0**

Connecting cables pre-fabricated at one end and connector sets to connect to the line supply

Selection and ordering data

	Order No.
Connecting cable pre-fabricated at one end	
Power supply cable, open at one end, for HAN Q4/2, angled, 4 × 4 mm^2	
• 1.5 m long	**3RK1911-0DB13**
• 5 m long	**3RK1911-0DB33**
Connector set for the power supply	
HAN Q4/2	
• 2.5 mm^2	**3RK1911-2BE50**
• 4 mm^2	**3RK1911-2BE10**
• 6 mm^2	**3RK1911-2BE30**

Accessories

Motor cables pre-fabricated at one end and connector sets to connect the inverter to the motor

Selection and ordering data

Motor cables pre-fabricated at one end For motors with brake and temperature sensor with HAN Q8 connector, shielded	Order No. (HTG: supplied from the Harting Company) (ZKT: supplied from the KnorrTec Company)		
Cross-section	1 mm^2	1.5 mm^2	2.5 mm^2	4 mm^2
• 1.5 m long	**HTG: 61 88 201 0288**	**HTG: 61 88 201 0291**	**HTG: 61 88 201 0303**
	new **ZKT: 70018601000150**	new **ZKT: 70009601000150**	new **ZKT: 70017001000150**
• 3 m long	**HTG: 61 88 201 0289**	**HTG: 61 88 201 0292**	**HTG: 61 88 201 0304**
	new **ZKT: 70018601000300**	new **ZKT: 70009601000300**	new **ZKT: 70017001000300**
• 5 m long	**HTG: 61 88 201 0290**	**HTG: 61 88 201 0293**	**HTG: 61 88 201 0305**
	new **ZKT: 70018601000500**	new **ZKT: 70009601000500**	new **ZKT: 70017001000500**
• 10 m long	**HTG: 61 88 201 0299**	**HTG: 61 88 201 0301**	**HTG: 61 88 201 0306**
	new **ZKT: 70018601001000**	new **ZKT: 70009601001000**	new **ZKT: 70017001001000**
Connector set for motor cables Shielded, HAN Q8	Order No.		
• up to 1.5 mm^2	–	**6ES7194-1AB01-0XA0**	–	–
Connector set for motor cables Shielded, HAN Q8	Order No. (HTG: supplied from the Harting Company) (ZKT: supplied from the KnorrTec Company)		
• up to 2.5 mm^2	–	–	new **HTG: 61 83 401 0132** new **ZKT: 10032011**	–
• up to 4 mm^2	–	–	–	new **HTG: 61 83 401 0133** new **ZKT: 10032021**

Power bus distribution 400 V in IP65 degree of protection

	Ordering (see Solution Partner)
Power T clamp connector for 2.5 ... 6 mm^2 With attached 7-pole connector, socket insert, grommet housing, UL Seals for various cable cross-sections must be separately ordered	Ordered and supplied from the Harting Company
T clamp connector Completely pre-fabricated	Ordered and supplied from the KnorrTec Company
T distributor box, IDC connection, power cable Uncut power cable, 2.5 ... 6 mm^2, 2 outgoing feeders: Push-in connection: 1.5 ... 6 mm^2 Seals for various cable cross-sections must be separately ordered	Ordered and supplied from the Weidmüller Company
T distributor box Completely pre-fabricated	Ordered and supplied from the KnorrTec Company

Additional information

For further information about the connecting cables and plug-in connectors mentioned above, please refer to Catalog IK PI.

Further selected accessories are available from Siemens Solution Partners. Select "Distributed Field Installation System" as technology in the "SolutionPartner Finder". http://www.siemens.com/automation/partnerfinder

Spare parts
Spare Parts Kit

Overview

A Spare Parts Kit can be ordered which comprises small parts such as replacement seals, caps and screws.

Selection and ordering data

		Order No.
Spare Parts Kit for SINAMICS G110D Comprising replacement seals, caps and screws	new	**6SL3500-0TK01-0AA0**

Spare parts
Replacement fan

Overview

The fans are designed for an extra long service life.
Replacement fans can be ordered for special applications.

Selection and ordering data

Rated power		SINAMICS G110D			**Replacement fan**
kW	hp	Type 6SL3511-...	Frame size		Order No.
380 … 500 V 3 AC					
4	5	. PE24-0AM0	FSB	new	**6SL3500-0TF01-0AA0** (pre-mounted unit with cover, fan and screws)
5.5	7.5	. PE25-5AM0	FSC		
7.5	10	. PE27-5AM0			

SINAMICS G120D
Distributed inverters
0.75 kW to 7.5 kW (1.0 hp to 10 hp)

6

SINAMICS G120D distributed inverters

Overview

The new SINAMICS G120D distributed frequency inverter series is the solution for demanding drive tasks especially in the field of conveyor systems. SINAMICS G120D inverters continuously control the speed of three-phase asynchronous motors and fulfill all the requirements of conveyor system applications from simple frequency control through to demanding vector control. With its well-thought-out 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 to save energy. Safety functions that are unique worldwide permit improved plant and system concepts with a higher productivity. This drive can be optimally integrated into the Siemens TIA world of automation via PROFIBUS or PROFINET.

With different device versions (frame sizes FSA to FSC) in a power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp), it is suitable for a wide variety of drive solutions.

Example: SINAMICS G120D, frame size FSA, comprising PM250D Power Module and Fail-safe CU240D DP-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 cables between the inverter and motor can be avoided (which means lower power losses, reduced noise emission and lower costs for shielded cables and 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 inverters 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
- Identical mounting dimensions for SINAMICS G110D and SINAMICS G120D
- Standard commissioning and configuration tool

Products from the family of distributed drives:

- SINAMICS G110D frequency inverters
- SINAMICS G120D frequency inverters
- SIMATIC ET 200S FC drive converters
- SIMATIC ET 200pro FC drive converters
- SIRIUS M200D motor starters

Modularity

SINAMICS G120D is a modular inverter 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 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 for processing within the context of the overall plant.

The Power Module supplies the motor in a power range 0.75 kW to 7.5 kW (1.0 hp to 10 hp). The Power Module is controlled by a microprocessor 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 (one 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, dimensional drawings, certificates, manuals and operating instructions), are available on the Internet under:
http://www.siemens.com/sinamics-g120d/documentation

and offline on the DVD CA 01 in the SD Configurator. In addition, the SD Configurator can be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

Overview

Safety Integrated

The SINAMICS G120D distributed inverters include versions for safety-oriented applications. All Power Modules are already designed for Safety Integrated. A Safety Integrated Drive can be created by combining a Power Module with the relevant Fail-safe Control Unit.

SINAMICS G120D fail-safe inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- 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 when a speed limit is exceeded

The functions “Safe Stop 1” and “Safely Limited Speed” can both be implemented without having to use a motor encoder or encoder; the implementation cost is minimal. Existing systems in particular can be updated with safety technology without the need to change the motor or mechanical system.

The safety functions “Safely Limited Speed” and “Safe Stop 1” are not certified for pull-through loads such as e.g. hoisting gear and unwinders.

Additional information is provided in the part Highlights, section Safety Integrated.

Efficient Infeed Technology

The advanced Efficient Infeed Technology is employed in PM250D Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters 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.

Additional information is included in the part Highlights, section Efficient Infeed Technology.

STARTER commissioning tool

The STARTER commissioning tool (from STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Benefits

- Mechanical design, installation and retrofit of a system 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; further, the dimensions are identical with those of the SINAMICS G110D
- Wide power range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp)
- 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 savings 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 space requirement and installation costs for the high IP65 degree of protection
- Simple commissioning and maintenance as a result of the same, standard plug-in connections of the bus, power and I/O connections (ISO 23570) for the complete range of power ratings of SINAMICS G110D and SINAMICS G120D
- 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
  - Module replacement under voltage (hot swapping)
  - 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)
  - SINAMICS G110D (inverter for basic, conveyor-related applications)
  - SINAMICS G120D (inverter for sophisticated, conveyor-related applications)
- The same connectors are used as for the SIRIUS M200D motor starter
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
  - Reduced number of interfaces
  - Plantwide engineering
  - Easy to handle
- Simple connection, configuration, data management as well as control of the inverter in complex 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) to parameterize, diagnose, control (open-loop) and copy drive parameters in the IOP
- The ability to connect up to six sensors and two actuators directly to the Control Unit means that almost all of the drive information can be directly managed; local preprocessing of the signals takes the load off the fieldbus and ensures a fast and reproducible response time
- Integrated class A EMC filter (acc. to EN 55011)
- Integrated brake control, brake voltages that are supported, 400 V AC / 180 V DC
- Integrated motor protection using a thermal motor model and evaluation of PTC, Thermo-Click or KTY 84 temperature sensors
- Software parameters for simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- Easy replacement of devices and fast copying of parameters to the memory card using the optional MMC memory card
- Engineering and commissioning with standard engineering tools such as SIZER (from Version 2.9 and higher), STARTER (from Version 4.1, SP1 and higher) 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, UL, cUL, C-tick and Safety Integrated according to EN 954-1, Category 3 and IEC 61508 SIL 2

SINAMICS G120D distributed inverters

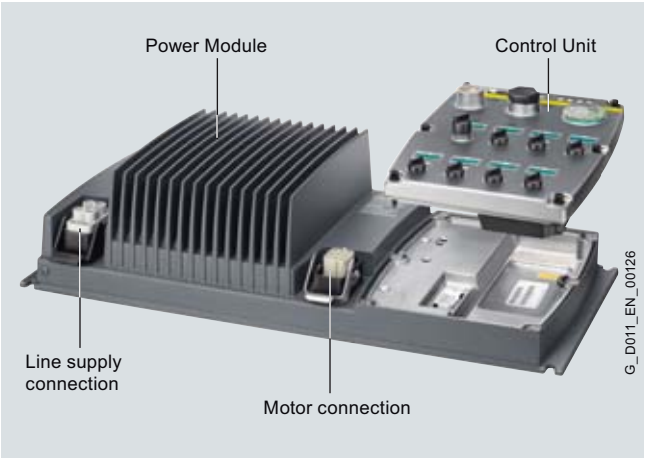
Applications

SINAMICS G120D is ideally suited to 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. assembly lines.

SINAMICS G120D is also suitable for additional high-performance applications, e.g. in the airport sector, food and beverage industry (without tenside) and in distribution logistics (e.g. electric monorail systems).

Design

The SINAMICS G120D distributed frequency inverters are modular inverters for standard drives. Each SINAMICS G120D comprises two operative units – the Power Module and Control Unit.



Power Module PM250D with line and motor connections and CU240D Control Unit

Power Modules

The following Power Modules are available for the SINAMICS G120D distributed inverters:

PM250D Power Modules

PM250D Power Modules (0.75 kW to 7.5 kW/1.0 hp to 10 hp) 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

The following Control Units are available for SINAMICS G120D distributed inverters:

CU240D Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization. Several Control Units are available in different versions:

- CU240D DP
- CU240D DP-F
- CU240D PN
- CU240D PN-F

Supplementary System Components

Intelligent Operator Panel IOP Handheld

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting and the Application Wizards, it is easy to commission, diagnose and locally control standard drives.

MMC memory card

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter 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.

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool from Version 4.1, SP1 and higher) has been installed.

USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (STARTER commissioning tool from Version 4.1.3 and higher) has been installed.

Connecting cable for the Control Units

Flexible plug-in cables to transfer data between the Industrial Ethernet participants or PROFIBUS participants, as well as to supply power to the Control Unit.

Connecting cable 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-fabricated 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 inverters:

Selection guide, SD Configurator within the CA 01

More than 100,000 products with approximately 5 million possible product versions from the area of drive technology are listed in the Interactive Catalog CA 01 – the Offline Mall from Siemens IA&DT. In order to make it easier to select the optimum motor and/or inverter from the wide range of Standard Drives, the SD Configurator was developed, which is integrated as "Selection guide" in this catalog on the DVD with the selection and configuration tools.

Online SD Configurator

In addition, the SD Configurator can now be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

SIZER Configuration Tool

The SIZER PC tool makes it easy to engineer the SINAMICS and MICROMASTER 4 drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER supports the configuration of the complete drive system and allows simple single-motor drives up to complex multi-axis applications to be engineered. For SINAMICS G120D from SIZER Version 2.9 and higher.

STARTER Commissioning Tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. In addition to SINAMICS drives, STARTER is also suitable for MICROMASTER 4 units and the drive converters for the distributed I/O SIMATIC ET 200S FC and SIMATIC ET 200pro FC. For SINAMICS G120D from STARTER Version 4.1, SP1 and higher.

Drive ES Engineering System

Drive ES 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 STEP 7 Manager user interface forms the basis. A variety of software packages, i.e. Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7, are available for SINAMICS.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for all the following components of the SINAMICS G120D distributed inverter listed here.

SINAMICS G120D	
Mechanical specifications	
Vibratory load according to EN 60068-2-6	
• Transport [1]	5 … 9 Hz: Constant deflection, 3.1 mm 9 … 200 Hz: Constant acceleration = 9.81 m/s^2 (1 × *g*)
• Operation	10 … 58 Hz: Constant deflection, 0.15 mm 58 … 200 Hz: Constant acceleration = 19.62 m/s^2 (2 × *g*)
Shock load according to EN 60068-2-27	
• Transport [1]	147.15 m/s^2 (15 × *g*)/11 ms 3 Shocks in each axis and direction
• Operation	147.15 m/s^2 (15 × *g*)/11 ms 3 Shocks in each axis and direction
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class III (PELV)
Touch protection according to EN 61800-5-1	Class I (with protective conductor system)
Permissible ambient and coolant temperature (air) during operation for Power Modules	–10 … +40 °C without derating > 40 … 55 °C see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units	CU240D DP: –10 … +55 °C CU240D PN: –10 … +50 °C CU240D DP-F: 0 … 55 °C CU240D PN-F: 0 … 50 °C (> 40 ... 55 °C see derating characteristics) up to 2000 m above sea level
Climatic ambient conditions	
• Storage [1] acc. to EN 60068-2-1	Temperature –40 … +70 °C
• Transport [1] acc. to EN 60068-2-1	Temperature –40 … +70 °C max. humidity 95 % at 40 °C
• Operation acc. to EN 60068-2-2	Temperature –10 … +40 °C 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	
• Category acc. to EN 954-1	3
• SIL Cl acc. to IEC 61508	2
• PL acc. to ISO 13849	Available soon
• PFH_D	5×10^{-8}
• T1	10 Years
Standards	
Compliance with standards	UL 508C (UL list number E121068), CE, c-tick
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC
EMC Directive [2]	
• Frame sizes FSA to FSC with integrated class A line filter	Category C2 [3] acc. to EN 61800-3 (corresponds to class A acc. to EN 55011)

Note: The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC Directive.

[1] In transport packaging.

[2] For further general information, see also SINAMICS G110 section Technical specifications, Compliance with standards.

[3] With shielded motor cable up to 15 m.

Overview

Example of CU240D DP-F Control Unit

Example of CU240D PN-F Control Unit

The Control Unit performs closed-loop control functions for the inverter. In addition to the closed-loop control, it has additional functions that can be adapted to the particular application through parameterization. Control Units are available in different versions:

- CU240D DP
- CU240D DP-F
- CU240D PN
- CU240D PN-F

Safety Integrated functions

The SINAMICS G120D fail-safe inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- 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 when a speed limit is exceeded

The functions “Safe Stop 1” and “Safely Limited Speed” can both be implemented without a motor encoder or encoder; the implementation cost is minimal. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The safety functions “Safely Limited Speed” and “Safe Stop 1” are not permitted for pull-through loads such as e.g. hoisting gear and unwinders.

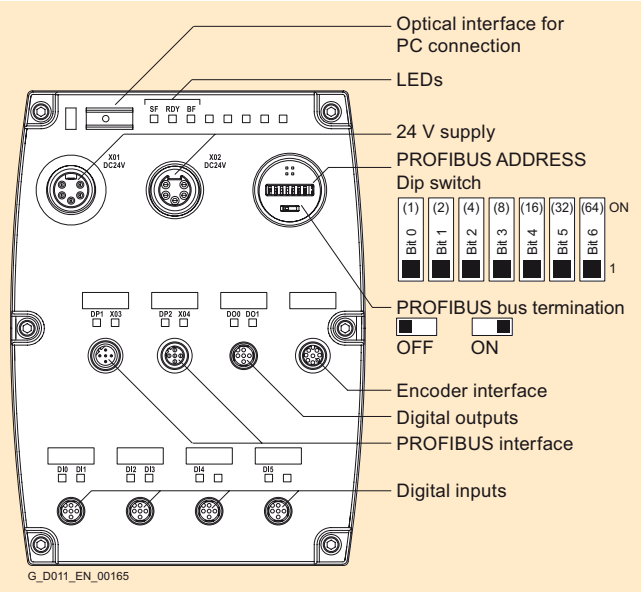
Safety functions have been extended with firmware V3.2.

Additional information is provided in the part Highlights, section Safety Integrated.

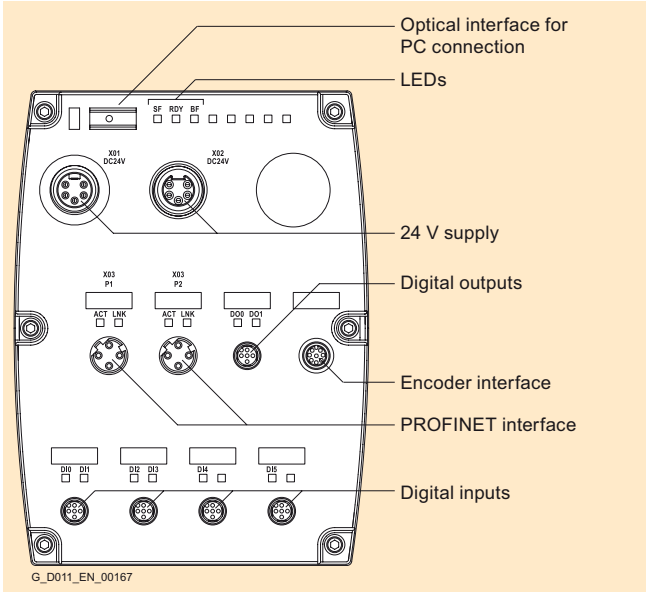
Selection and ordering data

Communication	Digital inputs	Digital outputs	Encoder interfaces	Designation	**Control Unit** Order No.
Standard					
PROFIBUS DP	6	2	1	CU240D DP	**6SL3544-0FA20-1PA0**
PROFINET	6	2	1	CU240D PN	**6SL3544-0FA20-1FA0**
Fail-safe for Safety Integrated					
PROFIBUS DP	6	2	1	CU240D DP-F	**6SL3544-0FA21-1PA0**
PROFINET	6	2	1	CU240D PN-F	**6SL3544-0FA21-1FA0**

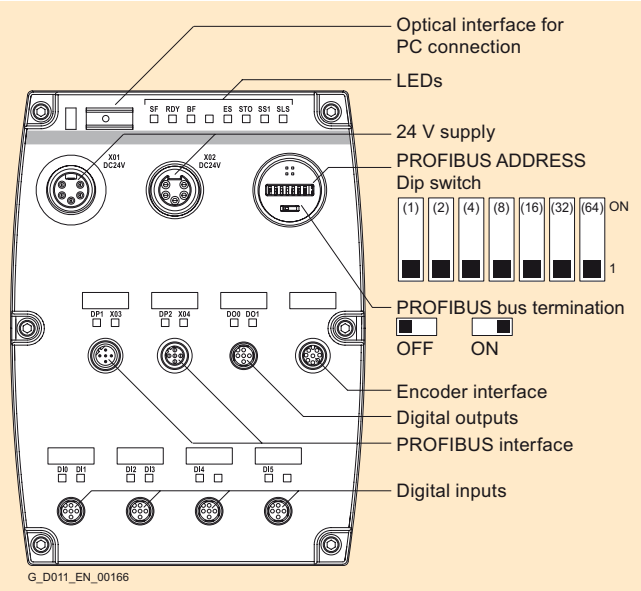
Design



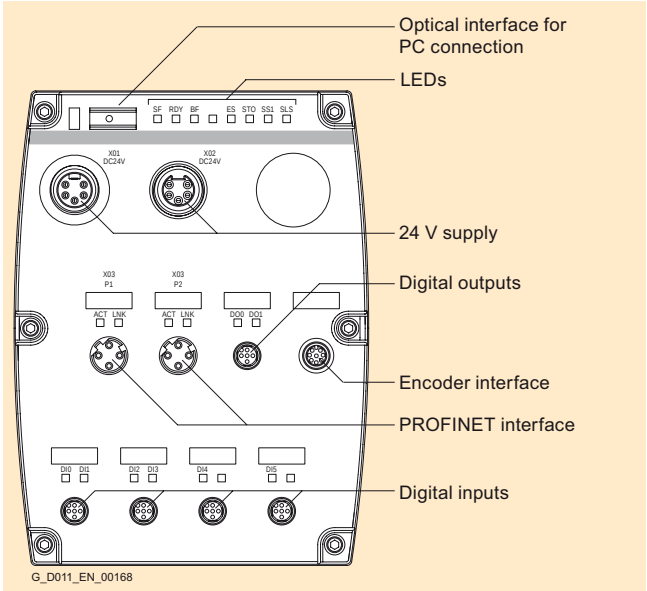
CU240D DP Control Unit



CU240D PN Control Unit



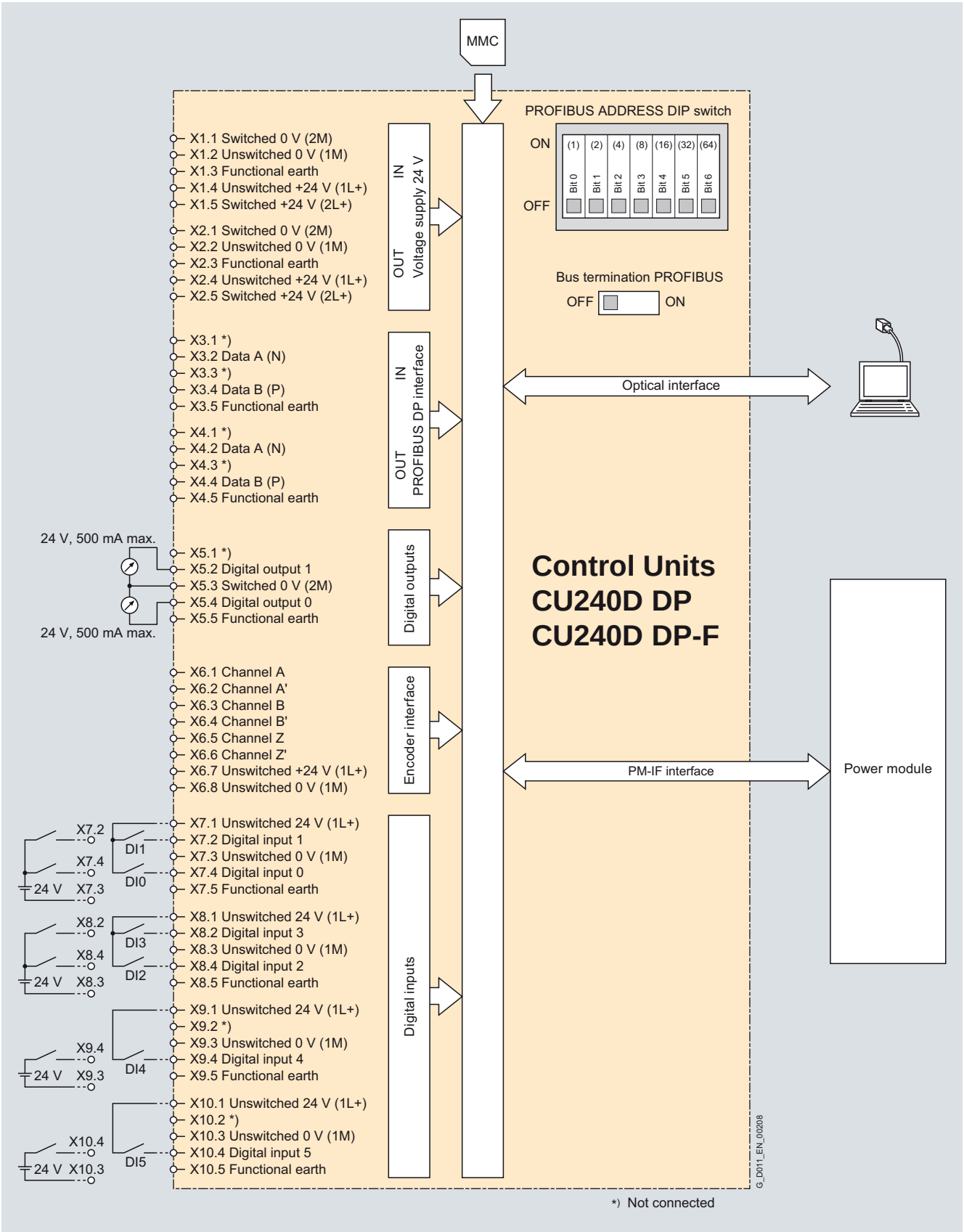
CU240D DP-F Control Unit



CU240D PN-F Control Unit

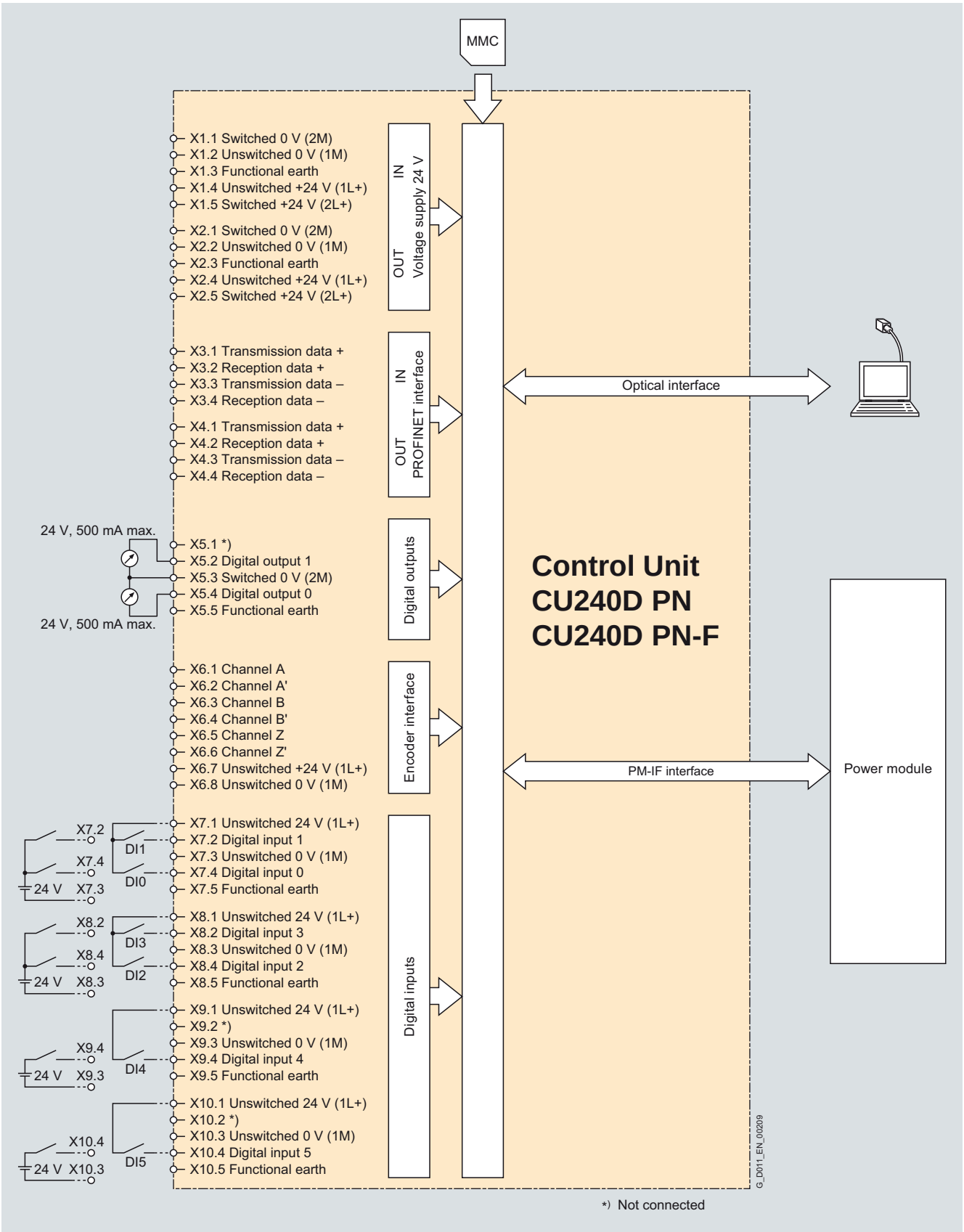
Control Unit, view from the rear, MMC slot at the top and PM-IF interface at bottom center

Integration



Connection diagram for CU240D DP and CU240D DP-F Control Units

Integration



Connection diagram for CU240D PN and CU240D PN-F Control Units

Technical specifications

Control Unit	CU240D DP 6SL3544-0FA20-1PA0	CU240D PN 6SL3544-0FA20-1FA0	CU240D DP-F 6SL3544-0FA21-1PA0	CU240D PN-F 6SL3544-0FA21-1FA0
Electrical specifications				
Operating voltage	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 supply)				
• with Power Module frame sizes FSA and FSB	200 mA	350 mA	200 mA	350 mA
• with Power Module frame size FSC	350 mA	500 mA	350 mA	500 mA
Interfaces				
Digital inputs	6	6	6	6
Digital outputs (0.5 A, fed through switched 24 V DC)	2	2	2	2
Bus interface	PROFIBUS DP	PROFINET	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe
Encoder interfaces (HTL incremental interface, bipolar up to 2048 pulses, max. 100 mA)	1	1	1	1
PTC/KTY interface (connection via Power Module)	✓	✓	✓	✓
• Motor temperature sensor	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click	1 input, sensors that can be connected: PTC, KTY or Thermo-Click
Control of a mechanical motor brake (connection via Power Module)	✓	✓	✓	✓
MMC memory card slot	✓	✓	✓	✓
RS232 interface (connected with RS232 interface cable or USB interface cable via the optical interface of the Control Unit)	✓	✓	✓	✓
Safety functions				
Integrated safety functions Acc. to Category 3 of EN 954-1 and acc. to SIL 2 of IEC 61508	–		• Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • The safety functions “Safely Limited Speed” and “Safe Stop 1” are not certified for pull-through loads such as e.g. hoisting gear and unwinders.	• Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • The safety functions “Safely Limited Speed” and “Safe Stop 1” are not certified for pull-through loads such as e.g. hoisting gear and unwinders.
Open-loop/closed-loop control techniques				
***V/f* linear/square/parameterizable**	✓	✓	✓	✓
***V/f* with flux current control (FCC)**	✓	✓	✓	✓
Vector control, without encoder	✓	✓	✓	✓
Vector control, with encoder	✓	✓	✓	✓
Torque control, without encoder	✓	✓	✓	✓
Torque control, with encoder	✓	✓	✓	✓

[1] The current consumption of connected encoders and sensors (total, max. 300 mA) as well as the current drawn from the digital outputs must be added.

CU240D Control Units

Technical specifications

Control Unit	CU240D DP 6SL3544-0FA20-1PA0	CU240D PN 6SL3544-0FA20-1FA0	CU240D DP-F 6SL3544-0FA21-1PA0	CU240D PN-F 6SL3544-0FA21-1FA0
Software functions				
Fixed frequencies	16, parameterizable	16, parameterizable	16, parameterizable	16, parameterizable
Signal interconnection with BICO technology	✓	✓	✓	✓
Automatic restart after line supply failure or operational fault	✓	✓	✓	✓
Positioning down ramp	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓	✓	✓
Ramp smoothing	✓	✓	✓	✓
3 selectable drive data sets	✓	✓	✓	✓
3 selectable command data sets (CDS) (manual/auto)	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓
JOG	✓	✓	✓	✓
Technology controller (PID)	✓	✓	✓	✓
Thermal motor protection	✓	✓	✓	✓
Thermal inverter protection	✓	✓	✓	✓
Setpoint input	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓
Mechanical specifications and ambient conditions				
Degree of protection	IP65	IP65	IP65	IP65
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)
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)
Relative humidity	< 95 % RH, condensation not permissible	< 95 % RH, condensation not permissible	< 95 % RH, condensation not permissible	< 95 % RH, condensation not permissible
Dimensions				
• Width	150 mm	150 mm	150 mm	150 mm
• Height	210 mm	210 mm	210 mm	210 mm
• Depth	40 mm	40 mm	40 mm	40 mm
Weight, approx.	0.7 kg	0.7 kg	0.7 kg	0.7 kg

Overview

Example of PM250D Power Module frame size FSA

The regenerative feedback capability of the PM250D Power Module in generator mode (electronic braking) means that energy is returned to the supply system and is not wasted in a braking resistor. This saves space, time-consuming dimensioning of the braking resistor as well as its wiring. The amount of generated heat is also reduced. For further information, please refer to part Innovation, section Efficient Infeed Technology.

An innovative circuit design reduces the line harmonics. A line reactor is not required. This saves space and costs for configuration 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 turned into a Safety Integrated Drive (see Control Units).

The PM250D Power Modules with integrated class A line filter are suitable for connection to TN and TT supply systems.

Selection and ordering data

Rated power [1]		Rated output current [2]	Input current	Frame size	**SINAMICS G120D PM250D Power Module with integrated class A line filter**
kW	hp	A	A		**Order No.**
380 … 500 V 3 AC					
0.75	1	2.2	2.1	FSA	**6SL3525-0PE17-5AA0**
1.5	1.5 [3]	4.1	3.8	FSA	**6SL3525-0PE21-5AA0**
3	4	7.7	7.2	FSB	**6SL3525-0PE23-0AA0**
4	5	10.2	9.5	FSC	**6SL3525-0PE24-0AA0**
5.5	7.5	13.2	12.2	FSC	**6SL3525-0PE25-5AA0**
7.5	10	19.0	17.7	FSC	**6SL3525-0PE27-5AA0**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for high overload (HO).

[2] The rated output current I_{rated} is based on the duty cycle for high overload (HO). These current values are valid for 400 V and are stamped on the rating plate of the Power Module.

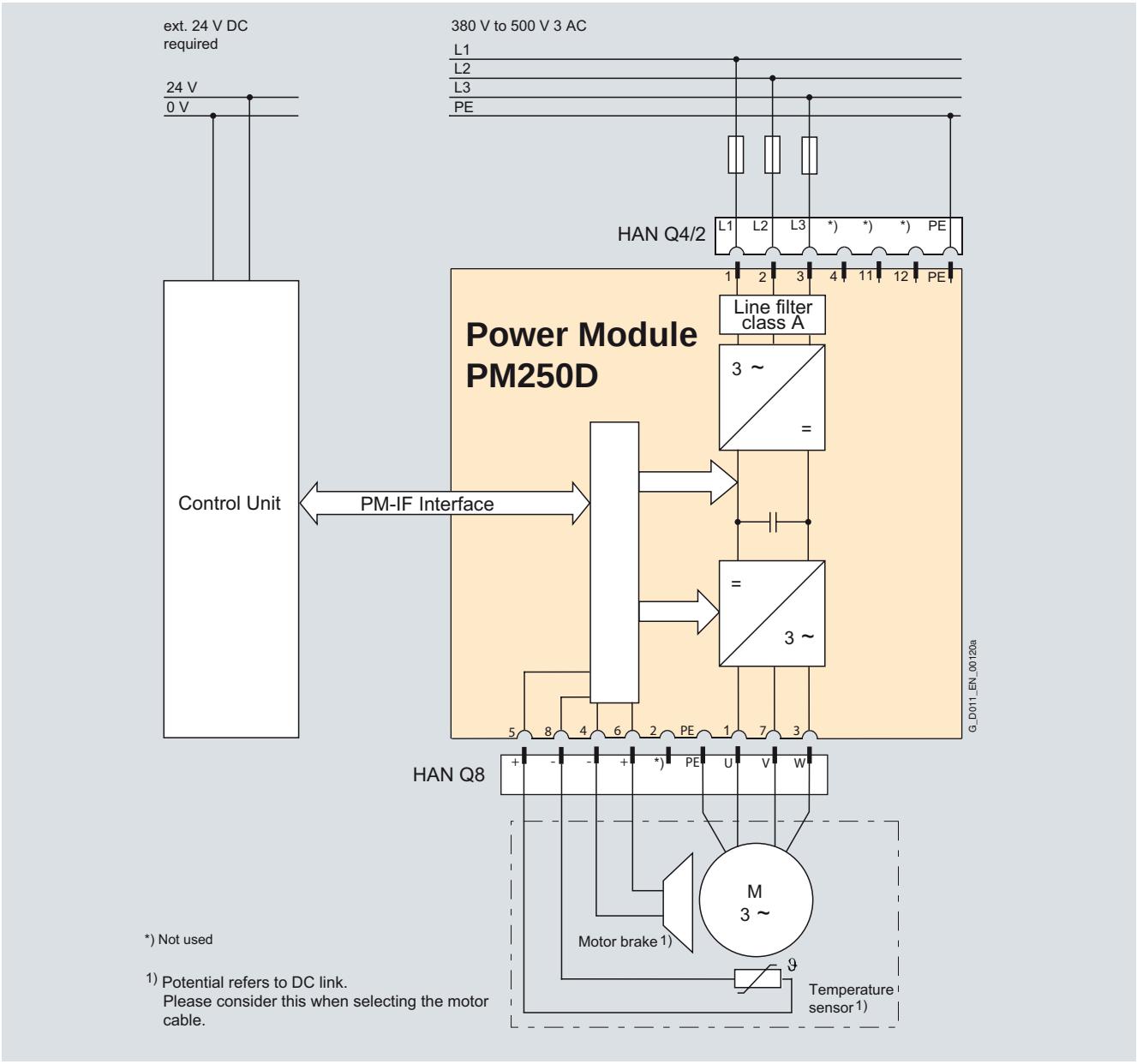
[3] It is not possible to make any assignment to a particular standard.

Integration

PM250D Power Modules communicate with the Control Unit via the PM-IF interface.

PM250D Power Modules have the following interfaces as standard:

- PM-IF interface to connect the PM250D Power Module to the Control Unit.
- Motor connection via a HAN Q8 (connector) including control of the motor brake and temperature sensor
- Line supply connection via HAN Q4/2 (socket)



Connection diagram for PM250D Power Module with integrated class A line filter

Technical specifications

General technical specifications

	PM250D Power Modules					
System operating voltage	380 … 500 V 3 AC ± 10 %					
Line supply requirements **Line short circuit voltage u_K**	≤ 1 %					
Input frequency	47 … 63 Hz					
Output frequency						
• Control type *V/f*	0 … 650 Hz					
• Control type Vector	0 … 200 Hz					
Pulse frequency	4 kHz (standard), higher pulse frequencies up to 16 kHz, see the derating data					
Power factor	0.95					
Inverter efficiency	95 … 97 %					
Modulation depth	87 %					
Overload capability						
• High overload (HO)	• Average maximum rated output current during a cycle time of 300 s • 1.5 × rated output current (i.e. 150 % overload) over 60 s at a cycle time of 300 s • 2 × rated output current (i.e. 200 % overload) over 3 s at a cycle time of 300 s					
Electromagnetic compatibility	Integrated class A line filter according to EN 55011					
Possible braking methods	Energy recovery in generator mode (max. with rated power possible); Integrated brake control supplies the DC supply voltage for the brake					
	Line voltage	380 V AC	400 V AC	440 V AC	480 V AC	500 V AC
	Rectified 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)					
Degree of protection	IP65					
Operating temperature	–10 … +55 °C (operating temperature ranges of the Control Units should 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 above sea level without power reduction, > 1000 m see derating characteristics					
Standard SCCR (Short Circuit Current Rating) [1]	10 kA					
Protection functions	• Undervoltage • Overvoltage • Overcontrol/overload • Ground fault • Short circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking					
Standards conformance	UL 508C (UL list number E121068), cUL, CE, c-tick					
CE mark	According to Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EC					

[1] Applies to industrial control cabinet installations to NEC Article 409/UL 508A. For further information, visit us on the Internet at: http://support.automation.siemens.com/WW/view/en/23995621

Technical specifications

Line supply voltage 380 … 500 V 3 AC		PM250D Power Modules		
		6SL3525-0PE17-5AA0	6SL3525-0PE21-5AA0	6SL3525-0PE23-0AA0
Rated output current I_{rated} [1]	A	2.2	4.1	7.7
Output current I_{max}	A	4.4	8.2	15.4
Rated power	kW (hp)	0.75 (1.0)	1.5 (1.5) [3]	3.0 (4.0)
Rated pulse frequency	kHz	4	4	4
Efficiency η		0.97	0.97	0.97
Power loss	kW	0.047	0.061	0.103
Cooling air requirement	m^3/s	0.004	0.005	0.009
Sound pressure level L_{pA} (1 m)	dB	–	–	–
Rated input current [2]	A	2.1	3.8	7.2
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)
• Conductor cross-section	mm^2	1.5 … 6	1.5 … 6	2.5 … 6
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)
• Conductor cross-section	mm^2	1 … 4	1 … 4	2.5 … 4
Motor cable length, max.	m	15	15	15
Degree of protection		IP65	IP65	IP65
Dimensions				
• Width	mm	450	450	450
• Height	mm	210	210	210
• Depth	mm	110	110	180
Frame size		FSA	FSA	FSB
Weight, approx.	kg	5.7	5.7	8

[1] The rated output current I_{rated} is based on the duty cycle for high overload (HO).

[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 = 1 %.

[3] It is not possible to make any assignment to a particular standard.

Technical specifications

Line supply voltage 380 … 500 V 3 AC		PM250D Power Modules		
		6SL3525-0PE24-0AA0	6SL3525-0PE25-5AA0	6SL3525-0PE27-5AA0
Rated output current I_{rated} [1]	A	10.2	13.2	19
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		0.97	0.97	0.97
Power loss	kW	0.141	0.209	0.295
Cooling air requirement	m^3/s	0.012	0.018	0.025
Sound pressure level L_{pA} (1 m)	dB	74.5	74.5	74.5
Rated input current [2]	A	9.5	12.2	17.7
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (connector)	HAN Q4/2 (connector)	HAN Q4/2 (connector)
• Conductor cross-section	mm^2	2.5 … 6	4 … 6	4 … 6
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (socket)	HAN Q8 (socket)	HAN Q8 (socket)
• Conductor cross-section	mm^2	2.5 … 4	4	4
Motor cable length, max.	m	15	15	15
Degree of protection		IP65	IP65	IP65
Dimensions				
• Width	mm	450	450	450
• Height	mm	210	210	210
• Depth	mm	220	220	220
Frame size		FSC	FSC	FSC
Weight, approx.	kg	8.5	8.5	8.5

[1] The rated output current I_{rated} is based on the duty cycle for high overload (HO).

[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 = 1 %.

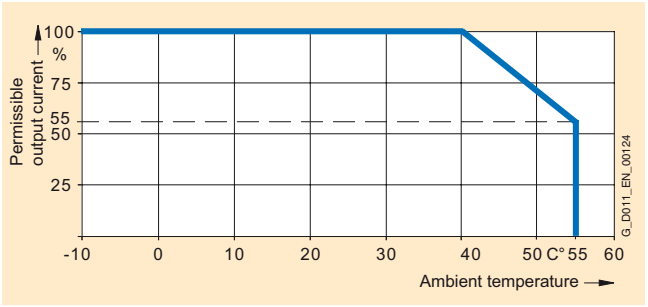
Characteristic curves

Derating data

Pulse frequency

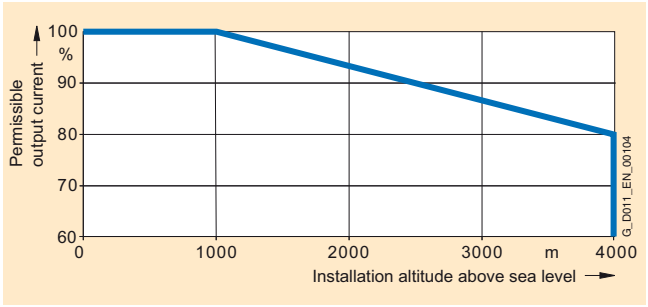
Rated power at 400 V 3 AC		Rated output current in A for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.75	1.0	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.5	1.5 [1)]	4.1	3.5	2.9	2.5	2.1	1.8	1.6
3.0	4.0	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	19	16.2	13.3	11.4	9.5	8.6	7.6

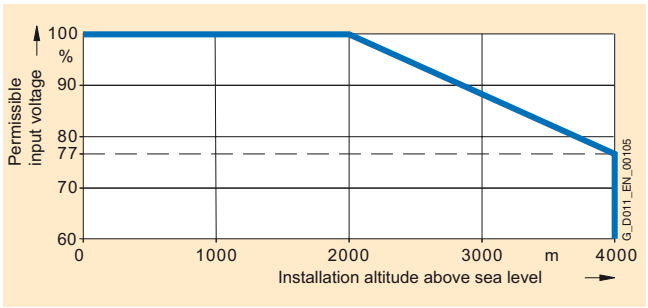
Ambient temperature



Note: 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.

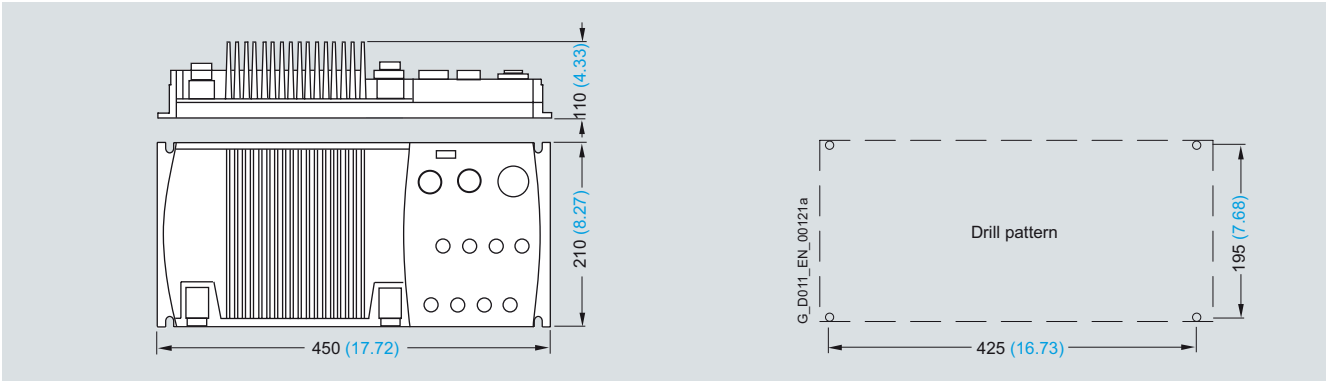
Installation altitude



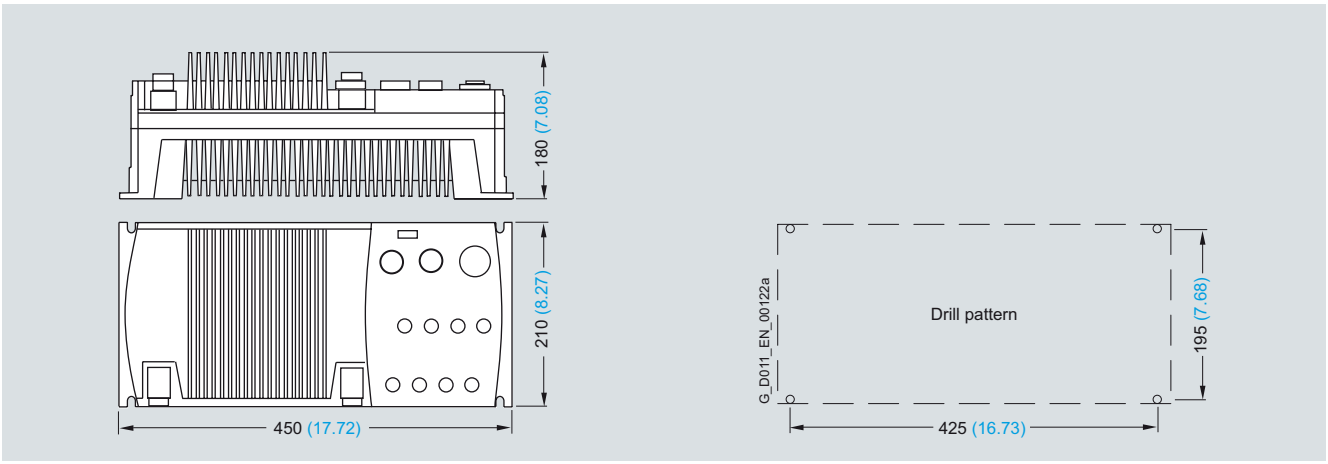


[1)] It is not possible to make any assignment to a particular standard.

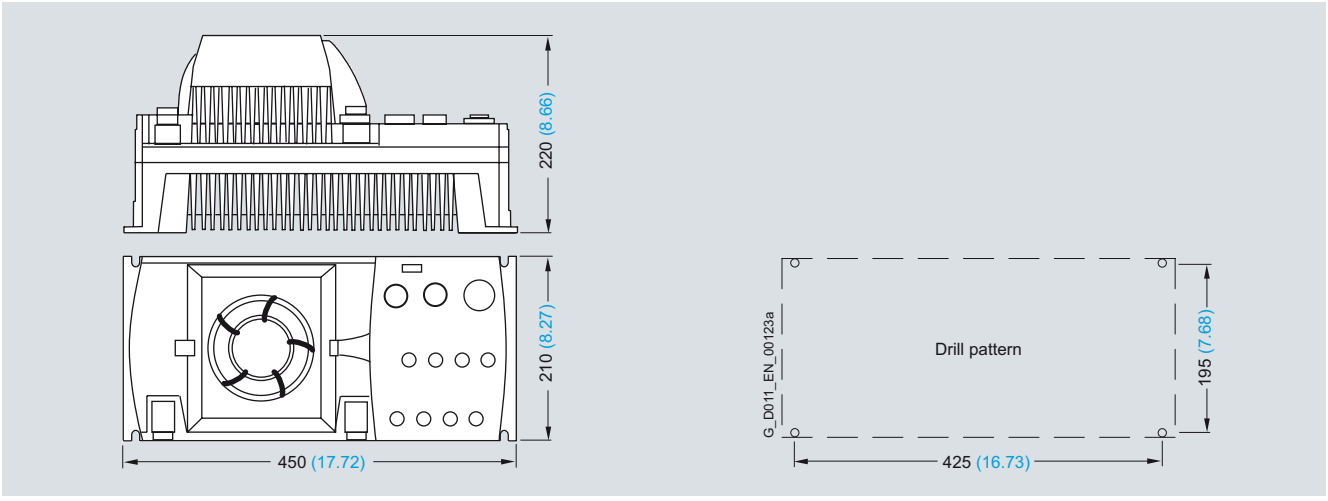
Dimensional drawings



PM250D Power Module frame size FSA with integrated class A line filter and plugged on Control Unit



PM250D Power Module frame size FSB with integrated class A line filter and plugged on Control Unit



PM250D Power Module frame size FSC with integrated class A line filter and plugged on Control Unit

Mounted using M5 or M6 screwed joints with a maximum washer diameter of 12 mm.

3 mm 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).

Recommended line components

Overview

The following table lists recommendations for additional line-side components, such as fuses and circuit breakers (line-side components dimensioned in accordance with IEC standards). The specified circuit breakers are UL-certified. 3NA3 fuses are recommended for European countries. The values in the table take into account the overload capability of the inverter.

Additional information about the listed fuses and circuit breakers can be found in Catalogs LV 1 and LV 1 T.

Selection and ordering data

For individual protection

Rated power		SINAMICS G120D PM250D Power Modules		Protection	**Fuse**	**Circuit breaker**
kW	hp	Type 6SL3525-...	Frame size	A	Order No.	Order No.
380 ... 500 V 3 AC						
0.75	1	0PE17-5AA0	FSA	10	**3NA3803**	**3RV1021-1FA10**
1.5	1.5 [1)]	0PE21-5AA0	FSA	10	**3NA3803**	**3RV1021-1JA10**
3	4	0PE23-0AA0	FSB	26	**3NA3805**	**3RV1021-4AA10**
4	5	0PE24-0AA0	FSC	20	**3NA3807**	**3RV1021-4BA10**
5.5	7.5	0PE25-5AA0	FSC	20	**3NA3807**	**3RV1031-4EA10**
7.5	10	0PE27-5AA0	FSC	32	**3NA3812**	**3RV1031-4FA10**

Group protection

The group protection designates those configurations in which a circuit-breaker or a fuse provides protection for two or several devices and their feeder cables. The protective device is known as branch protection (BCP) device.

You will find additional information on the group protection and recommended types in the FAQ:
http://support.automation.siemens.com/ww/view/en/31560253

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[1)] It is not possible to make any assignment to a particular standard.

Accessories

Intelligent Operator Panel IOP Handheld

IOP Handheld for mobile use

The Intelligent Operator Panel IOP Handheld is a very user-friendly and powerful operator panel for commissioning and diagnostics as well as local operator control and monitoring of the SINAMICS G120D distributed inverter.

The IOP supports both entry-level personnel and drive experts. Thanks to the large plain text display, the menu prompting 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, explanatory help texts are provided and the parameter filtering function.

Application Wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors.

There are Quick Commissioning Wizards for general commissioning.

The drives are manually and simply controlled using directly assigned buttons and the navigation wheel. The IOP Handheld has a dedicated switchover key to switch over from the automatic to the manual mode.

The inverter can be diagnosed in a user-friendly fashion using the plain text display of faults and alarms. Help texts can be obtained by pressing the INFO button.

Up to two process values can either be graphically or numerically visualized on the status screen/status display.

Process values can also be displayed in technological units.

The IOP Handheld supports series commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP Handheld and when required, downloaded into other drive units of the same type.

The IOP Handheld includes the following language packages: German, English, French, Italian and Spanish.

In addition to the IOP, the IOP Handheld includes a housing with the rechargeable batteries, charging unit and RS232 interface 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 8 hours.

To connect the IOP Handheld to SINAMICS G120D, in addition, the RS232 interface cable with optical interface is required.

Updating the IOP Handheld

The IOP Handheld can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be dragged from the PC and dropped into the IOP Handheld. Further, the USB interface allows user languages and Wizards that become available in the future to be subsequently downloaded and the firmware updated for the IOP Handheld.

The IOP is supplied with power via the USB interface during an update.

Selection and ordering data

Designation		Order No.
IOP Handheld For use with SINAMICS G120, SINAMICS G110D, SINAMICS G120D, SIMATIC ET 200S FC or SIMATIC ET 200pro FC Included in the scope of delivery: • IOP • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable (3 m long, can only be used for SINAMICS G120 and SIMATIC ET 200S FC) • USB cable (1 m long)	new	**6SL3255-0AA00-4HA0**
RS232 interface cable With optical interface to connect the SINAMICS G110D, SINAMICS G120D or SIMATIC ET 200pro FC inverters to the IOP Handheld (2.5 m long)		**3RK1922-2BP00**

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Accessories

MMC memory card

The parameter settings for an inverter can be stored on the MMC memory card. When service is required, e.g. after the inverter has been replaced and the data have been downloaded from the memory card the drive system is immediately ready for use again.

Selection and ordering data

	Order No.
MMC memory card	**6SL3254-0AM00-0AA0**

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC over a point-to-point link if the appropriate software (STARTER commissioning tool [1], from Version 4.1, SP1 and higher) has been installed.

Selection and ordering data

	Order No.
RS232 interface cable for communication with a PC	**3RK1922-2BP00**

USB interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC over a point-to-point link if the appropriate software (STARTER commissioning tool [1], from Version 4.1, SP1 and higher) has been installed.

Selection and ordering data

		Order No.
USB interface cable for communication with a PC (2.5 m long)	new	**6SL3555-0PA00-2AA0**

STARTER Commissioning Tool

The STARTER commissioning tool (from STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICSG120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Selection and ordering data

	Order No.
STARTER commissioning tool [1] on DVD	**6SL3072-0AA00-0AG0**

[1] The STARTER commissioning tool is also available on the Internet under http://support.automation.siemens.com/WW/view/en/10804985/133100

Accessories

Connecting cable for the Control Unit

PROFINET connecting cable

Flexible plug-in cables and connectors that can be assembled in the field for transmission of data (up to 100 Mbit/s) between Industrial Ethernet participants with IP65 degree of protection.

Selection and ordering data

	Order No.
IE connecting cable M12-180/M12-180	
Pre-fabricated IE FC TP trailing cable GP 2 × 2 PROFINET type C) with two 4-pin M12 connectors (4-pin, D-coded), IP65/IP67 degree of protection Length:	
• 0.3 m	**6XV1870-8AE30**
• 0.5 m	**6XV1870-8AE50**
• 1.0 m	**6XV1870-8AH10**
• 1.5 m	**6XV1870-8AH15**
• 2.0 m	**6XV1870-8AH20**
• 3.0 m	**6XV1870-8AH30**
• 5.0 m	**6XV1870-8AH50**
• 10 m	**6XV1870-8AN10**
• 15 m	**6XV1870-8AN15**
IE M12 Plug PRO	
For assembly in the field, M12 connector (D-coded), metal housing, fast connection method, for SCALANCE X208PRO and IM 154-4 PN	
• 1 unit	**6GK1901-0DB10-6AA0**
• 8 units	**6GK1901-0DB10-6AA8**

PROFIBUS connecting cable

Flexible plug-in cables/connectors for transmission of data (up to 12 Mbit/s) from PROFIBUS participants.

Selection and ordering data

	Order No.
PROFIBUS M12 plug-in cable	
Pre-fabricated with two 5-pole M12 connectors/sockets Length:	
• 0.3 m	**6XV1830-3DE30**
• 0.5 m	**6XV1830-3DE50**
• 1.0 m	**6XV1830-3DH10**
• 1.5 m	**6XV1830-3DH15**
• 2.0 m	**6XV1830-3DH20**
• 3.0 m	**6XV1830-3DH30**
• 5.0 m	**6XV1830-3DH50**
• 10 m	**6XV1830-3DN10**
• 15 m	**6XV1830-3DN15**
PROFIBUS M12 connectors	
5-pole, B-coded, metal enclosure, 1 package = 5 units	
• Pin insert	**6GK1905-0EA00**
• Socket insert	**6GK1905-0EB00**

Connecting cables/connectors for supplying the Control Unit with power

Selection and ordering data

	Order No.
7/8" plug-in cable	
For power supply, pre-fabricated with two 5-pole 7/8" plug/socket connectors Length:	
• 0.3 m	**6XV1822-5BE30**
• 0.5 m	**6XV1822-5BE50**
• 1.0 m	**6XV1822-5BH10**
• 1.5 m	**6XV1822-5BH15**
• 2.0 m	**6XV1822-5BH20**
• 3.0 m	**6XV1822-5BH30**
• 5.0 m	**6XV1822-5BH50**
• 10 m	**6XV1822-5BN10**
• 15 m	**6XV1822-5BN15**
7/8"-connector	
5-pole, B-coded, plastic enclosure, 1 package = 5 units	
• Pin insert	**6GK1905-0FA00**
• Socket insert	**6GK1905-0FB00**

Connecting cables for digital inputs

Selection and ordering data

	Order No.
M12 plug-in cable	
With PUR sheath, to connect digital sensors and actuators, pre-fabricated at one end, angled, plug connector, 5-pole, 5 × 0.34 mm^2 length:	
• 1.5 m	new **3RX8000-1CE52-1AB5**
• 5 m	new **3RX8000-1CE52-1AF0**
• 10 m	new **3RX8000-1CE52-1AL0**

Accessories

Connecting cables for Power Modules

Connecting cables pre-fabricated at one end and connector sets to connect to the line supply

Selection and ordering data

	Order No.
Connecting cable pre-fabricated at one end	
Power supply cable, open at one end, for HAN Q4/2, angled, 4 × 4 mm²	
• 1.5 m long	**3RK1911-0DB13**
• 5 m long	**3RK1911-0DB33**
Connector set for the power supply	
HAN Q4/2	
• 2.5 mm²	**3RK1911-2BE50**
• 4 mm²	**3RK1911-2BE10**
• 6 mm²	**3RK1911-2BE30**

Motor cables pre-fabricated at one end and connector sets to connect the Power Module to the motor

Selection and ordering data

Motor cables pre-fabricated at one end For motors with brake and temperature sensor with HAN Q8 connector, shielded	Order No. (HTG: supplied from the Harting Company) (ZKT: supplied from the KnorrTec Company)			
Cross-section	1 mm²	1.5 mm²	2.5 mm²	4 mm²
• 1.5 m long		**HTG: 61 88 201 0288**	**HTG: 61 88 201 0291**	**HTG: 61 88 201 0303**
	new **ZKT: 70018601000150**		new **ZKT: 70009601000150**	new **ZKT: 70017001000150**
• 3 m long		**HTG: 61 88 201 0289**	**HTG: 61 88 201 0292**	**HTG: 61 88 201 0304**
	new **ZKT: 70018601000300**		new **ZKT: 70009601000300**	new **ZKT: 70017001000300**
• 5 m long		**HTG: 61 88 201 0290**	**HTG: 61 88 201 0293**	**HTG: 61 88 201 0305**
	new **ZKT: 70018601000500**		new **ZKT: 70009601000500**	new **ZKT: 70017001000500**
• 10 m long		**HTG: 61 88 201 0299**	**HTG: 61 88 201 0301**	**HTG: 61 88 201 0306**
	new **ZKT: 70018601001000**		new **ZKT: 70009601001000**	new **ZKT: 70017001001000**
Connector set for motor cables Shielded, HAN Q8	Order No.			
• up to 1.5 mm²	–	**6ES7194-1AB01-0XA0**	–	–
Connector set for motor cables Shielded, HAN Q8	Order No. (HTG: supplied from the Harting Company) (ZKT: supplied from the KnorrTec Company)			
• up to 2.5 mm²	–	–	new **HTG: 61 83 401 0132** new **ZKT: 10032011**	–
• up to 4 mm²	–	–	–	new **HTG: 61 83 401 0133** new **ZKT: 10032021**

Accessories

Power bus distribution 400 V in IP65 degree of protection

	Ordering (see Solution Partner)
Power T clamp connector for 2.5 ... 6 mm² With attached 7-pole connector, socket insert, grommet housing, UL Seals for various cable cross-sections must be separately ordered	Ordered and supplied from the Harting Company
T clamp connector Completely pre-fabricated	Ordered and supplied from the KnorrTec Company
T distributor box, IDC connection, power cable Uncut power cable, 2.5 ... 6 mm², 2 outgoing feeders: Push-in connection: 1.5 ... 6 mm² Seals for various cable cross-sections must be separately ordered	Ordered and supplied from the Weidmüller Company
T distributor box Completely pre-fabricated	Ordered and supplied from the KnorrTec Company

Additional information

For further information about the connecting cables and plug-in connectors mentioned above, please refer to Catalog IK PI.

Further selected accessories are available from Siemens Solution Partners. Select “Distributed Field Installation System” as technology in the “SolutionPartner Finder”.
http://www.siemens.com/automation/partnerfinder

Spare parts
Spare Parts Kit

Overview

A Spare Parts Kit can be ordered which comprises small parts such as replacement seals, caps, PROFIBUS address windows and screws.

Selection and ordering data

	Order No.
Spare Parts Kit for SINAMICS G120D comprising replacement seals, caps, PROFIBUS address windows and screws	**6SL3500-0SK01-0AA0**

Spare parts
Replacement fan

Overview

The Power Module fans are designed for extra long service life. Replacement fans can be ordered for special applications.

Selection and ordering data

Rated power		SINAMICS G120D PM250D Power Module		**Replacement fan**
kW	hp	Type 6SL3525-...	Frame size	Order No.
380 … 500 V 3 AC				
4.0	5.0	0PE24-0AA0	FSC	**6SL3500-0SF01-0AA0** (pre-mounted unit with cover, fan and screws)
5.5	7.5	0PE25-5AA0		
7.5	10	0PE27-5AA0		

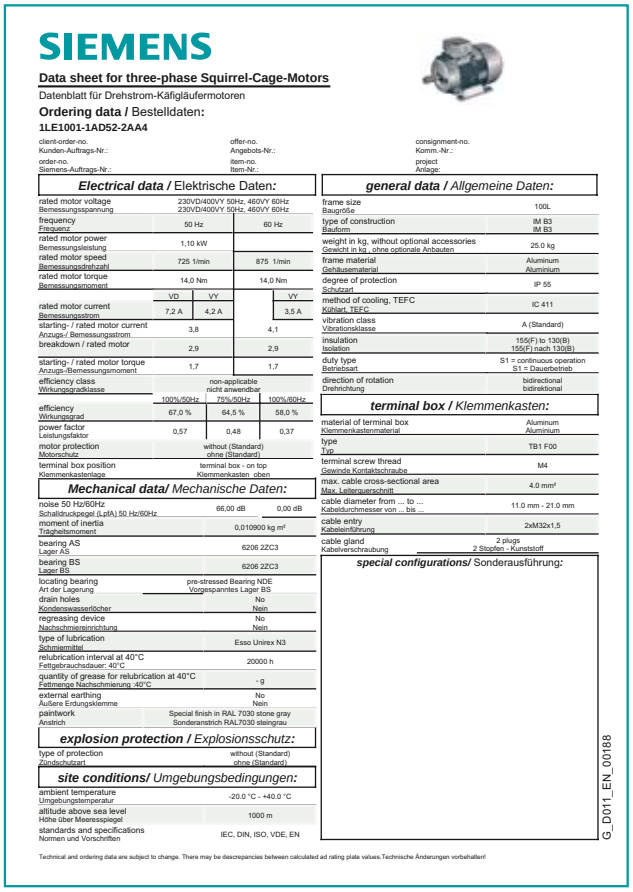
Tools and configuration

SD Configurator selection guide

Overview

Product description

The SD Configurator has been developed to facilitate the selection of a correct motor and/or inverter from the wide range of Standard Drives. The configurator is available as “selection guide” offline within the Interactive Catalog CA 01 (DVD) and online in the Siemens Mall. The SD Configurator is used to help locate the correct drive solution and delivers both the correct order number and relevant documentation.



SIEMENS

Data sheet for three-phase Squirrel-Cage-Motors

Datenblatt für Drehstrom-Käfigläufermotoren

Ordering data / Bestelldaten:

1LE1001-1AD52-2AA4

client-order-no. / Kunden-Auftrags-Nr.: offer-no. / Angebots-Nr.: consignment-no. / Komm.-Nr.:
order-no. / Siemens-Auftrags-Nr.: item-no. / Item-Nr.: project / Anlage:

***Electrical data** / Elektrische Daten:*

rated motor voltage / Bemessungsspannung	230VD/400VY 50Hz, 460VY 60Hz 230VD/400VY 50Hz, 460VY 60Hz			
frequency / Frequenz	50 Hz	60 Hz		
rated motor power / Bemessungsleistung	1,10 kW			
rated motor speed / Bemessungsdrehzahl	725 1/min	875 1/min		
rated motor torque / Bemessungsmoment	14,0 Nm	14,0 Nm		
	VD	VY		VY
rated motor current / Bemessungsstrom	7,2 A	4,2 A		3,5 A
starting- / rated motor current / Anzugs-/ Bemessungsstrom	3,8		4,1	
breakdown / rated motor	2,9		2,9	
starting- / rated motor torque / Anzugs-/Bemessungsmoment	1,7		1,7	
efficiency class / Wirkungsgradklasse	non-applicable / nicht anwendbar			
	100%/50Hz	75%/50Hz	100%/60Hz	
efficiency / Wirkungsgrad	67,0 %	64,5 %	58,0 %	
power factor / Leistungsfaktor	0,57	0,48	0,37	
motor protection / Motorschutz	without (Standard) / ohne (Standard)			
terminal box position / Klemmenkastenlage	terminal box - on top / Klemmenkasten oben			

***Mechanical data/** Mechanische Daten:*

noise 50 Hz/60Hz / Schalldruckpegel (LpfA) 50 Hz/60Hz	66,00 dB	0,00 dB
moment of inertia / Trägheitsmoment	0,010900 kg m²	
bearing AS / Lager AS	6206 2ZC3	
bearing BS / Lager BS	6206 2ZC3	
locating bearing / Art der Lagerung	pre-stressed Bearing NDE / Vorgespanntes Lager BS	
drain holes / Kondenswasserlöcher	No / Nein	
regreasing device / Nachschmiereinrichtung	No / Nein	
type of lubrication / Schmiermittel	Esso Unirex N3	
relubrication interval at 40°C / Fettgebrauchsdauer: 40°C	20000 h	
quantity of grease for relubrication at 40°C / Fettmenge Nachschmierung :40°C	- g	
external earthing / Äußere Erdungsklemme	No / Nein	
paintwork / Anstrich	Special finish in RAL 7030 stone gray / Sonderanstrich RAL7030 steingrau	

***explosion protection** / Explosionsschutz:*

type of protection / Zündschutzart	without (Standard) / ohne (Standard)

***site conditions/** Umgebungsbedingungen:*

ambient temperature / Umgebungstemperatur	-20.0 °C - +40.0 °C
altitude above sea level / Höhe über Meeresspiegel	1000 m
standards and specifications / Normen und Vorschriften	IEC, DIN, ISO, VDE, EN

***general data** / Allgemeine Daten:*

frame size / Baugröße	100L
type of construction / Bauform	IM B3 IM B3
weight in kg, without optional accessories / Gewicht in kg, ohne optionale Anbauten	25.0 kg
frame material / Gehäusematerial	Aluminum Aluminium
degree of protection / Schutzart	IP 55
method of cooling, TEFC / Kühlart, TEFC	IC 411
vibration class / Vibrationsklasse	A (Standard)
insulation / Isolation	155(F) to 130(B) 155(F) nach 130(B)
duty type / Betriebsart	S1 = continuous operation S1 = Dauerbetrieb
direction of rotation / Drehrichtung	bidirectional bidirektional

***terminal box** / Klemmenkasten:*

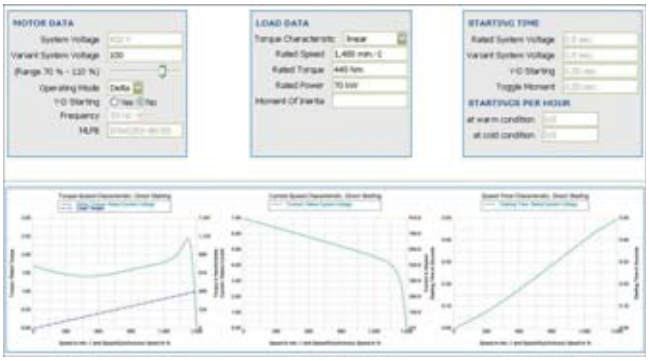
material of terminal box / Klemmenkastenmaterial	Aluminum Aluminium
type / Typ	TB1 F00
terminal screw thread / Gewinde Kontaktschraube	M4
max. cable cross-sectional area / Max. Leiterquerschnitt	4.0 mm²
cable diameter from ... to ... / Kabeldurchmesser von ... bis ...	11.0 mm - 21.0 mm
cable entry / Kabeleinführung	2xM32x1,5
cable gland / Kabelverschraubung	2 plugs 2 Stopfen - Kunststoff

***special configurations/** Sonderausführung:*

G_D011_EN_00188

Technical and ordering data are subject to change. There may be discrepancies between calculated ad rating plate values.Technische Änderungen vorbehalten!

It can display operating instructions, factory test certificate, terminal box documentation, etc. and generates data sheets, dimensional drawings and a start-up calculation for the relevant products. It can also be used to identify a suitable inverter for the selected motor.



3D models in a wide variety of 3D formats are also available.

The comprehensive help system not only explains the program functions, but also provides access to detailed technical background knowledge.

Product range

The SD Configurator covers the product range of low-voltage motors (energy-saving and explosion-proof motors) with the associated documentation and dimensional drawings, low-voltage inverters in the MICROMASTER 4 range, standard SINAMICS G110 and SINAMICS G120 inverters, as well as distributed SINAMICS G120D inverters and the SIMATIC ET 200S FC and SIMATIC ET 200pro drive converters.

Hardware and software requirements

- PC with 1.5 GHz CPU or faster
- Operating systems
  - Windows 98/ME
  - Windows 2000
  - Windows XP
  - Windows NT (from Service Pack 6 and higher)
  - Windows Vista
- At least 1024 MB RAM user memory
- Screen resolution 1024 × 768, graphics with more than 256 colors/small fonts
- DVD drive
- Windows-compatible sound card
- Windows-compatible mouse

Overview

Offline access in the Catalog CA 01 – the Offline Mall

More than 100,000 products with approx. 5 million possible product versions from the area of drive technology are listed in the Interactive Catalog CA 01 – the Offline Mall of Siemens Industry Automation and Drive Technologies (IA & DT).

The Catalog CA 01 can be directly installed on the hard disk or in the network from the DVD as a partial or full version.
The SD Configurator can then be found in the main menu of the CA 01 under the “Selection guide” tab.

Online access in the Siemens Mall

In addition, the SD Configurator can now be used on the Internet without requiring any installation. The SD Configurator can be found in the Siemens Mall under the following address:
http://www.siemens.com/dt-configurator

Selection and ordering data

Description	Order No.
Interactive Catalog CA 01 on DVD including selection guide, SD Configurator, English	**E86060-D4001-A510-C7-7600**

Additional Information

The Interactive Catalog CA 01 can be ordered from the relevant Siemens sales office or via the Internet:
http://www.siemens.com/automation/CA01

Links to tips, tricks and downloads for functional or content updates can be found at this address.

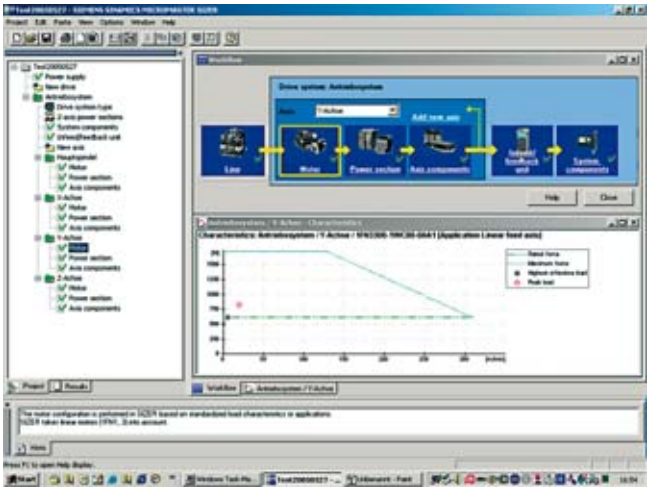
For technical support and hotline support, you can also contact our Hotline for the Catalog CA 01:

Phone.: +49 (0) 180 50 50 22 2

e-Mail: adsupport@siemens.com

SIZER configuration tool

Overview



The following drives and controls can be engineered in a user-friendly fashion using the SIZER configuration tool:

- The SINAMICS range of drives
- MICROMASTER 4 family of drives
- SINUMERIK solution line CNC control
- SIMOTION motion control
- SIMATIC Technology

It provides support when selecting and dimensioning the hardware and firmware components required for the drive task. SIZER supports the configuration of the complete drive system and allows simple single-motor drives up to complex multi-axis applications to be engineered.

SIZER supports all of the engineering steps in a workflow:

- Configuring the line supply infeed
- Selecting and dimensioning motors and gear units, including calculation of the 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 was being designed, particular importance was placed on a high degree of usability and an universal, function-based approach to the drive application. The extensive user guidance makes using the tool easy. Status information keeps the user continually informed about how the configuration is progressing.

The SIZER user interface is available in German, English, French and Italian.

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 allows the configuration of drive systems and already engineered drives to be copied/inserted/modified.

The configuration process results are:

- A parts list of the required components (export to Excel, use of the Excel data sheet for import to VSR)
- Technical specifications of the system
- Characteristic curves
- Comments regarding line harmonics
- Layout diagram of drive and control components and dimensional drawings of motors

These results are displayed in a results tree and can be reused for documentation purposes.

Technological online help is available:

- Detailed technical specifications
- Information about the drive systems and their components
- Decision-making criteria for the selection of components
- Online help in German, English, French, Italian, Chinese and Japanese

Minimum system requirements

Programming device or PC with Pentium II 400 MHz (Windows 2000), Pentium III 500 MHz (Windows XP)

512 MB RAM (1024 MB recommended)

At least 2.7 GB of free hard disk space

An additional 100 MB of free hard disk space on Windows system drive

Screen resolution 1024 × 768 pixels

Windows 2000 SP4 / XP Professional SP2 / XP Home Edition SP2

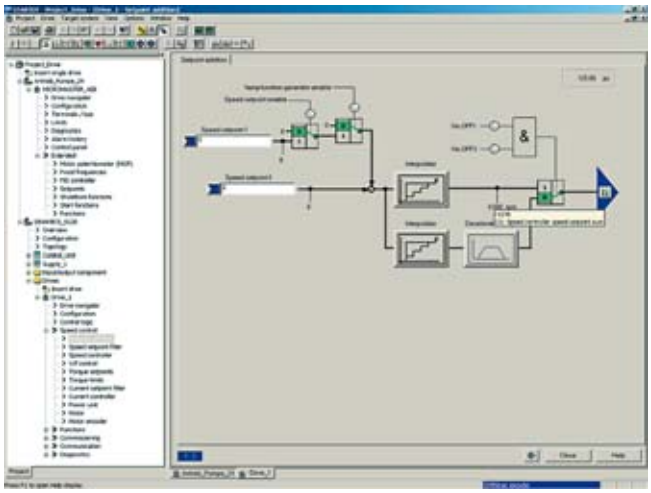
Microsoft Internet Explorer 5.5 SP2

Selection and ordering data

	Order No.
SIZER configuration tool for SINAMICS and MICROMASTER German, English, French, Italian	**6SL3070-0AA00-0AG0**

STARTER commissioning tool

Overview



The user-friendly STARTER commissioning tool can be used for:

- Commissioning
- Optimizing
- Diagnostics

This software can be operated as autonomous PC application, via Drive ES Basic in conformance with TIA, integrated in SIMATIC STEP 7 as well a integrated to a high level in the SCOUT engineering system (for SIMOTION). The basic functions and handling are the same in both cases.

In addition to the SINAMICS drives, in STARTER the MICROMASTER 4 and the SIMATIC ET 200S FC and SIMATIC ET 200pro FC drive converters are also supported.

The Project Wizard sets up the drives within the structure of the project tree.

Entry level personnel are supported by solution-based dialog guidance, which offers a standardized graphics-based display to make it easy 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)
- 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.

In addition, the following function is available for optimization:

- Self-optimization of the controller settings (depending on drive unit)

Diagnostics functions provide information about:

- Control/status words
- Parameter status
- Operating conditions
- Communication states

Performance features

- User-friendly: Only a few settings have to be made to complete the first commissioning: The motor starts to rotate
- Solution-oriented dialog-based user guidance simplifies commissioning
- Self-optimization functions reduce the manual effort required to optimize the drive

Minimum hardware and software requirements

PG or PC with Pentium III 1 GHz

512 MB RAM (1 GB RAM recommended)

Screen resolution 1024 × 768 pixels, 16-bit color depth

Free hard disk memory: 2 GB

Windows 2000 SP4, Windows 2003 Server SP1, SP2

Windows XP Professional SP1 or SP2

Windows Vista Business SP1, Windows Vista Ultimate SP1

Microsoft Internet Explorer 6.0

Selection and ordering data

	Order No.
STARTER commissioning tool for SINAMICS and MICROMASTER German, English, French, Italian, Spanish	**6SL3072-0AA00-0AG0**

7

Accessories

Connection

Depending on the Control Unit version, communications between the Control Unit (CU) of the drive unit and the programming device (PG) or PC can be realized via a serial interface, via PROFIBUS or Ethernet/PROFINET. The following accessories are available for the particular drive system as listed in the following table.

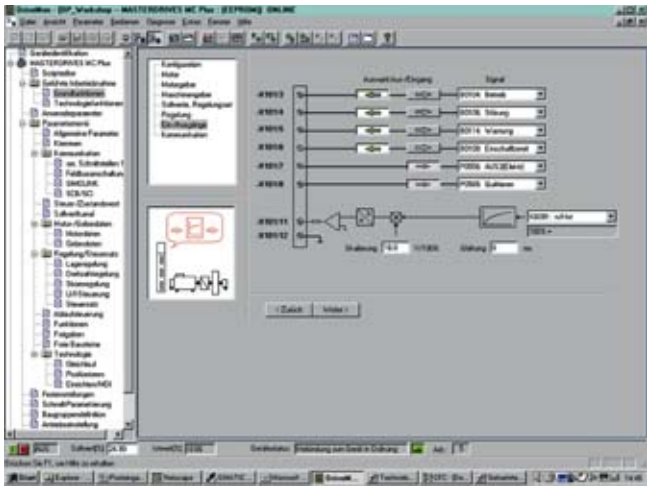
Selection and ordering data

Drive series	Recommended accessories for communication between the drive device and the programming device or PC via				
	RS232	Order No.	**PROFIBUS**	Order No.	**PROFINET**
SINAMICS G110	**PC Inverter Connection Kit** The scope of supply includes a 9-pin Sub-D connector, a RS232 standard cable, 3 m, and the STARTER commissioning tool on DVD	**6SL3255-0AA00-2AA1**	-	-	-
SINAMICS G120	**PC Inverter Connection Kit** The scope of supply includes a 9-pin Sub-D connector, a RS232 standard cable, 3 m, and the STARTER commissioning tool on DVD	**6SL3255-0AA00-2AA1**	**SIMATIC DP plug-in cable** 12 MBaud for PG connection, pre-fabricated with 2 × 9-pole SUB-D connectors, 3 m	**6ES7901-4BD00-0XA0**	Standard CAT5 Ethernet cable or PROFINET cable required
	PC Inverter Connection Kit for CU230P-2 Control Units The scope of supply includes a USB cable, 3 m, and the STARTER commissioning tool on DVD	**6SL3255-0AA00-2AA1**	**SIMATIC DP plug-in cable** 12 MBaud for PG connection, pre-fabricated with 2 × 9-pole SUB-D connectors, 3 m	**6ES7901-4BD00-0XA0**	-
SINAMICS G110D	**USB interface cable** for communication with a PC	**6SL3555-0PA00-2AA0**	-	-	-
SINAMICS G120D	**USB interface cable** for communication with a PC	**6SL3555-0PA00-2AA0**	Connection to the PROFIBUS system in the plant	-	Connection to the PROFINET system in the plant

Additional information

The STARTER commissioning tool is also available for update purposes on the Internet under
http://support.automation.siemens.com/WW/view/en/10804985/133100

Overview



Drive ES 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 STEP 7 Manager user interface provides the ideal basis for this.

Various software packages are available for SINAMICS:

- **Drive ES Basic**
  For entry into the world of Totally Integrated Automation and the capability of routing beyond network boundaries and the use of the SIMATIC Teleservice.
  Drive ES Basic is the basic software package for parameterizing all drives, both online and offline.
  With Drive ES Basic, the automation and drives are processed on the SIMATIC Manager screen. Drive ES Basic is the starting point for common data archiving for complete projects and for extending the use of routing and the SIMATIC Teleservice to drives. Drive ES Basic provides the engineering tools for the new Motion Control functions, slave-to-slave communication, equidistant mode and clock cycle synchronization with PROFIBUS DP and ensures that drives with PROFINET IO are simply integrated into the SIMATIC environment.
- **Drive ES SIMATIC**
  To simply parameterize the STEP 7 communication program instead of programming.
  Drive ES SIMATIC requires that STEP 7 is installed. It incorporates a SIMATIC block library; this means that the PROFIBUS and/or the PROFINET IO interface can be simply and reliably programmed in the SIMATIC CPU for the drives.
  There is no need for separate, time-consuming programming of the data exchange between the SIMATIC CPU and the drive.
  All Drive ES users have to remember is:
  Copy – Modify – Download – Ready.
  Coordinated, fully developed function blocks are copied from the library into a user-specific project.
  Frequently-used functions are completely programmed and ready to run:
  - Read out complete diagnostics buffer automatically from the drive
  - Download complete parameter sets automatically from the SIMATIC CPU into the drive, e.g. when a device has to be replaced.
  - Automatically download partial parameter sets (e.g. for recipe and product change) into the drive from the SIMATIC CPU
  - Upload the complete parameter assignment or partial parameter sets into the SIMATIC CPU from the drive, i.e. update.
- **Drive ES PCS 7**
  Integrates drives with PROFIBUS interface into the SIMATIC PCS 7 process control system.
  Drive ES PCS 7 requires a pre-installed SIMATIC PCS 7 process control system, from Version 5.2 and higher.
  Drive ES PCS 7 provides a function block library with function blocks for the drives and the corresponding faceplates for the operator station. This means that the drives can be operated from the PCS 7 process control system. From version V6.1 and higher, drives will also be able to be represented in the PCS7 Maintenance Station.

Selection and ordering data

		Order No.
Drive ES Basic V5.4 SPx [1]		
• Configuration software for the integration of drives into Totally Integrated Automation		
• Prerequisite: STEP 7 from V5.3, SP 3 and higher		
• Supplied as: DVD, de, en, fr, es, it with electronic documentation		
Floating license, 1 user		**6SW1700-5JA00-4AA0**
Floating license (copy license), 60 users		**6SW1700-5JA00-4AA1**
Update service for single-user license		**6SW1700-0JA00-0AB2**
Update service for copy license, 60 users		**6SW1700-0JA00-1AB2**
Upgrade from V5.x to V5.4 SPx [1]		**6SW1700-5JA00-4AA4**
Drive ES SIMATIC V5.4 SPx [1]		
• Block library for SIMATIC for the parameterization of communication with the drives		
• Prerequisite: STEP 7 from V5.3, SP3 and higher		
• Supplied as: CD-ROM, de, en, fr, es, it with electronic documentation		
Single-user license incl. 1x runtime license		**6SW1700-5JC00-4AA0**
Runtime license (without data carrier)		**6SW1700-5JC00-1AC0**
Update service for single-user license		**6SW1700-0JC00-0AB2**
Upgrade from V5.x to V5.4 SPx [1]		**6SW1700-5JC00-4AA4**
Drive ES PCS7 V6.1 SPx [1]		
• Block library for PCS7 for the integration of drives		
• Prerequisite: PCS7 from V6.1 and higher		
• Supplied as: CD-ROM, de, en, fr, es, it with electronic documentation		
Single-user license incl. 1x runtime license		**6SW1700-6JD00-1AA0**
Runtime license (without data carrier)		**6SW1700-5JD00-1AC0**
Update service for single-user license		**6SW1700-0JD00-0AB2**
Upgrade from V5.x to V6.x SPx [1]		**6SW1700-6JD00-1AA4**
Drive ES PCS7 V7.0 SPx [1]		
• Block library for PCS7 for the integration of drives		
• Prerequisite: PCS7 from V7.0 and higher		
• Supplied as: CD-ROM, de, en, fr, es, it with electronic documentation		
Single-user license incl. 1x runtime license	new	**6SW1700-7JD00-0AA0**
Runtime license (without data carrier)	new	**6SW1700-5JD00-1AC0**
Update service for single-user license	new	**6SW1700-0JD00-0AB2**
Upgrade from V5.x to V7.x SPx [1]	new	**6SW1700-7JD00-0AA4**

Additional information

For additional information go to:
http://www.siemens.com/drivesolutions

[1] Orders are always supplied with the latest SP.

SinaSave energy-saving program

Overview

The SinaSave energy-saving program is designed for applications with motors fed from the line supply (fixed speed) and from converters (variable speed). For line supply operation, the cost savings as well the payback time for the additional cost of the Siemens EFF1 energy-saving motors can be calculated using the three bases for comparison.

In comparison to:

- Siemens EFF2 energy-saving motors – **Case 1**
- Individually selected known motors – **Case 2**
- Known motors within an overall plant/system analysis – **Case 3**

The individual application cases are as follows:

Case 1

Calculation of the energy cost savings as well as the payback time for the additional costs of the Siemens EFF1 energy-saving motors when compared to Siemens EFF2 energy-saving motors.

In this case, the motor data for the Siemens energy-saving motors have already been stored complete with their order numbers. In addition, you will also be told the payback time for the additional costs of an energy-saving motor.

Case 2

Calculation of the energy cost savings as well as the payback time for the additional cost of the Siemens EFF1 energy-saving motors in comparison with other known motors.

However, the calculation requires exact knowledge of the technical specifications of the motor which is to be used for the comparison.

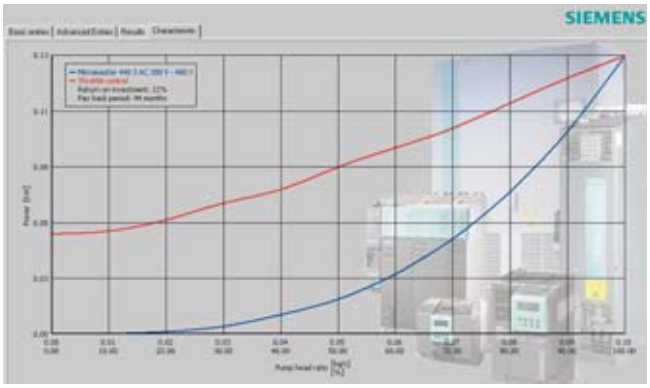
Case 3

Calculation of the energy cost savings as well as the payback time for the additional costs of Siemens EFF1 energy-saving motors when compared to any other known motors – plant/system analysis.

For **converter operation**, SinaSave takes into account all the necessary plant/system-specific parameters. Values required for the process such as flowrate and delivery height for pumps, mass flowrate and total pressure difference for fans as well as the density of the transported medium are taken into account in addition to the efficiency of the fan, pump or compressor, the electrical efficiency and the overall efficiency of the plant. Other basic data for the program include the number of working days and work shifts as well as the pumping profile over a day and year – decisive data for calculating the actual energy saving.

From the plant/system-specific basic data that has been entered, the program initially selects the drive system with the appropriate power rating and a price for a suitable frequency inverter. In a further step, the program determines the energy requirements of the variable-speed drive system for the specific application and compares it to the calculated values for all alternative concepts that can be considered for the plant/system in question; including for example, throttle valves, bypass, vane control or pole-changing motors. The energy-saving is obtained from the difference in kilowatt hours which the program then converts into a cash saving using the currently applicable cost of electrical energy for the plant.

The program calculates the payback time from the price of the frequency inverter, the decisive energy-saving and other cost-reducing effects of variable-speed operation that have also been taken into account, such as an improved power factor and operation that reduces the stress on the equipment in the plant/system.



Product range

The SinaSave program includes the product range of low-voltage motors/energy-saving motors and low-voltage inverters from the MICROMASTER 430 and MICROMASTER 440 product series as well as SINAMICS G110, SINAMICS G120 and SINAMICS G150 converters.

Additional information

The program can be downloaded from the Internet using the following link:
http://www.siemens.com/energysaving

Services and documentation

8

Training

Overview

Faster and more applicable know-how:
Hands-on training from the manufacturer

SITRAIN – Siemens Training for Automation and Industrial Solutions – provides you with comprehensive support in solving your tasks.

Training by the market leader in automation and plant engineering enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants is concerned. You can eliminate deficiencies in existing plants and avoid expensive planning mistakes right from the beginning.

First-class know-how which pays off directly: In shorter commissioning times, high-quality end products, faster troubleshooting and reduced downtimes. In other words, higher profits and lower costs.

Achieve more with SITRAIN

- Shorter times for commissioning, maintenance and service
- Optimized production operations
- Reliable engineering and commissioning
- Minimizing plant downtimes
- Flexible plant adaptation to market requirements
- Compliance with quality standards in production
- Increased employee satisfaction and motivation
- Shorter familiarization times following changes in technology and staff

Visit our Internet site under:
http://www.siemens.com/sitrain

or let us advise you personally. You can request our latest training catalog from:

SITRAIN Customer Support Germany:

Phone.: +49 (0)1805 – 23 56 11
Fax: +49 (0)1805 – 23 56 12
(0.14 €/minute from a German landline network,
mobile telephone prices may vary)

SITRAIN highlights

Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

Wide variety of training courses

With a total of about 300 local attendance courses, we provide training for the complete range of Siemens Industry products as well as interaction of the products in systems. Telecourses, teach-yourself software and web-hosted seminars supplement our classic range of courses.

Customized training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: Blended learning

“Blended learning” means a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Lower travel costs and shorter times away from work.

Overview

Range of courses for SINAMICS G110 and SINAMICS G120

The courses are modular in design and are intended for a variety of target groups as well as individual customer requirements. An overview course helps decision-makers and sales personnel to acquaint themselves with the SINAMICS drive concept and its position in the existing Siemens drives environment.

SITRAIN offers a compact course to users of the SINAMICS G110 system. Due to the uniform parameterization and commissioning of MICROMASTER 4 and SINAMICS G110, both technologies can be combined easily in a single course.

A training course on the subject of service and commissioning provides the necessary depth of technical knowledge for SINAMICS G120 and SINAMICS G120D.

SINAMICS G120 is also covered by various courses which deal more generally with the SINAMICS drive system.

All courses contain as many practical exercises as possible in order to enable intensive and direct training on the drive system and with the tools in small groups.

More information on course contents, dates and prices is available on the Internet at:
http://www.siemens.com/sitrain

Title	Target group					Duration	Course code
	Decision-makers, sales personnel	Project managers, project personnel	Programmers	Commissioning engineers, configuring engineers, service personnel	Maintenance personnel		
SINAMICS system overview	✓					2 days	DR-SN-UEB
MICROMASTER MM4/ SINAMICS G110 compact course		✓		✓	✓	1 day	SD-WSMM4
SINAMICS G120 service and commissioning	✓			✓	✓	2 days	DR-G120-EXP
SINAMICS communication			✓	✓		5 days	DR-SN-COM

SINAMICS G110 training case

Overview

The modular SIDEMO case system for micro-systems also includes a training case for SINAMICS G110 which is designed for mobile use for sales and service.

The training case is equipped with an analog version of a SINAMICS G110 inverter.

The training case can be operated on its own or together with training systems such as LOGO!, SIMATIC S7-200, and SITOP DC-UPS.

For this reason, a conversion guide is enclosed with the training case that allows the inverter to be replaced by a USS version (not included in the scope of supply).

The training systems are fitted in dark blue transport cases 400 × 300 × 210 mm (gross weight 12 kg). The transport cases can be stacked.

Additional information is available on the Internet under http://www.siemens.com/sidemo

Selection and ordering data

	Order No.
SINAMICS G110 training case (incl. BOP operator panel)	**6AG1064-1AA03-0AA0**
Line supply adapter 110 V/230 V	**6AG1064-1AA02-0AA0**

SINAMICS G120 training case

Applications

A training case is available for on-site training and demonstration of the SINAMICS G120 system. It can demonstrate and increase the understanding of a wide range of SINAMICS G120 functions. The case uses the CU240S DP-F or CU240S PN-F as a Control Unit with which the PROFIBUS or PROFINET interface and safety functions can be demonstrated.

Design

- CU240S DP-F Control Unit or CU240S PN-F Control Unit
- PM240 Power Module, frame size FSA, 0.37 kW (0.5 hp)
- Basic Operator Panel (BOP)
- Induction motor 1LA
- Encoder
- Load equipment (dynamometer)
- Simulator panel
- Power cable
- Storage and transport case

Technical specifications

	SINAMICS G120 training case
Input voltage	230 V 1 AC
Degree of protection acc. to DIN VDE 0470 Part 1, EN 60529, IEC 529	IP00
Ambient temperature, perm.	
• Storage and transport	–20 … +60 °C
• Operation	5 … 40 °C
Dimensions	
• Width	540 mm
• Height	500 mm
• Depth	400 mm
Weight, approx.	10 kg

Selection and ordering data

	Order No.
SINAMICS G120 training case	
• with CU 240S DP-F and Tanos box	**6ZB2480-0CD00**
• with CU 240S DP-F and Peli box	**6ZB2480-0CE00**
• with CU 240S PN-F and Tanos box	**6ZB2480-0CF00**
Line supply adapter 110 V/230 V	**6AG1064-1AA02-0AA0**

SINAMICS G110 documentation

Overview

The following manuals are available for the standard SINAMICS G110 inverters:

	Manuals		
	Operating instructions	Parameter list	Getting Started Guide
Controlled Power Modules			
CPM110	de, en, fr, it, es	de, en, fr, it, es	multilingual

Manuals are available in the following forms:

SD Manual Collection on DVD

All manuals on low-voltage motors, geared motors and low-voltage inverters are on the DVD in several languages.

Paper documentation

A Getting Started Guide is supplied in hard copy for the Controlled Power Modules. Additionally, the Operating instruction and the Parameter list can be ordered as hard copy.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g110/documentation

Selection and ordering data

Type of documentation	Language	Order No.
SINAMICS G110 Operating instructions (hard copy)	German	**6SL3298-0AA11-0AP0**
	English	**6SL3298-0AA11-0BP0**
	French	**6SL3298-0AA11-0DP0**
	Italian	**6SL3298-0AA11-0CP0**
	Spanish	**6SL3298-0AA11-0EP0**
SINAMICS G110 Parameter list (hard copy)	German	**6SL3298-0BA11-0AP0**
	English	**6SL3298-0BA11-0BP0**
	French	**6SL3298-0BA11-0DP0**
	Italian	**6SL3298-0BA11-0CP0**
	Spanish	**6SL3298-0BA11-0EP0**

SINAMICS G120 documentation

Overview

SINAMICS G120 is a modular inverter system that comprises different function units – these are primarily the Control Unit and the Power Module. The documentation is also organized in a modular structure. The following manuals are available:

	Manuals			
	Hardware Installation Manual	Operating instructions	List Manual	Getting Started
Control Units				
CU230P-2	–	de, en [1]	de, en	de, en, fr, it, es
CU240S	–	de, en	de, en [2]	de, en, fr, it, es
CU240E	–	de, en	de, en [2]	de, en, fr, it, es
Power Modules				
PM240	de, en	–	– [3]	multilingual
PM250	de, en	–	– [3]	multilingual
PM260	de, en	–	– [3]	multilingual

Manuals are available in the following forms:

SD Manual Collection on DVD

All manuals on low-voltage motors, geared motors and low-voltage inverters are on the DVD in several languages.

Paper documentation

A Getting Started Guide is supplied as hard copy with every Power Module and Control Unit.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g120/documentation

[1] In addition, a Function Manual is available for the CU230P-2 Control Unit. This describes all of the functions between the CU230P-2 and the corresponding Power Modules.

[2] A common List Manual is available for the CU240S and CU240E Control Units.

[3] The parameter settings for the Power Modules are included in the List Manual for the Control Units.

Additional information

Language	Manual in language
de	German
en	English
fr	French
it	Italian
es	Spanish
Multilingual	de, en, fr, it, es

Hardware Installation Manual

The Hardware Installation Manual describes the procedures that must be undertaken regarding a product so that the product can be used at the required location and in the required way. The Hardware Installation Manual contains all relevant information on setting up, installing, and wiring up and the necessary dimension drawings and wiring/circuit diagrams.

Usage phases: Installation and commissioning phase

Operating instructions

Operating instructions are a comprehensive collection of all information necessary for the normal and safe operation of products, parts of plants and complete complete plants (EN 62079).

Usage phases: Planning and engineering phase, implementation phase, installation and commissioning phase, application phase, maintenance and service phase.

List Manual/Parameter list

The List Manual or the Parameter list describes all parameters, function charts, and faults/warnings for the product/system as well as their meanings and setting options. It contains parameter data and fault/warning descriptions with functional correlations.

Usage phases: Commissioning of components that have already been connected, engineering plant and system functions and fault cause/diagnostics.

Getting Started/Getting Started Guide

The Getting Started or Getting Started Guide 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.

Usage phases: Commissioning components that have already been connected.

SINAMICS G110D documentation

Overview

SINAMICS G110D is a distributed, compact frequency inverter for single-motor drives in a high degree of protection for basic applications. The following manuals are available:

	Manuals			
	Hardware Installation Manual	Operating instructions	List Manual	Getting Started
SINAMICS G110D	–	de, en	de, en	de, en

Manuals are available in the following forms:

SD Manual Collection on DVD

All manuals on low-voltage motors, geared motors and low-voltage inverters are on the DVD in several languages.

Paper documentation

A Getting Started is supplied as hard copy with every SINAMICS G110D distributed inverter.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g110d/documentation

SINAMICS G120D documentation

Overview

SINAMICS G120D is a distributed, modular frequency inverter for single-motor drives in a high degree of protection for demanding applications. The documentation is also organized in a modular structure. The following manuals are available:

	Manuals			
	Hardware Installation Manual	Operating instructions	List Manual	Getting Started
Control Units				
CU240D	–	de, en	de, en	de, en, fr, it, es [1]
Power Modules				
PM250D	– [2]	–	– [3]	de, en, fr, it, es [1]

Manuals are available in the following forms:

SD Manual Collection on DVD

All manuals on low-voltage motors, geared motors and low-voltage inverters are on the DVD in several languages.

Paper documentation

A Getting Started is supplied as hard copy with every Power Module and Control Unit.

Online version on Internet as download

The documentation is also available on the Internet under http://www.siemens.com/sinamics-g120d/documentation

Additional information

Language	Manual in language
de	German
en	English
fr	French
it	Italian
es	Spanish
Multilingual	de, en, fr, it, es

Hardware Installation Manual

The Hardware Installation Manual describes the procedures that must be undertaken regarding a product so that the product can be used at the required location and in the required way. The Hardware Installation Manual contains all relevant information on setting up, installing, and wiring up and the necessary dimension drawings and wiring/circuit diagrams.

Usage phases: Installation and commissioning phase

Operating instructions

Operating instructions are a comprehensive collection of all information necessary for the normal and safe operation of products, parts of plants and complete plants (EN 62079).

Usage phases: Planning and engineering phase, implementation phase, installation and commissioning phase, application phase, maintenance and service phase.

List Manual

The List Manual describes all parameters, function charts, and faults/warnings for the product/system as well as their meanings and setting options. It contains parameter data and fault/warning descriptions with functional correlations.

Usage phases: Commissioning of components that have already been connected, engineering plant and system functions and fault cause/diagnostics.

Getting Started

The 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.

Usage phases: Commissioning components that have already been connected.

[1] A common Getting Started is available for the CU240D Control Units and the PM250D Power Modules.

[2] The installation instructions for the PM250D Power Module are included in the Getting Started.

[3] The parameter settings for the Power Modules are included in the List Manual for the Control Units.

Overview

The SD Manual Collection provides a concise summary of all of the manuals for the low-voltage motors, geared motors and low-voltage inverters. It is admirably suited for commissioning and service, in the office it replaces the space-consuming collection of catalogs and allows information to be quickly accessed:

- Keyword search within a PDF file
- Full-text search in the complete DVD
- Electronic update service, free of charge for 1 year
- The DVD can be networked, i.e. the PDFs can be stored on a central server

The SD Manual Collection on DVD in several languages (including German, English, French, Italian, Spanish) includes manuals for the following motors and inverters:

- Low-voltage motors
  - IEC motors
  - NEMA motors
- Geared motors
- Low-voltage inverters
  - MICROMASTER 3
  - MICROMASTER 4
  - SINAMICS G110
  - SINAMICS G120, SINAMICS G120D
  - SIMATIC ET200 converter

Update service for 1 year

In addition, an update service that includes the supply of the current SD Manual Collection and the three following updates can be ordered. This is valid for one year. If the contract is not cancelled, it is automatically extended by 1 year.

Selection and ordering data

		Order No.
SD Manual Collection on DVD [1] multilingual All manuals for the low-voltage motors, geared motors and low-voltage inverters	new	**6SL3298-0CA00-0MG0**
SD Manual Collection on DVD [1] multilingual, updated service for 1 year	new	**6SL3298-0CA10-0MG0**

[1] Subject to export regulations: AL: N and ECCN: 5D992

My Documentation Manager

Overview

My Documentation Manager is the web-based system to generate personalized documentation based on standard documents. It is part of the Service & Support Portal.

Example: For SINAMICS G120

Opening My Documentation Manager

My Documentation Manager opens in two ways

- Search in the Service & Support Portal
  http://www.siemens.com/automation/service&support
  The appropriate manuals are designated by “configurable”. My Documentation Manager opens by clicking on “Display and configure”. The selected document is displayed as the current document.
- Using the direct link from the Service & Support Portal
  https://www.automation.siemens.com/docconf/
  After logon/registration, the online help is displayed as current document.

My Documentation Manager offers the following options:

- Display
  View, print or download standard documents or personalized documents
- Configure
  Transfer standard documents or parts of them to personalized documents
- Generate/Manage
  Produce and manage personalized documents in the formats PDF, RTF or XML

You must register for Configure and Generate/Manage (the existing login can be used, e.g. Siemens Mall)

In the face of harsh competition you need optimum conditions to keep ahead all the time:
A strong starting position. A sophisticated strategy and team for the necessary support - in every phase.
Service & Support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and startup to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Online Support

The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

http://www.siemens.com/automation/service&support

Technical Support

Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

Tel.: +49 (0)180 50 50 222
Fax: +49 (0)180 50 50 223
(€ 0.14 /min. from a German landline network, mobile telephone prices may vary)

http://www.siemens.com/automation/support-request

Technical Consulting

Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution. [1)]

Configuration and Software Engineering

Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project. [1)]

Service On Site

With Service On Site we offer services for startup and maintenance, essential for ensuring system availability.

In Germany
0180 50 50 444 [1)]
(€ 0.14 /min. from a German landline network, mobile telephone prices may vary)

Repairs and Spare Parts

In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

In Germany
0180 50 50 448 [1)]
(€ 0.14 /min. from a German landline network, mobile telephone prices may vary)

Optimization and Upgrading

To enhance productivity and save costs in your project we offer high-quality services in optimization and upgrading. [1)]

SPARESonWeb – Online spare parts catalog

SPARESonWeb is a web-based tool for selecting the spare parts available for the SINAMICS system. After you have registered and entered the serial number and order number, the spare parts available for the relevant unit are displayed.
The delivery state for specific orders can be displayed for all shipped SINAMICS products.
http://workplace.automation.siemens.com/sparesonweb

[1)] For country-specific telephone numbers go to our Internet site at: http://www.siemens.com/automation/service&support

8

Notes

Appendix

9

Appendix

SIRIUS M200D Motor starters

For spatially extensive and distributed drive solutions without a control cabinet, it is recommended to use the especially rugged and favorably-priced SIRIUS M200D AS-i Basic motor starters in a high IP65 degree of protection for AS-Interface communication.
This motor starter distinguishes itself as a result of its simple commissioning and its level of standardization to other products such as frequency inverters and the ET 200pro distributed I/O system.

Quickly mounted, simply parameterized and precisely diagnosed
The SIRIUS M200D motor starters can be mounted with just a few manual operations. The integrated connector technology results in a significant reduction of the wiring costs. Motor cables can be directly plugged-in. The motor starters sense the actual current flowing. The evaluation of the current of the parameterizable electronic overload protection increases the availability of the drive system – just the same as the reliable signals that are output when setpoints are exceeded or undershot. A drive is locally controlled using the version with integrated manual operation. Extensive device diagnostics is possible on site using the LEDs. In addition to diagnostics using the process image PAE, the device can generate up to 15 different diagnostic messages per slave. The highest priority message can be read-out via the AS-Interface communication. You can obtain additional information under
http://www.siemens.com/sirius-motorstarter

	SIRIUS M200D
Main features	• Available as direct and reversing starter. • As electronically and mechanically switching version • Fast and fail-safe line supply and motor cable connections using an ISO 23570 plug connector system • Rugged and widely established M12 connection system for digital inputs and outputs, as well as for the AS-Interface bus connection • Integrated connector monitoring on the infeed side • Continuous wiring to the SINAMICS G120D frequency inverters as well as to the SIMATIC ET 200pro distributed I/O system • Integrated short-circuit protection • Full motor protection using overload protection and temperature sensor (PTC, TC) • Low variance – only 2 device versions up to 5.5 kW (7.4 hp) as a result of the wide range • Simple local parameterization using the integrated DIP switch • Simple and user-friendly installation • Integrated maintenance switch that can be locked using 3 locks (multi-stage service) • TIA integration via the AS-Interface, 2 digital inputs visible in the process image • Optionally available integrated manual-local control using a keyswitch • Optionally available brake control • Extensive diagnostics concept using LEDs and as highlight, also via the AS-Interface bus protocol
Power rating of AC motors	max. 5.5 KW (7.4 hp) (at 400 V)
Rated operating current • at 400 V • at 500 V	 0.15 ... 2 A/1.5 ... 12 A (mechanical version) 0.15 ... 2 A/1.5 ... 9 A (electronic version)
Type of assignment	2 (mech. motor starters up to 2 A), 1 (all other motor starters)
Utilization categories	AC-1, AC-2, AC-3, AC-4
Motor protection	Short-circuit and overload protection
Bus connection	AS-Interface via M12
Diagnostics	Diagnostics via LED, S1 status bit, detailed diagnostics via AS-Interface bus
Digital inputs	4, of which 2 via process image
Digital output	1, permanently assigned to the group fault
Brake	Optional, with 400 V AC/230 V AC or 180 V DC
Manual-local control	Optional, with MANUAL – AUTO keyswitch, jogging/latching, inhibit Quick Stop
Permissible ambient temperature	–25 ... +55 °C (in operation), –40 ... +70 °C (when stored)
Degree of protection	IP65
Dimensions (H × W × D)	215 mm × 295 mm × 159 mm

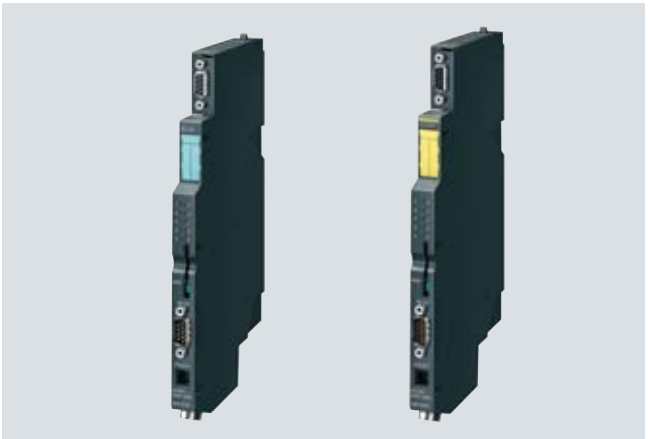
SIRIUS M200D motor starter, electronic version

SIRIUS M200D motor starter, mechanical version

Frequency inverters for SIMATIC ET 200

For the SIMATIC ET 200 distributed I/O system, there are frequency inverters that are available as modules that are completely integrated into the system. Inverters are available for the finely modular SIMATIC ET 200S FC system in IP20 degree of protection, as well as for the cabinetless SIMATIC ET 200pro FC system in IP65 degree of protection. With a wide range of possibilities, the frequency inverters expand the functional scope of the modular modules used in both systems (e.g. inputs and outputs, technology modules, direct starters and soft starters). Using the appropriate interface modules, these can be connected to PROFIBUS and PROFINET via the SIMATIC ET 200 system bus – and PLC functionality can be integrated into the system. Fail-safe frequency inverter functions can either be controlled locally or via PROFIsafe.
An overview of the features of these frequency inverters is shown in the following tables. You will find the complete product spectrum with ordering data, technical specifications and descriptions in Catalog IK PI "Industrial Communication for Automation and Drives" and on the Internet under
http://www.siemens.com/et200s-fc/documentation
and
http://www.siemens.com/et200pro-fc/documentation

	SIMATIC ET 200S FC
Main features	• A frequency inverter is completely embedded in a distributed I/O system with degree of protection IP20 • Extremely simple installation and low probability of errors due to the self-establishing power and communication bus • Space-saving design as a result of compact dimensions and common protection • When service is required, the frequency inverter can be quickly replaced without the need for tools ("hot swapping") • Frequency control (*V/f*), vector control with and without encoder • Line-commutated energy recovery using the latest generation of power electronics • Modular design with Control Unit (control module) and Power Module (power unit) • Frequency inverter version with integrated, autonomous, fail-safe functions without any complex external circuitry
Rated powers	0.75 kW (1.0 hp) 2.2 kW (3.0 hp) 4.0 kW (5.4 hp)
Input voltage	380 ... 480 V 3 AC +10 % –10 %
Overall width	Control Unit + Power Module up to 0.75 kW (1.0 hp): 80 mm, otherwise 145 mm
Line supply frequency	47 … 63 Hz
Overload capability	• Overload current 1.5 × rated output current (i.e. 150 % overload capability) for 60 s, cycle time 300 s • Overload current 2 × rated output current (i.e. 200 % overload capability) for 3 s, cycle time 300 s
Output frequency	0 … 650 Hz
Pulse frequency	8 kHz (standard), 2 … 16 kHz (in steps of 2 kHz)
Skippable frequency range	1, parameterizable
Efficiency	≥ 96 %
Interfaces	• Connection to PROFIBUS via IM151 interface module • Connection to PROFINET via IM151-3PN interface module • Integration of PLC functionality via IM151-CPU and IM151-7 F-CPU interface modules • RS232 interface with USS protocol for commissioning at the PC using the STARTER commissioning software • Slot for an optional Micro Memory Card for uploading or downloading parameter settings • PTC/KTY84 interface for motor monitoring • Speed encoder interface (Sub-D connector) for unipolar HTL incremental encoder • Control of the integrated safety functions via PROFIsafe (using the Power Module PM-D F PROFIsafe) or terminals (using the Safety Local Power Module PM-D F X1)
Standards conformance	UL, cUL ,CE and c-tick, Low-Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC
Functional safety	Control module with integrated safety functions according to Category 3 of EN 954-1 and according to SIL 2 of IEC 61508: • Safe Torque Off (STO) • Safely Limited Speed (SLS) • Safe Stop 1 (SS1) The safety functions "Safely Limited Speed" and "Safe Stop 1" are not permitted for pulling loads such as e.g. lifting gear and winders
Degree of protection	IP20



SIMATIC ET 200S FC Control Units

SIMATIC ET 200S FC Power Modules

Appendix

Frequency inverters for SIMATIC ET 200

	SIMATIC ET 200pro FC
Main features	• A frequency inverter is completely embedded in a distributed I/O system with IP65 degree of protection • Extremely simple installation and low probability of errors due to the self-establishing power and communication bus • The frequency inverter can be quickly replaced when service is required without interrupting bus communications to other modules within SIMATIC ET 200pro FC • Frequency control (*V/f*), vector control without encoder • Line-commutated energy recovery using the latest generation of power electronics • Frequency inverter version with integrated, autonomous, fail-safe functions without any complex external circuitry.
Rated powers	1.1 kW (1.5 hp) (at 0 … 55 °C ambient temperature) 1.5 kW (2.0 hp) (at 0 … 45 °C ambient temperature)
Input voltage	380 ... 480 V 3 AC +10 % –10 %
Overall width	155 mm
Line supply frequency	47 … 63 Hz
Overload capability	• Overload current 1.5 × rated output current (i.e. 150 % overload capability) for 60 s, cycle time 300 s • Overload current 2 × rated output current (i.e. 200 % overload capability) for 3 s, cycle time 300 s
Output frequency	0 … 650 Hz
Pulse frequency	4 kHz (standard) 2 … 16 kHz (in steps of 2 kHz)
Skippable frequency range	1, parameterizable
Efficiency	≥ 96 %
Interfaces	• Connection to PROFIBUS via IM154-1 and IM154-2 interface modules • Available soon: Connection to PROFINET via IM154-4PN interface module and connection to IM154-8 CPU interface module • Optical interface with USS protocol for optical RS232 connecting cable • Control for an electro-mechanical motor brake 180 V DC • Slot for an optional memory card (MMC) to upload or download parameter settings • PTC/KTY84 interface for motor temperature monitoring • Control of the integrated safety functions via the Safety Local maintenance switch module F RSM or via F-Switch PROFIsafe
Standards conformance	UL, cUL, CE, Low-Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC
Functional safety	Version with integrated safety functions according to Category 3 of EN 954-1 and according to SIL 2 of IEC 61508: • Safe Torque Off (STO) • Safely Limited Speed (SLS) • Safe Stop 1 (SS1) The safety functions “Safely Limited Speed” and “Safe Stop 1” are not permitted for pulling loads such as e.g. lifting gear and winders
Degree of protection	IP65

SIMATIC ET 200pro FC
Standard frequency converter

SIMATIC ET 200pro FC Fail-safe
Frequency converter with integrated safety functions

MICROMASTER inverters from Siemens perfectly complement the motors. The table shows an overview of the features of these inverters. For the full range of products complete with ordering data, technical details and information, see Catalog DA 51.2.

For up-to-date information on MICROMASTER 420/430/440 frequency inverters, visit the Internet at http://www.siemens.com/micromaster/documentation

	MICROMASTER 410	MICROMASTER 420	MICROMASTER 430	MICROMASTER 440
Main features	**"The low-price solution"** for variable speeds with 3-phase motors connected to 1-phase line supplies, e.g. for pumps, fans, billboards, barriers, gate drives and automated machines **Discontinued product** [1]	**"The universal inverter"** for 3-phase line supplies and optional fieldbus connection, e.g. for conveyor belts, material transport, pumps, fans and processing machines	**"The specialist for pumps and fans"** with optimized OP (manual/ automatic changeover), adapted software functionality and optimized power yield	**"The all-rounder"** with sophisticated vector control (with and without encoder feedback) for a wide range of applications in sectors such as conveyor systems, textiles, elevators, hoisting gear and machinery construction
Power range	0.12 ... 0.75 kW (0.16 ... 1.0 hp)	0.12 ... 11 kW (0.16 ... 15 hp)	7.5 ... 250 kW (10 ... 335 hp)	0.12 ... 250 kW (0.16 ... 335 hp)
Voltage ranges	100 ... 120 V 1 AC 200 ... 240 V 1 AC	200 ... 240 V 1 AC 200 ... 240 V 3 AC 380 ... 480 V 3 AC	380 ... 480 V 3 AC	200 ... 240 V 1 AC 200 ... 240 V 3 AC 380 ... 480 V 3 AC 500 ... 600 V 3 AC
Closed-loop control	• *V/f* characteristic • Multipoint characteristic (parameterizable *V/f* characteristic) • FCC (Flux Current Control)	• *V/f* characteristic • Multipoint characteristic (parameterizable *V/f* characteristic) • FCC (Flux Current Control)	• *V/f* characteristic • Multipoint characteristic (parameterizable *V/f* characteristic) • FCC (Flux Current Control)	• *V/f* characteristic • Multipoint characteristic (parameterizable *V/f* characteristic) • FCC (Flux Current Control) • Vector control
Process control		Internal PI controller	Internal PID controller	Internal PID controller (autotuning)
Inputs	3 Digital inputs 1 Analog input	3 Digital inputs 1 Analog input	6 Digital inputs 2 Analog inputs 1 PTC/KTY input	6 Digital inputs 2 Analog inputs 1 PTC/KTY input
Outputs	1 Relay output	1 Analog output 1 Relay output	2 Analog outputs 3 Relay outputs	2 Analog outputs 3 Relay outputs
Interfacing to the automation system	The PLC partner for LOGO! and SIMATIC S7-200	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION	The ideal partner for your automation tasks, whether with SIMATIC S7-200, SIMATIC S7-300/400 (TIA) or SIMOTION
Additional features	• Natural cooling (no fan unit) • Position of connections the same as for conventional switching elements (e.g. contactors) • Version with flat heat sink	• BICO technology • Compound braking for controlled rapid braking	• Energy-saving mode • Load torque monitoring (detects dry-running pumps) • Motor staging • Bypass mode • BICO technology	• 3 switchable drive data sets • Integrated brake chopper (up to 75 kW) • Torque control • BICO technology

Examples of MICROMASTER 410/420/430/440

[1] Can only be ordered as spare part.

Appendix

IEC squirrel-cage motors

With a power range from 0.06 kW to 1250 kW (0.08 hp to 1676 hp), low-voltage motors are available for the widest range of requirements and applications that are harmonized and coordinated with the MICROMASTER and SINAMICS frequency inverters. In addition to energy-saving motors and explosion-proof motors, there are also sector and customer-specific motors such as smoke extraction motors. The table shows an overview of the technical features of these motors. The available product range with ordering data, technical specifications and detailed information is provided in Catalog D 81.1 “IEC Squirrel-Cage Motors – frame sizes 56 to 450” and on the Internet under: http://www.siemens.com/motors/documentation

	IEC squirrel-cage motors		
Versions	**Energy-saving motors**		
	Aluminum frame	**Cast iron frame**	**Temp. time classes F200/F300/F400**
Rated power	0.06 ... 45 kW (0.08 ... 60 hp)	0.75 ... 1250 kW (0.1 ... 1676 hp)	0.37 ... 200 kW (0.5 ... 268 hp)
Frame sizes	56 M ... 225	100 L ... 450	80 M ... 315 L
Type of construction	All common types of construction	All common types of construction	All common types of construction
Speed	750 ... 3000 rpm	750 ... 3000 rpm	1000 ... 3000 rpm
Rated torque	0.3 ... 292 Nm	9.9 ... 10300 Nm	2.5 ... 1546 Nm
Rated voltages	All commonly used voltages	All commonly used voltages	230 VΔ/400 VY, 500 VΔ, 400 VΔ/690 VY, 500 VY
Marking	EFF1, EFF2	EFF1, EFF2	EFF1, EFF2
Degree of protection	IP55	IP55	IP55
Frame	Aluminum	Cast iron	Aluminum, cast iron
Type of cooling	Surface-cooled	Surface-cooled	Surface-cooled
Temperature class	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B)
Standards and approvals	CE, CCC, UL, CSA	CE, CCC, UL, CSA	CE
Approvals for marine drives	Below-deck applications: BV, DNV, GL, LR	Below-deck applications: BV, DNV, GL, LR	no
Explosion protection (incl. temp. class)	Ex nA II T3 (Zone 2), Dust ex (Zone 21, 22)	Ex nA II T3 (Zone 2), Dust ex (Zone 21, 22)	no

Examples of energy-saving motors

Example of smoke extraction motors

	IEC squirrel-cage motors			
Versions	**Explosion-proof motors**			
	Type of protection "e"	**Type of protection "de"/"de"**	**Type of protection "n"**	**Dust explosion protection**
Rated power	0.12 ... 165 kW (0.16 ... 221.3 hp)	0.25 ... 132 kW (0.34 ... 177 hp)	0.09 ... 1000 kW (0.12 ... 1341 hp)	0.06 ... 1000 kW (0.08 ... 1341 hp)
Frame sizes	63 M ... 315 L	71 M ... 315 M	63 M ... 450	Zone 21: 56 M ... 315 L Zone 22: 56 M ... 450
Type of construction	All common types of construction	All common types of construction	All common types of construction	All common types of construction
Speed	1000 ... 3000 rpm	750 ... 3000 rpm	750 ... 3000 rpm	750 ... 3000 rpm
Rated torque	0.61 ... 1300 Nm	1 ... 970 Nm	1 ... 8090 Nm	0.3 ... 8090 Nm
Rated voltages	All commonly used voltages	All commonly used voltages	All commonly used voltages	All commonly used voltages
Marking	See Catalog D 81.1	See Catalog D 81.1	Analog energy-saving motors EFF1/EFF2	Analog energy-saving motors EFF1/EFF2
Degree of protection	IP55, IP56 (non-heavy-sea), IP65	IP55, IP56 (non-heavy-sea), IP65	IP55, IP56 (non-heavy-sea), IP65	Zone 21: IP65 Zone 22: IP55
Frame	FS 63 ... 160 L aluminum FS 100 L ... 315 L cast iron	FS 71 M ... 315 M cast iron	FS 63M ... 160 L aluminum FS 100 L ... 450 cast iron	FS 63 M ... 225 M aluminum FS 100 L ... 450 cast iron
Type of cooling	Surface-cooled	Surface-cooled	Surface-cooled	Surface-cooled
Temperature class	155 (F) utilized to 130 (B) / 155 (F)	155 (F) utilized to 130 (B) (line operation) 155 (F) utilized to 155 (F) (inverter operation)	155 (F) utilized to 130 (B)	155 (F) utilized to 130 (B)
Standards and approvals	CE, CCC, GOST, ATEX	CE, CCC, GOST, ATEX, NEPSI	CE, CCC, GOST, ATEX, NEPSI	CE, CCC, GOST, ATEX
Approvals for marine drives	Below-deck applications: BV, DNV, GL, LR	Below-deck applications: BV, DNV, GL, LR	Below-deck applications: BV, DNV, GL, LR	Below-deck applications: BV, DNV, GL, LR
Explosion protection (incl. temp. class)	II 2G Ex e II T1-T3	II 2G Ex de IIC T1-T4	II 3G Ex nA II T3	Zone 21: II 2D Ex tD A21 IP65 T125 °C Zone 22: II 3D Ex tD A22 IP55 T125 °C

Examples of explosion-proof motors

Appendix

IEC squirrel-cage motors 1LE1/1PC1 generation of motors

Increasing energy costs have resulted in greater emphasis on the power consumption of drive systems. It is extremely important to utilize the full potential to minimize energy consumption here to secure competitiveness today and in the future. This is the reason that already today, Siemens is developing a new generation of low-voltage motors. Innovative copper rotors create the best requisites for motors with high efficiencies. The new motors for EFF1 (High Efficiency) offer considerable energy savings and protect our environment. The table shows an overview of the technical features of these motors. The presently available product range with ordering data, technical specifications and detailed information is listed in Catalog D 81.1 "Low-Voltage Motors – IEC Squirrel-Cage Motors – frame sizes 56 to 450" and on the Internet under:
http://www.siemens.com/motors/documentation

	IEC squirrel-cage motors – 1LE1/1PC1 generation of motors
Versions	**Self-cooled 1LE1 energy-saving motors with:** • Improved efficiency (EFF2) • High efficiency (EFF1) **Self-cooled 1LE1 motors with increased power and:** • Improved efficiency (EFF2) • High efficiency (EFF1) **Forced-air-cooled 1LE1 motors without external fan and fan cover with:** • Improved efficiency (EFF2) • High efficiency (EFF1) **Naturally cooled 1PC1 motors without external fan and fan cover with:** • Improved efficiency (EFF2) • High efficiency (EFF1)
Rated power	0.75 ... 22 kW (1 ... 30 hp) (1LE1 motor series) 0.3 ... 9 kW (0.4 ... 12 hp) (1PC1 motor series)
Frame sizes	100 L to 160 L
Type of construction	**Without flange:** IM B3, IM B6, IM B7, IM B8, IM V5 without canopy, IM V6, IM V5 with canopy **With flange:** IM B5, IM V1 without canopy, IM V1 with canopy, IM V3, IM B35 **With standard flange:** IM B14, IM V19, IM V18 without canopy, IM V18 with canopy, IM B34
Speed	750 ... 3000 rpm
Rated torque	9.9 ... 150 Nm (1LE1 motor series) 4.05 ... 60 Nm (1PC1 motor series)
Rated voltages	All commonly used voltages
Marking	EU/CEMEP efficiency classification: EFF1: 2-, 4-pole, EFF2: 2-, 4-pole US EPACT legislation: 2-, 4-, 6-pole
Degree of protection	IP55 as standard
Frame	Aluminum
Type of cooling	**Self-ventilated (1LE1 motor series):** Frame size 100 L to 160 L (IC 411) **Forced-air cooled (1LE1 motor series):** Frame size 100 L to 160 L (IC 416) **Naturally cooled (1PC1 motor series):** Frame size 100 L to 160 L (IC 410)
Temperature class	Temperature class 155 (F), utilized to temperature class 130 (B)
Standards and approvals	CE

Examples of IEC squirrel-cage motors – new 1LE1 generation, aluminum frame

Customized motors

In addition to the products offered in the catalog, our range of motors also includes “Customized motors”.

We can develop individual drive solutions for your special requirements, provide samples and supply them in accordance with your logistical requirements.

Our worldwide network of Siemens offices as well as our regional offices in Germany are, of course, available to provide advice (see “Siemens Contacts Worldwide”).

Please inquire for details.

We have listed below some of the “Customized solutions” that have been already implemented:

- High-speed motors for textile machines and compressors
- Motors with increased power density
- Liquid-cooled motors
- Synchronous generators for standby supply systems
- Motors for wood processing plants
- Built-in motors for refrigerating motors/compressors (freezer proof)
- Rolling motors for harsh conditions (e.g. roller drives)
- Pump motors with special shafts/special materials
- Single-phase motors for industrial applications
- Lifting gear motors

Built-in motor for refrigeration

Pump motor with special shaft/special materials

Roller motor for harsh conditions

Hoisting gear motor

Appendix

NEMA motors

We manufacture low-voltage motors in accordance with the NEMA standard for a wide range of different application areas to fulfill NAFTA market specifications (USA, Canada, Mexico). These include motors designed in conformance with the US EPACT legislation (specified minimum efficiency levels) up to motors with NEMA premium efficiency levels: Our NEMA motor series provide the highest operating reliability and maximum service life. Designed and manufactured for rugged operation, our NEMA motors withstand even the harshest of industrial conditions strictly in accordance with the ISO 9001 international quality standard; with maximum performance, reliability and efficiency.
You will find the complete product spectrum with ordering data, technical specifications and information in Catalog D 81.2 U.S./Canada on the Internet at http://www.sea.siemens.com/motors/documentation

	NEMA motors (NEMA = National Electrical Manufacturers Association)
Frame size	NEMA frame size 56 ... 449
Power range	0.25 ... 500 HP
Number of poles	2/4/6/8
Voltages	230/460/575 V 3 AC
Frequency	60 Hz, 50 Hz on request
Type of construction	Foot-mounted, D flange, C flange, P flange
Frame	Cast iron, aluminum or steel depending on the version
Type of cooling	Surface-cooling or internal ventilation depending on the version
Temperature class	Temperature class 155 (F), utilized to temperature class 130 (B)
Type spectrum	**General purpose motors** • Legally specified minimum efficiency levels or NEMA premium efficiency levels • Standard motors for general industrial use • Aluminum or cast iron frame depending on the version
	Severe duty motors • Legally specified minimum efficiency levels or NEMA premium efficiency levels • Cast iron frame • Motors for use under extremely difficult environmental conditions
	Severe duty IEEE841 motors • Efficiency levels specified by IEEE that exceed the EPACT legislation • Motors with increased requirements for use in the petrochemical industry (according to IEEE841) • Cast iron frame
	Explosion-proof motors • Efficiency levels better than or equal to EPACT • Multi-label according to Division 1, Class I, Group D and Class II, Groups F&G • Single label according to Division 1, Class I, Groups C&D

Example of a NEMA motor, Severe Duty SD100, cast iron frame

Example of a NEMA motor, General Purpose GP10A, aluminum frame

Siemens Contacts Worldwide

At

http://www.siemens.com/automation/partner

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.

Information and Ordering in the Internet and on DVD

Siemens Industry Automation and Drive Technologies in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

http://www.siemens.com/automation

you will find everything you need to know about products, systems and services.

Product Selection Using the Offline Mall of Industry

Detailed information together with convenient interactive functions:
The Offline Mall CA 01 covers more than 80,000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the Offline Mall CA 01 can be found in the Internet under

http://www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall

The Industry Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the Industry Mall on the Internet under:

http://www.siemens.com/automation/mall

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Appendix

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Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

For customers with a seat or registered office in Germany

The "General Terms of Payment" as well as the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

For customers with a seat or registered office outside of Germany

The "General Terms of Payment" as well as the "General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.
The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products.

An exact explanation of the metal factor and the text of the Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA1
  (for customers based in Germany)
- 6ZB5310-0KS53-0BA1
  (for customers based outside Germany)

or download them from the Internet
http://www.siemens.com/automation/mall
(Germany: A&D Mall Online-Help System)

Export regulations

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the German Export List Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "AL" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
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Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

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Notes

Notes

Catalogs

Industry Automation, Drive Technologies and Electrical Installation Technology

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Interactive catalog on DVD	*Catalog*
for Industry Automation, Drive Technologies and Electrical Installation Technology	**CA 01**

Drive Systems

Variable-Speed Drives	
SINAMICS G110/SINAMICS G120 Inverter Chassis Units SINAMICS G120D Distributed Frequency Inverters	D 11.1
SINAMICS G130 Drive Converter Chassis Units, SINAMICS G150 Drive Converter Cabinet Units	D 11
SINAMICS GM150/SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS S150 Drive Converter Cabinet Units	D 21.3
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
PDF: SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units	*DA 22*
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMOVERT MASTERDRIVES Vector Control	DA 65.10
SIMOVERT MASTERDRIVES Motion Control	DA 65.11
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3
SIMODRIVE 611 universal and POSMO	DA 65.4
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22
Low-Voltage Three-Phase-Motors	
IEC Squirrel-Cage Motors	D 81.1
MOTOX Geared Motors	D 87.1
Automation Systems for Machine Tools SIMODRIVE	NC 60
• Motors	
• Converter Systems SIMODRIVE 611/POSMO	
Automation Systems for Machine Tools SINAMICS	NC 61
• Motors	
• Drive System SINAMICS S120	
Drive and Control Components for Hoisting Equipment	HE 1
Mechanical Driving Machines	
Flender Standard Couplings	MD 10.1

Electrical Installation Technology

PDF: ALPHA Distribution Boards and Terminal Blocks	*ET A1*
PDF: ALPHA 8HP Molded-Plastic Distribution System	*ET A3*
PDF: BETA Low-Voltage Circuit Protection	*ET B1*
PDF: DELTA Switches and Socket Outlets	*ET D1*
PDF: GAMMA Building Management Systems	*ET G1*

PDF: These catalogs are only available as pdf files.

Motion Control

	Catalog
SINUMERIK & SIMODRIVE Automation Systems for Machine Tools	NC 60
SINUMERIK & SINAMICS Automation Systems for Machine Tools	NC 61
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22

Low-Voltage

Controls and Distribution – SIRIUS, SENTRON, SIVACON	LV 1
Controls and Distribution – Technical Information SIRIUS, SENTRON, SIVACON	LV 1 T
SIDAC Reactors and Filters	LV 60
SIVENT Fans	LV 65
SIVACON 8PS Busbar Trunking Systems	LV 70

Process Instrumentation and Analytics

Field Instruments for Process Automation	FI 01
PDF: Indicators for panel mounting	*MP 12*
SIREC Recorders and Accessories	MP 20
SIPART, Controllers and Software	MP 31
PDF: Products for Weighing Technology	*WT 10*
Process Analytical Instruments	PA 01
PDF: Process Analytics, Components for the System Integration	*PA 11*

SIMATIC HMI

Human Machine Interface Systems	ST 80

SIMATIC Industrial Automation Systems

Products for Totally Integrated Automation and Micro Automation	ST 70
SIMATIC PCS 7 Process Control System	ST PCS 7
Add-ons for the SIMATIC PCS 7 Process Control System	ST PCS 7.1
Migration solutions with the SIMATIC PCS 7 Process Control System	ST PCS 7.2
pc-based Automation	ST PC
SIMATIC Control Systems	ST DA

SIMATIC NET

Industrial Communication	IK PI

SIMATIC Sensors

Sensors for Factory Automation	FS 10

Systems Engineering

Power supplies SITOP power and LOGO! Power	KT 10.1
System cabling SIMATIC TOP connect	KT 10.2

System Solutions

Applications and Products for Industry are part of the interactive catalog CA 01

TELEPERM M Process Control System

PDF: AS 488/TM automation systems	*PLT 112*

Siemens AG
Industry Sector
Drive Technologies Division
Standard Drives
Postfach 3180
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www.siemens.com/sinamics

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