

SINAMICS G120

Inverter chassis units

0.37 kW to 132 kW (0.5 hp to 200 hp)

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Overview

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

With different device versions (frame sizes FSA to FSF) in a power range of 0.37 kW to 132 kW (0.5 hp to 200 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

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Overview (continued)

Modularity

SINAMICS G120 is a modular converter system comprising a variety of functional units. The two main units are

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

The Control Unit controls and monitors the Power Module and the connected motor in several different modes. It supports communication with a local or central controller and monitoring devices.

The Power Module supplies the motor in the power range 0.37 kW to 132 kW (0.5 hp to 200 hp). The Power Module is controlled by a microprocessor in the Control Unit. It features state-of-the-art IGBT technology with pulse-width-modulated motor voltage. It also features a range of protective functions offering a high degree of protection for the Power Module and motor.

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

- Basic Operator Panel (BOP) for parameterizing, diagnosing, controlling, and copying drive parameters
- Line filter, classes A and B
- Line reactors
- Braking resistors
- Output reactors

Safety Integrated

The SINAMICS G120 inverter chassis units are available in a number of different variants 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.

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 on exceeding a speed limit
- Safe Brake Control (SBC) for driving motor brakes which 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 a motor sensor or encoder; the implementation cost is minimal. Existing plants 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 certified for asynchronous motors without encoders – these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

For further information, please refer to section Safety Integrated in chapter Innovations.

Efficient Infeed Technology

The advanced Efficient Infeed Technology is employed in PM250 and PM260 Power Modules. This technology allows the energy produced by motors operating in generator mode on standard inverters to be fed back into the supply system. The control cabinet can be designed even more compactly thanks to the omission of extra cooling equipment and components such as braking resistors, brake choppers and line reactors. The time and expense involved in planning and wiring the system are significantly reduced. At the same time, considerable savings can be achieved in terms of energy consumption and operating costs.

For further information, please refer to section Efficient Infeed Technology in chapter Innovations.

Innovative cooling concept and paint finish of electronic modules

The new cooling system and the paint finish for the electronic modules significantly increase the service life or useful life of the device. These features are based on the following principles:

- Disposal of all heat losses via 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 supports the commissioning and maintenance of SINAMICS G120 inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allows you to commission the device quickly and easily.

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Benefits

- Modularity ensures flexibility for an advanced drive concept
 - Module replacement when system is running (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
- Capable of communicating via PROFINET or PROFIBUS with PROFIdrive Profil 4.0
 - Reduced number of interfaces
 - Plant-wide 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 implemented. 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 inverter with an optional sine-wave filter for the same output
- A new cooling concept and paint finish for the electronic modules increase robustness and service life
- Simple unit replacement and quick copying of parameters using the optional Basic Operator Panel or the optional MMC memory card
- Low-noise motor operation resulting from high pulse frequency
- Compact, space-saving construction
- Software parameters for easy adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2/3-wire control (static/pulsated signals) for universal control via digital inputs
- Engineering and commissioning with uniform engineering tools such as SIZER, STARTER, and Drive ES: ensure rapid 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, Safety Integrated to IEC 61508 SIL 2

Application

SINAMICS G120 is ideal

- as a universal drive in all industrial and commercial applications
- in the automotive, textiles, printing, and chemical industries
- for end-to-end applications, e.g. in conveyor systems

Design

The SINAMICS G120 inverter chassis units 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.

Guide for module selection

The steps to be taken for the selection of a complete SINAMICS G120 frequency inverter should be as follows:

1st	Selection of the appropriate Control Unit (in dependence of the required style depth of communication, hardware and software)
2nd	Selection of the appropriate Power Module (in dependence of the necessary performance and technology)
3rd	Selection of the optional additional components. A large number of components for expanding the system is available, e. g. line-side power components, DC link components, load-side power components, and supplementary system components. Please note that not every component is required for every Power Module (example: Braking resistors are not necessary for PM250 and PM260 Power Modules!). You can find the exact indications in the technical data tables of the respective components.

Control Units

The following Control Units and an MMC memory card are available as accessories for SINAMICS G120 inverter chassis units:

CU240 Control Units

The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. A number of Control Units are available in different versions:

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

MMC memory card (not available for Control Unit CU240E)

The parameter settings for an inverter can be stored on the MMC memory card. When the plant is serviced, it is immediately ready for use again after, for example, replacement of the frequency inverter and transfer of the memory card data. The associated slot is located on top of the Control Unit.

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Design (continued)

Power Modules

The following Power Modules are available for SINAMICS G120 inverter chassis units:

PM240 Power Modules

PM240 Power Modules feature an integrated brake chopper and are designed for drives without energy recovery capability to the supply. Generator energy produced during braking is converted to heat via externally connected braking resistors.

PM250 Power Modules

PM250 Power Modules use an innovative circuit design which allows line-commutated energy recovery to the 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 also use an innovative circuit design which allows line-commutated energy recovery to the 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 charge/discharge currents usually associated with converter operation.

Line-side power components

The following line-side power components are available for SINAMICS G120 inverter chassis units:

Line filters

The Power Module complies with a higher radio interference class with one additional line filter.

Line reactors (for PM240 Power Modules only)

A line reactor reduces the system perturbations caused by harmonics. This is valid in particular for low power supplies (system fault level $u_k > 1\%$).

Recommended line components

This is a recommendation for further line-side components, such as fuses and circuit-breakers (line-side components must be dimensioned in accordance with IEC standards). Further 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 SINAMICS G120 inverter chassis units:

Braking resistors (for PM240 Power Modules only)

Excess power in the DC link is dissipated via the braking resistor. The braking resistors are designed for use with PM240 Power Modules. They are equipped with an integrated brake chopper (electronic switch).

Load-side power components

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

Output reactors (for PM240 Power Modules only)

Output reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents, which place an additional load on the power section when long motor cables are used, are reduced.

Sine-wave filter (available soon, not available for PM260 Power Modules)

The sine-wave filter limits the rate of rise of voltage and the capacitive charge/discharge currents usually associated with converter operation. An output reactor is not required.

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Design (continued)

Available optional power and DC link components depending on the used Power Module

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

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
Power Module PM240 with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
Line-side power components						
Line filter class A	U	F	F	F	F	F/S ³⁾
Line filter class B	U	U	U	–	–	–
Line reactor	U	U	U	U	U	S
DC link components						
Braking resistor	U	U	S	S	S	S
Load-side power components						
Output reactor	U	U	U	S	S	S
Sine-wave filter	Available soon	Available soon	Available soon	Available soon	Available soon	Available soon
Power Module PM250 with line-commutated regenerative feedback and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
Line-side power components						
Line filter class A	–	–	I	I	I	I
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	–	–	Available soon	Available soon	Available soon	Available soon
Power Module PM260 with line-commutated regenerative feedback 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

F = Power Modules available without and with integrated filter class A

– = Not possible

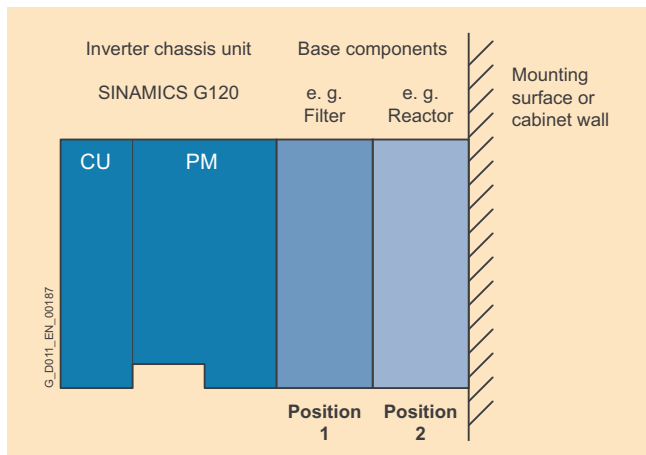
¹⁾ In connection with a PM250 or PM260 Power Module a line reactor is not necessary and may not be used.

²⁾ In connection with a PM250 or PM260 Power Module a line-commutated regenerative feedback is carried out. A braking resistor cannot be connected and is not necessary.

³⁾ PM240 FSF Power Modules from 110 kW (150 hp) on are only available without integrated filter class A. Therefore an optional line filter class A is available for lateral mounting.

Design (continued)

General information on design



- Max. two base components plus converter are possible.
- The line filter has to be mounted directly underneath 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.

Frequency converters, consisting of Power Module (PM) and Control Unit (CU) and two base components at positions 1 and 2

Recommended installation combinations of converter and optional power and DC link components

Power Module Frame size	Base component		Lateral mounting	
	Position 1	Position 2	On the left side of the converter (for line-side power components)	On the right side of the converter (for output-side power components and DC link components)
FSA and FSB	Line filter	Line reactor	–	Output reactor and/or Braking resistor
	Line filter or Line reactor	Output reactor	–	Braking resistor
	Line filter or Line reactor	Braking resistor	–	–
	Line filter or Line reactor or Braking resistor	–	–	–
FSC	Line filter	Line reactor	–	Output reactor and/or Braking resistor
	Line filter or Line reactor	Output reactor	–	Braking resistor
FSD and FSE	Line reactor	–	Line filter	Output reactor and/or Braking resistor
FSF	–	–	Line filter and/or Line reactor	Output reactor and/or Braking resistor

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Design (continued)

Supplementary system components

The following supplementary system components are available for SINAMICS G120 inverter chassis units:

Basic Operator Panel BOP

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 for a quick copying of parameters.

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 is supplied with the PC inverter connection kit on DVD.

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 by the Control Unit in accordance with EN 954-1, category 3 and IEC 61508 SIL 2.

Adapter for DIN rail attachment

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

Shield connection kit

The shield connection kit makes it easier to bond the shields of supply and control cables, offers mechanical strain relief and thus ensures optimum EMC performance.

Configuration

The following electronic configuration and engineering tools are available for SINAMICS G120 inverter chassis units:

SD configurator selection aid within the CA 01

The interactive catalog CA 01 – the offline mall of Siemens Automation and Drives (A&D) – contains over 100000 products with approximately 5 million potential drive system product variants. The SD configurator has been developed to facilitate selection of the correct motor and/or inverter from the wide spectrum of Standard Drives products. The configurator is integrated in this catalog with the selection and configuration tools as a “selection help” on CD 2 “Configuring”.

SIZER configuration tool

The SIZER PC tool provides an easy-to-use means of configuring the SINAMICS and MICROMASTER 4 drive family. It provides support when setting up the technologies involved in the hardware and firmware components required for a drive task. SIZER supports the complete configuration of the drive system, from simple individual drives to complex multi-axis applications.

STARTER commissioning tool

The STARTER commissioning tool provides menu-guided assistance with commissioning, optimization and diagnostics. STARTER is not only designed for use on SINAMICS drives but also for MICROMASTER 4 units and frequency inverters for the distributed I/Os SIMATIC ET 200S FC and SIMATIC ET 200pro FC.

Drive ES engineering system

Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the basis for this procedure. A variety of software packages, i.e. Drive ES Basic, Drive ES SIMATIC and Drive ES PCS 7, is available for SINAMICS.

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Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for the following components of the SINAMICS G120 inverter chassis unit.

Mechanical specifications	
Vibratory load	
• Transport ¹⁾	Class 2M3 to EN 60068-2-6
• Operation	Class 3M4 to EN 60068-2-6 10 ... 58 Hz: Constant deflection 0.075 mm 58 ... 200 Hz: Constant acceleration = 9.81 m/s ² (1 g)
Shock load	
• Transport ¹⁾	Class 2M2 to EN 60068-2-27
• Operation	Class 3M4 to EN 60068-2-27 49 m/s ² (5 g)/30 ms
Ambient conditions	
Protection class	Class I (with protective conductor system) and class III (PELV) to EN 61800-5-1
Shock protection	according to EN 61800-5-1 when used properly
Permissible ambient and coolant temperature (air) during operation for line-side power components and Power Modules	
• High overload (HO)	-10 ... +50 °C (14 ... 122 °F) without derating, > 50 ... 60 °C see derating characteristics
• Light overload (LO)	-10 ... +40 °C (14 ... 104 °F) without derating, > 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 up to 2000 m above sea level
Climatic ambient conditions	
• Storage ¹⁾	Class 1K3 to EN 60721-3-1 Temperature -25 ... +55 °C
• Transport ¹⁾	Class 2K4 to EN 60721-3-2 Temperature -40 ... +70 °C Max. air humidity 95 % at 40 °C
• Operation	Class 3K5 to EN 60721-3-3 Condensation, splashwater and ice formation are not permitted (EN 60204, Part 1)

Ambient conditions (continued)

Environmental class/harmful chemical substances	
• Storage ¹⁾	Class 1C2 to EN 60721-3-1
• Transport ¹⁾	Class 2C2 to EN 60721-3-2
• Operation	Class 3C2 to EN 60721-3-3
Organic/biological influences	
• Storage ¹⁾	Class 1B1 to EN 60721-3-1
• Transport ¹⁾	Class 2B1 to EN 60721-3-2
• Operation	Class 3B1 to EN 60721-3-3
Degree of contamination	2 to EN 61800-5-1
Standards	
Standards conformance	UL, cUL, CE, c-tick
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC
EMC directive	
• Frame sizes FSA to FSF without integrated line filter class A	Category C3 ²⁾ to EN 61800-3
• Frame sizes FSB to FSF with integrated line filter class A	Category C2 ³⁾ to EN 61800-3 (corresponds to class A to EN 55011 for conducted interference)
• Frame size FSA without integrated line filter and with additional line filter class A	Category C2 ³⁾ to EN 61800-3 (corresponds to class A to EN 55011 for conducted interference)
• Frame sizes FSA with additional line filter class A and with additional line filter class B	Category C2 ³⁾ to EN 61800-3 (corresponds to class B to EN 55011 for conducted interference)
• Frame sizes FSB and FSC with integrated line filter class A and with additional line filter class B	Category C2 ³⁾ to EN 61800-3 (corresponds to class B to EN 55011 for conducted interference)
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⁾ Unfiltered inverters can be used in industrial environments as long as they are installed in a system that contains line filters on the higher-level infeed side. Then a PDS (Power Drive System) Category C3 can be installed.

³⁾ With shielded motor cable up to 25 m.

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Technical specifications (continued)

Compliance with standards

CE mark



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 EU gazette:

- 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



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

For use in environment with contamination degree 2.

On the Internet at
<http://www.ul.com>

Machinery directive

The devices are suitable for installation in machines. Compliance with the machinery directive 98/37/EEC requires a separate certificate of conformity. This must be provided by the plant constructor or the installer of the machine.

EMC directive

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

The modified EMC product standard EN 61800-3 for electrical drive systems is valid 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 the SINAMICS G120 frequency inverters from Siemens AG:

- 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 Instruction Manual, however, specifies the conditions regarding compliance with the product standard if the frequency inverter is expanded to a PDS. The EMC directive in the EU is complied with for a PDS by observance of the product standard EN 61800-3 for variable-speed electrical drive systems. The frequency inverters on their own do not generally require identification according to the EMC directive.

- In the new EN 61800-3 of July 2005, a distinction is no longer made between "general availability" and "restricted availability". Instead, different categories have been defined, C1 to C4, in accordance with the environment of the PDS at the operating site:
 - **Category C1:** Drive systems for rated voltages < 1000 V for use in environment 1
 - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in environment 1, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning is required.
 - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in environment 2. A warning is required.
 - **Category C4:** Drive systems for rated voltages ≥ 1000 V, for rated currents ≥ 400 A, or for use in complex systems in environment 2. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for "environment 2" (= 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 installed in a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120 Power Drive Systems (PDS) that fulfill EMC product standard EN 61800-3 can be set up upon following the setup instructions.
- 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.
- Regarding the compliance of limit values for line harmonics, EMC product standard EN 61800-3 for PDS refers to compliance with EN 61000-3-2 and EN 61000-3-12.
- Regardless of the configuration with SINAMICS G120 and its components, the mechanical engineer 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 interferences at the line supply connection point and outside the machine remain below the relevant limit values. Any suitable technical means can be used to ensure this.

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CU240 Control Units

Overview



Example of CU240S DP-F Control Unit

The Control Unit performs closed-loop control functions for the inverter. In addition to control functions, the Control Unit can also perform other tasks which can be adapted to the relevant application by parameterization. A number of 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 (SBC), 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 on exceeding a speed limit
- Safe Brake Control (SBC) for driving motor brakes which 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 a motor sensor or encoder; the implementation cost is minimal. Existing plants 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 certified for asynchronous motors without encoders – these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

For further information, please refer to section Safety Integrated in chapter Innovations.

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

Design

Control Unit CU240E



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-	
26	AO1+	Freely programmable (0/4 ... 20 mA with max. 500 Ω)
27	AO1-	
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 with 100 mA
28	U 0 V	Isolated user reference voltage
1	+10 V	Non-isolated, stabilized 10 V power supply for I/O – max. 10 mA
2	0 V	Power supply reference

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

Design (continued)

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 plug-in 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 (with CU240S, CU240S DP, and CU240S PN only)	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 (with 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 (GND)
26	AO1+	Freely programmable (0/4 ... 20 mA with max. 500 Ω)
27	AO1-	M (GND)
Encoder interface		
70	ENC AP	Encoder AP – channel A non-negating input
71	ENC AN	Encoder AN – channel A negating input
72	ENC BP	Encoder BP – channel B non-negating input
73	ENC BN	Encoder BN – channel B negating input
74	ENC ZP	Encoder ZP – zero pulse non-negating input
75	ENC ZN	Encoder ZN – zero pulse negating input
PTC/KTY interface		
14	PTC+	Positive PTC/KTY input
15	PTC-	Negative PTC/KTY input
Power supply		
33	ENC+ supply	Isolated encoder power supply (+24 V with 100 mA, +5 V with 300 mA), configured via DIP switches
9	U 24 V	Isolated user power supply +24 V with 100 mA
28	U 0 V	Isolated encoder power supply and user reference voltage
1	+10 V	Non-isolated, stabilized 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

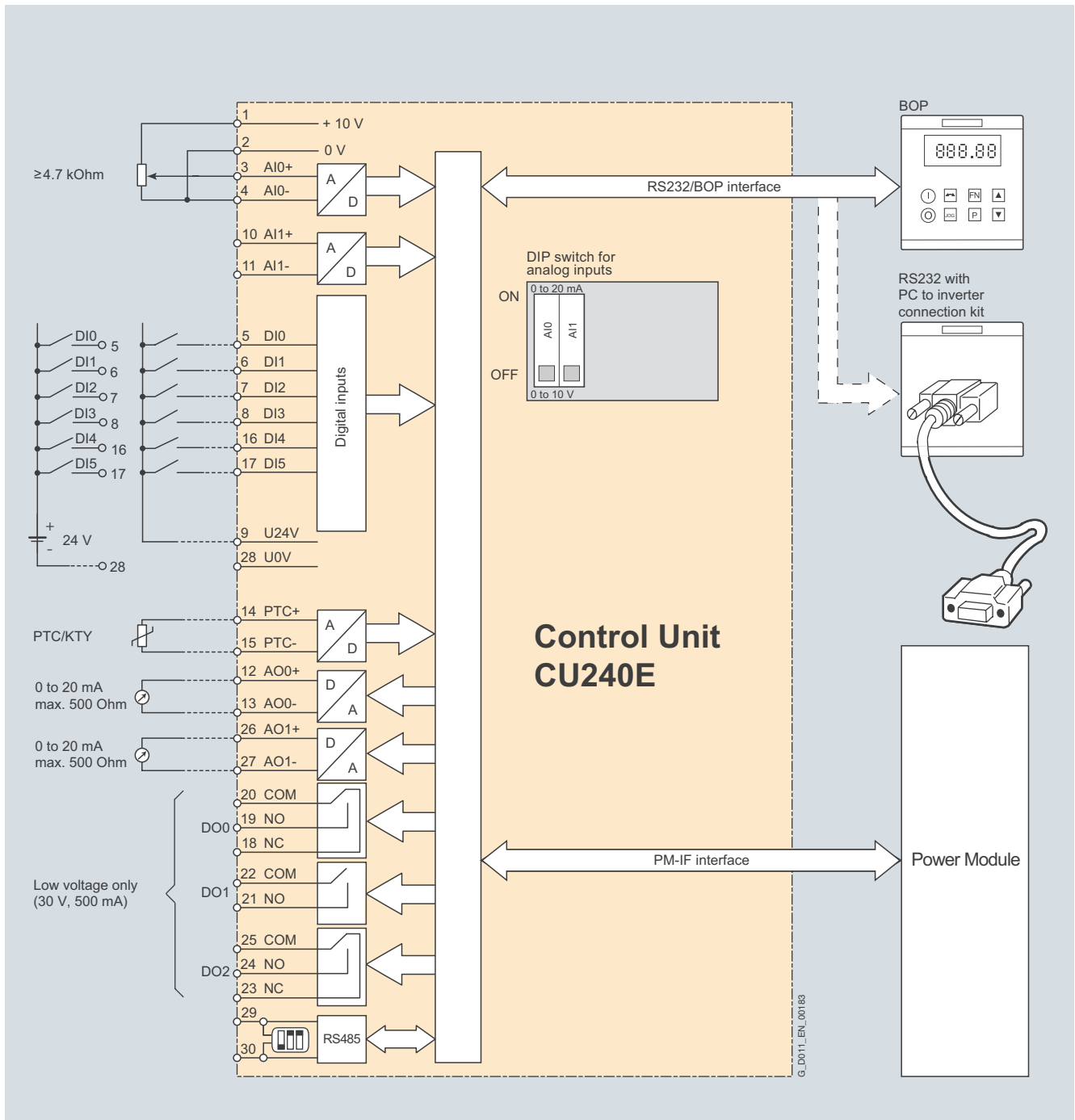
SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

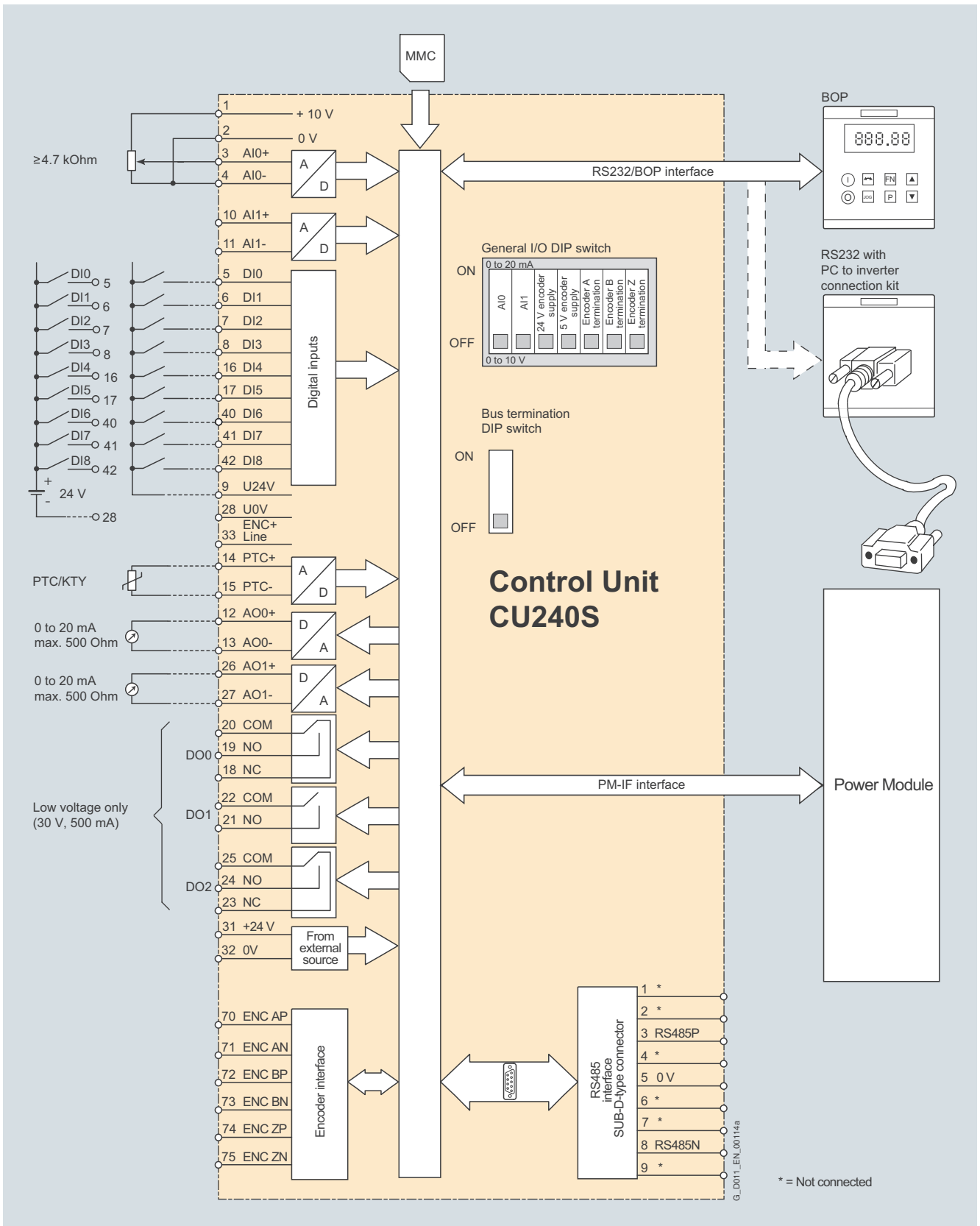
Integration

3



Connection diagram for CU240E Control Unit

Integration (continued)



Connection diagram for CU240S Control Unit

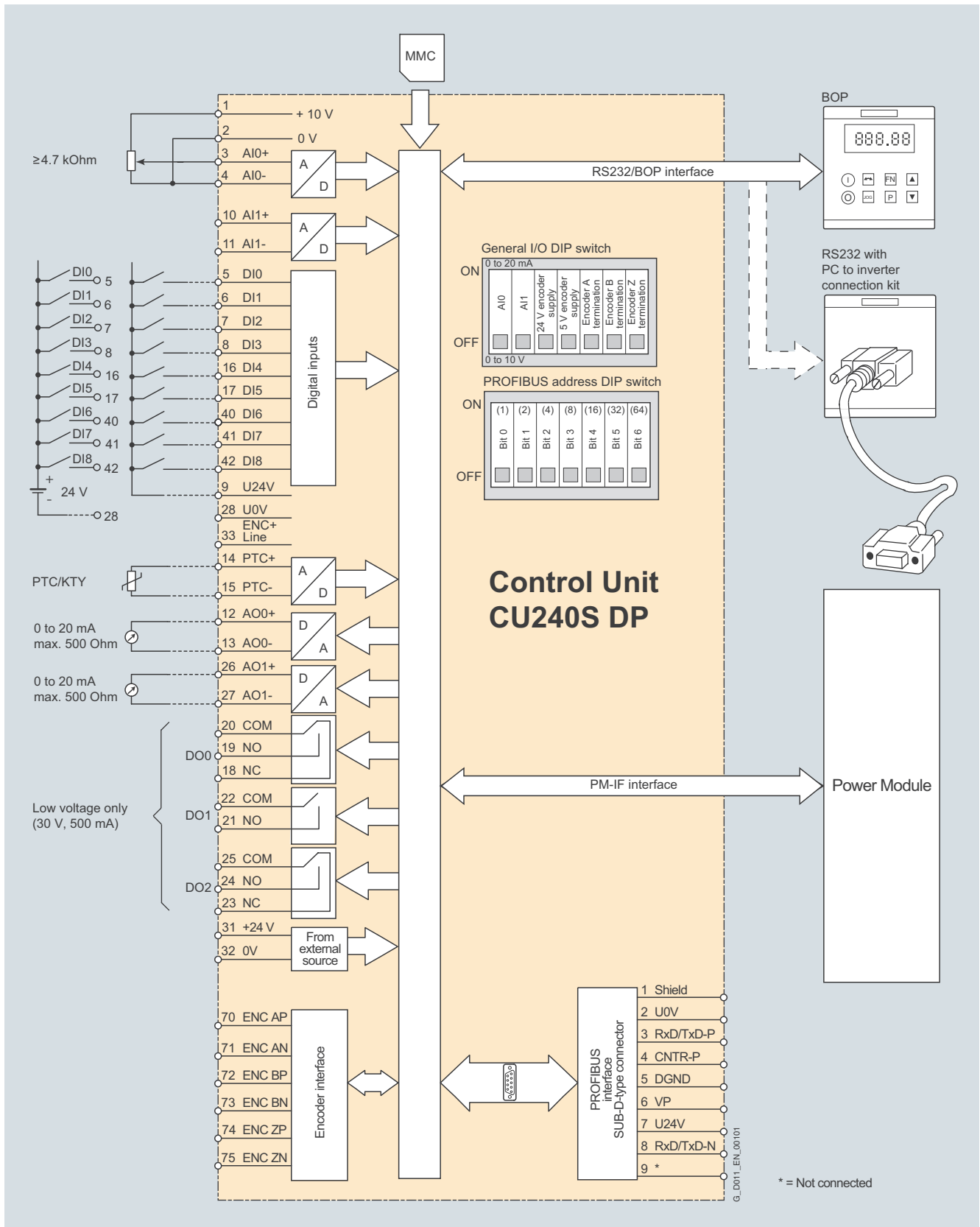
SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

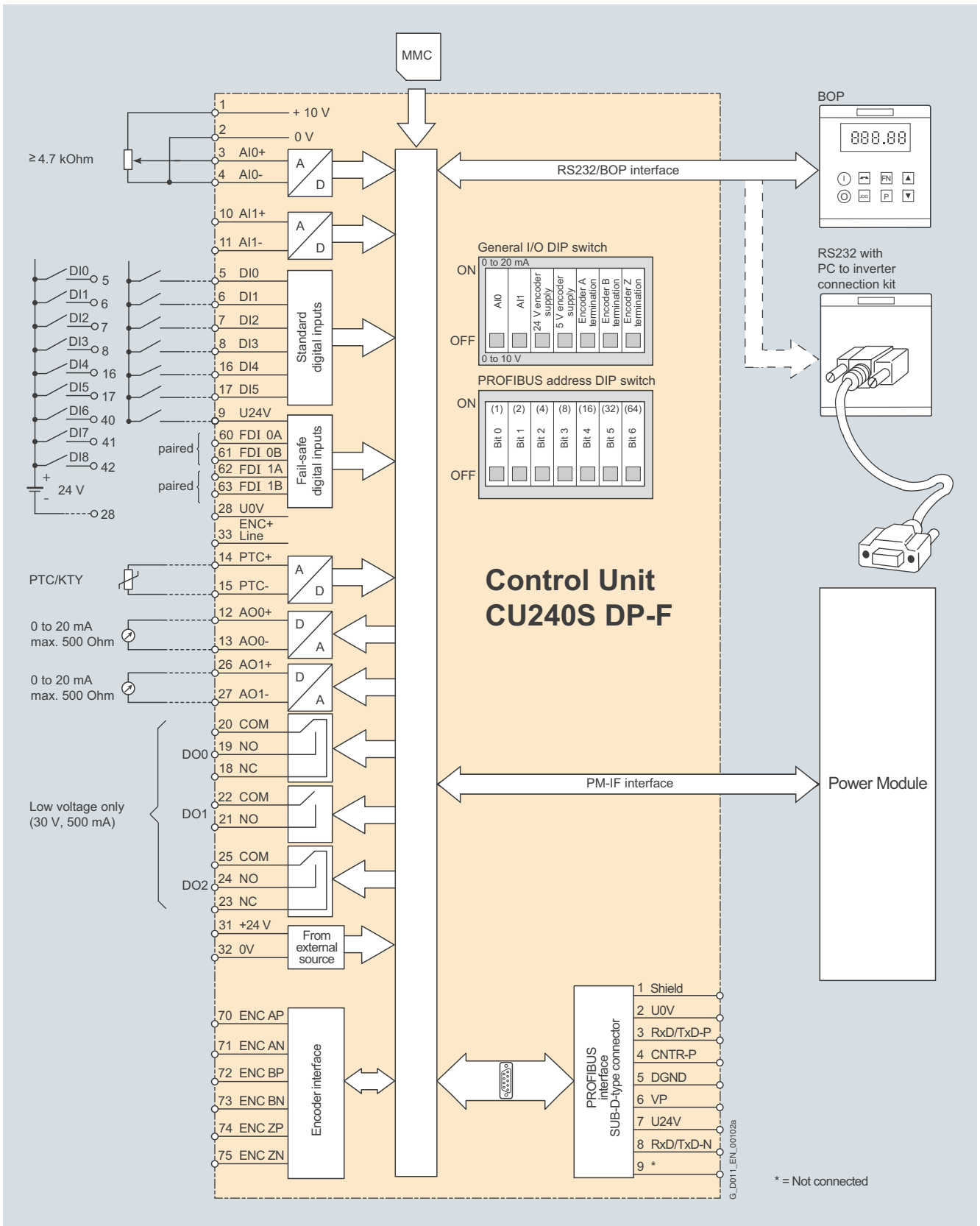
Integration (continued)

3



Connection diagram for CU240S DP Control Unit

Integration (continued)



Connection diagram for CU240S DP-F Control Unit

3

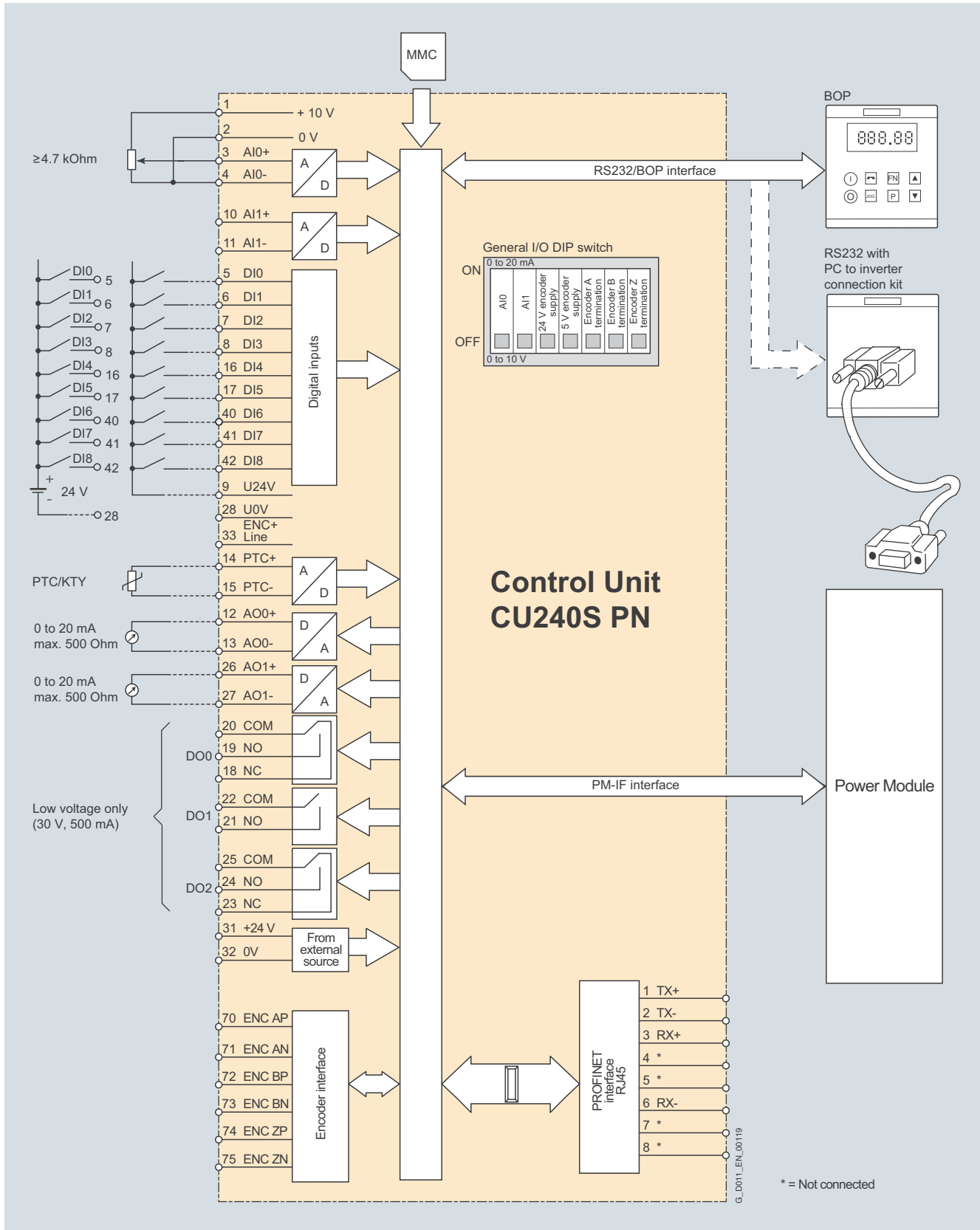
SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

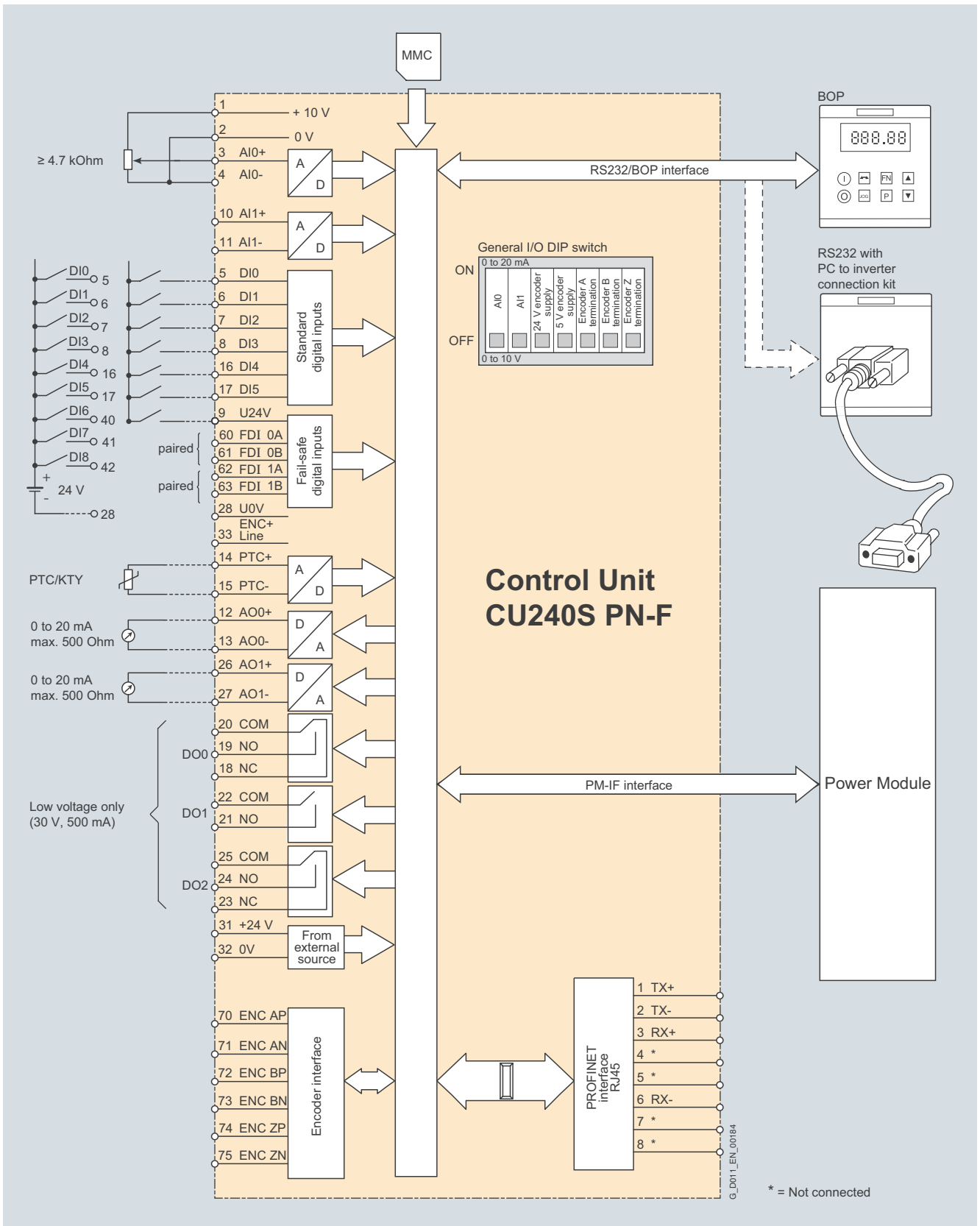
Integration (continued)

3



Connection diagram for CU240S PN Control Unit

Integration (continued)



Connection diagram for CU240S PN-F Control Unit

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

Technical specifications

	Control Unit CU240E 6SL3244- 0BA10-0BA0	Control Unit CU240S 6SL3244- 0BA20-1BA0	Control Unit CU240S DP 6SL3244- 0BA20-1PA0	Control Unit CU240S PN 6SL3244- 0BA20-1FA0	Control Unit CU240S DP-F 6SL3244- 0BA21-1PA0	Control Unit CU240S PN-F 6SL3244- 0BA21-1FA0
Electrical data						
Operating voltage	24 V DC via the Power Module	24 V DC via the Power Module or an external 24 V DC supply	24 V DC via the Power Module or an external 24 V DC supply	24 V DC via the Power Module or an external 24 V DC supply	24 V DC via the Power Module or an external 24 V DC supply	24 V DC via the Power Module or an external 24 V DC supply
Power loss	< 40 W	< 40 W	< 40 W	< 40 W	< 40 W	< 40 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 current mode, maximum output current = 20 mA in voltage mode. The reaction time should equal approximately 1 ms with a load of maximum 10 kΩ in 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 / Safe Brake Relay interface (connection via Power Module)	✓	✓	✓	✓	✓	✓
MMC memory card slot	–	✓	✓	✓	✓	✓
RS232/USS interface (connection via PC inverter connection kit)	✓	✓	✓	✓	✓	✓
Safety functions						
Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508	–	–	–	–	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Brake Control (SBC) • Safe Torque Off (STO) 	<ul style="list-style-type: none"> • Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Brake Control (SBC) • Safe Torque Off (STO)
Open-loop and closed-loop control functions						
V/f linear/quadratic/parameterizable	✓	✓	✓	✓	✓	✓
V/f with flux current control (FCC)	✓	✓	✓	✓	✓	✓
Vector control, encoderless	✓	✓	✓	✓	✓	✓
Vector control with encoder	–	✓	✓	✓	✓	✓
Torque control, encoderless	✓	✓	✓	✓	✓	✓
Torque control with encoder	–	✓	✓	✓	✓	✓

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

CU240 Control Units

Technical specifications (continued)

	Control Unit CU240E 6SL3244- 0BA10-0BA0	Control Unit CU240S 6SL3244- 0BA20-1BA0	Control Unit CU240S DP 6SL3244- 0BA20-1PA0	Control Unit CU240S PN 6SL3244- 0BA20-1FA0	Control Unit CU240S DP-F 6SL3244- 0BA21-1PA0	Control Unit CU240S PN-F 6SL3244- 0BA21-1FA0
Software functions						
Fixed frequencies	16, programmable	16, programmable	16, programmable	16, programmable	16, programmable	16, programmable
Signal interconnection with BICO technology	✓	✓	✓	✓	✓	✓
Automatic restart following line failure or operation fault	✓	✓	✓	✓	✓	✓
Positioning deceleration ramp	✓	✓	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓	✓	✓	✓	✓
Ramp smoothing	✓	✓	✓	✓	✓	✓
3 switchable drive data sets	✓	✓	✓	✓	✓	✓
3 switchable command data sets (CDS) (manual/auto)	✓	✓	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓	✓	✓
JOG	✓	✓	✓	✓	✓	✓
Technology controller (PID)	✓	✓	✓	✓	✓	✓
Thermal motor protection	✓	✓	✓	✓	✓	✓
Thermal inverter protection	✓	✓	✓	✓	✓	✓
Setpoint specification	✓	✓	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓	✓	✓
V _{dcmax} controller	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)
Kinetic buffering	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)
Braking functions	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)	✓ (with PM240 only)
<ul style="list-style-type: none"> • DC injection braking • Compound braking • Dynamic braking with integrated brake chopper 						
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, non-condensing	< 95 % RH, non-condensing	< 95 % RH, non-condensing	< 95 % RH, non- condensing	< 95 % RH, non-condensing	< 95 % RH, non-condensing
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	37 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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Memory card for Control Units

Overview



The parameter settings for an inverter can be stored on the MMC memory card. When the plant is serviced, it is immediately ready for use again after, for example, replacement of the frequency inverter and transfer of the memory card data.

- 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 standard commissioning without the use of additional commissioning tools (e.g. BOP and STARTER).
- How the MMC memory card is commissioned can be defined by the user (parameter p8458):
 - 0 = Parameter set 0 is never automatically downloaded from the MMC ("never")
 - 1 = Parameter set 0 is downloaded once after PowerOn ("once")
 - 2 = Parameter set 0 is always downloaded once after Power On ("always")

Note:

The MMC memory card is not required when the inverter is running and does not have to remain inserted.

Note:

The MMC memory card function is not integrated in the CU240E Control Unit.

Integration



Inserting the MMC memory card into the Control Unit



Control Unit with inserted MMC memory card

Selection and Ordering Data

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Overview



PM240 Power Modules feature an integrated brake chopper to which an external braking resistor can be connected via terminals DCP/R1 and R2 (see DC-link components).

The PM240 Power Module can be used to couple the DC link of up to 10 Power Modules. This functionality is useful for applications such as safe power-down after power failure or kinetic buffering (the DC link is supplied in generator mode with kinetic load energy 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 for minimizing system perturbations (see line-side power components).

Frame size FSA of the PM240 Power Module is available only without integrated line filter to class A. A base filter for compliance with class A is therefore available. A base filter for compliance with class B is available (see line-side power components).

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

Power Modules with integrated line filter to class A 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.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Selection and Ordering Data

To ensure correct selection of the Power Module, it should be chosen according to the

- **rated output current for applications with light overload (LO) or**
- **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 standard 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 data of the Power Modules.

Rated power ¹⁾		Rated output current ²⁾		Power based on the base load current ³⁾		Base load current ³⁾	Frame size	SINAMICS G120 Power Module PM240 without integrated line filter	SINAMICS G120 Power Module PM240 with integrated line filter (class A)
kW	hp	A	kW	hp	A				
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	–	

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

²⁾ The rated output current I_{rated} is based on the loading for light overload (LO). These current values are quoted on the rating plate of the Power Module.

³⁾ The base load current I_H is based on the loading for high overload (HO).

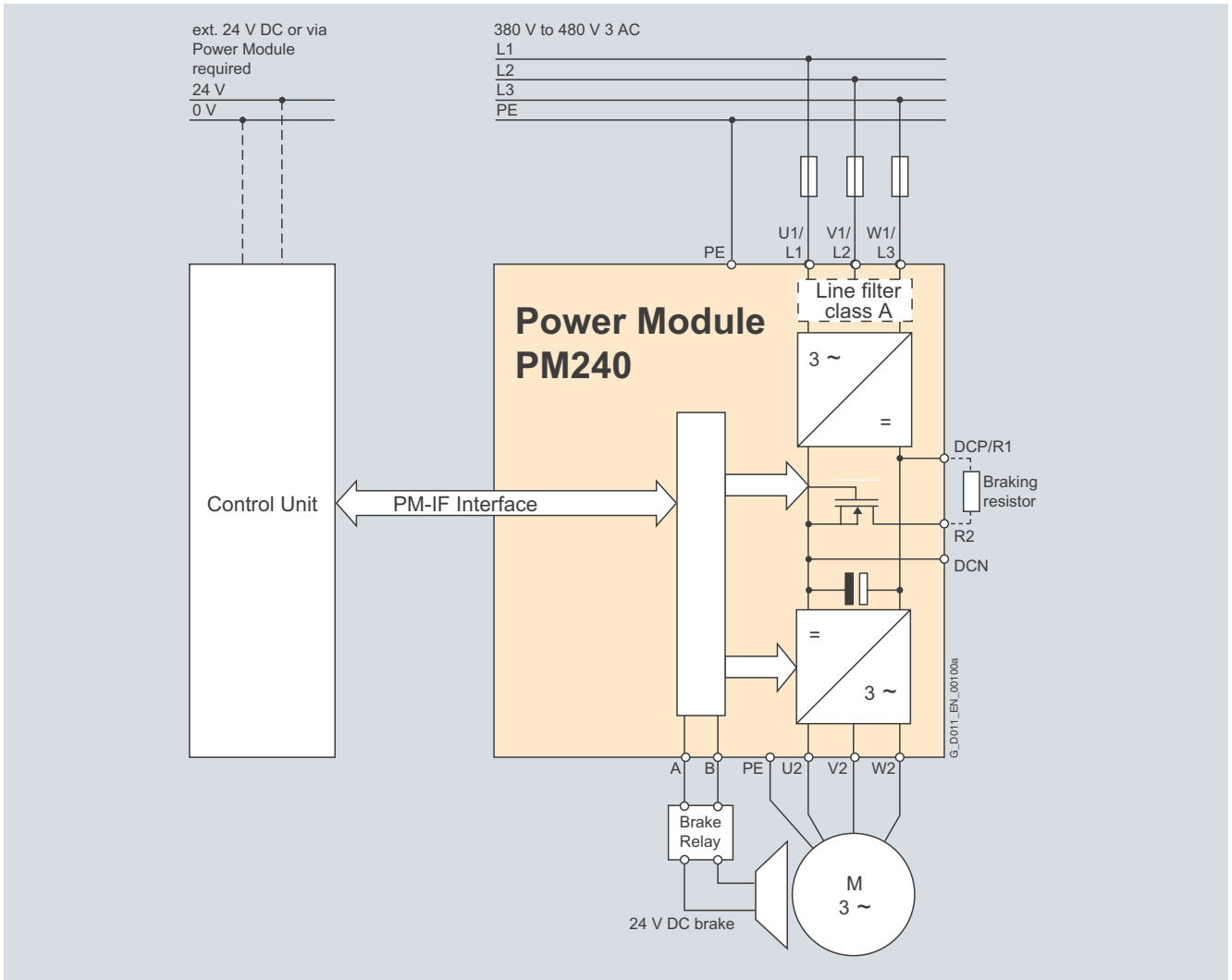
Integration

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

PM240 Power Modules feature the following interfaces as standard:

- PM-IF interface for connection of the PM240 Power Module and Control Unit. The PM240 Power Module also supplies power to the Control Unit by means of an integrated power pack

- Terminals DCP/R1 and R2 for connection of an external braking resistor
- Motor connection made with screw terminals or screw studs
- Drive circuit for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 x PE (protective earth) connections



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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Integration (continued)

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 corresponding frame sizes for the Power Modules:

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
PM240 Power Module with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
Line-side power components						
Line filter class A	U	F	F	F	F	F/S ¹⁾
Line filter class B	U	U	U	–	–	–
Line reactor	U	U	U	U	U	S
DC link components						
Braking resistor	U	U	S	S	S	S
Load-side power components						
Output reactor	U	U	U	S	S	S
Sine-wave filter	Available soon	Available soon	Available soon	Available soon	Available soon	Available soon

U = Base component

S = Lateral mounting

– = Not possible

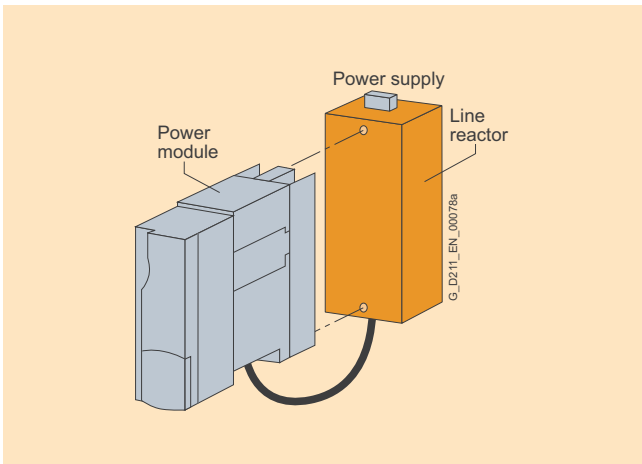
F = Power Modules available without and with integrated filter class A

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

Integration (continued)

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 construction. Up to two base components can be mounted above one another.

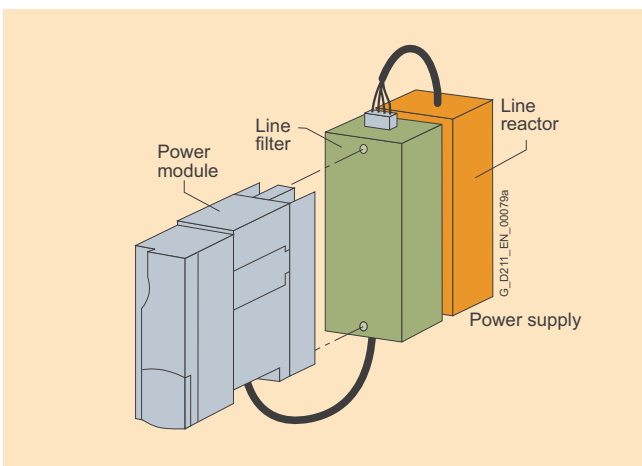
The following diagram shows the basic layout of a PM240 Power Module with line reactor as base component. The line-side reactors are equipped with terminals and the reactors at the Power Module end with a pre-assembled cable. In the final installation position, the mains terminals are at the top on frame sizes FSA to FSC, and at the bottom on frame sizes FSD to FSE.



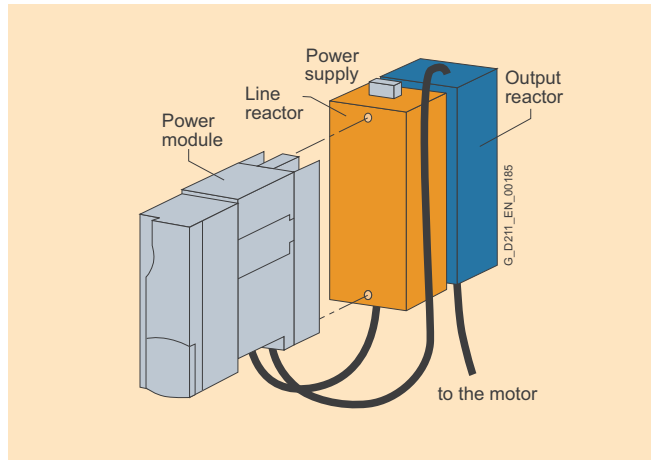
Basic layout of a PM240 Power Module with line reactor as base component

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 supply connection is below.

Power Modules of 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.

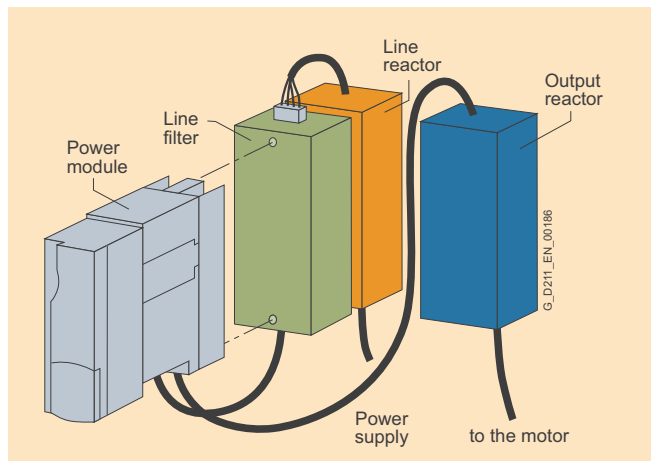


PM240 Power Module frame size FSA with line reactor and class A line filter



PM240 Power Module frame size FSA with line reactor and output reactor

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 instance, the line reactor and line filter must be installed under the Power Module and the output reactor to the side.



PM240 Power Module frame size FSA with line reactor, line filter and output reactor

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Technical specifications

General technical data

	PM240 Power Modules
Line operating voltage	380 ... 480 V 3 AC \pm 10 %
Line requirements Line short-circuit voltage u_k	no restriction
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), for higher pulse frequencies up to 16 kHz, see derating data
Power factor	0.7 ... 0.85
Inverter efficiency	95 ... 97 %
Control factor	93 %
Overload capability	
• High overload	1.5 x rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 x rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	1.1 x rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.5 x rated output current (i.e. 150 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Optional line filter class A or B to EN 55011 available
Possible braking methods	<ul style="list-style-type: none"> • DC injection braking • Compound braking • Dynamic braking with integrated brake chopper
Degree of protection	IP20
Operating temperature	
• High overload (HO)	-10 ... +50 °C (14 ... 122 °F) without derating, > 50 ... 60 °C, see derating characteristics
• Light overload (LO)	-10 ... +40 °C (14 ... 104 °F) without derating, > 40 ... 60 °C, see derating characteristics
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	< 95 % RH, non-condensing
Cooling	Internal air cooling, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics
Standard SCCR (Short Circuit Current Rating) ¹⁾	FSA, FSB, FSC: 10 kA FSD, FSE, FSF: 42 kA
Protective functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overload • Ground fault • Short-circuit • Stall prevention • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter interlock
Standards conformance	UL, cUL, CE, c-tick
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC

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>

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Technical specifications (continued)

Line 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 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	kW	0.1	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
Length of cable to braking resistor, max.	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 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 loading for light overload (LO).

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load representing the rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are quoted 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.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Technical specifications (continued)

Line 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 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 (4.0)	4 (5.0)	7.5 (10)	11 (15)
• based on I_H	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	5.5 (10)	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	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 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
Length of cable to braking resistor, max.	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 loading for light overload (LO).

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load representing the rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are quoted 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.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM240 Power Modules				
		6SL3224- 0BE31-1UA0	6SL3224- 0BE31-5UA0	6SL3224- 0BE31-8UA0	6SL3224- 0BE32-2UA0	6SL3224- 0BE33-0UA0
Without integrated line filter		6SL3224- 0BE31-1AA0	6SL3224- 0BE31-5AA0	6SL3224- 0BE31-8AA0	6SL3224- 0BE32-2AA0	6SL3224- 0BE33-0AA0
With integrated line filter		6SL3224- 0BE31-1AA0	6SL3224- 0BE31-5AA0	6SL3224- 0BE31-8AA0	6SL3224- 0BE32-2AA0	6SL3224- 0BE33-0AA0
Output current at 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	kW	0.4	0.44	0.55	0.72	1
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
Length of cable to braking resistor, max.	m	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 35	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 35	10 ... 35	10 ... 35	10 ... 35
DC link connection, connection for the braking resistor DCP/R1, DCN, R2						
• Conductor cross-section	mm ²	2.5 ... 10	10 ... 35	10 ... 35	10 ... 35	10 ... 35
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	50
• 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 loading for light overload (LO).

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load representing the rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are quoted 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.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Technical specifications (continued)

Line 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 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 (100)	90 (125)	110 (150)
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η		> 0.97	> 0.97	> 0.97	> 0.97	> 0.97	> 0.97
Power loss	kW	1.3	1.5	2	2.4	2.4	2.5
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
Length of cable to braking resistor, max.	m	15	15	15	15	15	15
Line supply connection U1/L1, V1/L2, W1/L3							
• Conductor cross-section	mm ²	10 ... 35	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50
Motor connection U2, V2, W2							
• Conductor cross-section	mm ²	10 ... 35	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50
DC link connection, connection for the braking resistor DCP/R1, DCN, R2							
• Conductor cross-section	mm ²	10 ... 35	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50
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	50	50	50	50	50	50
• Unshielded	m	100	100	100	100	100	100
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 loading for light overload (LO).

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. The input currents apply for a load representing the rated power (based on I_{rated}) for a line impedance corresponding to $u_K = 1\%$. These current values without line reactor are quoted 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.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

3

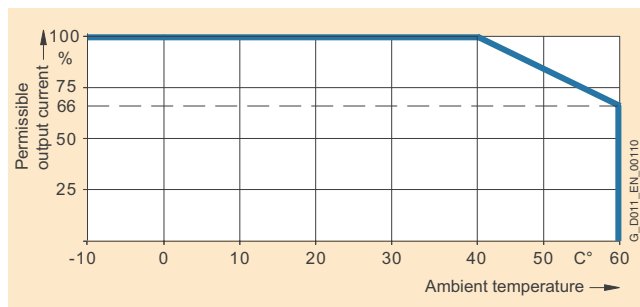
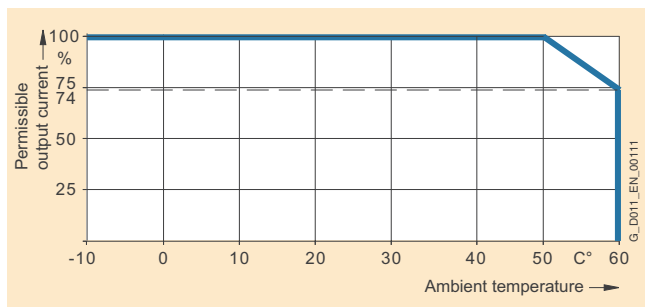
Characteristic curves

Derating data

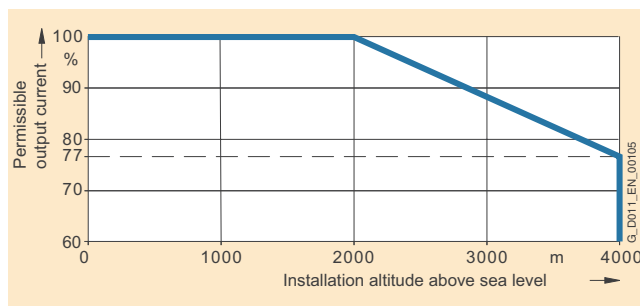
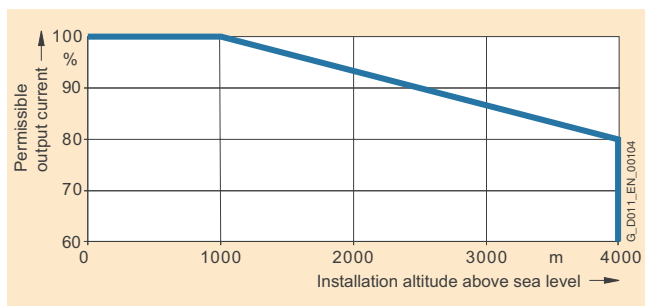
Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A at a switching 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⁾	205.0	–	–	–	–	–	–

Ambient temperature



Installation altitude



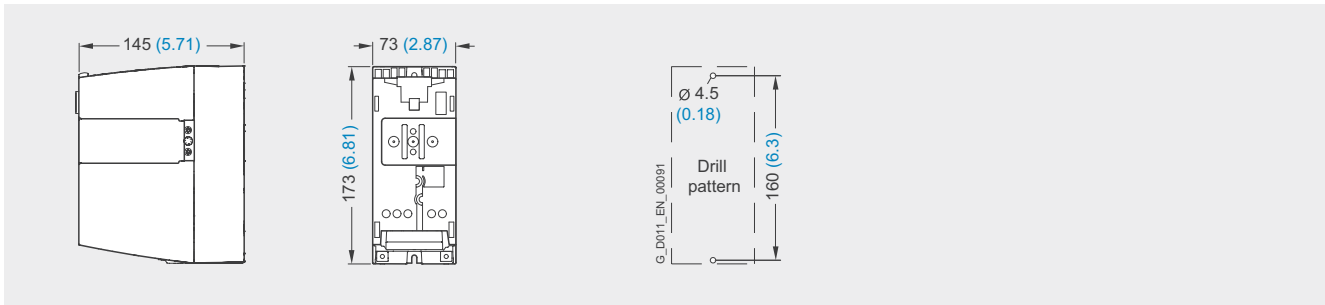
¹⁾ The pulse frequency can be switched over from 4 kHz (default) to 2 kHz only for the light overload (LO) duty cycle.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Dimensional drawings



PM240 Power Module frame size FSA

Fixing 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)

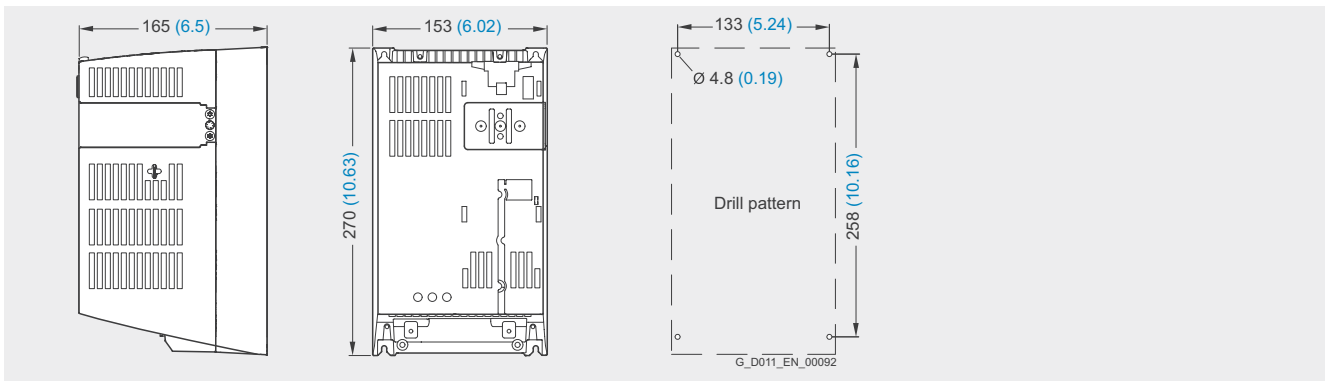
Ambient temperature > 40 °C: 30 mm (1.18 inches)

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

Exception: Mounting depth on CU240E +39 mm (+1.54 inches), total height +32 mm (+1.26 inches).

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

3



PM240 Power Module frame size FSB

Fixing 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 in, the mounting depth increases by 65 mm (2.56 inches).

Exception: Mounting depth on CU240E +39 mm (+1.54 inches).

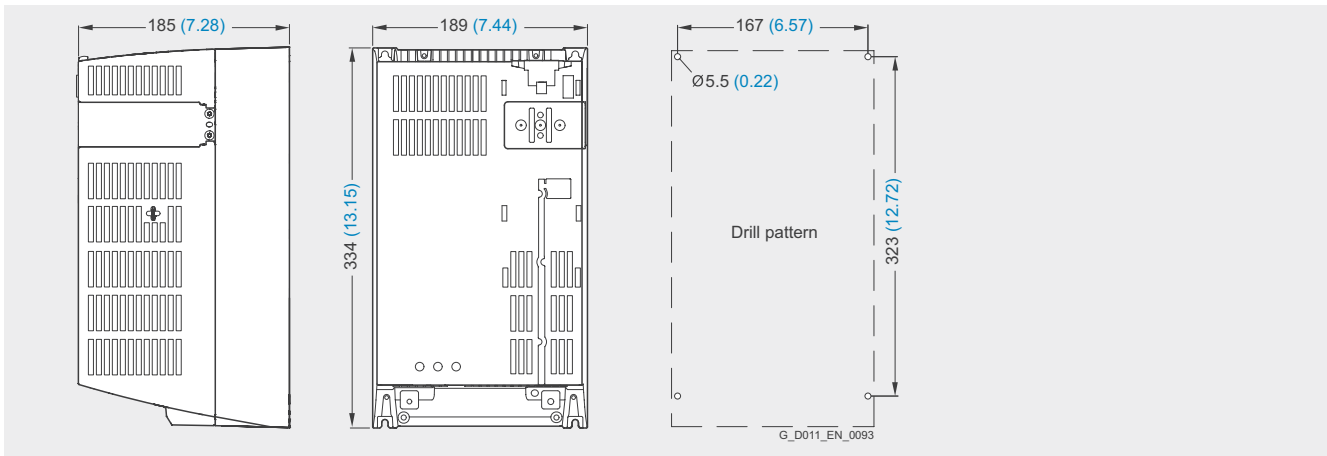
All dimensions in mm (values in brackets are in inches).

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Dimensional drawings (continued)



PM240 Power Module frame size FSC

Fixing 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 in, the mounting depth increases by 65 mm (2.56 inches).

Exception: Mounting depth on CU240E +39 mm (+1.54 inches).

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

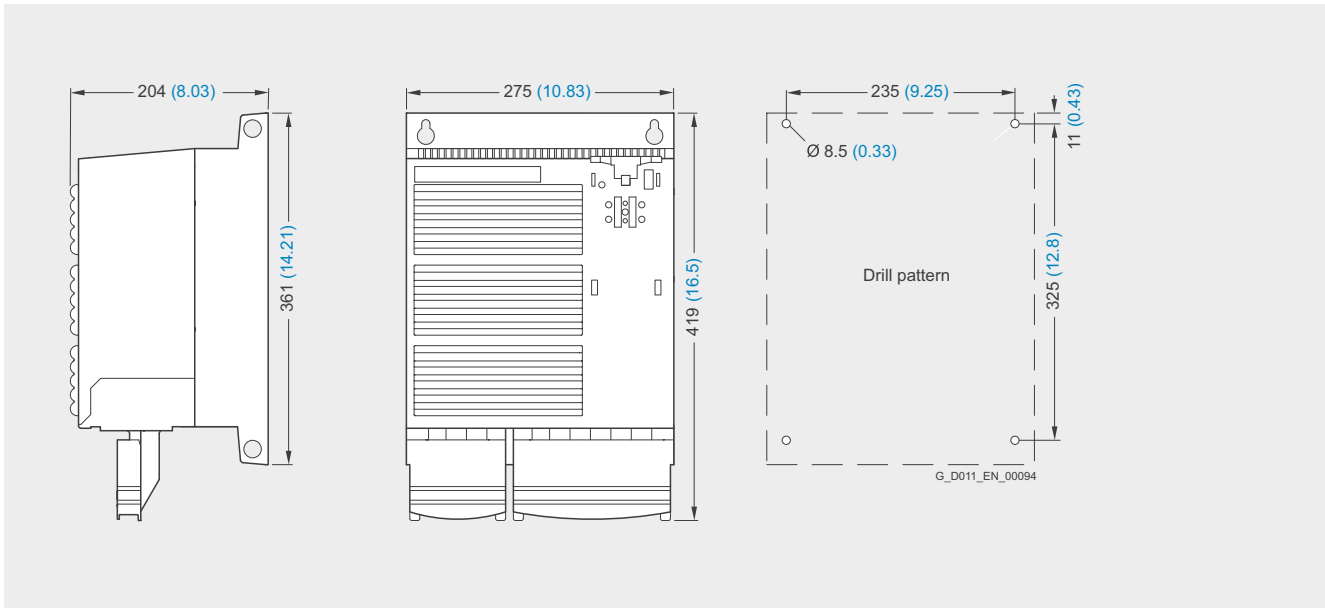
SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

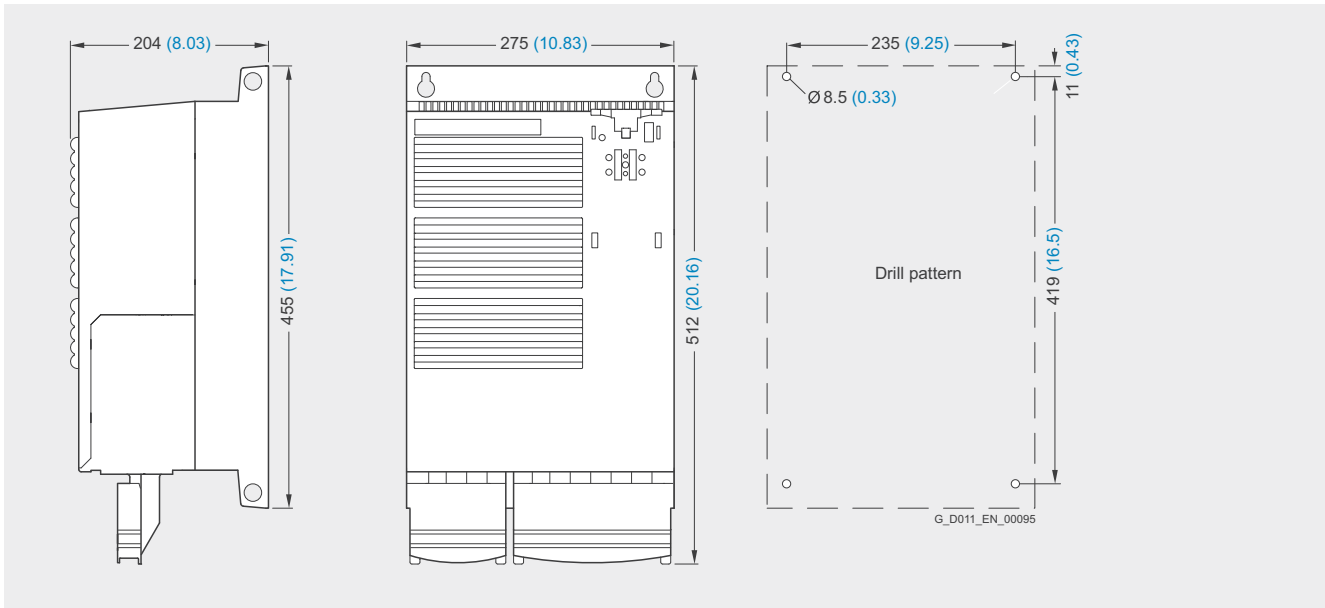
PM240 Power Modules

Dimensional drawings (continued)

3



PM240 Power Module frame size FSD without line filter



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

Fixing 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 front: 28 mm (1.1 inches)

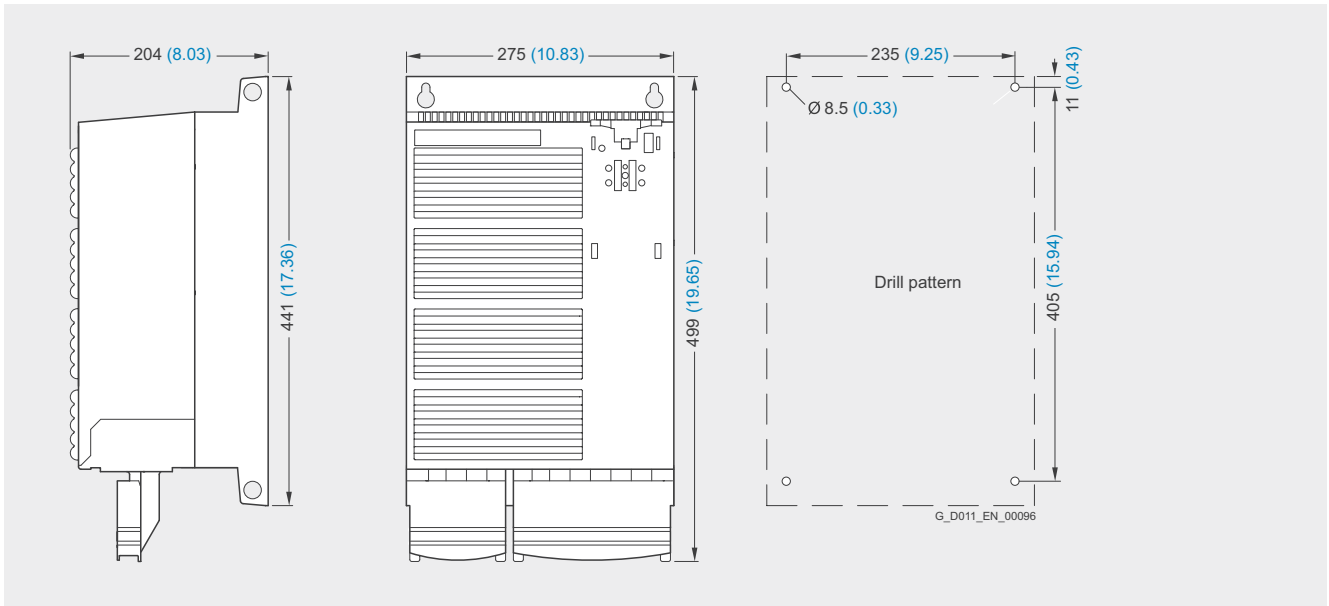
Ventilation clearance required at sides: 0 mm (0 inches)

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

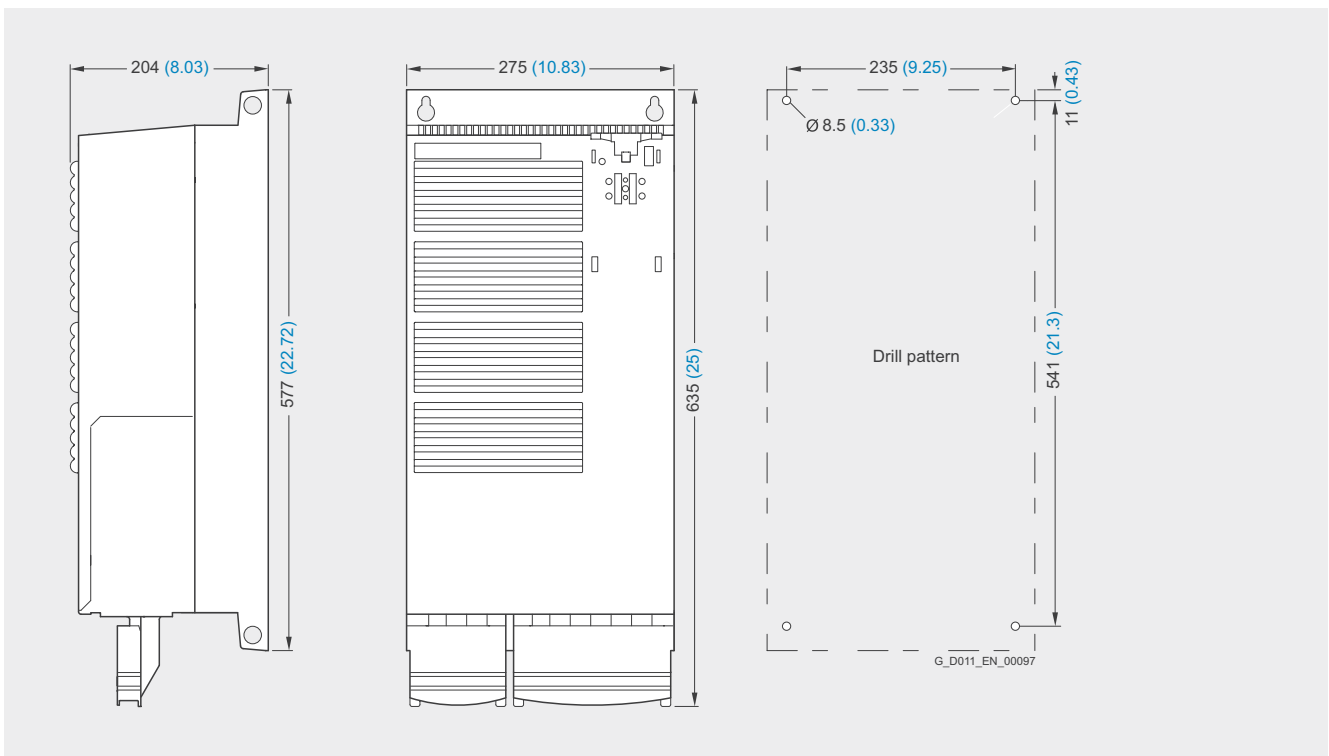
Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

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

Dimensional drawings (continued)



PM240 Power Module frame size FSE without line filter



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

Fixing 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 front: 28 mm (1.1 inches)

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

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

Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

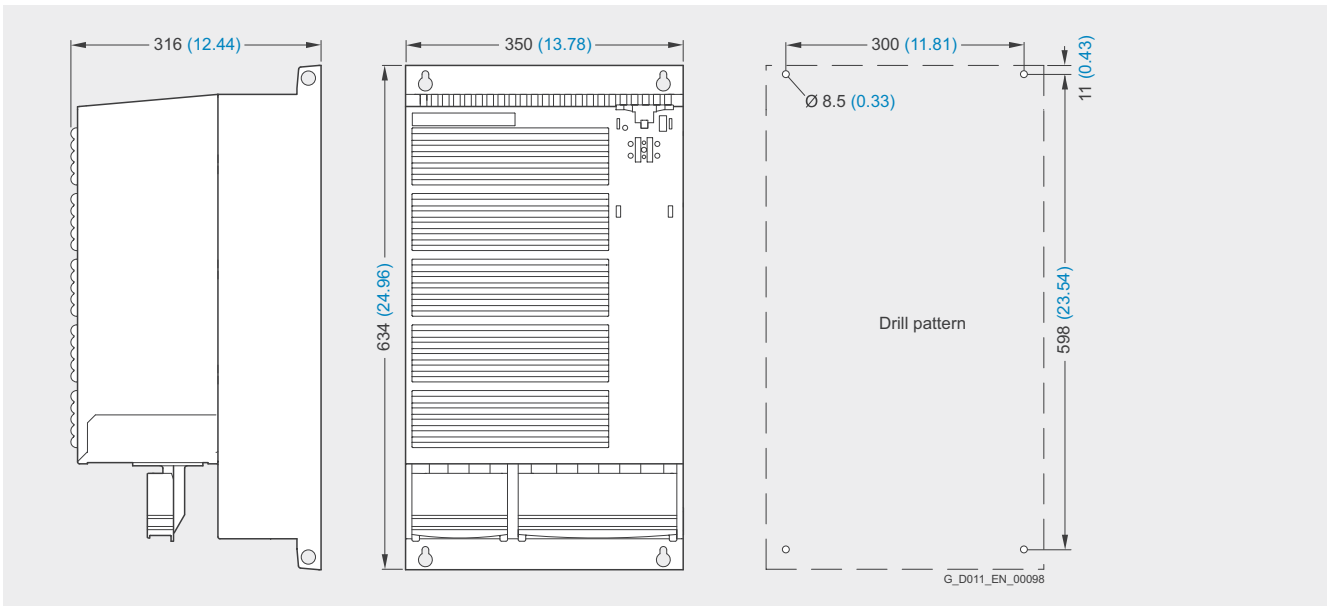
All dimensions in mm (values in brackets are in inches).

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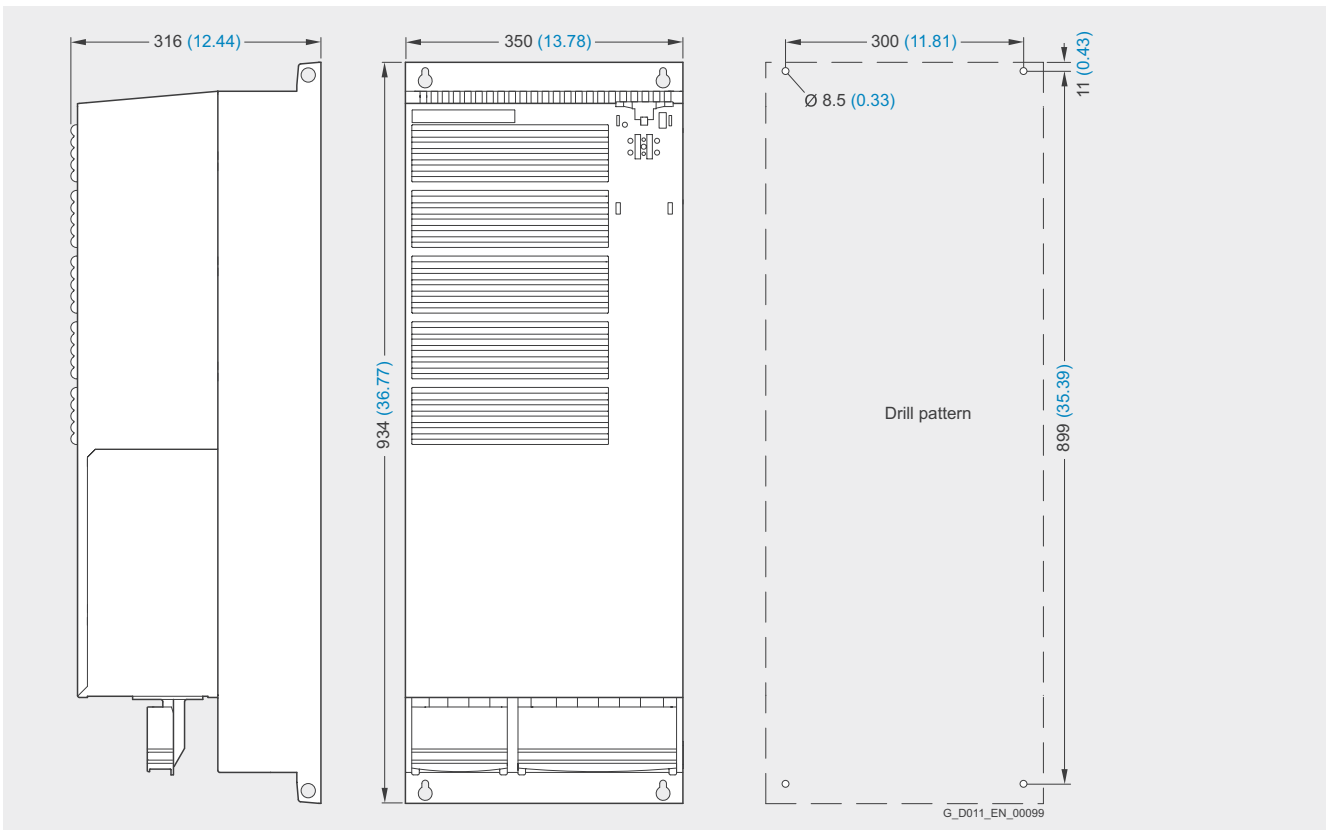
Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM240 Power Modules

Dimensional drawings (continued)



PM240 Power Module frame size FSF without line filter



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

Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).

Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Overview



The PM250 Power Module features an absolutely unique technology which we have called "Efficient Infeed Technology". This regenerative feedback capability of the PM250 Power Module in generating mode (electronic braking) means that energy is returned to the supply system and not destroyed in a braking resistor. This saves space in the control cabinet. The time-consuming dimensioning of the braking resistor as well as the wiring are eliminated. Generated heat is also reduced in the control cabinet.

The innovative circuit design used in Efficient Infeed Technology reduces supply 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 safety-oriented applications. In conjunction with a Fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive (see Control Units).

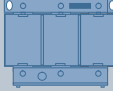


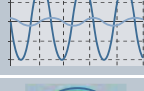






The permissible cable lengths between inverter and motor are limited. Longer cables can be used if output reactors are connected (see load-side power components).

For frame size FSC of Power Module PM250 with an integral line filter of class A, an additional base filter of class B 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.

Overview of how customers benefit from Efficient Infeed Technology

For more detailed information, please refer to section Efficient Infeed Technology in chapter Innovations.

		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 +

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SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Selection and Ordering Data

To ensure correct selection of the Power Module, it should be chosen according to the

- **rated output current for applications with light overload (LO) or**
- **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 standard 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 data of the Power Modules.

Rated power ¹⁾		Rated output current ²⁾		Power based on the base load current ³⁾		Base load current ³⁾	Frame size	SINAMICS G120 PM250 Power Module with integrated line filter (Class A)	Order No.
kW	hp	A	A	kW	hp				
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	6SL3225-0BE31-5AA0	
22	30	45		18.5	25	38	FSD	6SL3225-0BE31-8AA0	
30	40	60		22	30	45	FSD	6SL3225-0BE32-2AA0	
37	50	75		30	40	60	FSE	6SL3225-0BE33-0AA0	
45	60	90		37	50	75	FSE	6SL3225-0BE33-7AA0	
55	75	110		45	60	90	FSF	6SL3225-0BE34-5AA0	
75	100	145		55	75	110	FSF	6SL3225-0BE35-5AA0	
90	125	178		75	100	145	FSF	6SL3225-0BE37-5AA0	

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

²⁾ The rated output current I_{rated} is based on the loading for light overload (LO). These current values are quoted on the rating plate of the Power Module.

³⁾ The base load current I_H is based on the loading for high overload (HO).

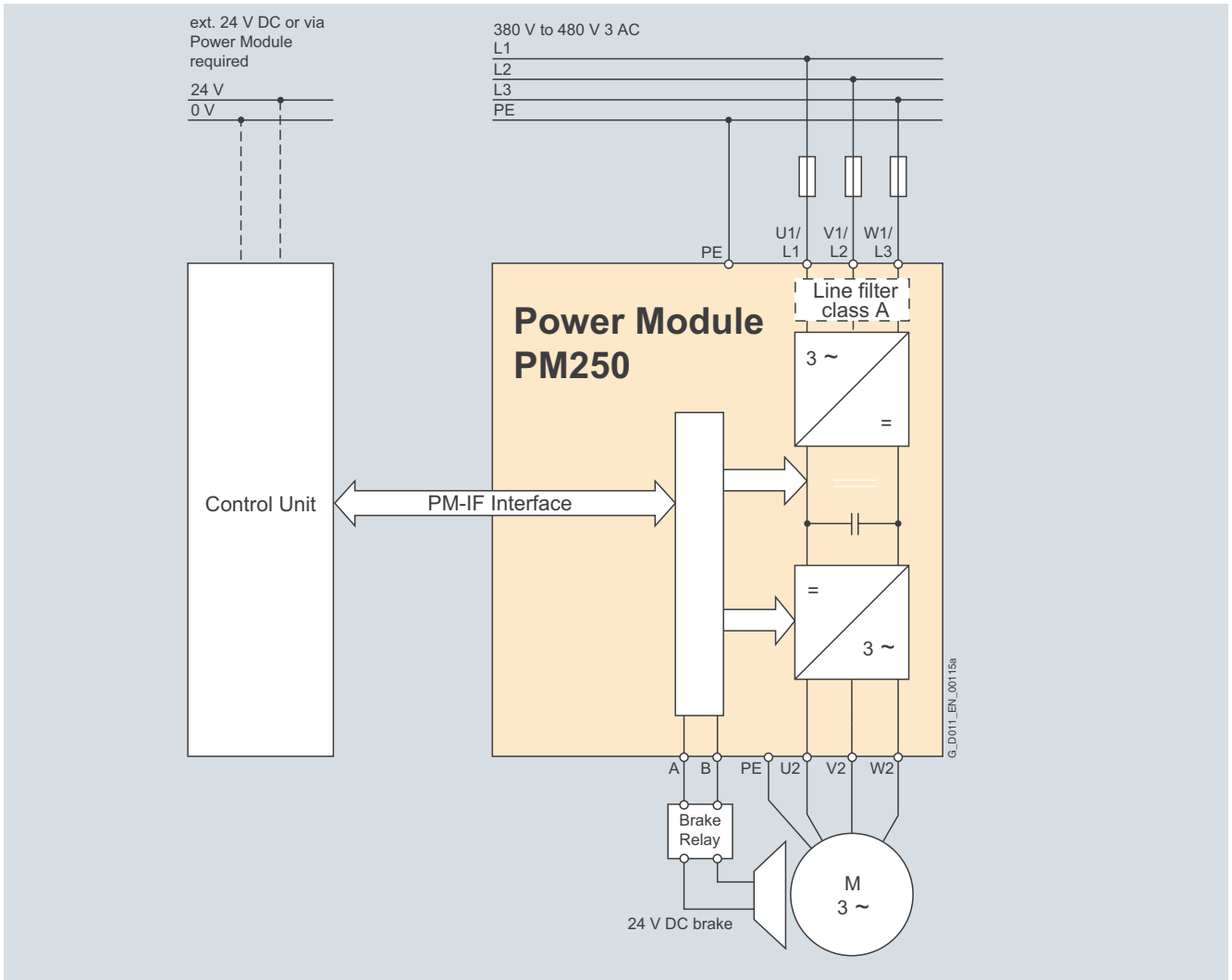
Integration

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 for connection of the PM250 Power Module and Control Unit. The PM250 Power Module also supplies power to the Control Unit by means of an integrated power pack

- Motor connection made with screw terminals or screw studs
- Drive circuit for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 x PE (protective earth) connections



Connection diagram for PM250 Power Module with integrated line filter class A

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Integration (continued)

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:

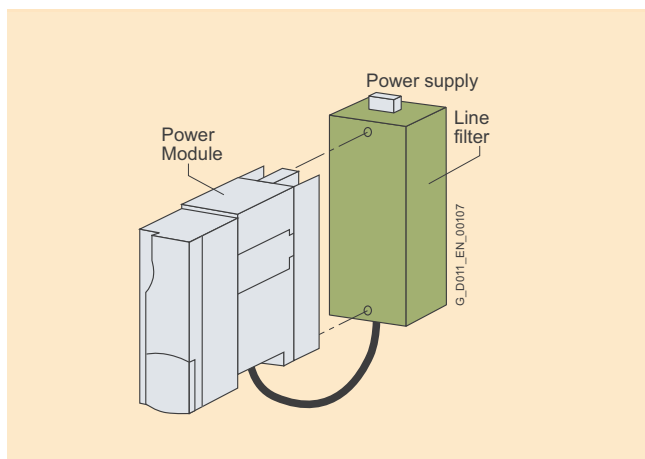
	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
PM250 Power Module with line-commutated energy feedback and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
Line-side power components						
Line filter class A	–	–	I	I	I	I
Line filter class B	–	–	U	–	–	–
Line reactor ¹⁾	–	–	_ 1)	_ 1)	_ 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	–	–	Available soon	Available soon	Available soon	Available soon

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

Availability as base components

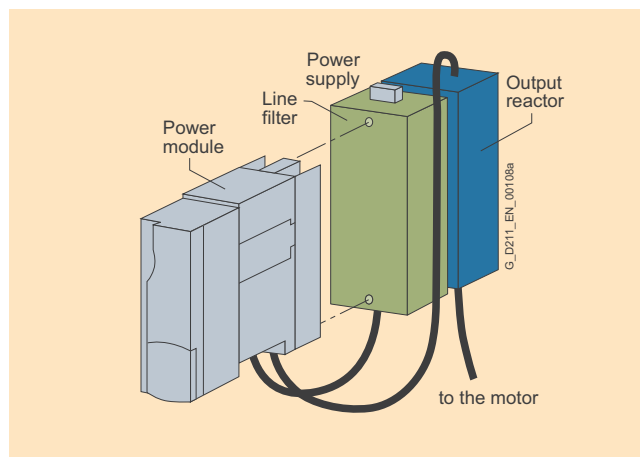
Many system components for PM250 Power Modules are designed as base components, i.e. the component is mounted on the baseplate and the PM250 Power Module above it in a space-saving construction. Up to two base components can be mounted above one another.

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



Basic layout of a PM250 Power Module with line filter class B 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 Power Module of type PM250.

²⁾ A PM250 Power Module is capable of line-commutated energy feedback. A braking resistor cannot be connected to this module and is not necessary.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Technical specifications

General technical data

	PM250 Power Modules
Line operating voltage	380 ... 480 V 3 AC \pm 10 %
Line requirements	\leq 1 %
Line short-circuit voltage u_k	
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), for higher pulse frequencies up to 16 kHz, see derating data
Power factor	0.9
Inverter efficiency	95 ... 97 %
Control factor	87 %
Overload capability	
• High overload (HO)	1.5 x rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 x rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	1.1 x rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.5 x rated output current (i.e. 150 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Integral line filter class A; optional line filter class B compliant with EN 55011 available
Possible braking methods	Regenerative feedback in generating mode
Degree of protection	IP20
Operating temperature	
• High overload (HO)	-10 ... +50 °C (14 ... 122 °F) without derating, > 50 ... 60 °C, see derating characteristics
• Light overload (LO)	-10 ... +40 °C (14 ... 104 °F) without derating, > 40 ... 60 °C, see derating characteristics
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	< 95 % RH, non-condensing
Cooling	Internal air cooling, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics
Standard SCCR (Short Circuit Current Rating) ¹⁾	FSC: 10 kA FSD, FSE, FSF: 42 kA
Protective functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overload • Ground fault • Short-circuit • Stall prevention • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter interlock
Standards conformance	UL, cUL, CE, c-tick
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC

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>

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules		
		6SL3225-0BE25-5AA0	6SL3225-0BE27-5AA0	6SL3225-0BE31-1AA0
With integrated line filter				
Output current at 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	kW	4	4	4
Efficiency η		0.95	0.95	0.95
Power loss	kW	Available soon	Available soon	Available soon
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 the Control Unit	A	1	1	1
Input current ³⁾				
• Rated current ³⁾	A	18	25	32
• Current based on I_H ³⁾	A	13.2	19	26
Line supply connection U1/L1, V1/L2, W1/L3				
• Conductor cross-section	mm ²	2.5 ... 10	2.5 ... 10	2.5 ... 10
Motor connection U2, V2, W2				
• 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.				
• Shielded	m	25	25	25
• 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 loading for light overload (LO).

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. It applies with a line impedance of $u_k = 1\%$. The rated input currents apply for a load representing the rated power (based on I_{rated}) – these current values are specified on the rating plate.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules		
		6SL3225-0BE31-5AA0	6SL3225-0BE31-8AA0	6SL3225-0BE32-2AA0
With integrated line filter				
Output current at 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	kW	0.44	0.55	0.72
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 the Control Unit	A	1	1	1
Input current				
• Rated current ³⁾	A	36	42	56
• based on I_H ³⁾	A	30	36	42
Line supply connection U1/L1, V1/L2, W1/L3				
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2				
• 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.				
• Shielded	m	25	25	25
• Unshielded	m	100	100	100
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.	kg	15	15	16

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

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. It applies with a line impedance of $u_k = 1\%$. The rated input currents apply for a load representing the rated power (based on I_{rated}) – these current values are specified on the rating plate.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules				
		6SL3225- 0BE33-0AA0	6SL3225- 0BE33-7AA0	6SL3225- 0BE34-5AA0	6SL3225- 0BE35-5AA0	6SL3225- 0BE37-5AA0
With integrated line filter						
Output current at 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	kW	1	1.3	1.5	2	2.4
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 the Control Unit	A	1	1	1	1	1
Input current						
• Rated current ³⁾	A	70	84	102	135	166
• based on $I_H^{3)}$	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
• Conductor cross-section, max.	mm ²	10 ... 35	10 ... 35	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section, max.	mm ²	10 ... 35	10 ... 35	1 × 120 or 2 × 50	1 × 120 or 2 × 50	1 × 120 or 2 × 50
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.						
• Shielded	m	25	25	25	25	25
• Unshielded	m	100	100	100	100	100
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm	275	275	350	350	350
• Height	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.	kg	21	21	51	51	51

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

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. It applies with a line impedance of $u_k = 1\%$. The rated input currents apply for a load representing the rated power (based on I_{rated}) – these current values are specified on the rating plate.

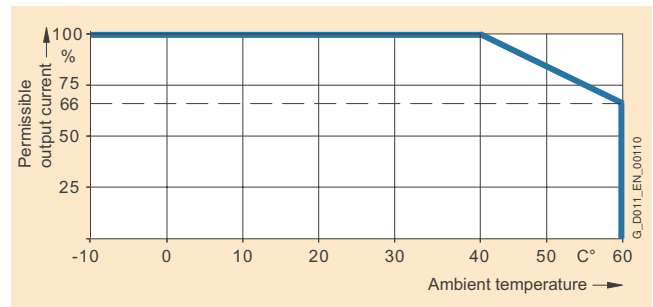
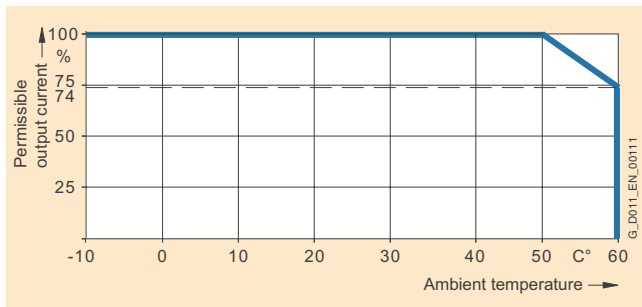
Characteristic curves

Derating data

Pulse frequency

Rated power at 400 V 3 AC		Rated output current in A at a switching 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	—	—	—	—

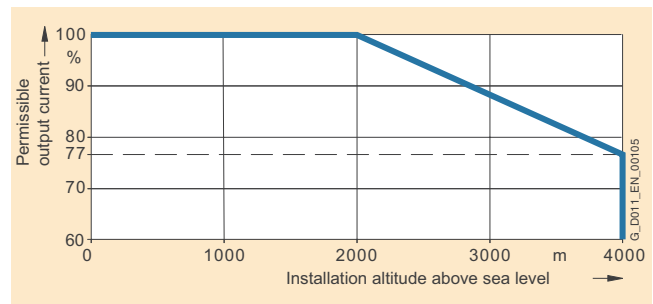
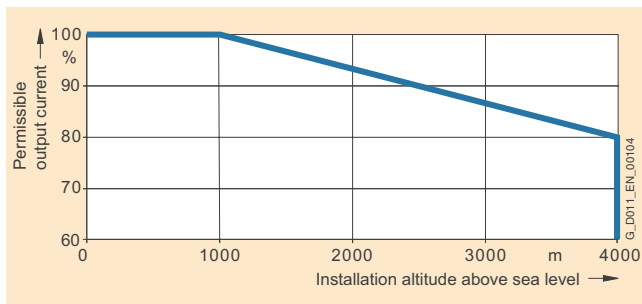
Ambient temperature



High overload (HO)

Light overload (LO)

Installation altitude

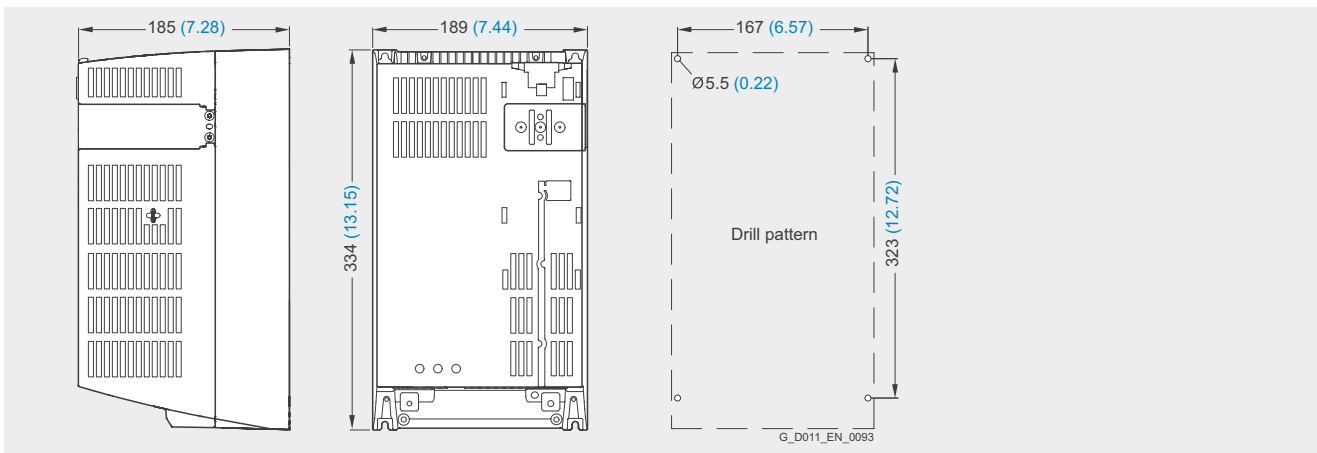


SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Dimensional drawings



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

Fixing 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:

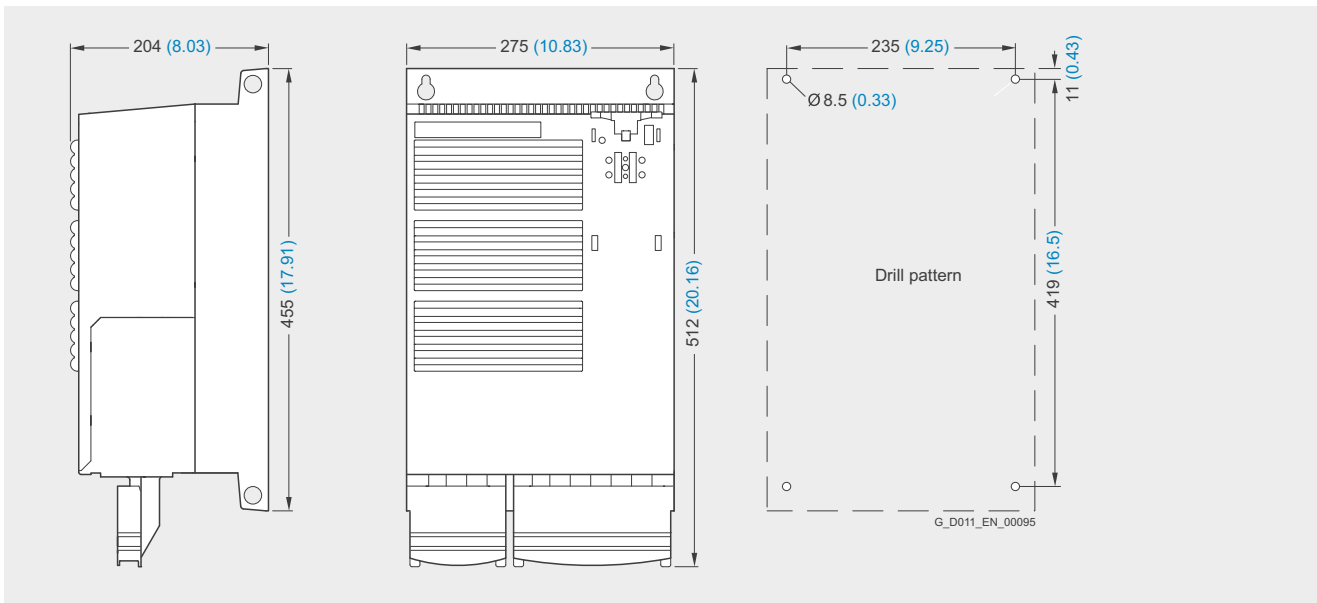
Ambient temperature ≤ 40 °C: 0 mm (0 inches)

Ambient temperature > 40 °C: 50 mm (1.97 inches)

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

Exception: Mounting depth on CU240E +39 mm (+1.54 inches).

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



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

Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).

Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

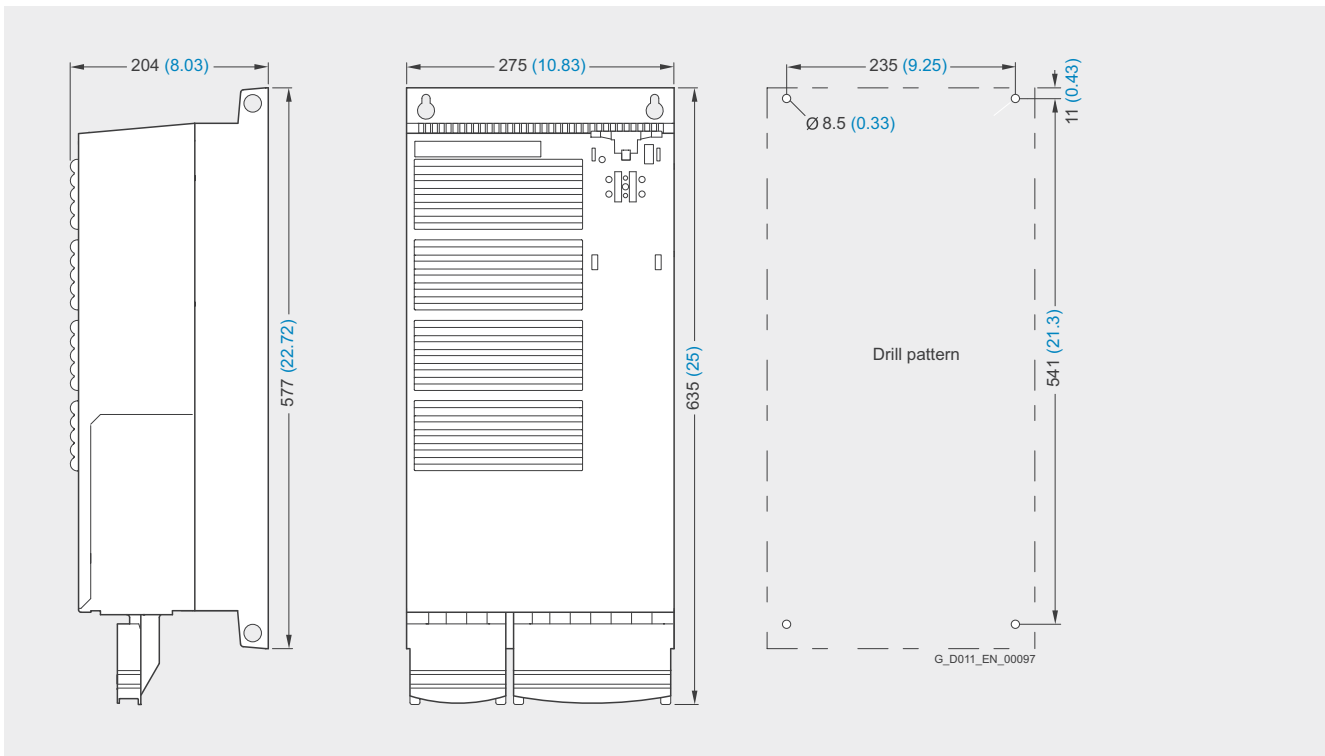
All dimensions in mm (values in brackets are in inches).

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Dimensional drawings (continued)



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

Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).

Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

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

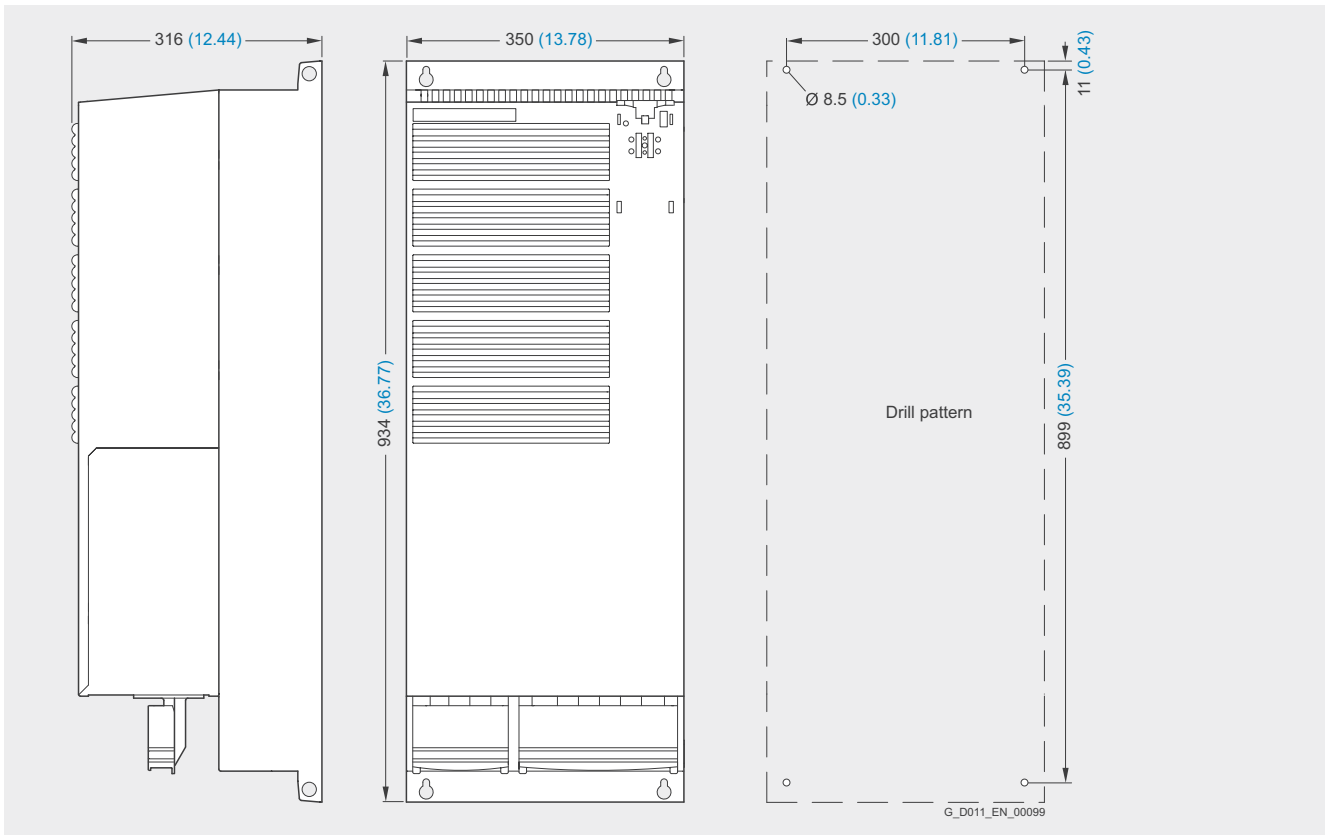
SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM250 Power Modules

Dimensional drawings (continued)

3



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

Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).

Exception: Mounting depth on CU240E +30 mm (+1.18 inches).

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

Overview



Example of PM260 FSD Power Module

The PM260 Power Module features an absolutely unique technology which we have called "Efficient Infeed Technology". The regenerative feedback capability of the PM260 Power Module in generating mode (electronic braking) means that energy is returned so the supply system and not destroyed in a braking resistor. This saves space in the control cabinet. The time-consuming dimensioning of the braking resistor as well as the wiring are eliminated. Generated heat is also reduced in the control cabinet.

The innovative circuit design used in Efficient Infeed Technology reduces supply 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 outstanding efficiency and an integral sine-wave filter. The integral 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, which reduces stress on the motor.

The incorporation 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 runs very quietly thanks to its high pulse frequencies.

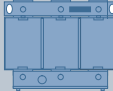


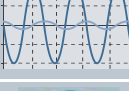



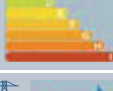


Standard motors can be used in conjunction with the PM260 Power Module. An increased dielectric strength of the winding system is not required.

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 section Efficient Infeed Technology in chapter Innovations.

	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 in 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
- Suitable for use on motors without special insulation
- Very low bearing currents, no bearing insulation required

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Selection and Ordering Data

To ensure correct selection of the Power Module, it should be chosen according to the

- **rated output current for applications with light overload (LO) or**
- **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 standard 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 data 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 line filter (Class A)
kW	hp	A	kW	hp	A		Order No.	Order No.
660 ... 690 V 3 AC								
11.0	15	14	7.5	10	10	FSD	6SL3225-0BH27-5UA0	6SL3225-0BH27-5AA0
15.0	20	19	11	15	14	FSD	6SL3225-0BH31-1UA0	6SL3225-0BH31-1AA0
18.5	25	23	15	20	19	FSD	6SL3225-0BH31-5UA0	6SL3225-0BH31-5AA0
30	40	35	22	30	26	FSF	6SL3225-0BH32-2UA0	6SL3225-0BH32-2AA0
37	50	42	30	40	35	FSF	6SL3225-0BH33-0UA0	6SL3225-0BH33-0AA0
55	75	62	37	50	42	FSF	6SL3225-0BH33-7UA0	6SL3225-0BH33-7AA0

Accessories

	Order No.
Replacement connector for PM260 Power Modules (ingoing and outgoing connector)	6SL3200-0ST04-0AA0

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

²⁾ The rated output current I_{rated} is based on the loading for light overload (LO). These current values are quoted on the rating plate of the Power Module.

³⁾ The base load current I_H is based on the loading for high overload (HO).

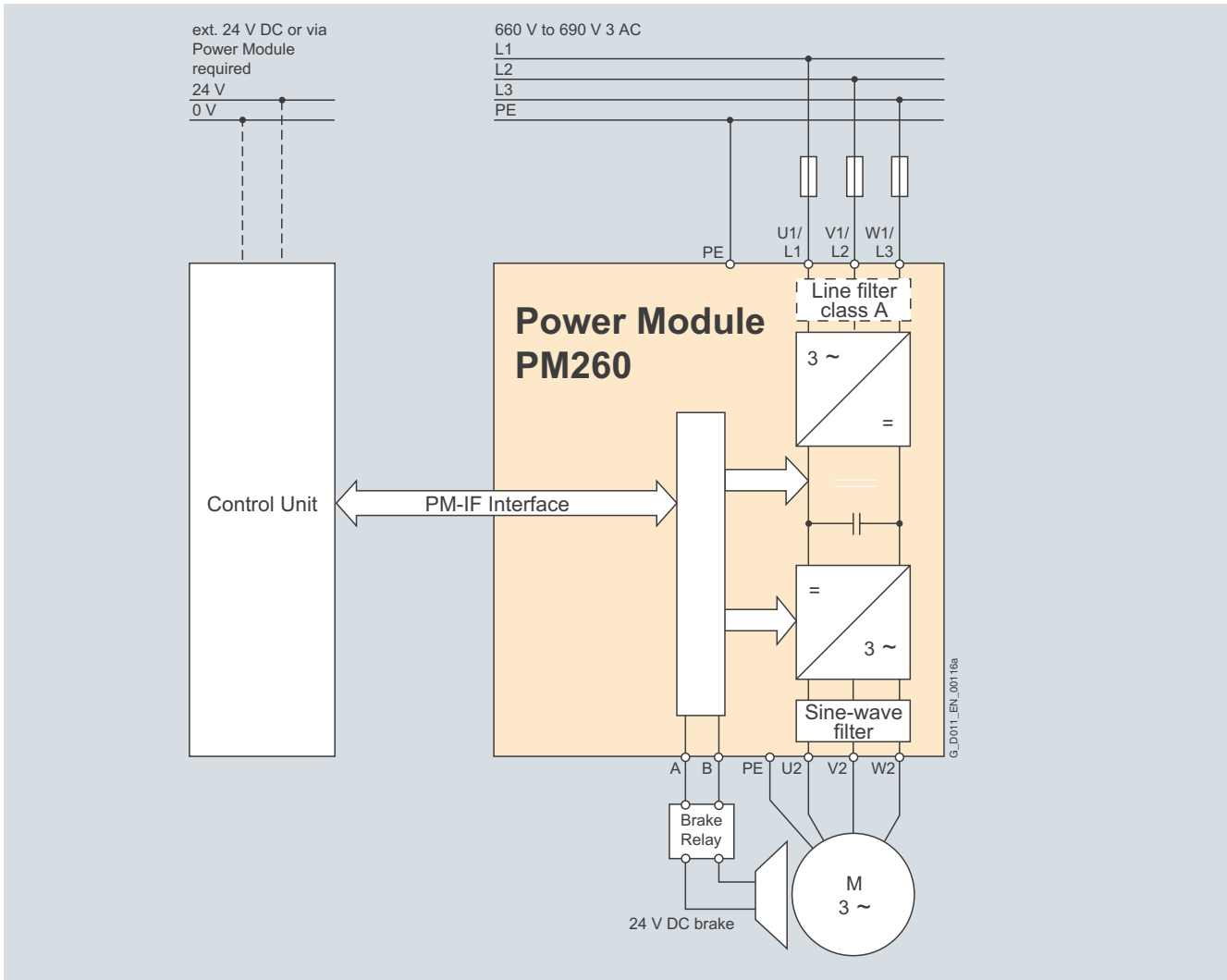
Integration

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 for connection of the PM260 Power Module and Control Unit. The PM260 Power Module also supplies power to the Control Unit by means of an integrated power pack

- Motor connection made with screw terminals or screw studs
- Drive circuit for the Brake Relay or the Safe Brake Relay for controlling a motor brake
- 2 x PE (protective earth) connections



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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Integration (continued)

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
PM260 Power Module with line-commutated energy feedback 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 without and with integrated filter class A

¹⁾ A line reactor is not required and must not be used in conjunction with a Power Module of type PM260.

²⁾ A PM260 Power Module is capable of line-commutated energy feedback. A braking resistor cannot be connected to this module and must not be used.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Technical specifications

General technical data

	PM260 Power Modules
Line operating voltage	660 ... 690 V 3 AC $\pm 10\%$ The power units can also be operated with a minimal voltage of 500 V -10% . In this case, the power is reduced linearly – see derating characteristics.
Line requirements Line short-circuit voltage u_k	$\leq 1\%$
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 %
Control factor	87 %
Overload capability	
• High overload (HO)	1.5 x rated output current (i.e. 150 % overload) for 57 s with a cycle time of 300 s 2 x rated output current (i.e. 200 % overload) for 3 s with a cycle time of 300 s
• Light overload (LO)	1.1 x rated output current (i.e. 110 % overload) for 57 s with a cycle time of 300 s 1.4 x rated output current (i.e. 140 % overload) for 3 s with a cycle time of 300 s
Electromagnetic compatibility	Optional line filter class A compliant with EN 55011
Possible braking methods	Regenerative feedback in generating mode
Degree of protection	IP20
Operating temperature	
• High overload (HO)	$-10 \dots +50\text{ °C}$ ($14 \dots 122\text{ °F}$) without derating, $> 50 \dots 60\text{ °C}$, see derating characteristics
• Light overload (LO)	$-10 \dots +40\text{ °C}$ ($14 \dots 104\text{ °F}$) without derating, $> 40 \dots 60\text{ °C}$, see derating characteristics
Storage temperature	$-40 \dots +70\text{ °C}$ ($-40 \dots +158\text{ °F}$)
Relative humidity	$< 95\%$ RH, non-condensing
Cooling	Internal air cooling, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m above sea level without derating, $> 1000\text{ m}$ see derating characteristics
Standard SCCR (Short Circuit Current Rating) ¹⁾	42 kA
Protective functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overload • Ground fault • Short-circuit • Stall prevention • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter interlock
Standards conformance	CE
CE mark	To Low-Voltage Directive 73/23/EEC and Machinery Directive 98/37/EEC

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>

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		PM260 Power Modules		
Without integrated line filter		6SL3225-0BH27-5UA0	6SL3225-0BH31-1UA0	6SL3225-0BH31-5UA0
With integrated line filter		6SL3225-0BH27-5AA0	6SL3225-0BH31-1AA0	6SL3225-0BH31-5AA0
Output current at 400 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	kW	Available soon	Available soon	Available soon
Cooling air requirement	m ³ /s	0.022	0.022	0.039
Sound pressure level L_{pA} (1 m)	dB	< 64	< 64	< 64
24 V DC power supply for the Control Unit	A	1	1	1
Input current				
• Rated current ³⁾	A	13	18	22
• based on $I_H^{3)}$	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.				
• 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	20	20	20
• with integrated filter	kg	21	21	21

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

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. It applies with a line impedance of $u_k = 1\%$. The rated input currents apply for a load representing the rated power (based on I_{rated}) – these current values are specified on the rating plate.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Technical specifications (continued)

Line voltage 660 ... 690 V 3 AC		PM260 Power Modules		
		6SL3225-0BH32-2UA0	6SL3225-0BH33-0UA0	6SL3225-0BH33-7UA0
Without integrated line filter				
With integrated line filter		6SL3225-0BH32-2AA0	6SL3225-0BH33-0AA0	6SL3225-0BH33-7AA0
Output current at 400 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	kW	Available soon	Available soon	Available soon
Cooling air requirement	m ³ /s	0.094	0.094	0.117
Sound pressure level L_{pA} (1 m)	dB	< 70	< 70	< 70
24 V DC power supply for the Control Unit	A	1	1	1
Input current				
• Rated current ³⁾	A	34	41	60
• based on $I_H^{3)}$	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 ... 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.				
• 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	46	46	46
• with integrated filter	kg	48	48	48

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

²⁾ The base load current I_H is based on the loading for high overload (HO).

³⁾ The input current depends on the motor load and line impedance. It applies with a line impedance of $u_k = 1\%$. The rated input currents apply for a load representing the rated power (based on I_{rated}) – these current values are specified on the rating plate.

SINAMICS G120

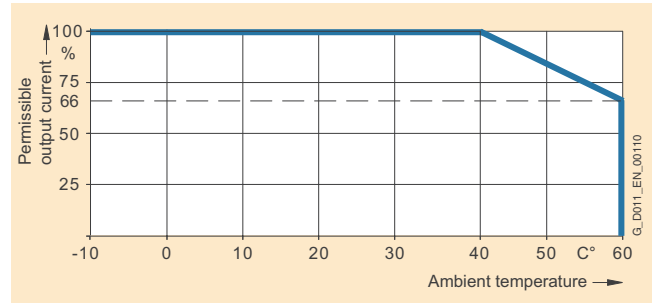
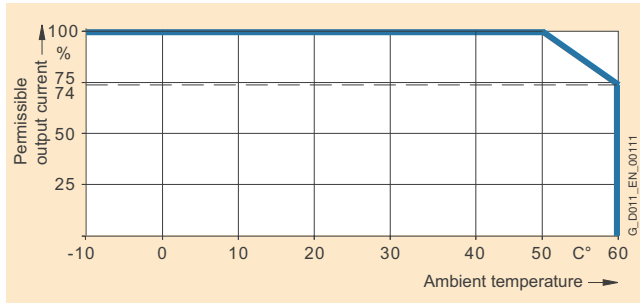
Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

PM260 Power Modules

Characteristic curves

Derating data

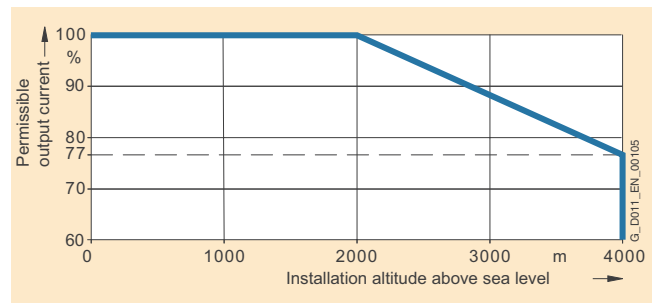
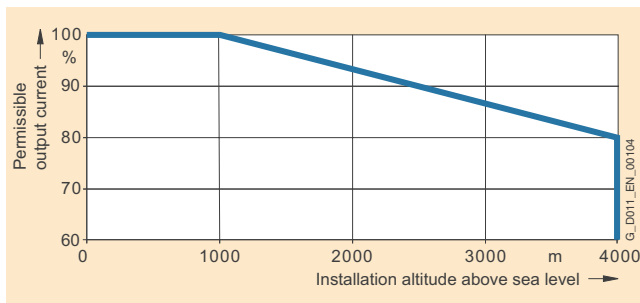
Ambient temperature



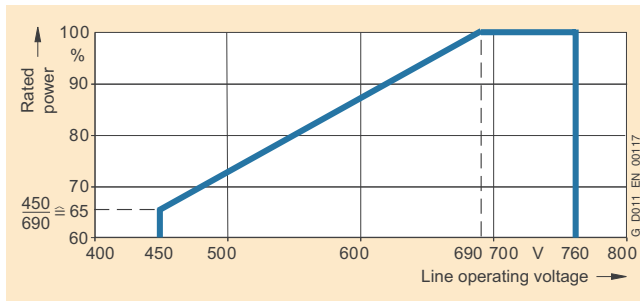
High overload (HO)

Light overload (LO)

Installation altitude



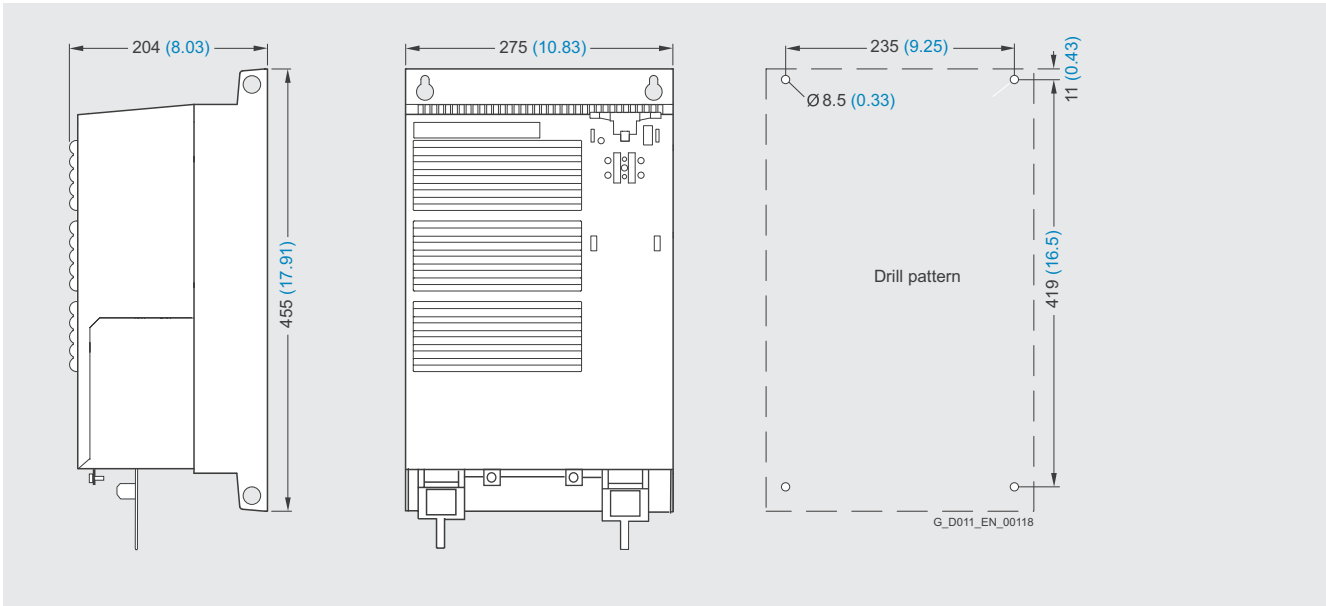
Line operating voltage



The power units can also be operated on a minimum voltage of 500 V -10%. In this case, the power is reduced linearly as required.

3

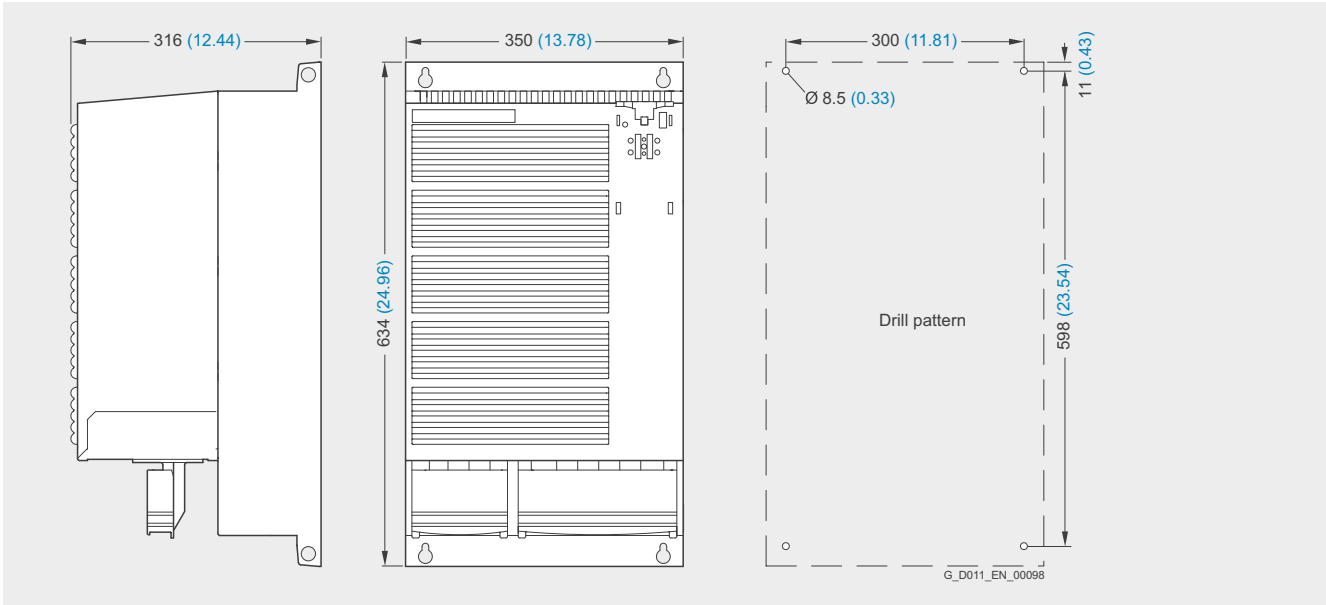
Dimensional drawings



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

- Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).
- Exception: Mounting depth on CU240E +30 mm (+1.18 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

- Fixing 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 in, the mounting depth increases by 56 mm (2.2 inches).
- Exception: Mounting depth on CU240E +30 mm (+1.18 inches).
- All dimensions in mm (values in brackets are in inches).

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components Line filters

Overview



Example: Line filter for Power Modules frame size FSA

The Power Module complies with a higher radio interference class when an additional line filter is used.

Frame size FSA of the PM240 Power Module is available only without integrated line filter to class A. A base filter for compliance with class A is therefore provided. For compliance with class B, a base filter to class B is available.

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

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

Additional line filters to class B are not available for the PM260 Power Module

Line filters optionally available depending on the used Power Module

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
PM240 Power Modules with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
Line-side power components						
Line filter class A	U	F	F	F	F	F/S ¹⁾
Line filter class B	U	U	U	–	–	–
PM250 Power Modules with line-commutated energy recovery to the supply and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
Line-side power components						
Line filter class A	–	–	I	I	I	I
Line filter class B	–	–	U	–	–	–
PM260 Power Modules with line-commutated energy recovery to the supply an 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 without and with integrated filter class A

¹⁾ PM240 Power Modules FSF 110 kW (150 hp) and higher available only without integrated filter class A. An optional line filter class A for lateral mounting is available.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components Line filters

Selection and Ordering Data

Rated power		SINAMICS G120 Power Module <u>PM240</u>		Line filter to class A according to EN 55011
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SE6400-2FA00-6AD0
0.55	0.75	OBE15-5UA0	FSA	
0.75	1.0	OBE17-5UA0	FSA	
1.1	1.5	OBE21-1UA0	FSA	
1.5	2.0	OBE21-5UA0	FSA	
110	150	OBE38-8UA0	FSF	6SL3203-OBE32-5AA0
132	200	OBE41-1UA0	FSF	
Rated power		SINAMICS G120 Power Module <u>PM240</u>		Line filter to class B according to EN 55011
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SE6400-2FB00-6AD0
0.55	0.75	OBE15-5UA0	FSA	
0.75	1.0	OBE17-5UA0	FSA	
1.1	1.5	OBE21-1UA0	FSA	
1.5	2	OBE21-5UA0	FSA	
2.2	3	OBE22-2AA0	FSB	6SL3203-OBE21-6SA0
3.0	4	OBE23-0AA0	FSB	
4.0	5	OBE24-0AA0	FSB	
7.5	10	OBE25-5AA0	FSC	6SL3203-0BD23-8SA0
11	15	OBE27-5AA0	FSC	
15	20	OBE31-1AA0	FSC	
Rated power		SINAMICS G120 PM250 Power Module		Line filter to class B according to EN 55011
kW	hp	Type 6SL3225-...	Frame size	Order No.
380 ... 480 V 3 AC				
7.5	10	OBE25-5AA0	FSC	6SL3203-0BD23-8SA0
11	15	OBE27-5AA0	FSC	
15	20	OBE31-1AA0	FSC	

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components Line filters

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line filter class A		Line filter class B		
		6SE6400- 2FA00-6AD0	6SL3203- 0BE32-5AA0	6SE6400- 2FB00-6AD0	6SL3203- 0BE21-6SA0	6SL3203- 0BD23-8SA0
Rated current	A	6	250	6	10.2	39.4
Line supply connection L1, L2, L3		Screw terminals	On housing via M8 screw stud	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm ²	2.5	–	2.5	2.5	4
Load connection U, V, W		Shielded cable	On housing via M8 screw stud	Shielded cable	Shielded cable	Shielded cable
• Conductor cross-section	mm ²	3 × 2.5	–	3 × 2.5	3 × 2.5	3 × 4
• Length	m	0.4	–	0.4	0.4	0.4
PE connection		On housing via M4 screw studs	Flat connector for M10 screw	On housing via M4 screw studs	On housing via M4 screw studs	On housing via M4 screw studs
Degree of protection		IP20	IP00	IP20	IP20	IP20
Dimensions						
• Width	mm	73	240	73	153	190
• Height	mm	200	360	200	296	362
• Depth	mm	42.5	116	42.5	50	55
Possible as base component		yes	no	yes	yes	yes
Weight, approx.	kg	0.5	12.4	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- 0BE38-8UA0 6SL3224- 0BE41-1UA0	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	FSF	FSA	FSB	FSC

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components
Line reactors

Overview



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



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

The purpose of a line reactor is to reduce line-side harmonic currents and harmonic effects. This applies particularly in the case of weak power supplies (network short-circuit power $u_K > 1\%$).

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

Benefits

Only AC reactors are available as inverter reactors.

- Only an AC reactor offers protection for the input rectifier of the inverter.
- The capacitor service life of the inverter doubles when using an AC reactor compared to the service life when using a DC reactor.
- The harmonic response of AC reactors is almost constant during the whole service life. DC reactors are changing in their harmonic response by and by (over months).
- An AC reactor reduces a possible asymmetry of one current phase to another. A DC reactor would be inefficient in this case.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components Line reactors

Integration

The line reactors for PM240 Power Modules of frame sizes FSA to FSE are designed as base components. The line reactor is attached to the mounting surface and the Power Module is mounted directly on the line reactor. The cables to the Power Module are already connected to 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
PM240 Power Module with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
Line-side power components						
Line reactor	U	U	U	U	U	S
PM250 Power Module with line-commutated energy feedback and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
Line-side power components						
Line reactor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾
PM260 Power Module with line-commutated energy feedback 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

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

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components
Line reactors

Technical specifications

Line 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 stud	On housing with M5 screw stud	On housing with M5 screw stud	On housing with M5 screw stud
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	70
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 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 stud	On housing with M5 screw stud	On housing with M5 screw stud	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	70	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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components Line reactors

Technical specifications (continued)

Line 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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components
Recommended line components

Overview

The following table lists recommendations for further 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. Fuses of type 3NA3 are recommended for European countries. 3NE1 fuses are UL-compliant (corresponds to RU).

Further 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 Power Modules PM240		Fuse		Circuit-breakers
kW	hp	Type 6SL3224-...	Frame size	Type 3NA3 Order No.	Type 3NE1 (RU) 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 American countries.	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		3RV1031-4FA10	
15.0	20	0BE31-1 . A0	FSC	3NA3812		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	–	3NE1227-0	3VL4731-.DC36-....
132	200	0BE41-1UA0	FSF	–	3NE1230-0	3VL4731-.DC36-....

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Line-side power components
Recommended line components

Selection and Ordering Data (continued)

Rated power		SINAMICS G120 Power Modules PM250		Fuse		Circuit-breakers
kW	hp	Type 6SL3225-...	Frame size	Type 3NA3 Order No.	Type 3NE1 (RU) 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 American countries.	3RV1031-4EA10
11.0	15	0BE27-5AA0	FSC	3NA3812		3RV1031-4FA10
15.0	20	0BE31-1AA0	FSC	3NA3814		3RV1031-4HA10
18.5	25	0BE31-5AA0	FSD	3NA3820	3NE1817-0	3RV1042-4KA10
22	30	0BE31-8AA0	FSD	3NA3822	3NE1818-0	
30	40	0BE32-2AA0	FSD	3NA3824	3NE1820-0	3RV1042-4MA10
37	50	0BE33-0AA0	FSE	3NA3830	3NE1021-0	3VL1712-.DD33-....
45	60	0BE33-7AA0	FSE	3NA3832	3NE1022-0	3VL1716-.DD33-....
55	75	0BE34-5AA0	FSF	3NA3836	3NE1224-0	3VL3720-.DC36-....
75	100	0BE35-5AA0	FSF	3NA3140	3NE1225-0	3VL3725-.DC36-....
90	125	0BE37-5AA0	FSF	3NA3144	3NE1227-0	3VL4731-.DC36-....
660 ... 690 V 3 AC						
Rated power		SINAMICS G120 Power Modules PM260		Fuse		Circuit-breakers
kW	hp	Type 6SL3225-...	Frame size	Type 3NA3 Order No.	Type 3NE1 (RU) Order No.	Order No.
11.0	15	0BH27-5 . A0	FSD	3NA3120-6	–	3RV1041-4FA10
15.0	20	0BH31-1 . A0	FSD			
18.5	25	0BH31-5 . A0	FSD			
30	40	0BH32-2 . A0	FSF	3NA3122-6		3RV1041-4JA10
37	50	0BH33-0 . A0	FSE			3RV1041-4KA10
55	75	0BH33-7 . A0	FSF	3NA3130-6		3RV1041-4MA10

Overview



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

Excess power in the DC link is dissipated via 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. For regenerative 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 next to the PM240 Power Modules. The braking resistors for the FSA and FSB frame sizes are designed as base components. If the PM240 Power Modules of the FSA or FSB frame size are operated without line reactor, the braking resistors can also be installed under the Power Modules.

The braking resistors for the Power Modules of the FSC to FSF frame sizes should be placed outside the control cabinet or outside the control room in order to dissipate the resulting heat loss from the area of the Power Modules, thereby allowing a corresponding reduction in the level of air conditioning required.

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

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

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
PM240 Power Module with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
DC link components						
Braking resistor	U	U	S	S	S	S
PM250 Power Module with line-commutated energy feedback and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
DC link components						
Braking resistor ¹⁾	–	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾
PM260 Power Module with line-commutated energy feedback and integrated sine-wave filter						
Available frame sizes	–	–	–	✓	–	✓
DC link components						
Braking resistor ¹⁾	–	–	–	– ¹⁾	–	– ¹⁾

U = Base component

S = Lateral mounting

– = Not possible

¹⁾ PM250 and PM260 Power Modules are capable of line-commutated energy feedback. A braking resistor cannot be connected to these modules and would be superfluous.

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

DC link components
Braking resistors

Selection and Ordering Data

Rated power		SINAMICS G120 Power Module <u>PM240</u>		Braking resistor
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SE6400-4BD11-0AA0
0.55	0.75	OBE15-5UA0	FSA	
0.75	1.0	OBE17-5UA0	FSA	
1.1	1.5	OBE21-1UA0	FSA	
1.5	2	OBE21-5UA0	FSA	
2.2	3	OBE22-2 . A0	FSB	6SL3201-0BE12-0AA0
3.0	4	OBE23-0 . A0	FSB	
4.0	5	OBE24-0 . A0	FSB	
7.5	10	OBE25-5 . A0	FSC	6SE6400-4BD16-5CA0
11.0	15	OBE27-5 . A0	FSC	
15.0	20	OBE31-1 . A0	FSC	6SE6400-4BD21-2DA0
18.5	25	OBE31-5 . A0	FSD	
22	30	OBE31-8 . A0	FSD	
30	40	OBE32-2 . A0	FSD	6SE6400-4BD22-2EA0
37	50	OBE33-0 . A0	FSE	
45	60	OBE33-7 . A0	FSE	6SE6400-4BD24-0FA0
55	75	OBE34-5 . A0	FSF	
75	100	OBE35-5 . A0	FSF	
90	125	OBE37-5 . A0	FSF	6SE6400-4BD26-0FA0
110	150	OBE38-8UA0	FSF	
132	200	OBE41-1UA0	FSF	

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SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

DC link components
Braking resistors

Technical specifications

Line 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	0.1	0.2	0.65
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) Contact load, max.		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

Line voltage 380 V ... 480 V 3 AC		Braking resistor			
		6SE6400-4BD21-2DA0	6SE6400-4BD22-2EA0	6SE6400-4BD24-0FA0	6SE6400-4BD26-0FA0
Resistor	Ω	27	15	8.2	5.5
Rated power P_{DB}	kW	1.2	2.2	4	6
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) Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/0.2 A	250 V AC/0.2 A
Degree of protection		IP20	IP20	IP20	IP20
Frame size		FSD	FSE	FSF	FSF
Dimensions					
• Width	mm	270	270	395	483
• Height	mm	515	645	650	526
• Depth	mm	175	175	315	301
Possible as base component		no	no	no	no
Weight, approx.	kg	7.4	10.6	16.7	21
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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components Output reactors

Overview



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

Output reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents, which place an additional load on the power section 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.

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

	Frame size					
	FSA	FSB	FSC	FSD	FSE	FSF
PM240 Power Module with integrated brake chopper						
Available frame sizes	✓	✓	✓	✓	✓	✓
Load-side power components						
Output reactor	U	U	U	S	S	S
Sine-wave filter	Available soon	Available soon	Available soon	Available soon	Available soon	Available soon
PM250 Power Module with line-commutated energy feedback and integrated line filter class A						
Available frame sizes	–	–	✓	✓	✓	✓
Load-side power components						
Output reactor	–	–	U	S	S	S
Sine-wave filter	–	–	Available soon	Available soon	Available soon	Available soon
PM260 Power Module with line-commutated energy feedback and integrated sine-wave filter						
Available frame sizes	–	–	–	✓	–	✓
Load-side power components						
Output reactor ¹⁾	–	–	–	–	–	–
Sine-wave filter	–	–	–	I	–	I

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

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components
Output reactors

Selection and Ordering Data

Rated power		SINAMICS G120 Power Modules <u>PM240</u>		Output reactor
kW	hp	Type 6SL3224-...	Frame size	Order No.
380 ... 480 V 3 AC				
0.37	0.50	OBE13-7UA0	FSA	6SE6400-3TC00-4AD2
0.55	0.75	OBE15-5UA0	FSA	
0.75	1.0	OBE17-5UA0	FSA	
1.1	1.5	OBE21-1UA0	FSA	
1.5	2	OBE21-5UA0	FSA	
2.2	3	OBE22-2 . A0	FSB	6SL3202-0AE21-0CA0
3.0	4	OBE23-0 . A0	FSB	
4.0	5	OBE24-0 . A0	FSB	
7.5	10	OBE25-5 . A0	FSC	6SL3202-0AJ23-2CA0
11.0	15	OBE27-5 . A0	FSC	
15.0	20	OBE31-1 . A0	FSC	6SE6400-3TC05-4DD0
18.5	25	OBE31-5 . A0	FSD	
22	30	OBE31-8 . A0	FSD	6SE6400-3TC03-8DD0
30	40	OBE32-2 . A0	FSD	6SE6400-3TC05-4DD0
37	50	OBE33-0 . A0	FSE	6SE6400-3TC08-0ED0
45	60	OBE33-7 . A0	FSE	6SE6400-3TC07-5ED0
55	75	OBE34-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	OBE35-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	OBE37-5 . A0	FSF	6SE6400-3TC14-5FD0
110	150	OBE38-8UA0	FSF	6SL3000-2BE32-1AA0
132	200	OBE41-1UA0	FSF	6SL3000-2BE32-6AA0
Rated power		SINAMICS G120 Power Modules <u>PM250</u>		Output reactor
kW	hp	Type 6SL3225-...	Frame size	Order No.
380 ... 480 V 3 AC				
7.5	10	OBE25-5 . A0	FSC	6SL3202-0AJ23-2CA0
11.0	15	OBE27-5 . A0	FSC	
15.0	20	OBE31-1 . A0	FSC	
18.5	25	OBE31-5 . A0	FSD	6SE6400-3TC05-4DD0
22	30	OBE31-8 . A0	FSD	6SE6400-3TC03-8DD0
30	40	OBE32-2 . A0	FSD	6SE6400-3TC05-4DD0
37	50	OBE33-0 . A0	FSE	6SE6400-3TC08-0ED0
45	60	OBE33-7 . A0	FSE	6SE6400-3TC07-5ED0
55	75	OBE34-5 . A0	FSF	6SE6400-3TC14-5FD0
75	100	OBE35-5 . A0	FSF	6SE6400-3TC15-4FD0
90	125	OBE37-5 . A0	FSF	6SE6400-3TC14-5FD0

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components Output reactors

Technical specifications

Line 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 stud	M5 screw stud	M5 screw stud	M5 screw stud	M5 screw stud
Cable length, max. between output reactor and motor						
• 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 output 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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components Output reactors

Technical specifications (continued)

Line 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 stud	M5 screw stud	M5 screw stud	M5 screw stud	M5 screw stud	M5 screw stud
Cable length, max. between output reactor and motor							
• 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 output of the Power Module	kW (hp)	2.2 (3.0)	3 (4.0)	4 (5.0)	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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components Output reactors

Technical specifications (continued)

Line 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	45	68	104	90
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						
• 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	6SL3225-0BE31-5AA0	6SL3225-0BE31-8AA0	6SL3225-0BE32-2AA0	6SL3225-0BE33-0AA0	6SL3225-0BE33-7AA0
Rated output 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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Load-side power components Output reactors

Technical specifications (continued)

Line 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	178	178	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						
• Shielded	m	200	200	200	300	300
• Unshielded	m	300	300	300	450	450
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	6SL3225-0BE34-5AA0	6SL3225-0BE35-5AA0	6SL3225-0BE37-5AA0	–	–
Rated output 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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Supplementary system components
Basic Operator Panel BOP

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 via a 5-digit display.

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

The BOP offers a function that enables you to copy parameters quickly and easily. A parameter set of one inverter can be saved and then loaded to another inverter.

Selection and Ordering Data

	Order No.
Basic Operator Panel BOP	6SL3255-0AA00-4BA1

Integration



Control Unit with mounted Basic Operator Panel BOP

Overview

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

This is an isolated RS232 adapter module 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 (type 12.02.1086R supplied by Roline has been successfully tested).

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

With these, the inverter can be

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

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⁾ STARTER commissioning tool also available on the Internet at <http://support.automation.siemens.com/WW/view/en/10804985/133100>

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Supplementary system components Brake Relay

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

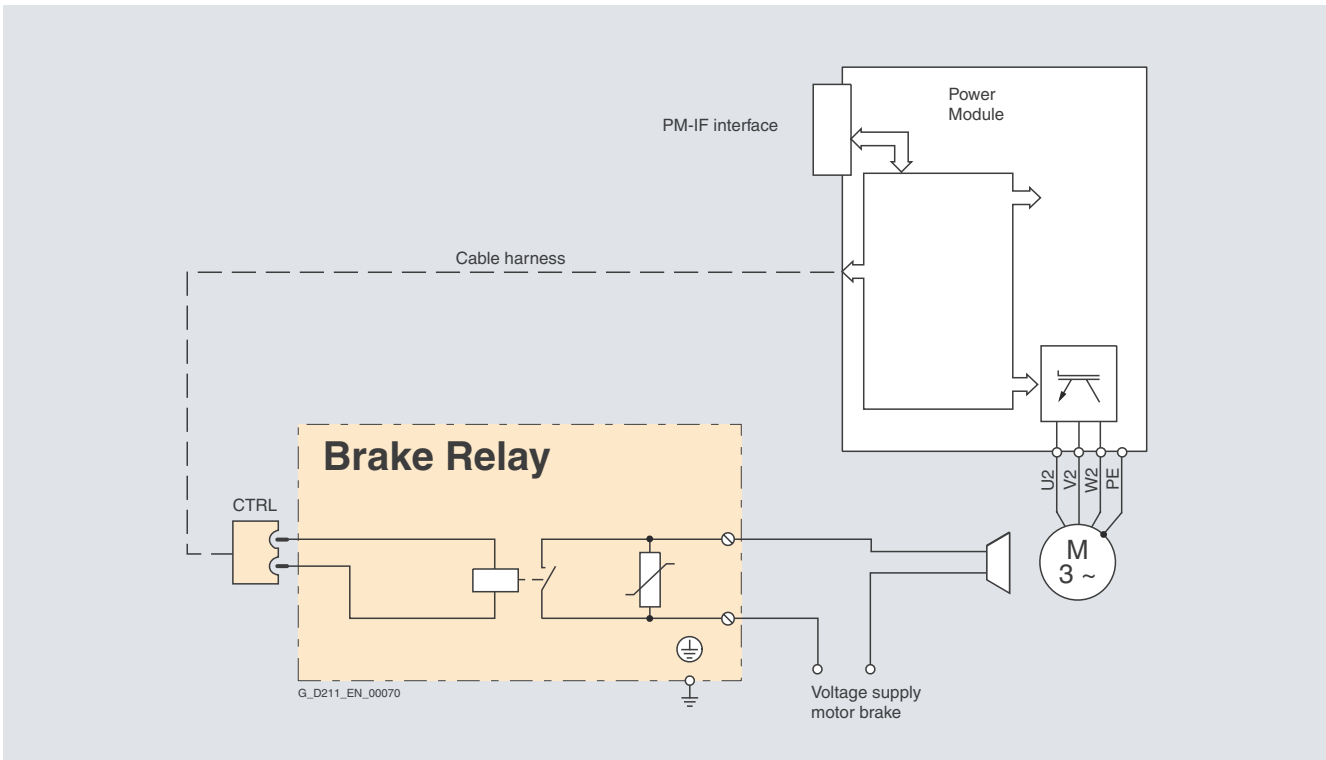
Integration

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 for Brake Relay

Technical specifications

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

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

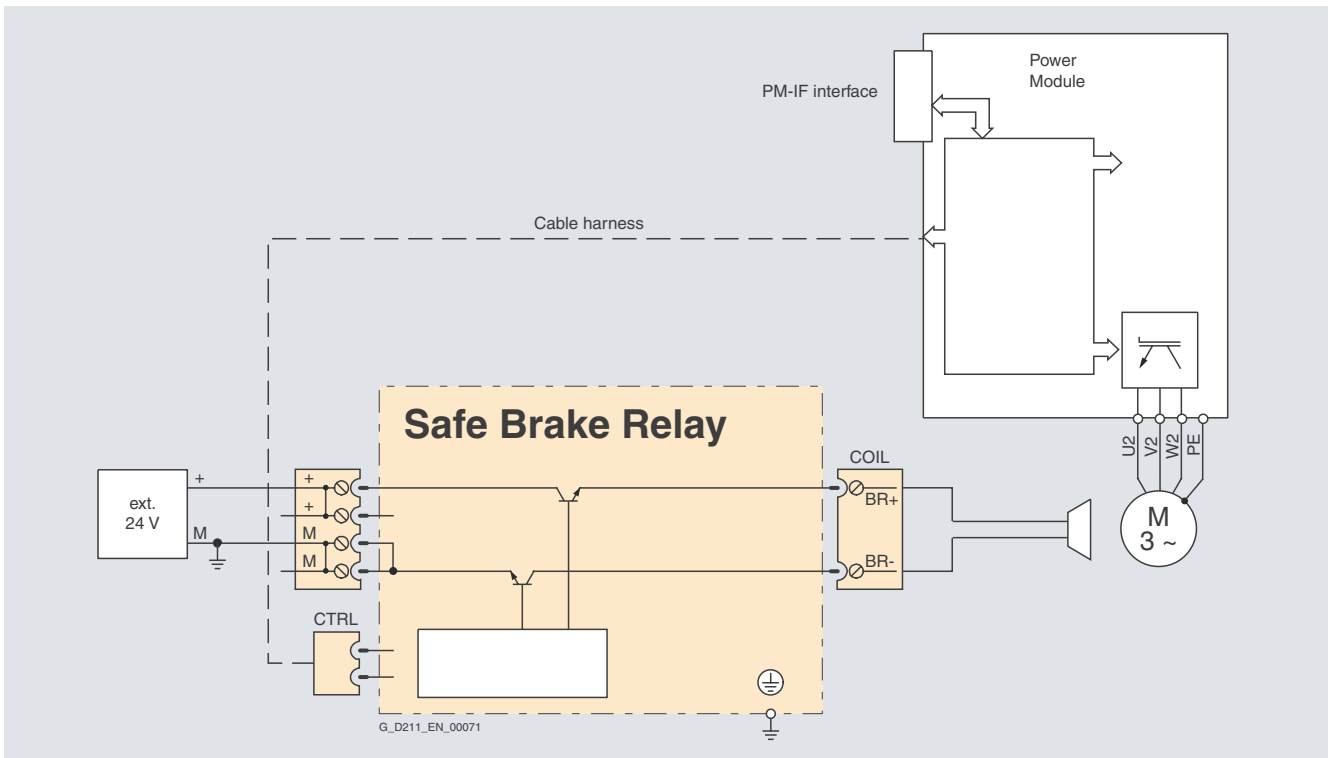
The Safe Brake Relay has the following interfaces:

- A two-channel transistor output stage to control the motor brake solenoid
- A connection for a 24 V DC voltage 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 overvoltage limiters are not required.



Typical connection of Safe Brake Relay

Technical specifications

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

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

SINAMICS G120

Inverter chassis units 0.37 kW to 132 kW (0.5 hp to 200 hp)

Supplementary system components Adapter for DIN rail attachment

Overview

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

Furthermore, the motor cable shield connection and other cable shields required for DIN-rail mounting of inverters 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 inverters singly or with matching line filter.

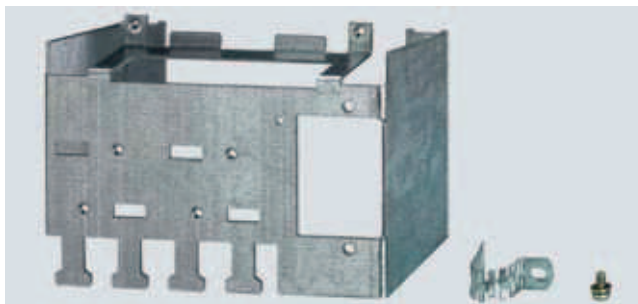
The adapter for inverter frame size FSB can be used to mount inverters with or without an integrated line filter.

Selection and Ordering Data

Adapter for DIN rail attachment	Order No.
• for Power Module frame size FSA	6SL3262-1BA00-0BA0
• for Power Module frame size FSB	6SL3262-1BB00-0BA0

Shield connection kit

Overview



Example of shield connection kit for Power Module frame size FSB

The shield connection kit

- makes it easier to bond the shields of supply and control cables
- provides mechanical strain relief
- ensures optimum EMC performance

The shield connection kit includes

- a shield bonding plate for the required Power Module
- a shield bonding plate for a 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