SINAMICS G120D
Distributed frequency inverters
0.75 kW to 7.5 kW (1.0 hp to 10 hp)

4

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Overview

The new SINAMICS G120D distributed frequency inverter series is the solution for demanding drive tasks especially in the field of conveyor systems. SINAMICS G120D supports bump-free, closed-loop speed control of three-phase asynchronous motors and fulfills all the requirements of conveyor system applications from simple frequency control through to demanding vector control. With its well-thought-out modular type of construction to the IP65 degree of protection (tested to UL50 type 3), it is seamlessly integrated into the plant and supports a high plant availability and minimizes spare parts inventories. The innovative power module concept with regenerative feedback capability helps to save energy. Safety functions that are unique worldwide support enhanced plant concepts with increased productivity. This drive can be optimally integrated into the Siemens TIA world of automation via PROFIBUS or PROFINET.

With different device versions (frame sizes FSA to FSC) in an output range of 0.75 kW to 7.5 kW (1.0 hp to 10 hp), it is suitable for a wide variety of drive solutions.

Example: SINAMICS G120D, frame size FSA, comprising Power Module PM250D and Fail-Safe Control Unit CU240D DP-F

Reasons for using distributed drive systems

- Modular drive solutions providing standardized mechatronic elements that can be individually tested
- No need for a control cabinet, resulting in a smaller space requirement and less air-conditioning
- Long cables between the inverter and motor can be avoided (which means lower output losses, reduced interference emission and lower costs for shielded cables and additional filters)
- Distributed configurations offer considerable benefits for conveyor systems with their extensive coverage (e.g. in the automotive and logistics sectors)

Modularity

SINAMICS G120D is a modular inverter system to IP65 degree of protection comprising a variety of functional units. The two main units are

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

The Control Unit controls and monitors the Power Module and the connected motor in several different control modes. The digital inputs and digital outputs on the device support the simple wiring of sensors and actuators directly on the drive. The input signals can either be directly linked within the Control Unit and trigger local responses automatically or they can be transferred to the central controller via PROFIBUS or PROFINET for processing within the context of the overall plant.

The Power Module supplies the motor in the power range 0.75 kW to 7.5 kW (1.0 hp to 10 hp). The Power Module is controlled by a microprocessor in the Control Unit. State-of-the-art IGBT technology with pulse-width-modulation is used for highly reliable and flexible motor operation. It also features a range of safety functions offering a high degree of protection for the Power Module and motor. The unusually slimline type of construction is optimized for use directly in the plant. The Power Module also has the same drilling template for all outputs (constant footprint).

Safety Integrated

The SINAMICS G120D distributed frequency inverters 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 G120D fail-safe frequency inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- Safe Torque Off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements on exceeding a speed limit

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 PM250D 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. 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.

STARTER commissioning tool

The STARTER commissioning tool (STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Benefits

- Compact and space-saving design with slimline type of construction and identical drilling template for all outputs
- Wide output range from 0.75 kW to 7.5 kW (1.0 hp to 10 hp)
- The safety functions make it easier to integrate drives into safety-oriented machines or plants
- The innovative circuit design (bidirectional input rectifier with "pared-down" DC link) allows the kinetic energy of a load to be fed back into the supply system. This feedback capability provides enormous savings because generated energy no longer has to be converted into heat in a braking resistor. Braking resistors and reactors are not necessary – this is a particular advantage in terms of space requirement and installation costs for the high IP65 degree of protection.
- Enhanced ruggedness and longer service life due to coating of the electronic modules
- Flexibility due to modularity for a future-oriented distributed drive concept in the high IP65 degree of protection
  - Module replacement when system is running (hot swapping)
  - The modules can be easily replaced, which makes the system extremely service friendly.
- Capable of communicating via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
  - Reduced number of interfaces
  - Plant-wide engineering
  - Easy to handle
- The ability to connect up to six sensors and up to two actuators directly to the Control Unit means that almost all drive information can be directly managed; local preprocessing of the signals takes the load off the fieldbus at a high and reproducible response time.
- Integrated EMC filter of class A (according to EN 55011), integrated braking control (400 V 1 AC rectified, corresponds to 180 V DC) and integrated motor protection due to thermal motor model and evaluation of PTC or KTY 84 temperature sensors
- Software parameters for easy adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- Easy replacement of devices and time-saving copying of parameters with the optional MMC memory card
- Engineering and commissioning with uniform engineering tools such as SIZER (Version 2.9 and higher), STARTER (Version 4.1, SP1 and higher) 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 and Safety Integrated according to EN 954-1, Cat. 3 and IEC 61508 SIL 2

Application

SINAMICS G120D is ideally suited for demanding conveyor system applications in the industrial environment for which a distributed drive with communications capability is required. This applies in particular to the automotive sector, e.g. assembly lines.

SINAMICS G120D is also suitable for further high-performance applications, e.g. in the airport sector, food and beverages industry (without tensides) and in distribution logistics (e.g. monorail overhead conveyors).

Configuration

The following electronic configuration and engineering tools are available for SINAMICS G120D distributed frequency inverters:

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 guide" 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. For SINAMICS G120D as from SIZER Version 2.9.

STARTER commissioning tool

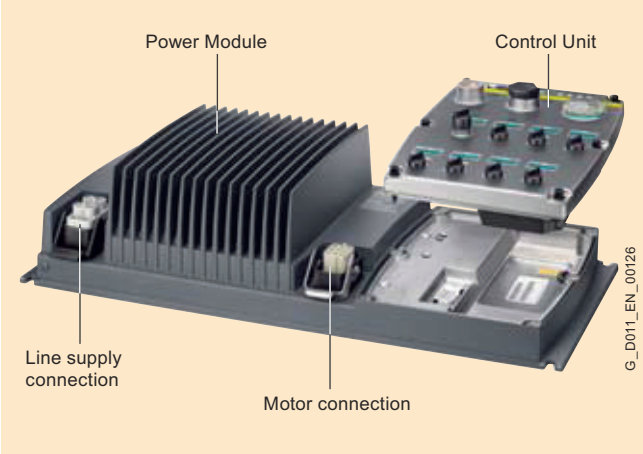
The STARTER commissioning tool provides menu-guided assistance with commissioning, optimization and diagnostics. STARTER is not only designed for use on SINAMICS drives but also for MICROMASTER4 units and frequency inverters for the distributed I/O SIMATIC ET 200S FC and SIMATIC ET 200pro FC. For SINAMICS G120D from STARTER Version 4.1, SP1.

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.

Design

The SINAMICS G120D distributed frequency inverters are modular frequency inverters for standard drives. Each SINAMICS G120D comprises two operative units – the Power Module and Control Unit.



Power Module PM250D with line and motor connections and Control Unit CU240D

Power Modules

The following Power Modules are available for SINAMICS G120D distributed frequency inverters:

PM250D Power Modules

PM250D 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.

Accessories

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

Control Units

The following Control Units are available for SINAMICS G120D distributed frequency inverters:

CU240D 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:

- CU240D DP
- CU240D DP-F
- CU240D PN
- CU240D PN-F

Accessories

- MMC memory card

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 the rear of the Control Unit.

- RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC if the appropriate software (commissioning tool STARTER Version 4.1, SP1 and higher) has been installed.

- Spare parts kit

A spare parts kit is available which comprises small parts such as seals, cover caps, PROFIBUS address windows and screws.

- Connecting cable

Flexible connecting cables for data transfer between Industrial Ethernet participants or PROFIBUS participants, as well as for power supply of the Control Unit.

Technical specifications

Unless explicitly specified otherwise, the following technical specifications are valid for the following components of the distributed SINAMICS G120D frequency inverters.

SINAMICS G120D	
Mechanical specifications	
Vibratory load	
• Transport [1]	EN 60068-2-6 5 … 9 Hz: Constant deflection 3.1 mm 9 … 200 Hz: Constant acceleration = 9.81 m/s^2 (1 *g*)
• Operation	EN 60068-2-6 10 … 58 Hz: Constant deflection 0.15 mm 58 … 200 Hz: Constant acceleration = 19.62 m/s^2 (2 *g*)
Shock load	
• Transport [1]	EN 60068-2-27 147.15 m/s^2 (15 *g*)/11 ms; 3 shocks in each axis and direction
• Operation	EN 60068-2-27 147.15 m/s^2 (15 *g*)/11 ms; 3 shocks in each axis and direction
Ambient conditions	
Protection class	Class III (PELV) to EN 61800-5-1
Shock protection	Class I (with PE conductor system) acc. to EN 61800-5-1
Permissible ambient and coolant temperature (air) during operation for Power Modules	–10 … +40 °C without derating, > 40 … 55 °C, see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units	–10 … +55 °C with CU240D DP-F and/or CU240D PN-F: 0 … 40 °C up to 2000 m above sea level
Climatic ambient conditions	
• Storage [1]	EN 60068-2-1 Temperature –40 … +70 °C
• Transport [1]	EN 60068-2-1 Temperature –40 … +70 °C max. air humidity 95 % at 40 °C
• Operation	EN 60068-2-2 Temperature–10 … +40 °C without derating
Environmental class/harmful chemical substances	
• Operation	Class 3C2 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 [2]	
• Frame sizes FSA to FSC with integrated line filter class A	Category C2 [3] to EN 61800-3 (corresponds to class A to EN 55011)
Note: The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter. The frequency inverters on their own do not generally require identification according to the EMC directive	

[1] In transport packaging.

[2] For further, general information, see also SINAMICS G110 sections “Technical specifications” and “Compliance with standards”.

[3] With shielded motor cable up to 15 m.

CU240D Control Units

Overview

Example of CU240D DP-F Control Unit

Example of CU240D PN-F Control Unit

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

- CU240D DP
- CU240D DP-F
- CU240D PN
- CU240D PN-F

Safety Integrated functions

The SINAMICS G120D fail-safe frequency inverter provides three safety functions, certified in accordance with EN 954-1, Category 3 and IEC 61508 SIL 2:

- Safe Torque Off (STO) to protect against active movement of the drive
- Safe Stop 1 (SS1) for continuous monitoring of a safe braking ramp
- Safely Limited Speed (SLS) for protection against dangerous movements on exceeding a speed limit

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.

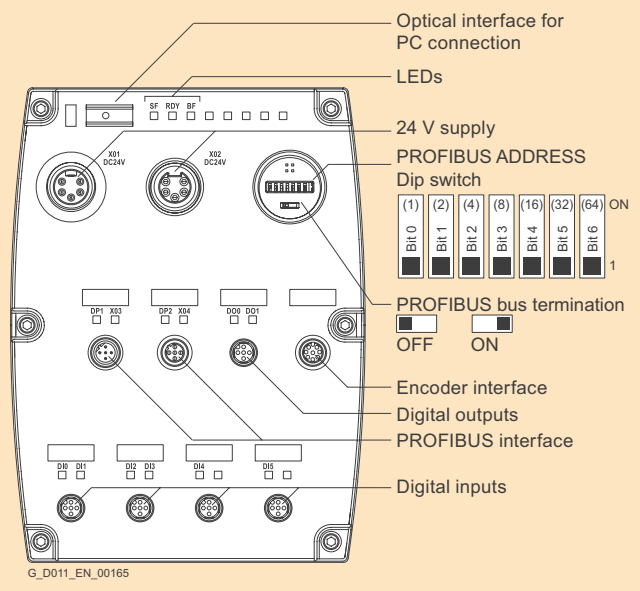
The safety functions “Safely Limited Speed” and “Safe Stop 1” are certified for asynchronous motors without encoders – these safety functions are not permitted for pull-through loads as in the case of lifting gear and winders.

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

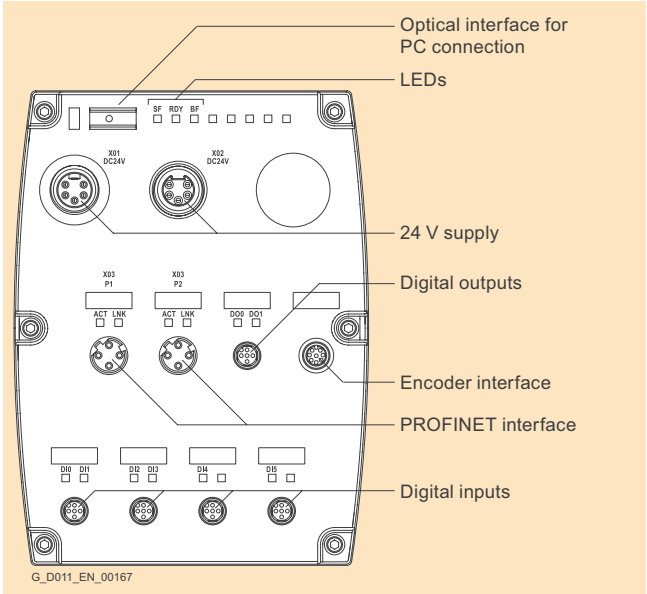
Selection and Ordering Data

Communication	Digital inputs	Digital outputs	Encoder interfaces	Designation	**Control Unit** Order No.
Standard					
PROFIBUS DP	6	2	1	CU240D DP	**6SL3544-0FA20-1PA0**
PROFINET	6	2	1	CU240D PN	**6SL3544-0FA20-1FA0**
Fail-safe for Safety Integrated					
PROFIBUS DP	6	2	1	CU240D DP-F	**6SL3544-0FA21-1PA0**
PROFINET	6	2	1	CU240D PN-F	**6SL3544-0FA21-1FA0**

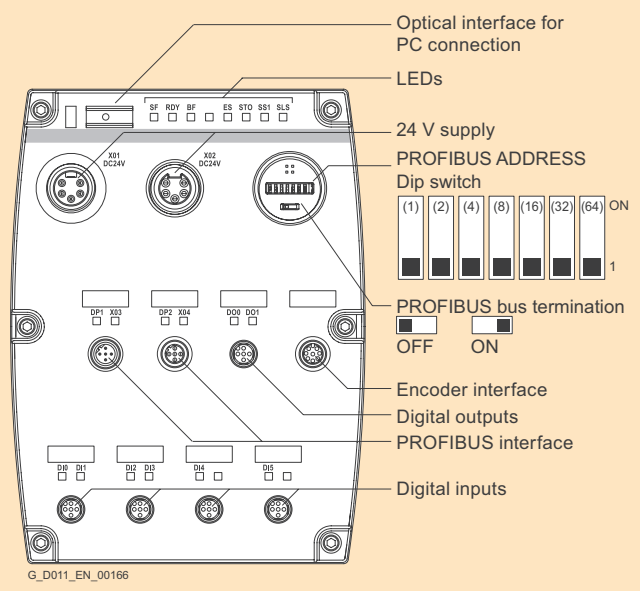
Design



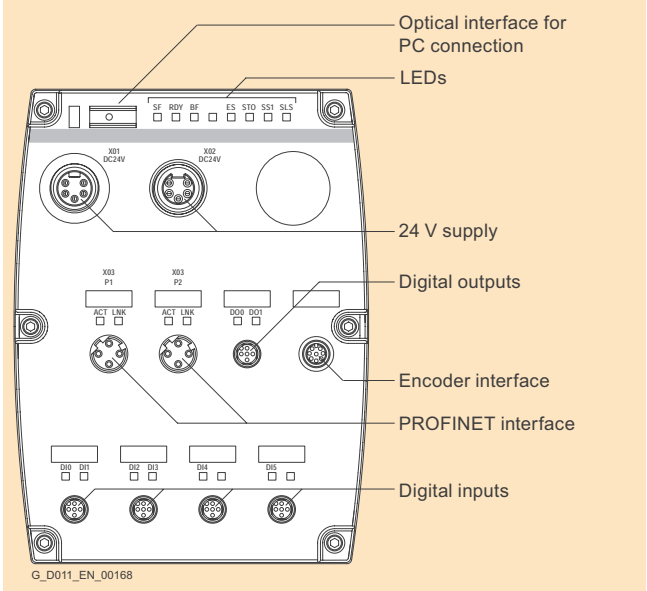
CU240D DP Control Unit



CU240D PN Control Unit



CU240D DP-F Control Unit



CU240D PN-F Control Unit

Control Unit, view of rear panel,
MMC slot on top and PM-IF interface in center at bottom

CU240D Control Units

Technical specifications

	Control Unit CU240D DP 6SL3544-0FA20-1PA0	Control Unit CU240D PN 6SL3544-0FA20-1FA0	Control Unit CU240D DP-F 6SL3544-0FA21-1PA0	Control Unit CU240D PN-F 6SL3544-0FA21-1FA0
Electrical data				
Operating voltage	External 24 V DC required	External 24 V DC required	External 24 V DC required	External 24 V DC required
Power consumption [1] (from the 24 V supply)				
• with Power Module frame sizes FSA and FSB	200 mA	350 mA	200 mA	350 mA
• with Power Module frame size FSC	350 mA	500 mA	350 mA	500 mA
Interfaces				
Digital inputs	6	6	6	6
Digital outputs (0.5 A, supplied over switched 24 V DC)	2	2	2	2
Bus interface	PROFIBUS DP	PROFINET	PROFIBUS DP, PROFIsafe	PROFINET, PROFIsafe
Encoder interfaces	1	1	1	1
PTC/KTY interface (connected via Power Module)	✓	✓	✓	✓
Activation of a mechanical motor brake (connected via Power Module)	✓	✓	✓	✓
MMC memory card slot	✓	✓	✓	✓
RS232 interface (connected with RS232 interface cable via the optical interface of the Control Unit)	✓	✓	✓	✓
Safety functions				
Integral safety functions to Category 3 of EN 954-1 and SIL2 of IEC 61508	–		• Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • The safety functions "Safely Limited Speed" and "Safe Stop 1" are 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.	• Safe Stop 1 (SS1) • Safely Limited Speed (SLS) • Safe Torque Off (STO) • 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.
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	✓	✓	✓	✓

[1] To this must be added the power consumption of connected encoders and sensors and the power draw on the digital outputs.

Technical specifications (continued)

	Control Unit CU240D DP 6SL3544-0FA20-1PA0	Control Unit CU240D PN 6SL3544-0FA20-1FA0	Control Unit CU240D DP-F 6SL3544-0FA21-1PA0	Control Unit CU240D PN-F 6SL3544-0FA21-1FA0
Software functions				
Fixed frequencies	16, programmable	16, programmable	16, programmable	16, programmable
Signal interconnection with BICO technology	✓	✓	✓	✓
Automatic restart following line failure or fault	✓	✓	✓	✓
Positioning deceleration ramp	✓	✓	✓	✓
Slip compensation	✓	✓	✓	✓
Free function blocks (FFB) for logic and arithmetic operations	✓	✓	✓	✓
Ramp smoothing	✓	✓	✓	✓
3 selectable drive data sets	✓	✓	✓	✓
3 selectable command data sets (CDS) (manual/auto)	✓	✓	✓	✓
Flying restart	✓	✓	✓	✓
JOG	✓	✓	✓	✓
Technology controller (PID)	✓	✓	✓	✓
Thermal motor protection	✓	✓	✓	✓
Thermal inverter protection	✓	✓	✓	✓
Setpoint specification	✓	✓	✓	✓
Motor identification	✓	✓	✓	✓
Motor holding brake	✓	✓	✓	✓
Mechanical specifications and ambient conditions				
Degree of protection	IP65	IP65	IP65	IP65
Operating temperature	–10 … +55 °C (14 … 131 °F)	–10 … +55 °C (14 … 131 °F)	0 … 40 °C (32 … 104 °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)
Relative humidity	< 95 % RH, non-condensing	< 95 % RH, non-condensing	< 95 % RH, non-condensing	< 95 % RH, non-condensing
Dimensions				
• Width	150 mm	150 mm	150 mm	150 mm
• Height	210 mm	210 mm	210 mm	210 mm
• Depth	40 mm	40 mm	40 mm	40 mm
Weight, approx.	0.7 kg	0.7 kg	0.7 kg	0.7 kg

Accessories

MMC memory card

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 the rear of the Control Unit.

	Order No.
MMC memory card	**6SL3254-0AM00-0AA0**

RS232 interface cable for communication with a PC

For controlling and commissioning an inverter directly from a PC over a point-to-point link if the appropriate software (STARTER commissioning tool [1], Version 4.1, SP1 and higher) has been installed.

	Order No.
RS232 interface cable for communication with a PC	**3RK1922-2BP00**

STARTER commissioning tool

The STARTER commissioning tool (STARTER Version 4.1, SP1 and higher) supports the commissioning and maintenance of SINAMICS G120D inverters. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

	Order No.
STARTER commissioning tool [1] on DVD	**6SL3072-0AA00-0AG0**

Spare parts kit

A spare parts kit can be ordered which comprises small parts such as replacement seals, cover caps, PROFIBUS address windows and screws.

	Order No.
Spare parts kit for SINAMICS G120D Control Units comprising replacement seals, cover caps, PROFIBUS address windows and screws	**6SL3500-0SK01-0AA0**

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

Accessories (continued)

PROFINET connecting cable

Flexible connecting cables and plug-in connectors that can be assembled in the field for transmission of data (up to 100 Mbit/s) between Industrial Ethernet stations with IP65 degree of protection.

	Order No.
IE connecting cable M12-180/M12-180	
Pre-assembled IE FC TP trailing cable GP 2 x 2 PROFINET type C) with two 4-pole M12 connector (4-pole, D-coded), IP65/IP67 degree of protection	
Length:	
• 0.3 m	**6XV1870-8AE30**
• 0.5 m	**6XV1870-8AE50**
• 1.0 m	**6XV1870-8AH10**
• 1.5 m	**6XV1870-8AH15**
• 2.0 m	**6XV1870-8AH20**
• 3.0 m	**6XV1870-8AH30**
• 5.0 m	**6XV1870-8AH50**
• 10 m	**6XV1870-8AN10**
• 15 m	**6XV1870-8AN15**
IE M12 plug PRO	
For assembly in the field, M12 plug-in connector (D-coded), metal enclosure, fast connection method, for SCALANCE X208PRO and IM 154-4 PN	
• 1 unit	**6GK1901-0DB10-6AA0**
• 8 units	**6GK1901-0DB10-6AA8**

PROFIBUS connecting cable

Flexible connecting cables/plug-in connectors for transmission of data (up to 12 Mbit/s) from PROFIBUS stations

	Order No.
PROFIBUS M12 connecting cable	
Pre-assembled with two 5-pole M12 male/female connectors	
Length:	
• 0.3 m	**6XV1830-3DE30**
• 0.5 m	**6XV1830-3DE50**
• 1.0 m	**6XV1830-3DH10**
• 1.5 m	**6XV1830-3DH15**
• 2.0 m	**6XV1830-3DH20**
• 3.0 m	**6XV1830-3DH30**
• 5.0 m	**6XV1830-3DH50**
• 10 m	**6XV1830-3DN10**
• 15 m	**6XV1830-3DN15**
PROFIBUS M12 cable connector	
5-pole, B-coded, metal enclosure, 1 pack = 5 units	
• Male insert	**6GK1905-0EA00**
• Socket insert	**6GK1905-0EB00**

Connecting cable/plug-in connector for supplying the Control Unit with power

	Order No.
7/8" connecting cable	
For power supply, pre-assembled with two 5-pole 7/8" male/female connectors	
Length:	
• 0.3 m	**6XV1822-5BE30**
• 0.5 m	**6XV1822-5BE50**
• 1.0 m	**6XV1822-5BH10**
• 1.5 m	**6XV1822-5BH15**
• 2.0 m	**6XV1822-5BH20**
• 3.0 m	**6XV1822-5BH30**
• 5.0 m	**6XV1822-5BH50**
• 10 m	**6XV1822-5BN10**
• 15 m	**6XV1822-5BN15**
7/8" plug-in connector	
5-pole, B-coded, plastic enclosure, 1 pack = 5 units	
• Male insert	**6GK1905-0FA00**
• Socket insert	**6GK1905-0FB00**

Additional information

For further information about the connecting cables and plug-in connectors listed above, please refer to Catalog IK PI.

Further selected accessories are available from Siemens Solution Partners. Please go to the “Solution Partner Finder”

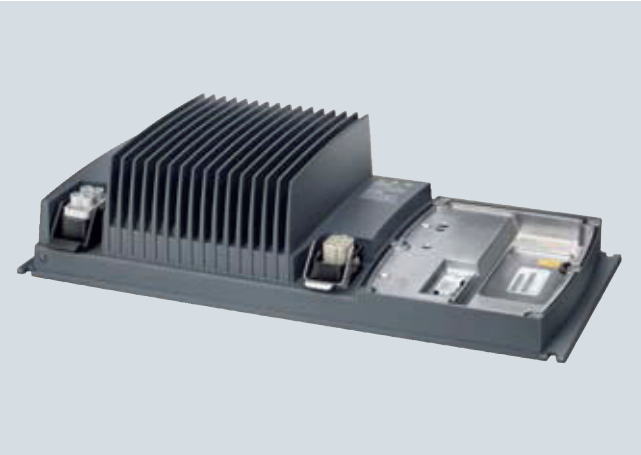
http://www.siemens.com/automation/partnerfinder

and select “Distributed Field Installation System” as technology.

4

PM250D Power Modules

Overview



Example of PM250D Power Module frame size FSA

The regenerative feedback capability of the PM250D Power Module in generating mode (electronic braking) means that energy is returned to the supply system and not destroyed in a braking resistor. This saves space, time-consuming dimensioning of the braking resistor as well as its wiring. Generated heat is also reduced. For further information, please refer to section Efficient Infeed Technology in chapter Innovations.

An innovative circuit design reduces supply harmonics. There is no need to use a line reactor. This saves space and costs for engineering and procurement.

The PM250D Power Module is also designed for safety-oriented applications. In conjunction with a Fail-safe Control Unit, the drive can be turned into a Safety Integrated Drive (see Control Units).

The PM250D Power Modules with integrated line filter to class A are suitable for connection to TN and TT supply systems.

Selection and Ordering Data

Rated power [1]		Rated output current [2]	Input current	Frame size	**SINAMICS G120D PM250D Power Module with integrated line filter class A**
kW	hp	A	A		Order No.
380 … 480 V 3 AC [3]					
0.75	1	2.2	2.1	FSA	**6SL3525-0PE17-5AA0**
1.5	1.5 [4]	4.1	3.8	FSA	**6SL3525-0PE21-5AA0**
3	4	7.7	7.2	FSB	**6SL3525-0PE23-0AA0**
4	5	10.2	9.5	FSC	**6SL3525-0PE24-0AA0**
5.5	7.5	13.2	12.2	FSC	**6SL3525-0PE25-5AA0**
7.5	10	19.0	17.7	FSC	**6SL3525-0PE27-5AA0**

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the loading for high overload (HO).

[2] The rated output current I_{rated} is based on the loading for high overload (HO).

[3] 500 V +10 % is possible outside the UL range.

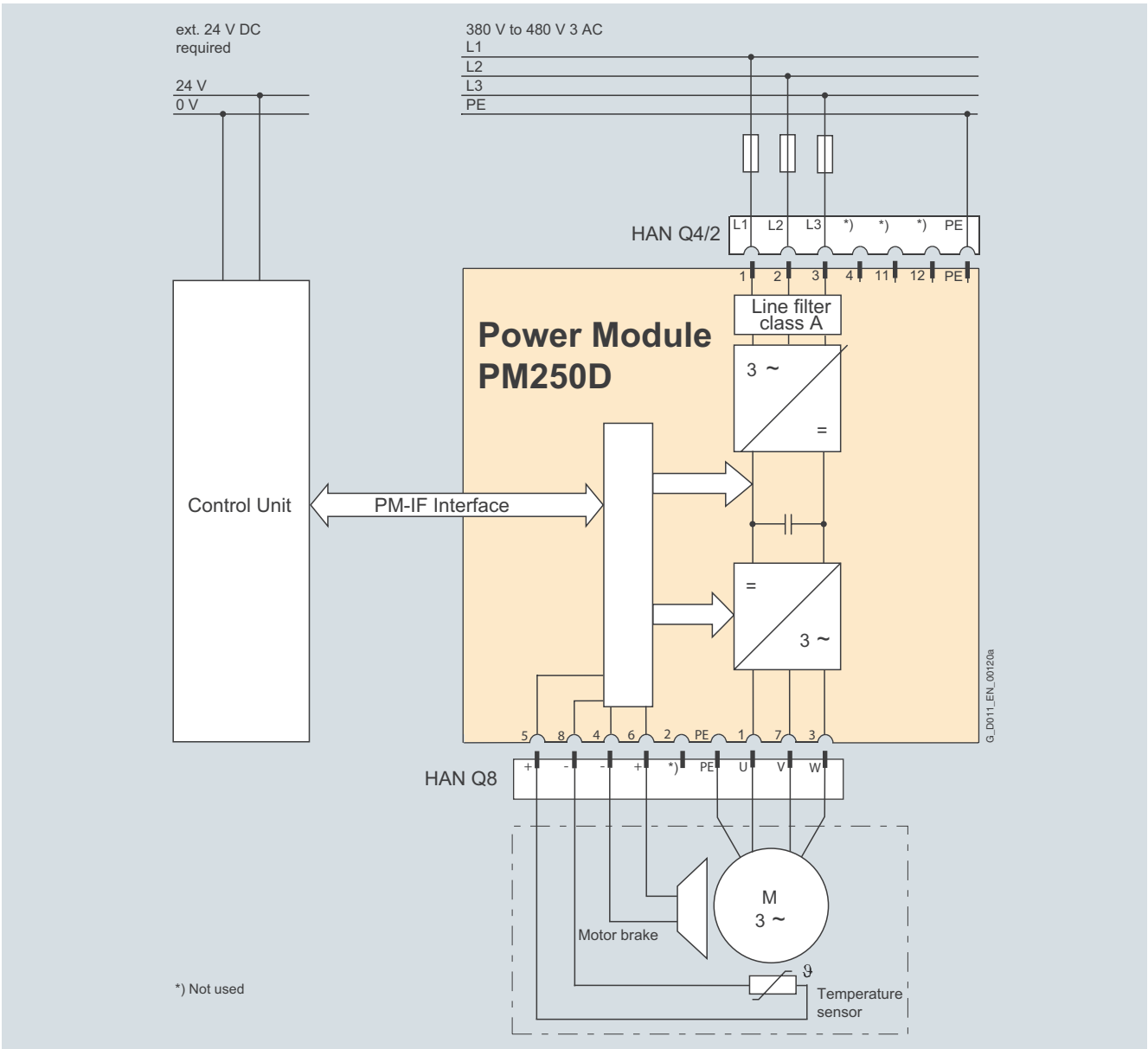
[4] Not governed by a specific standard.

Integration

PM250D Power Modules communicate with the Control Unit via the PM-IF interface.

PM250D Power Modules feature the following interfaces as standard:

- PM-IF interface for connection of the PM250D Power Module and Control Unit.
- Motor is connected through HAN Q8 (male connector) including activation of the motor brake and temperature sensor
- Input voltage is connected through HAN Q4/2 (female connector)



Connection diagram for PM250D Power Module with integrated line filter class A

PM250D Power Modules

Technical specifications

General technical data

	PM250D Power Modules
Line operating voltage	380 ... 480 V 3 AC ± 10 %
Line requirements Line short-circuit voltage u_K	≤ 1 %
Input frequency	47 ... 63 Hz
Output frequency	
• Control type *V/f*	0 ... 650 Hz
• Control type Vector	0 ... 200 Hz
Pulse frequency	4 kHz (standard), for higher pulse frequencies up to 16 kHz, see derating data
Power factor	0.95
Inverter efficiency	95 … 97 %
Control factor	87 %
Overload capability	
• High overload (HO)	• Average maximum rated output current during a cycle time of 300 s • 1.5 × rated output current (i.e. 150 % overload) over 60 s at a cycle time of 300 s • 2 × rated output current (i.e. 200 % overload) over 3 s at a cycle time of 300 s
Electromagnetic compatibility	Integrated line filter class A according to EN 55011
Possible braking methods	Regenerative feedback in generating mode; integrated braking control 180 V DC (corresponds to 400 V 1 AC rectified)
Degree of protection	IP65
Operating temperature	
• with standard Control Unit	–10 ... +40 °C (14 … 104 °F) without derating, > 40 ... 55 °C, see derating characteristics
• with Fail-Safe Control Unit	0 ... 40 °C (32 ... 104 °F)
Storage temperature	–40 ... +70 °C (-40 ... +158 °F)
Permitted mounting position	Horizontal wall mounting and free-standing
Relative humidity	< 95 % RH, non-condensing
Cooling	FSA and FSB: Convection FSC: Air cooling as required through built-in fan
Installation altitude	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics
Standard SCCR (Short Circuit Current Rating) [1]	10 kA
Protective functions	• 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

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250D Power Modules		
		6SL3525-0PE17-5AA0	6SL3525-0PE21-5AA0	6SL3525-0PE23-0AA0
Rated output current I_{rated} [1]	A	2.2	4.1	7.7
Output current I_{max}	A	4.4	8.2	15.4
Rated power	kW (hp)	0.75 (1.0)	1.5 (1.5 [3])	3 (4.0)
Rated pulse frequency	kHz	4	4	4
Efficiency η		0.97	0.97	0.97
Power loss	kW	0.047	0.061	0.103
Cooling air requirement	m^3/s	0.004	0.005	0.009
Sound pressure level L_{pA} (1 m)	dB	–	–	–
Rated input current [2]	A	2.1	3.8	7.2
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (male connector)	HAN Q4/2 (male connector)	HAN Q4/2 (male connector)
• Conductor cross-section	mm^2	1.5 … 6	1.5 … 6	2.5 … 6
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (female connector)	HAN Q8 (female connector)	HAN Q8 (female connector)
• Conductor cross-section	mm^2	1 … 4	1 … 4	2.5 … 4
Motor cable length, max.	m	15	15	15
Degree of protection		IP65	IP65	IP65
Dimensions				
• Width	mm	450	450	450
• Height	mm	210	210	210
• Depth	mm	110	110	180
Frame size		FSA	FSA	FSB
Weight, approx.	kg	5.7	5.7	8

[1] The rated output current I_{rated} is based on the loading for high overload (HO).

[2] The input current depends on the motor load and line impedance. The input currents apply for rated power loading for a line impedance corresponding to u_K = 1 %.

[3] Not governed by a specific standard.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250D Power Modules		
		6SL3525-0PE24-0AA0	6SL3525-0PE25-5AA0	6SL3525-0PE27-5AA0
Rated output current I_{rated} [1]	A	10.2	13.2	19
Output current I_{max}	A	20.4	26.4	38
Rated power	kW (hp)	4 (5)	5.5 (7.5)	7.5 (10)
Rated pulse frequency	kHz	4	4	4
Efficiency η		0.97	0.97	0.97
Power loss	kW	0.141	0.209	0.295
Cooling air requirement	m^3/s	0.012	0.018	0.025
Sound pressure level L_{pA} (1 m)	dB	74.5	74.5	74.5
Rated input current [2]	A	9.5	12.2	17.7
Line supply connection U1/L1, V1/L2, W1/L3, PE		HAN Q4/2 (male connector)	HAN Q4/2 (male connector)	HAN Q4/2 (male connector)
• Conductor cross-section	mm^2	2.5 … 6	4 … 6	4 … 6
Motor connection U2, V2, W2, PE, motor brake, temperature sensor		HAN Q8 (female connector)	HAN Q8 (female connector)	HAN Q8 (female connector)
• Conductor cross-section	mm^2	2.5 … 4	4	4
Motor cable length, max.	m	15	15	15
Degree of protection		IP65	IP65	IP65
Dimensions				
• Width	mm	450	450	450
• Height	mm	210	210	210
• Depth	mm	220	220	220
Frame size		FSC	FSC	FSC
Weight, approx.	kg	8.5	8.5	8.5

[1] The rated output current I_{rated} is based on the loading for high overload (HO).

[2] The input current depends on the motor load and line impedance. The input currents apply for rated power loading for a line impedance corresponding to u_K = 1 %.

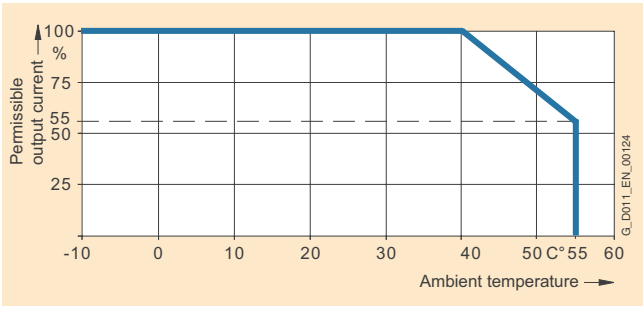
Characteristic curves

Derating data

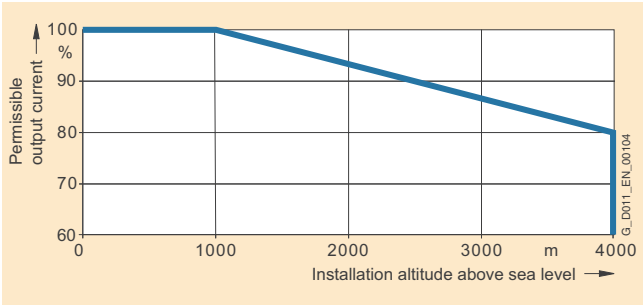
Pulse frequency

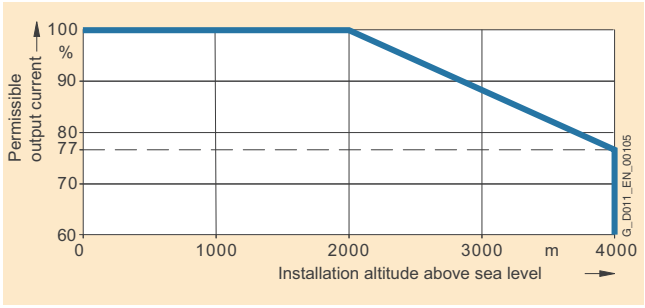
Rated power at 400 V 3 AC		**Rated output current in A** at a switching frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.75	1.0	2.2	1.9	1.5	1.3	1.1	1.0	0.9
1.5	1.5 [1)]	4.1	3.5	2.9	2.5	2.1	1.8	1.6
3.0	4.0	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4.0	5.0	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	19	16.2	13.3	11.4	9.5	8.6	7.6

Ambient temperature



Installation altitude





[1)] Not governed by a specific standard.

Accessories

Connecting cables pre-assembled on one end and connector sets for line infeed

	Order No.
Connecting cables pre-assembled on one end, power supply cable, open at one end, for HAN Q4/2, angled, 4 × 4 mm^2	
Length:	
• 1.5 m	**3RK1911-0DB13**
• 5 m	**3RK1911-0DB33**
Connector set for power supply, HAN Q4/2	
• 2.5 mm^2	**3RK1911-2BE50**
• 4 mm^2	**3RK1911-2BE10**
• 6 mm^2	**3RK1911-2BE30**

Motor cables pre-assembled on one end and connector sets for the connection between the Power Module and the motor

	Order No. (supplied by Harting)		
Motor cables pre-assembled on one end, for motors with brake and temperature encoder with HAN Q8 male connector, shielded	Cross-section 1.5 mm^2	2.5 mm^2	4 mm^2
Length:			
• 1.5 m	**HTG: 61 88 201 0288**	**HTG: 61 88 201 0291**	**HTG: 61 88 201 0303**
• 3 m	**HTG: 61 88 201 0289**	**HTG: 61 88 201 0292**	**HTG: 61 88 201 0304**
• 5 m	**HTG: 61 88 201 0290**	**HTG: 61 88 201 0293**	**HTG: 61 88 201 0305**
• 10 m	**HTG: 61 88 201 0299**	**HTG: 61 88 201 0301**	**HTG: 61 88 201 0306**
	Order No.		
Connector set for motor cable, shielded, HAN Q8			
• Up to 1.5 mm^2	**6ES7194-1AB01-0XA0**		
	Order No. (supplied by Harting)		
Connector set for motor cable, shielded, HAN Q8			
• Up to 2.5 mm^2		**HTG: 61 83 401 0118**	
• Up to 4 mm^2			**HTG: 61 83 401 0119**

Additional information

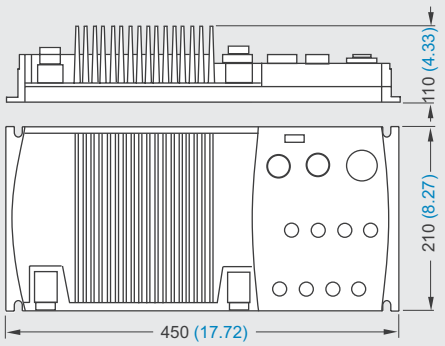
For further information about the connecting cables and connector sets listed above, please refer to Catalog IK PI.

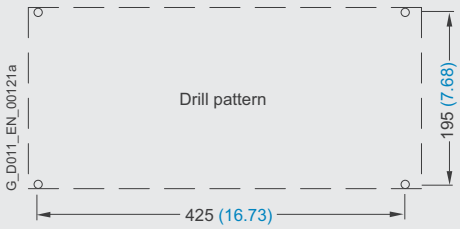
Further selected accessories – particularly motor cables for motors without brake or temperature encoder – are available from Siemens Solution Partners. Please go to the "Solution Partner Finder"

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

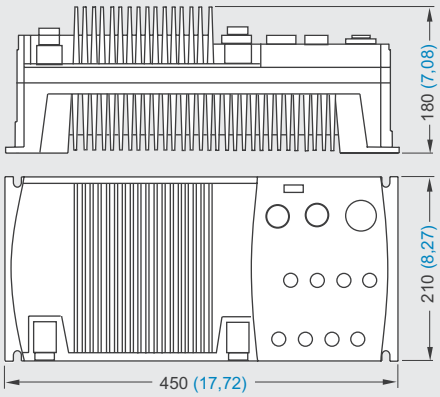
and select "Distributed Field Installation System" as technology.

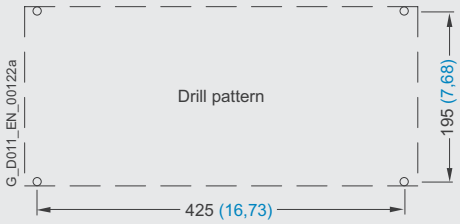
Dimensional drawings



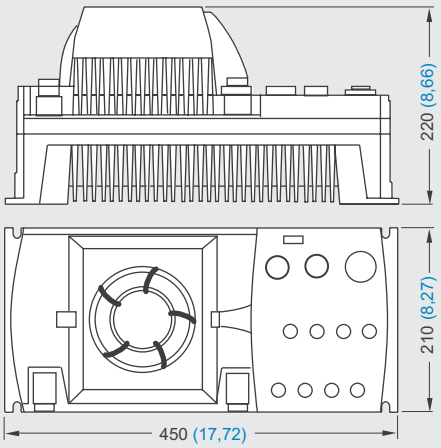


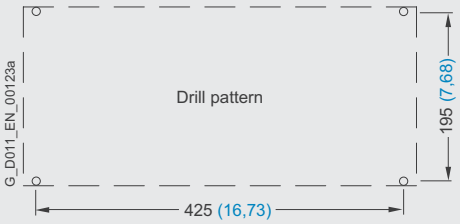
PM250D Power Module frame size FSA with integrated line filter class A and plugged-in Control Unit





PM250D Power Module frame size FSB with integrated line filter class A and plugged-in Control Unit





PM250D Power Module frame size FSC with integrated line filter class A and plugged-in Control Unit

Fixing with 4 M5 studs, 4 M5 nuts, 4 M5 washers

Ventilation clearance required (for wall mounting) at top and bottom: 150 mm (5.9 inches)

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

Notes