SIEMENS

ELTRA trade

Siemens SINAMICS G120

Standard converter

ELTRA trade

Siemens Sinamics G120 is a frequency modular drive with a wide range of functions.

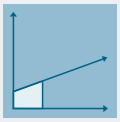
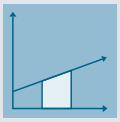
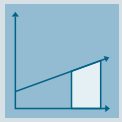
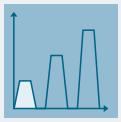
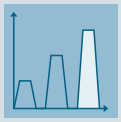
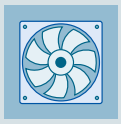
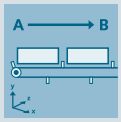
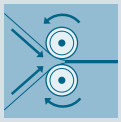
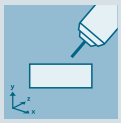
Main advantages from using Sinamics G120 are an integrated security function with a set of innovative features, a system for returning excess electricity to the power network, as well as a new principle of cooling and compatibility with any kind of automation.

Siemens vfd g120 an innovative range of frequency modular inverters with smart access and easy integration with the main controlling applications in automated processes.

To find out stock ability and delivery time to your region, please contact our manager.

info@eltra-trade.com

Application

Use	Requirements for torque accuracy/speed accuracy/position accuracy/coordination of axes/functionality					
	Continuous motion			Non-continuous motion		
	Basic	Medium	High	Basic	Medium	High
						
Pumping, ventilating, compressing	Centrifugal pumps Radial / axial fans Compressors	Centrifugal pumps Radial / axial fans Compressors	Eccentric screw pumps	Hydraulic pumps Metering pumps	Hydraulic pumps Metering pumps	Descaling pumps Hydraulic pumps
	V20 G120C G120P	G120P G130/G150 G180 [1]	S120	**G120**	S110	S120
Moving 	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Lifting/lowering devices Elevators Escalators/ moving walkways Indoor cranes Marine drives Cable railways	Elevators Container cranes Mining hoists Excavators for open-cast mining Test bays	Acceleration conveyors Storage and retrieval machines	Acceleration conveyors Storage and retrieval machines Cross cutters Reel changers	Storage and retrieval machines Robotics Pick & place Rotary indexing tables Cross cutters Roll feeds Engagers/ disengagers
	V20 G110D G110M G120C ET 200pro FC-2 [2]	**G120** G120D G130/G150 G180 [1]	S120 S150 DCM	V90 **G120** G120D	S110 S210 DCM	S120 S210 DCM
Processing 	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Lead/follower drives Calenders Main press drives Printing machines	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Tubular bagging machines Single-axis motion control such as • Position profiles • Path profiles	Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cams • Interpolations
	V20 G120C	**G120** G130/G150 G180 [1]	S120 S150 DCM	V90 **G120**	S110 S210	S120 S210 DCM
Machining 	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Lasering • Gear cutting • Grinding • Nibbling and punching
	S110	S110 S120	S120	S110	S110 S120	S120

The standard SINAMICS G120 inverter is especially well-suited

- as a universal drive in all industrial and commercial applications
- e.g. in the automotive, textile, process technology industries
- for higher-level applications such as, for example, conveyor systems in the steel, oil, gas and offshore sectors, or in regenerative energy recovery applications.

Practical application examples and descriptions are available on the Internet at
www.siemens.com/sinamics-applications

More information

You may also be interested in these drives:

- Higher degree of protection for power ratings up to 7.5 kW ⇒ SINAMICS G110M, SINAMICS G110D, SINAMICS G120D (Catalog D 31.2)
- With positioning function for distributed drive solutions in IP65 degree of protection ⇒ SINAMICS G120D (Catalog D 31.2)
- With positioning function in the control cabinet in IP20 degree of protection ⇒ SINAMICS S110
- Special functions for pumps, fans, and compressors ⇒ SINAMICS G120P (Catalog D 35)

[1] Industry-specific inverters.

[2] Information on the SIMATIC ET 200pro FC-2 frequency converter is available in Catalog D 31.2 and at www.siemens.com/et200pro-fc

Overview

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

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

Example: SINAMICS G120, frame sizes FSA, FSB and FSC; each with Power Module, CU240E-2 F Control Unit and Basic Operator Panel BOP-2

Example: SINAMICS G120, frame sizes FSD, FSE, FSF and FSG; each with Power Module, CU240E-2 F Control Unit and Intelligent Operator Panel IOP-2

Overview (continued)

Operator-friendly design

SINAMICS G120 is a modular inverter system that essentially comprises two function units:

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

The Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. 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 250 kW. It features state-of-the-art IGBT technology with pulse-width-modulated motor voltage and selectable pulse frequency. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

The Control Units can be combined with the following Power Modules:

Control Units	Power Modules degree of protection IP20	
	PM240-2	PM250
CU230P-2	✓	✓
CU240E-2	✓	✓
CU250S-2	✓	✓

Safety Integrated

SINAMICS G120 standard inverters are available in different versions for safety-related applications. The PM240-2 and PM250 Power Modules are already designed for Safety Integrated. A drive can be combined with a Control Unit with safety functions (see overview) in order to create a Safety Integrated drive. The availability of Safety Integrated functions depends on the type of Control Unit.

Control Unit	Basic Safety functions			Extended Safety functions		
	STO	SS1	SBC [1]	SLS	SDI	SSM
CU230P-2	–	–	–	–	–	–
CU240E-2	✓	–	–	–	–	–
CU240E-2 F	✓	✓	–	✓	✓	✓ [2]
CU250S-2	✓	✓	✓	✓ [3]	✓ [3]	✓ [3]

Basic Safety functions (certified according to IEC 61508 SIL 2, and EN ISO 13849-1 PL d and Category 3)

- Safe Torque Off (STO)
  to protect against active movement of the drive
- The PM240-2 Power Modules, frame sizes FSD to FSG, offer additional terminals to achieve STO acc. to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
- Safe Stop 1 (SS1)
  for continuous monitoring of a safe braking ramp
- Safe Brake Control (SBC) is used to safely control a holding brake. When enabled, SBC is always activated at the same time as STO. The Safe Brake Relay is used for SBC.

Extended Safety functions (certified according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3)

- Safely-Limited Speed (SLS)
  for protection against dangerous movements on exceeding a speed limit
- Safe Direction (SDI)
  This function ensures that the drive can only rotate in the selected direction.
- Safe Speed Monitor (SSM)
  This function signals if a drive operates below a specific speed/feed velocity.

Basic Safety and Extended Safety functions can be activated via PROFIsafe or by means of the safety inputs.

None of the safety functions require a motor encoder and they are thus cheaper and easier to implement. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SSM and SDI functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Further information can be found in the section Safety Integrated.

Efficient Infeed Technology

The innovative Efficient Infeed Technology is employed in PM250 Power Modules. This technology allows the energy produced by motors operating in generator mode connected to standard inverters to be fed back into the supply system. For control cabinets, an additional temperature rise can be avoided and the amount of space required can be reduced due to the fact that components such as braking resistors, braking choppers and line reactors can be eliminated. Further, wiring and engineering costs are significantly reduced. At the same time, energy consumption can be reduced and ongoing operating costs noticeably reduced.

Innovative cooling concept and varnishing of electronic modules

The new cooling system and varnishing of the electronic modules significantly increases the service life or useful life of the device.

- Disposal of all heat losses via an external heat sink
- Consequential convection cooling of the Control Unit, electronic modules are not located in the air duct
- All cooling air from the fan is directed through the heat sink

Energy efficiency

Integrated technologies help when optimizing the energy usage of the plant or system referred to the particular application:

- Energy-efficient vector control with or without sensors
- Automatic flux reduction with V/f ECO mode
- Integrated energy saving computer

Further information can be found in the section Energy efficiency.

[1] The SBC function can be utilized only if a Safe Brake Relay is installed.

[2] SSM possible only for CU240E-2 DP-F / CU240E-2 PN-F Control Units with PROFIsafe.

[3] With license for Extended Safety functions.

Benefits

- Modularity ensures flexibility for a drive concept that is fit for the future
  - Control Unit can be hot-swapped
  - Pluggable terminals
  - The modules can be easily replaced, which makes the system extremely service friendly
- The integrated safety functions significantly reduce the costs when integrating drives into safety-oriented machines or systems
- The PM240-2 Power Modules, frame sizes FSD to FSG, offer additional terminals to achieve STO acc. to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
- Communications-capable via PROFINET or PROFIBUS with PROFIdrive Profile 4.0
  - Plant-wide engineering
  - Easy to handle
- Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional SINAMICS G120 Smart Access
- 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 PM250 Power Modules are used. This feedback capability provides enormous potential for savings because generated energy no longer has to be converted into heat in a braking resistor
- Integrated USB interface for simplified, local commissioning and diagnostics
- With Control Unit CU230P-2: Application-specific functions for pumps, fans and compressors
  Integrated are, e.g.:
  - 4 freely-programmable PID controllers
  - Application-specific wizards
  - Pt1000-/LG-Ni1000-/DIN-Ni1000 temperature sensor interface
  - 230 V AC relay
  - 3 freely-programmable digital time switches

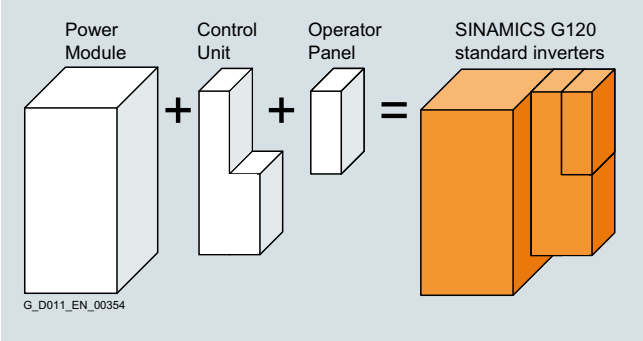
Detailed information can be found in Catalog D 35.

- With CU250S-2 Control Units: Integrated positioning functionality (basic positioner EPos) supports process-related implementation of positioning tasks with a high dynamic response. Positioning can be implemented with an incremental and/or absolute encoder (SSI)
  - Encoder interfaces DRIVE-CLiQ, HTL/TTL/SSI (SUB-D) and resolver/HTL (terminal)
  - Vector control with or without sensors
- Integrated control functionality by using BICO technology
- An innovative cooling concept and coated electronic modules increase robustness and service life
  - External heat sink
  - Electronic components are not located in air duct
  - Control Unit that is completely cooled by convection
  - Additional coating of the most important components
- Simple unit replacement and quick copying of parameters using an optional Operator Panel or an optional memory card
- Quiet motor operation as a result of the high pulse frequency
- Compact, space-saving design
- Simple adaptation to 50 Hz or 60 Hz motors (IEC or NEMA motors)
- 2/3-wire control for static/pulsed signals for universal control via digital inputs
- Certified worldwide for compliance with CE, UL, cUL, RCM, SEMI F47 and Safety Integrated according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3

Design

Application-orientated design of SINAMICS G120

SINAMICS G120 standard inverters are modular inverters for standard drives. Selection of the SINAMICS G120 is reduced to two or three steps thanks to the modular system used.



Selecting the Control Unit

The optimum Control Unit is selected first, based on the number of I/Os and any additional functions required such as Safety Integrated or HVAC. The communication options are already integrated and do not have to be additionally ordered or plugged in. Three product series are available corresponding to the particular application.

CU230P-2 Control Units

The CU230P-2 Control Units have been specifically designed for pump, fan and compressor applications.
The CU230P-2 is the Control Unit for the pump, fan and compressor inverters SINAMICS G120P and SINAMICS G120P Cabinet. Detailed information can be found in Catalog D 35.

Control Unit CU240E-2

The CU240E-2 Control Unit is suitable for a wide range of applications in general machine construction, such as conveyor belts, mixers and extruders.

CU250S-2 Control Units

The CU250S-2 Control Units are suitable for applications involving single drives with exacting speed control requirements such as extruders and centrifuges, and for positioning tasks such as conveyor belts, lifting/lowering devices, etc. They can also be used to implement multi-motor drives without DC coupling such as wire-drawing machines and simple material lines.

Design (continued)

Description	Fieldbus	Profile	Inputs Outputs	Integrated safety technology	Fail-safe digital inputs digital outputs	**Control Unit** Article No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings Technology functions (selection): Free function blocks (FFB), 4 × PID controller, cascade connection, hibernation mode, essential service mode, multi-zone control						
CU230P-2 HVAC	• USS • Modbus RTU • BACnet MS/TP • FLN P1	–	6 DI 4 AI 3 DO 2 AO	–	–	**6SL3243-0BB30-1HA3**
CU230P-2 DP	• PROFIBUS DP	• PROFIdrive				**6SL3243-0BB30-1PA3**
CU230P-2 PN	• PROFINET	• PROFIdrive • PROFIenergy				**6SL3243-0BB30-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU240E-2 series – for standard applications in general machinery construction, such as conveyor belts, mixers and extruders – without encoder Technology functions (selection): Free function blocks (FFB), 1 × PID controller, motor holding brake						
CU240E-2	• USS • Modbus RTU	–	6 DI 2 AI 3 DO 2 AO	STO	1 F-DI (opt. for each 2 DI)	**6SL3244-0BB12-1BA1**
CU240E-2 DP	• PROFIBUS DP	• PROFIdrive • PROFIsafe				**6SL3244-0BB12-1PA1**
CU240E-2 PN	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3244-0BB12-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU240E-2 F	• USS • Modbus RTU	–		STO, SS1, SLS, SDI	3 F-DI (opt. for each 2 DI)	**6SL3244-0BB13-1BA1**
CU240E-2 DP-F	• PROFIBUS DP	• PROFIdrive • PROFIsafe		STO, SS1, SLS, SSM [1], SDI		**6SL3244-0BB13-1PA1**
CU240E-2 PN-F	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3244-0BB13-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU250S-2 series – for complex applications such as extruders and centrifuges – with and without encoder (basic positioner (EPos) optional) Technology functions (selection): Free function blocks (FFB), 1 × PID controller, motor holding brake						
CU250S-2	• USS • Modbus RTU	–	11 DI 2 AI 3 DO 2 AO 4 DI/DO (DI can be used as high-speed inputs)	STO, SBC, SS1	3 F-DI (opt. for each 2 DI) 1 F-DO (opt. for each 2 DO)	**6SL3246-0BA22-1BA0**
CU250S-2 DP	• PROFIBUS DP	• PROFIdrive • PROFIsafe				**6SL3246-0BA22-1PA0**
CU250S-2 PN	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3246-0BA22-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU250S-2 CAN	• CANopen	–				**6SL3246-0BA22-1CA0**

[1] SSM is possible only with PROFIsafe.

Design (continued)

Optional memory card with firmware V4.7 SP10 for CU230P-2, CU240E-2 and CU250S-2 Control Units

Description	Suitable for		Article No.
SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10)	CU230P-2 CU240E-2 CU250S-2	NEW	**6SL3054-7TF00-2BA0**

Optional memory cards with licenses for CU250S-2 Control Units only

Description	**SINAMICS SD card 512 MB + licenses** Article No.	**SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10) + licenses** Article No.	**Licenses (without SD card) for upgrading license of an existing SD card** Article No.
License Extended Functions Basic positioner (EPos)	**6SL3054-4AG00-2AA0-Z E01**	**6SL3054-7TF00-2BA0-Z E01**	**6SL3074-7AA04-0AA0**
License Extended Functions Safety (SLS, SSM, SDI)	**6SL3054-4AG00-2AA0-Z F01**	**6SL3054-7TF00-2BA0-Z F01**	**6SL3074-0AA10-0AA0**
Licenses Extended Functions Basic positioner (EPos) + Safety (SLS, SSM, SDI)	**6SL3054-4AG00-2AA0-Z E01+F01**	**6SL3054-7TF00-2BA0-Z E01+F01**	**–**

More information on firmware V4.7 SP10:
https://support.industry.siemens.com/cs/document/109755811

For an overview and more information on all available firmware versions, see
https://support.industry.siemens.com/cs/document/67364620

Selecting the Power Module

The optimum power unit can be quickly selected based on the required motor power, the supply voltage and the braking cycles to be expected. Power Modules in degree of protection IP20 are intended for installation in a control cabinet.

PM240-2 Power Modules – degree of protection IP20

PM240-2 Power Modules have an integrated braking chopper (four-quadrant applications) and are suitable for a large number of applications in general machinery construction.

PM250 Power Modules – degree of protection IP20

PM250 Power Modules are suitable for the same applications as the PM240-2. Any braking energy is directly fed back into the line supply (four-quadrant applications – a braking resistor is not required).

The Power Modules can be combined with the following Control Units:

Control Units	**Power Modules degree of protection IP20**	
	PM240-2	**PM250**
CU230P-2	✓	✓
CU240E-2	✓	✓
CU250S-2	✓	✓

Design (continued)

PM240-2 and PM250 Power Modules

Rated power [1]		Rated output current I_{rated} [2]	Frame size	PM240-2 Power Modules Degree of protection IP20 All CUs pluggable	PM250 Power Modules Degree of protection IP20 All CUs pluggable
kW	hp	A		Article No.	Article No.
200 ... 240 V 1 AC/3 AC					
0.55	0.75	3.2	FSA	**6SL3210-1PB13-0■L0**	–
0.75	1	4.2	FSA	**6SL321■-1PB13-8■L0**	–
1.1	1.5	6	FSB	**6SL3210-1PB15-5■L0**	–
1.5	2	7.4	FSB	**6SL3210-1PB17-4■L0**	–
2.2	3	10.4	FSB	**6SL321■-1PB21-0■L0**	–
3	4	13.6	FSC	**6SL3210-1PB21-4■L0**	–
4	5	17.5	FSC	**6SL321■-1PB21-8■L0**	–
200 ... 240 V 3 AC					
5.5	7.5	22	FSC	**6SL3210-1PC22-2■L0**	–
7.5	10	28	FSC	**6SL3210-1PC22-8■L0**	–
11	15	42	FSD	**6SL3210-1PC24-2UL0**	–
15	20	54	FSD	**6SL3210-1PC25-4UL0**	–
18.5	25	68	FSD	**6SL321■-1PC26-8UL0**	–
22	30	80	FSE	**6SL3210-1PC28-0UL0**	–
30	40	104	FSE	**6SL321■-1PC31-1UL0**	–
37	50	130	FSF	**6SL3210-1PC31-3UL0**	–
45	60	154	FSF	**6SL3210-1PC31-6UL0**	–
55	75	178	FSF	**6SL321■-1PC31-8UL0**	–
380 ... 480 V 3 AC					
0.37 [3]	0.5	1.3	–	– [3]	–
0.55	0.75	1.7	FSA	**6SL3210-1PE11-8■L1**	–
0.75	1	2.2	FSA	**6SL3210-1PE12-3■L1**	–
1.1	1.5	3.1	FSA	**6SL3210-1PE13-2■L1**	–
1.5	2	4.1	FSA	**6SL3210-1PE14-3■L1**	–
2.2	3	5.9	FSA	**6SL3210-1PE16-1■L1**	–
3	4	7.7	FSA	**6SL321■-1PE18-0■L1**	–
4	5	10.2	FSB	**6SL3210-1PE21-1■L0**	–
5.5	7.5	13.2	FSB	**6SL3210-1PE21-4■L0**	–
Heat sink variant				↑	
Standard				**0**	
Push-through				**1**	
Integrated line filter				↑	
Without	(for IT systems)			**U**	
Class A	(for TN systems)			**A**	
Class B	(for TN systems)			–	–

Data based on a duty cycle with low overload (LO).
Data based on duty cycle with high overload (HO), see section Power Modules.

[1] Rated power based on the rated output current I_{rated}. The rated output current I_{rated} is based on the duty cycle for low overload (LO). Low overload (LO) generally applies for applications with low dynamic response (continuous operation), quadratic torque characteristic with low break loose torque and low speed accuracy. Examples: Centrifugal pumps, radial/axial fans, rotary piston fans, radial compressors, vacuum pumps, chain conveyors, agitators. High overload (HO) generally applies for applications with increased dynamic response (cyclic operation) and constant torque characteristics with high break loose torque. Examples: Gear pumps, eccentric worm pumps, mills, mixers, crushers, lifting/lowering gear, centrifuges.

[2] The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are applicable for 200 V, 400 V or 690 V.

[3] The PM240-2 Power Module with Article No. 6SL3210-1PE11-8. L1 corresponds to 0.37 kW (0.5 hp) with duty cycle HO.

[4] The 690 V versions of the PM240-2 Power Modules, frame size FSG are only available with an integrated Category C3 filter. To operate the inverter also within TN systems with grounded outer conductor, you must remove the grounding screw.

Design (continued)

Rated power [1]		Rated output current I_{rated} [2]	Frame size	PM240-2 Power Modules Degree of protection IP20 All CUs pluggable	PM250 Power Modules Degree of protection IP20 All CUs pluggable
kW	hp	A		Article No.	Article No.
380 ... 480 V 3 AC (continued)					
7.5	10	18	FSB	**6SL321■-1PE21-8■L0**	**6SL3225-0BE25-5AA1**
11	15	26/25	FSC	**6SL3210-1PE22-7■L0**	**6SL3225-0BE27-5AA1**
15	20	32	FSC	**6SL321■-1PE23-3■L0**	**6SL3225-0BE31-1AA1**
18.5	25	38	FSD	**6SL3210-1PE23-8■L0**	**6SL3225-0BE31-5■A0**
22	30	45	FSD	**6SL3210-1PE24-5■L0**	**6SL3225-0BE31-8■A0**
30	40	60	FSD	**6SL3210-1PE26-0■L0**	**6SL3225-0BE32-2■A0**
37	50	75	FSD	**6SL321■-1PE27-5■L0**	**6SL3225-0BE33-0■A0**
45	60	90	FSE	**6SL3210-1PE28-8■L0**	**6SL3225-0BE33-7■A0**
55	75	110	FSE	**6SL321■-1PE31-1■L0**	**6SL3225-0BE34-5■A0**
75	100	145	FSF	**6SL3210-1PE31-5■L0**	**6SL3225-0BE35-5■A0**
90	125	178	FSF	**6SL3210-1PE31-8■L0**	**6SL3225-0BE37-5■A0**
110	150	205	FSF	**6SL3210-1PE32-1■L0**	–
132	200	250	FSF	**6SL321■-1PE32-5■L0**	–
160	250	302	FSG NEW	**6SL3210-1PE33-0■L0**	–
200	300	370	FSG NEW	**6SL3210-1PE33-7■L0**	–
250	400	477	FSG NEW	**6SL3210-1PE34-8■L0**	–
500 ... 690 V 3 AC					
11	10	14	FSD	**6SL3210-1PH21-4■L0**	–
15	15	19	FSD	**6SL3210-1PH22-0■L0**	–
18.5	20	23	FSD	**6SL3210-1PH22-3■L0**	–
22	25	27	FSD	**6SL3210-1PH22-7■L0**	–
30	30	35	FSD	**6SL3210-1PH23-5■L0**	–
37	40	42	FSD	**6SL3210-1PH24-2■L0**	–
45	50	52	FSE	**6SL3210-1PH25-2■L0**	–
55	60	62	FSE	**6SL3210-1PH26-2■L0**	–
75	75	80	FSF	**6SL3210-1PH28-0■L0**	–
90	100	100	FSF	**6SL3210-1PH31-0■L0**	–
110	100	115	FSF	**6SL3210-1PH31-2■L0**	–
132	125	142	FSF	**6SL3210-1PH31-4■L0**	–
160	150	171	FSG NEW	**6SL3210-1PH31-7CL0**	–
200	200	208	FSG NEW	**6SL3210-1PH32-1CL0**	–
250	250	250	FSG NEW	**6SL3210-1PH32-5CL0**	–
Heat sink variant				↑	↑
Standard				**0**	**0**
Push-through				**1**	Not available
Integrated line filter				↑	↑
Without			(for IT systems)	**U**	**U**
Category C3 (only for FSG)			(for IT systems [4])	**C**	–
Class A and Category C2 (for FSG)			(for TN systems)	**A**	**A**
Class B			(for TN systems)	–	Integrated line filter not available, as external option only

Data based on a duty cycle with low overload (LO).
Data based on duty cycle with high overload (HO), see section Power Modules.

Design (continued)

Selecting optional system components

IOP-2 Intelligent Operator Panel

Color display, new functions, functional design for faster commissioning and easy adjustment of settings during operation. The most striking features are the new flat design of the operator panel and its integrated membrane keyboard with a central sensor control field.

IOP-2 Handheld Intelligent Operator Panel

A handheld version of the IOP-2 can be ordered for mobile use. In addition to the IOP-2, this includes a housing with rechargeable batteries, charging unit and RS232 connecting cable.

BOP-2 Basic Operator Panel

Menu navigation and 2-line display permit fast and user-friendly commissioning of the inverter. Simple basic commissioning by simultaneously displaying parameter and parameter value, as well as the option of filtering parameters.

Door mounting kit for IOP-2/BOP-2

Using the optionally available door mounting kit, the IOP-2/BOP-2 can be mounted in a control cabinet door with just a few manual operations (IP55/UL Type 12 degree of protection is achieved).

Push-through mounting frame for push-through variants of the PM240-2 Power Modules

It is advisable to use an optionally available mounting frame to install the push-through unit in a control cabinet. This mounting frame includes the necessary seals and frame to ensure compliance with degree of protection IP54. If the Power Module is installed without use of the optional mounting frame, the user is responsible for ensuring that the requisite degree of protection is provided. The kit contains all the necessary nuts and seals. For push-through Power Modules, frame sizes FSD to FSF, installation handles are available.

Memory card

The parameter settings for an inverter can be stored on the SINAMICS SD memory card. When service is required, e.g. after the inverter has been replaced, the drive system is immediately ready for use again. The memory card can also be used to upgrade the firmware of the Control Unit.

SINAMICS G120 Smart Access

Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional web server module SINAMICS G120 Smart Access enabling user-friendly operation and easy access to the inverter, even if this is installed in areas difficult to access.

Brake Relay

The Brake Relay allows the Power Module to be connected to an electromechanical motor brake. This allows the motor brake to be controlled directly from the Control Unit.

Safe Brake Relay

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 from the CU250S-2 Control Unit in accordance with IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3.

PC inverter connection kit 2

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

Shield connection kits for Power Modules

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

A shield connection kit is supplied as standard with PM240-2 Power Modules in frame sizes FSA to FSC.

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size for the frame sizes FSD to FSG. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

Shield connection kits for Control Units

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

Design (continued)

Description	Article No.
IOP-2 Intelligent Operator Panel Operating languages: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	**6SL3255-0AA00-4JA2**
IOP-2 Handheld Operator Panel	**6SL3255-0AA00-4HA1**
BOP-2 Operator Panel	**6SL3255-0AA00-4CA1**
Door mounting kit for IOP-2/BOP-2	**6SL3256-0AP00-0JA0**
Push-through mounting frame	
• For PM240-2 Power Modules degree of protection IP20, push-through variants	
- Frame size FSA	**6SL3260-6AA00-0DA0**
- Frame size FSB	**6SL3260-6AB00-0DA0**
- Frame size FSC	**6SL3260-6AC00-0DA0**
- Frame size FSD	**6SL3200-0SM17-0AA0**
- Frame size FSE	**6SL3200-0SM18-0AA0**
- Frame size FSF	**6SL3200-0SM20-0AA0**
Installation handles	
• For PM240-2 Power Modules – push-through variants	
- Frame sizes FSD to FSF	**6SL3200-0SM22-0AA0**
Memory card SINAMICS SD card [1] 512 MB	**6SL3054-4AG00-2AA0**
Brake Relay	**6SL3252-0BB00-0AA0**
Safe Brake Relay	**6SL3252-0BB01-0AA0**
PC inverter connection kit 2	**6SL3255-0AA00-2CA0**

Description	Article No.
Shield connection kits	
• For PM240-2 Power Modules	
- Frame sizes FSA to FSC	Supplied with the Power Modules, available as a spare part
- Frame sizes FSD to FSG A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered.	
- Frame size FSD	**6SL3262-1AD01-0DA0**
- Frame size FSE	**6SL3262-1AE01-0DA0**
- Frame size FSF	**6SL3262-1AF01-0DA0**
- Frame size FSG NEW	**6SL3262-1AG01-0DA0**
• For PM250 Power Modules	
- Frame size FSC	**6SL3262-1AC00-0DA0**
- Frame sizes FSD and FSE	**6SL3262-1AD00-0DA0**
- Frame size FSF	**6SL3262-1AF00-0DA0**
• For Control Units	
- For CU230P-2 HVAC and CU230P-2 DP	**6SL3264-1EA00-0FA0**
- For CU240E-2	**6SL3264-1EA00-0HA0**
- For CU230P-2 PN, CU240E-2 PN and CU240E-2 PN-F	**6SL3264-1EA00-0HB0**
- For CU250S-2	**6SL3264-1EA00-0LA0**
STARTER commissioning tool [2] on DVD-ROM	**6SL3072-0AA00-0AG0**
SINAMICS Startdrive commissioning tool [3] on DVD-ROM	**6SL3072-4EA02-0XG0**

[1] Approved for CU230P-2 HVAC and CU230P-2 DP Control Units with firmware version V4.6 and higher.

[2] STARTER commissioning tool is also available on the Internet at www.siemens.com/starter

[3] The SINAMICS Startdrive commissioning tool is also available on the Internet at https://support.industry.siemens.com/cs/document/68034568

Design (continued)

Line-side components

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

Line filters

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

Line reactors
(for PM240-2 Power Modules only)

Line reactors smooth the current drawn by the inverter and thus reduce harmonic components in the line current. Through the reduction of the current harmonics, the thermal load on the power components in the rectifier and in the DC link capacitors is reduced as well as the harmonic effects on the supply. The use of a line reactor increases the service life of the inverter.

A DC link reactor is integrated in the PM240-2 Power Modules, frame sizes FSD to FSG, and therefore no line reactor is required. No line reactor is provided for the PM250 Power Modules, nor may one be used.

Recommended line-side overcurrent protection devices

Overcurrent protection devices are absolutely necessary for the operation of the inverters. The tables listed in the section "Recommended line-side overcurrent protection devices" provide recommendations according to IEC and UL regulations, depending on the area of application. Recommendations on further overcurrent protection devices are available at:
https://support.industry.siemens.com/cs/document/109486009

More information about the listed Siemens fuses is available in Catalog LV 10 as well as in the Industry Mall.

DC link components

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

Braking resistors
(for PM240-2 Power Modules only)

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are designed for use with PM240-2 Power Modules. They are equipped with an integrated braking chopper (electronic switch).

For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

Load-side power components

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

Output reactors

Output reactors reduce the rate of voltage rise (dv/dt) and the height of the current peaks, and can allow longer motor cables to be connected.

Sine-wave filters
(not for PM240-2 Power Modules)

Sine-wave filters limit the rate of voltage rise (dv/dt) and the peak voltages on the motor winding. Similar to an output reactor, they enable the connection of longer motor cables.

dv/dt filters plus VPL
(for PM240-2 Power Modules 400 V and 690 V versions only)

dv/dt filters plus voltage peak limiters limit the rate of voltage rise and the typical voltage peaks.

Additional options

Further selected accessories are available from "Siemens Product Partner for Drives Options":
www.siemens.com/drives-options-partner

Spare parts

Spare parts kit for Control Units

The spare parts kit contains small parts for all variants of the following SINAMICS G120 Control Units:

- CU230P-2
- CU240E-2
- CU240E-2 F
- CU250S-2

Shield connection kits for PM240-2 Power Modules

A shield connection kit is supplied as standard with PM240-2 Power Modules in frame sizes FSA to FSC. This shield connection kit is also available as a spare part.

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size for the frame sizes FSD to FSG. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

Terminal cover kits for frame sizes FSD to FSG

The terminal cover kit includes a replacement cover for the connecting terminals. Terminal cover kits which are suitable for the PM240-2 and PM250 Power Modules are available.

Replacement connectors for PM240-2 Power Modules

A set of connectors for the line feeder cable, braking resistor and motor cable can be ordered corresponding to the frame size of the PM240-2 Power Module.

Fan units for PM240-2 Power Modules

The fans of PM240-2 Power Modules are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily.

Replacement fans for PM250 Power Modules

The fans of PM250 Power Modules are designed for extra long service life. Replacement fans can be ordered for special applications.

Configuration

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

Drive Technology Configurator (DT Configurator) within the CA 01

The interactive catalog CA 01 – the offline Industry Mall of Siemens – contains over 100000 products with approximately 5 million possible drive system product variants. The Drive Technology Configurator (DT Configurator) has been developed to facilitate selection of the correct motor and/or inverter from the wide spectrum of drives. It is integrated as a selection tool in Catalog CA 01.

Online DT Configurator

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

SIZER for Siemens Drives engineering tool

The SIZER for Siemens Drives engineering tool makes it easy to configure the SINAMICS drive family. It provides support when selecting the hardware and firmware components necessary to implement a drive task. SIZER for Siemens Drives is designed to support configuring of the entire drive system.

You can find further information on the SIZER for Siemens Drives engineering tool in the section Engineering tools.

The SIZER for Siemens Drives engineering tool is available free on the Internet at
www.siemens.com/sizer

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices.

You can find further information about the STARTER commissioning tool in the section Engineering tools.

Additional information about the STARTER commissioning tool is available on the Internet at
www.siemens.com/starter

SINAMICS Startdrive commissioning tool

SINAMICS Startdrive is a tool for configuring, commissioning, and diagnosing the SINAMICS family of drives and is integrated into the TIA Portal. SINAMICS Startdrive can be used to implement drive tasks with the SINAMICS G110M, SINAMICS G120, SINAMICS G120C, SINAMICS G120D and SINAMICS G120P inverter series. The commissioning tool has been optimized with regard to user friendliness and consistent use of the TIA Portal benefits of a common working environment for PLC, HMI and drives.

You can find further information about the SINAMICS Startdrive commissioning tool in the section Engineering tools.

The SINAMICS Startdrive commissioning tool is available free on the Internet at
www.siemens.com/startdrive

Drive ES engineering system

Drive ES is the engineering system that can be used to integrate the communication, configuration and data management functions of Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively. Two software packages are available for SINAMICS – Drive ES Basic Maintenance and Drive ES PCS.

You can find further information about the Drive ES engineering system in the section Engineering tools.

Additional information about the Drive ES engineering system is available on the Internet at
www.siemens.com/drive-es

Technical specifications

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

General technical specifications	
Mechanical ambient conditions	
Long-term storage acc. to EN 60721-3-1	
• Devices and components, frame sizes FSA ... FSG [1]	Class 1M2
Transport acc. to EN 60721-3-2	
• Devices and components, frame sizes FSA ... FSG [2]	Class 2M3
Operation acc. to EN 60721-3-3	
• Devices and components, frame sizes FSA ... FSG	Class 3M1
- Vibration test	Test Fc (sinusoidal) according to EN 60068-2-6 Deflection: 0.075 mm at 10 ... 57 Hz Acceleration: 10 m/s^2 (1 × *g*) at 57 ... 150 Hz 10 frequency cycles per axis
- Shock test	Test Ea (semi-sinusoidal) according to EN 60068-2-27 Acceleration: 49 m/s^2 (5 × *g*) at 30 ms 3 shocks in all three axes in both directions

General technical specifications	
Ambient conditions	
Protection class acc. to EN 61800-5-1	Class I (with protective conductor system) and class III (PELV)
Touch protection acc. to EN 61800-5-1	For the intended purpose
Permissible ambient and coolant temperature (air) during operation for line-side components and Power Modules	
• Low overload (LO)	
- PM240-2, frame sizes FSA ... FSC	-10 ... +40 °C (14 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
- PM240-2, frame sizes FSD ... FSG	-20 ... +40 °C (-4 ... +104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
- PM250	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
• High overload (HO)	
- PM240-2, frame sizes FSA ... FSC	-10 ... +50 °C (14 ... 122 °F) without derating >50 ... 60 °C (>104 ... 140 °F) see derating characteristics
- PM240-2, frame sizes FSD ... FSG	-20 ... +50 °C (-4 ... +122 °F) without derating >50 ... 60 °C (>104 ... 140 °F) see derating characteristics
- PM250	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics
Permissible ambient and coolant temperature (air) during operation for Control Units and supplementary system components	With CU230P-2 HVAC and CU230P-2 DP: -10 ... +60 °C (14 ... 140 °F) With CU230P-2 PN: -10 ... +55 °C (14 ... 131 °F) With CU240E-2 (without PN): -10 ... +55 °C (14 ... 131 °F) With CU240E-2 PN and CU240E-2 PN-F: -10 ... +53 °C (14 ... 127.4 °F) With CU250S-2: -10 ... +50 °C (14 ... 122 °F) With IOP/BOP-2: 0 ... 50 °C (32 ... 122 °F) Derating of 3 K/1000 m (3281 ft) applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.

[1] In product packaging.
[2] In transport packaging.

Technical specifications (continued)

General technical specifications	
Ambient conditions (continued)	
Climatic ambient conditions	
• Storage [1] acc. to EN 60721-3-1	Class 1K4 Temperature: -25 ... +55 °C (-13 ... +131 °F)
• Transport [1] acc. to EN 60721-3-2	Class 2K4 Temperature -40 ... +70 °C (-40 ... +158 °F)
• Operation acc. to EN 60721-3-3	Better than class 3K3 with regard to • Temperature: -10 ... +40 °C (14 ... 104 °F) without derating >40 ... 60 °C (>32 ... 140 °F) see derating characteristics • Relative humidity: 5 … 95 % (no condensation) Oil mist, salt mist, ice formation, condensation, dripping water, spraying water, splashing water and water jets are not permitted
Environmental class/harmful chemical substances	
• Storage [1] acc. to EN 60721-3-1	Class 1C2
• Transport [2] acc. to EN 60721-3-2	Class 2C2
• Operation acc. to EN 60721-3-3	
- PM250 and PM240-2 Power Modules FSA to FSC	Class 3C2 [2]
- PM240-2 Power Modules, FSD to FSG	Class 3C3 [2]
Organic/biological influences	
• Storage [1] acc. to EN 60721-3-1	Class 1B1
• Transport [1] acc. to EN 60721-3-2	Class 2B1
• Operation acc. to EN 60721-3-3	Class 3B1
Degree of pollution acc. to EN 61800-5-1	2
Certification for fail-safe versions	
Applies to Control Units of the CU240E-2 and CU250S-2 series. The values include Control Unit and Power Module. Note: The Safety Integrated Function Manual contains detailed information about the safety functions: https://support.industry.siemens.com/cs/document/109477367	The PM240-2 Power Modules, frame sizes FSD to FSG additionally offer STO acc. to IEC 61508 SIL 3 and EN ISO 13489-1 PL e and Category 3.
• According to IEC 61508	SIL 2
• According to EN ISO 13849-1	PL d and Category 3
Standards	
Compliance with standards	
- PM240-2	CE, cULus, RCM, SEMI F47, RoHS, EAC, KC (only with internal or external line filters Category C2) For frame sizes FSD ... FSG also: WEEE (Waste Electrical & Electronic Equipment)
- PM250	CE, UL, cUL, RCM, SEMI F47
CE marking	According to Low-Voltage Directive 2014/35/EU

General technical specifications	
EMC Directive acc. to EN 61800-3	
Interference immunity	
PM240-2 Power Modules **PM250 Power Modules**	The Power Modules are tested according to the interference immunity requirements for environments according to Category C3
Interference emissions	
PM240-2 Power Modules	
• Frame sizes FSA to FSF without integrated line filter	[3]
• Frame sizes FSA to FSC with integrated line filter class A	Observance of the limit values - according to Category C3 - for conducted interferences and field-conducted interference emissions according to Category C2 [4]
• Frame sizes FSD to FSG with integrated line filter class A	Observance of the limit values according to Categories C3 and C2 [4]
• Frame sizes FSA to FSC without integrated line filter with optional line filter class B	Observance of the limit values - for conducted interferences according to Category C1 - for field-conducted interference emissions according to Category C2 [4]
PM250 Power Modules	
• Frame size FSC with integrated line filter class A	Observance of the limit values according to Categories C3 and C2 [4]
• Frame size FSC with integrated line filter class A and optional line filter class B	Observance of the limit values - for low-frequency harmonic effects and conducted interferences according to Category C1 - for field-conducted interference emissions according to Category C2 [4]
• Frame sizes FSD to FSF without integrated line filter	[3]
• Frame sizes FSD to FSF with integrated line filter class A	Observance of the limit values according to Categories C3 and C2 [4]

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] SIPLUS components for extreme requirements are available. More information is available on the Internet at www.siemens.com/siplus-drives

[3] Non-filtered devices are designed for operation on IT systems or in conjunction with an RCD. The customer must provide suitable RI suppression equipment to ensure that these devices comply with the limits defined for Category C3 or C2.

[4] Max. permissible cable lengths see section Power Modules → Integration.

Technical specifications (continued)

Compliance with standards

CE marking

The SINAMICS G120 inverters meet the requirements of 2014/35/EU.

Low-Voltage Directive

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

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

UL listing

Inverter devices in UL category NMMS certified to UL and cUL, in compliance with UL508C. UL list numbers E121068 and E192450. This applies to all PM240-2 and PM250 Power Modules.

For use in environments with pollution degree 2.

See also on the Internet at
www.ul.com

Machinery Directive

The inverters are suitable for installation in machines. Compliance with the Machinery Directive 2006/42/EC requires a separate certificate of conformity. This must be provided by the plant construction company or the organization marketing the machine.

EMC Directive

- EN 61800-3
  Adjustable speed electrical power drive systems
  Part 3: EMC product standard including specific test methods

The following information applies to SINAMICS G120 frequency inverters from Siemens:

- The EMC product standard EN 61800-3 does not apply directly to a frequency inverter but to a PDS (Power Drive System), which comprises the complete circuitry, motor and cables in addition to the inverter.
- Frequency inverters are normally only supplied to experts for installation in machines or systems. A frequency inverter must, therefore, only be considered as a component which, on its own, is not subject to the EMC product standard EN 61800-3. The inverter's operating instructions, however, specify the conditions regarding compliance with the product standard if the frequency inverter is expanded to become a PDS. For a PDS, the EMC Directive in the EU is complied with by observing the product standard EN 61800-3 for variable-speed electric drive systems. The frequency inverters on their own do not generally require identification according to the EMC Directive.
- Different categories C1 to C4 have been defined in accordance with the environment of the PDS at the operating location:
  - **Category C1:** Drive systems for rated voltages < 1000 V for use in the first environment
  - **Category C2:** Stationary drive systems not connected by means of a plug connector for rated voltages < 1000 V. When used in the first environment, the system must be installed and commissioned by personnel familiar with EMC requirements. A warning note is required.
  - **Category C3:** Drive systems for rated voltages < 1000 V for exclusive use in the second environment. A warning note is required.
  - **Category C4:** Drive systems for rated voltages ≥ 1000 V or for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be created.
- The EMC product standard EN 61800-3 also defines limit values for conducted interference and radiated interference for the "second environment" (= industrial power supply systems that do not supply households). These limit values are below the limit values of filter class A acc. to EN 55011. Unfiltered inverters can be used in industrial environments as long as they are part of a system that contains line filters on the higher-level infeed side.
- With SINAMICS G120, Power Drive Systems (PDS) that fulfill the EMC product standard EN 61800-3 can be configured when observing the installation instructions in the product documentation.
- A differentiation must be made between the product standards for electrical drive systems (PDS) of the range of standards EN 61800 (of which Part 3 covers EMC topics) and the product standards for the devices/systems/machines, etc. This will probably not result in any changes in the practical use of frequency inverters. Since frequency inverters are always part of a PDS and these are part of a machine, the machine manufacturer must observe various standards depending on their type and environment (e.g. EN 61000-3-2 for line harmonics and EN 55011 for radio interference). The product standard for PDS on its own is, therefore, either insufficient or irrelevant.
- With respect to the compliance with limits for line supply harmonics, the EMC product standard EN 61800-3 for PDS refers to compliance with the EN 61000-3-2 and EN 61000-3-12 standards.
- Regardless of the configuration with SINAMICS G120 and its components, the machine construction company (OEM) can also apply other measures to ensure that the machine complies with the EU EMC Directive. The EU EMC Directive is generally fulfilled when the relevant EMC product standards are observed. If they are not available, the generic standards (e.g. DIN EN 61000-x-x) can be used instead. It is important that the conducted and emitted interference at the line supply connection point and outside the machine remain below the relevant limit values. Any suitable technical measures can be applied to ensure this.

SEMI F47

SEMI F47 is an industry standard relating to the immunity to voltage dips. This includes the requirement that industrial equipment must be able to tolerate defined dips or drops of the line supply voltage. As a result, industrial equipment that fulfills this standard is more reliable and productive. In the SINAMICS G120 product family, the PM240-2 and PM250 Power Modules fulfill the latest SEMI F47-0706 standard. In the case of a voltage dip, defined in accordance with SEMI F47-0607, these drives either continue to supply a defined output current, or using an automatic restart function, continue to operate as expected.

Overview

CU230P-2 Control Units

CU230P-2 PN Control Unit

The Control Unit performs closed-loop control functions for the inverter.

The CU230P-2 Control Units are designed for drives with integrated technological functions for pump, fan and compressor applications.

The I/O interface, the fieldbus interfaces and the additional software functions optimally support these applications. The integration of technological functions is a significant differentiating feature to the other Control Units of the SINAMICS G120 drive family.

The CU230P-2 Control Units can be operated with the following Power Modules:

- PM240-2
- PM250

Note:

The CU230P-2 is the Control Unit for SINAMICS G120P and SINAMICS G120P Cabinet for pumps, fans and compressors.
Please refer to Catalog D 35 for more information.

Note:

Shield plates and shield connection kits are available for use in the wiring installation of Control Units and Power Modules to ensure that it complies with EMC guidelines.
For more information about shield connection kits and shield plates for Control Units and Power Modules, please refer to section Supplementary system components.

Typical, integrated HVAC/HLK functions

- Linear and quadratic torque characteristic for fluid flow and positive displacement machines
- ECO mode for additional energy saving in V/f control mode
- 2 analog inputs (current/voltage can be selected) to directly connect pressure/level sensors
- 2 additional analog inputs to connect Pt1000/LG-Ni1000/DIN-Ni1000 temperature sensors
- Direct control of valves and flaps using two 230 V AC relays
- Automatic restart
- Flying restart
- Skip frequencies
- Hibernation mode
- Load check function to monitor belts and flow
- Cascade connection
- 4 integrated PID controllers (e.g. for temperature, pressure, air quality, level)
- Multi-zone controller
- Essential service mode
- Real time clock with three time generators

IOP-2 wizards for special applications

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

Overview (continued)

Control Unit CU240E-2

CU240E-2 DP-F Control Unit

The Control Unit performs closed-loop control functions for the inverter.

The CU240E-2 Control Unit is designed as standard Control Unit for all of the usual applications involving V/f or vector control.

- CU240E-2 series with standard I/O quantity structure and integrated safety technology

The CU240E-2 Control Unit can be combined with the following Power Modules:

- PM240-2
- PM250

Note:

Shield plates and shield connection kits are available for use in the wiring installation of Control Units and Power Modules to ensure that it complies with EMC guidelines.
For more information about shield connection kits and shield plates for Control Units and Power Modules, please refer to section Supplementary system components.

Safety Integrated functions

The safety function "Safe Torque Off" (STO) (certified according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3) is already integrated into the basic versions of the CU240E-2 series (CU240E-2, CU240E-2 DP, CU240E-2 PN).

With the fail-safe variants of the CU240E-2 series (CU240E-2 F, CU240E-2 DP-F, CU240E-2 PN-F), the fail-safe SINAMICS G120 inverter provides five safety functions which are certified according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3:

- Safe Torque Off (STO)
  to protect against active movement of the drive
- Safe Stop 1 (SS1)
  for continuous monitoring of a safe braking ramp
- Safely-Limited Speed (SLS)
  for protection against dangerous movements when a speed limit is exceeded (the CU240E-2 DP Failsafe Control Unit has 4 selectable SLS limit values)
- Safe Direction (SDI)
  This function ensures that the drive can only rotate in the selected direction.
- Safe Speed Monitor (SSM)
  This function signals if a drive operates below a specific speed/feed velocity (CU240E-2 DP-F / CU240E-2 PN-F with PROFIsafe).

These functions can be activated by means of PROFIsafe or via the safety inputs.

None of the safety functions require a motor encoder and they are thus much cheaper and easier to implement. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SDI and SSM functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Further information can be found in the section Safety Integrated.

Overview (continued)

CU250S-2 Control Units

CU250S-2 Control Unit

The Control Unit performs closed-loop control functions for the inverter.

The CU250S-2 Control Units are designed as standard Control Units for all of the usual applications involving V/f or vector control.

CU250S-2 Control Units can be used to implement all common applications involving V/f or vector control as well as applications for drives with positioning requirements. This expansion allows them to be used in lifting, swiveling, traversing or rotating applications. The positioning functionality is comparable with SINAMICS S110 servo drives.

Two points must be noted here:

- Vector control (VC) and sensorless vector control (SLVC) are possible
- Encoder possible for speed and position control (positioning)

The CU250S-2 Control Units can be combined with the following Power Modules:

- PM240-2
- PM250

Note:

Shield plates and shield connection kits are available for use in the wiring installation of Control Units and Power Modules to ensure that it complies with EMC guidelines.

For more information about shield connection kits and shield plates for Control Units and Power Modules, please refer to section Supplementary system components.

Safety Integrated functions

The following Safety Integrated Basic Functions (certified according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3) are integrated as standard in the CU250S-2 series:

- Safe Torque Off (STO)
  to protect against active movement of the drive
- Safe Stop 1 (SS1)
  for continuous monitoring of a safe braking ramp
- Safe Brake Control (SBC) is used to safely control a holding brake

The following Safety Integrated Extended Functions (certified according to IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3) are optionally available for the CU250S-2 series:

- Safely-Limited Speed (SLS)
  for protection against dangerous movements when a speed limit is exceeded
- Safe Direction (SDI)
  This function ensures that the drive can only rotate in the selected direction.
- Safe Speed Monitor (SSM)
  This function signals if a drive operates below a specific speed/feed velocity.

These functions can be activated by means of PROFIsafe or via the safety inputs.

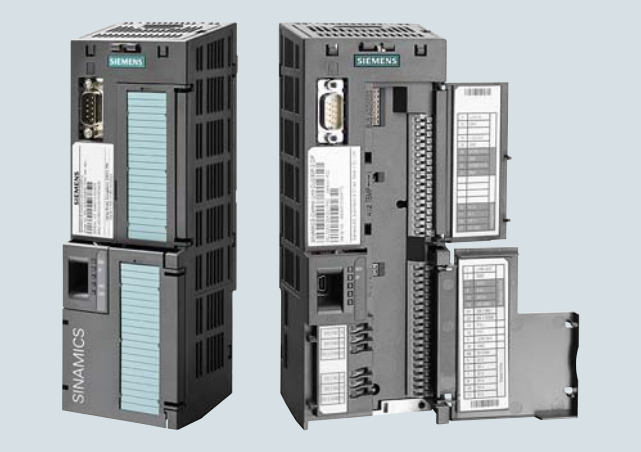
None of the safety functions require a motor encoder and they are thus much cheaper and easier to implement. Existing systems in particular can be simply updated with safety technology without the need to change the motor or mechanical system.

The Safe Torque Off (STO) function can be used without restriction for all applications. The SS1, SLS, SDI and SSM functions are only permissible for applications where the load can never accelerate when the inverter is switched off. They are therefore not permitted for applications involving pull-through loads such as hoisting gear and unwinders.

Further information can be found in the section Safety Integrated.

Design

CU230P-2 HVAC, CU230P-2 DP and CU230P-2 PN Control Units



CU230P-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
69	DI COM	Reference potential for digital inputs
5 ... 8, 16, 17	DI0 ... DI5	Freely programmable isolated, inputs in compliance with IEC 61131-2
Digital outputs (DO)		
18	DO0, NC	Relay output 1 NC contact (5 A, 30 V DC or 2 A, 250 V AC) [1]
19	DO0, NO	Relay output 1 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
20	DO0, COM	Relay output 1 Common contact (5 A, 30 V DC or 2 A, 250 V AC) [1]
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 (5 A, 30 V DC or 2 A, 250 V AC) [1]
24	DO2, NO	Relay output 3 NO contact (5 A, 30 V DC or 2 A, 250 V AC)
25	DO2, COM	Relay output 3 Common contact (5 A, 30 V DC or 2 A, 250 V AC) [1]

Terminal No.	Signal	Features
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
50	AI2+	Non-isolated input, switchable between current and temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000 Value range: 0/4 ... 20 mA, Pt1000: -88 ... +240 °C; LG-Ni1000/DIN-Ni1000: -88 ... +165 °C
51	GND	Reference potential of the AI2/ internal electronics ground
52	AI3+	Non-isolated input for temperature sensors, type Pt1000/LG-Ni1000/DIN-Ni1000 Value range: Pt1000: -88 ... +240 °C; LG-Ni1000/DIN-Ni1000: -88 ... +165 °C
53	GND	Reference potential of the AI3/ internal electronics ground
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/ internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/ internal electronics ground
PTC/KTY interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, Pt1000, KTY, bimetal
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 100 mA
28	GND	Reference potential of the power supply/ internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/ internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input
35	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
36	GND	Reference potential of the power supply/ internal electronics ground

[1] The following applies to systems complying with UL: A maximum of 3 A, 30 V DC or 2 A, 250 V AC may be connected via terminals 18 / 20 (DO0 NC) and 23 / 25 (DO2 NC).

Design (continued)

CU240E-2, CU240E-2 DP, CU240E-2 PN, CU240E-2 F, CU240E-2 DP-F and CU240E-2 PN-F Control Units

CU240E-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI) – Standard		
5 ... 8, 16, 17	DI0 … DI5	Freely programmable (isolated) 5.5 mA/24 V
69	DI COM1	Reference potential for digital inputs 0, 2, 4, 6
34	DI COM2	Reference potential for digital inputs 1, 3, 5, 7
Digital inputs (DI) – Fail-safe (formed from two standard inputs using the appropriate parameter setting)		
16, 17	F-DI0	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
The following are only available for CU240E-2 F, CU240E-2 DP-F and CU240E-2 PN-F		
5, 6	F-DI0	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
7, 8	F-DI1	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
16, 17	F-DI2	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V

Terminal No.	Signal	Features
Digital outputs (DO)		
18	DO0, NC	Relay output DO0 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output DO0 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output DO0 Common contact (0.5 A, 30 V DC)
21	DO1+	Transistor output DO1 Positive (0.5 A, 30 V DC)
22	DO1-	Transistor output DO1 Negative (0.5 A, 30 V DC)
23	DO2, NC	Relay output DO2 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output DO2 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output DO2 Common contact (0.5 A, 30 V DC)
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
13	GND	Reference potential of the AO0/ internal electronics ground
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of the AO1/ internal electronics ground
PTC/KTY interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, Pt1000, KTY, bimetal
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 100 mA
28	GND	Reference potential of the power supply/ internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/ internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input

Design (continued)

CU250S-2, CU250S-2 DP, CU250S-2 PN, CU250S-2 CAN Control Units

CU250S-2 Control Unit with open and closed terminal covers

Terminal No.	Signal	Features
Digital inputs (DI)		
5	DI0	Digital inputs, isolated, 5.5 mA/24 V
6	DI1+	Digital inputs, isolated, 5.5 mA/24 V
64	DI1-	Digital inputs, isolated, 5.5 mA/24 V
7	DI2	Digital inputs, isolated, 5.5 mA/24 V
8	DI3+	Digital inputs, isolated, 5.5 mA/24 V
65	DI3-	Digital inputs, isolated, 5.5 mA/24 V
16	DI4	Digital inputs, isolated, 5.5 mA/24 V
17	DI5+	Digital inputs, isolated, 5.5 mA/24 V
66	DI5-	Digital inputs, isolated, 5.5 mA/24 V
67	DI6	Digital inputs, isolated, 5.5 mA/24 V
69	DI COM1	Reference potential for digital inputs DI0, DI2, DI4, DI6
41 ... 44	DI16 ... DI19	Freely programmable (isolated) 5.5 mA/24 V
40	DI COM3	Reference potential for digital inputs DI16 ... DI19
Digital inputs (DI) – Fail-safe (formed from two standard inputs using the appropriate parameter setting)		
5, 6	F-DI0	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
7, 8	F-DI1	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
16, 17	F-DI2	Fail-safe digital inputs, 2 channels (redundant), freely programmable (isolated) 5.5 mA/24 V
69	DI COM1	Reference potential for digital inputs F-DI0, F-DI1, F-DI2
Switchable digital inputs or outputs (digital inputs DI24 to DI27 can also be used as a pulse input with a maximum frequency of 32 kHz)		
51	DI24/DO24	Freely programmable (not isolated), DI: 5.5 mA/24 V, DO: 100 mA/24 V
53	DI25/DO25	Freely programmable (not isolated), DI: 5.5 mA/24 V, DO: 100 mA/24 V
53	DI26/DO26	Freely programmable (not isolated), DI: 5.5 mA/24 V, DO: 100 mA/24 V
54	DI27/DO27	Freely programmable (not isolated), DI: 5.5 mA/24 V, DO: 100 mA/24 V
50	GND	Reference potential

Terminal No.	Signal	Features
Digital outputs (DO)		
18	DO0, NC	Relay output DO0 NC contact (0.5 A, 30 V DC)
19	DO0, NO	Relay output DO0 NO contact (0.5 A, 30 V DC)
20	DO0, COM	Relay output DO0 Common contact (0.5 A, 30 V DC)
21	DO1 NO	Relay output DO1 NO contact (0.5 A, 30 V DC)
22	DO1 COM	Relay output DO1 Common contact (0.5 A, 30 V DC)
23	DO2, NC	Relay output DO2 NC contact (0.5 A, 30 V DC)
24	DO2, NO	Relay output DO2 NO contact (0.5 A, 30 V DC)
25	DO2, COM	Relay output DO2 Common contact (0.5 A, 30 V DC)
Digital output (DO) – Fail-safe (formed from two standard outputs using the appropriate parameter setting)		
18, 23	F-DO0, NC	Relay output F-DO0 NC contact (0.5 A, 30 V DC), 2-channel (redundant)
19, 24	F-DO0, NO	Relay output F-DO0 NO contact (0.5 A, 30 V DC), 2-channel (redundant)
20, 25	F-DO0, COM	Relay output F-DO0 common contact (0.5 A, 30 V DC), 2-channel (redundant)
Analog inputs (AI)		
3	AI0+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
4	AI0-	
10	AI1+	Differential input, switchable between current, voltage Value range: 0 ... 10 V, -10 ... +10 V, 0/2 ... 10 V, 0/4 ... 20 mA
11	AI1-	
13	GND	Reference potential of AI
Analog outputs (AO)		
12	AO0+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
26	AO1+	Non-isolated output Freely programmable Value range: 0 ... 10 V; 0/4 ... 20 mA
27	GND	Reference potential of AO
PTC/KTY interface		
14	T1 MOTOR	Positive input for motor temperature sensor Type: PTC, Pt1000, KTY, bimetal
15	T2 MOTOR	Negative input for motor temperature sensor
Power supply		
9	+24 V OUT	Power supply output 24 V DC, max. 200 mA
28	GND	Reference potential of the power supply/ internal electronics ground
1	+10 V OUT	Power supply output 10 V DC ±0.5 V, max. 10 mA
2	GND	Reference potential of the power supply/ internal electronics ground
31	+24 V IN	Power supply input 20.4 ... 28.8 V DC, max. 1500 mA
32	GND IN	Reference potential of the power supply input

Design (continued)

Terminal No.	Signal	Features
HTL encoder/resolver interface via terminal		
33	ENC+	HTL encoder power supply
79	GND	Reference potential
70	AP/S2	HTL track A+ / resolver signal A (sin+)
71	AN/S4	HTL track A- / inverted resolver signal A (sin-)
72	BP/S1	HTL track B+ / resolver signal S1
73	BN/S3	HTL track B- / inverted resolver signal B (cos-)
74	ZP	HTL zero signal+
75	ZN	HTL zero signal-
76	R1	Resolver excitation+
77	R2	Resolver excitation-

Terminal No.	Signal
DRIVE-CLiQ	
1	Transmit data +
2	Transmit data -
3	Receive data +
4	–
5	–
6	Receive data -
7	–
8	–
A	+24 V power supply
B	M, reference for power supply

HTL, TTL, SSI, temperature via SUB-D interface

Terminal No.	Signal	HTL	TTL	SSI (RS422 standard)	PTC, Pt1000, KTY84, bimetal
1	Motor temperature sensing +	–	–	–	Temp +
2	SSI clock	–	–	Clock +	–
3	Inverse SSI clock	–	–	Clock -	–
4	5 V/24 V encoder supply	P encoder	P encoder	P encoder	–
5	5 V/24 V encoder supply	P encoder	P encoder	P encoder	–
6	Sense input, encoder supply	–	P sense	–	–
7	0 V, reference for encoder supply	M encoder	M encoder	M encoder	–
8	Motor temperature sensing -	–	–	–	Temp-
9	0 V, reference for sense input	–	M sense	–	–
10	Referencing signal	R +	R +	–	–
11	Inverted referencing signal	R -	R -	–	–
12	Inverted incremental signal B	B -	B -	–	–
13	Incremental signal B	B +	B +	–	–
14	Inverted incremental signal A / SSI data	A -	A -	Data -	–
15	Incremental signal A / SSI data	A +	A +	Data +	–

Function

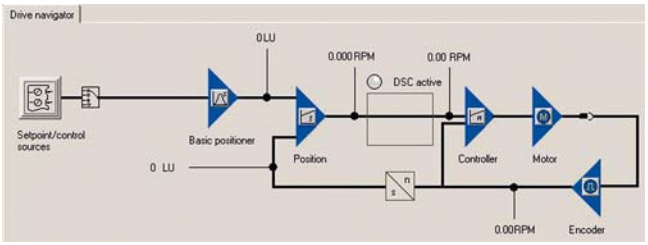
Function module basic positioner EPos

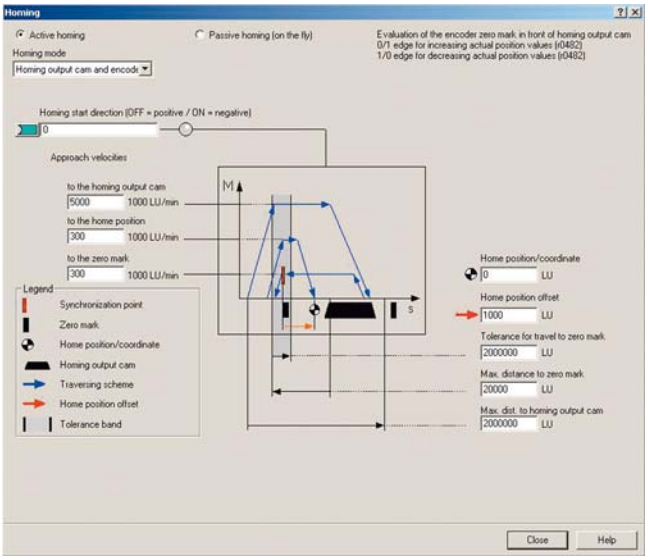
The basic positioner EPos is available as a standard technology function for the following SINAMICS Control Units and can be called as a function module that can be activated additionally.

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

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

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





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

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

Many applications can be carried out without external position controllers.

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

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

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

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

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

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

Function (continued)

Functionality of the EPos basic positioner

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

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

Mechanical system

- Backlash compensation
- Modulo offset

Limitations

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

Referencing or adjustment

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

Traversing block mode

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

Direct setpoint specification (MDI) mode

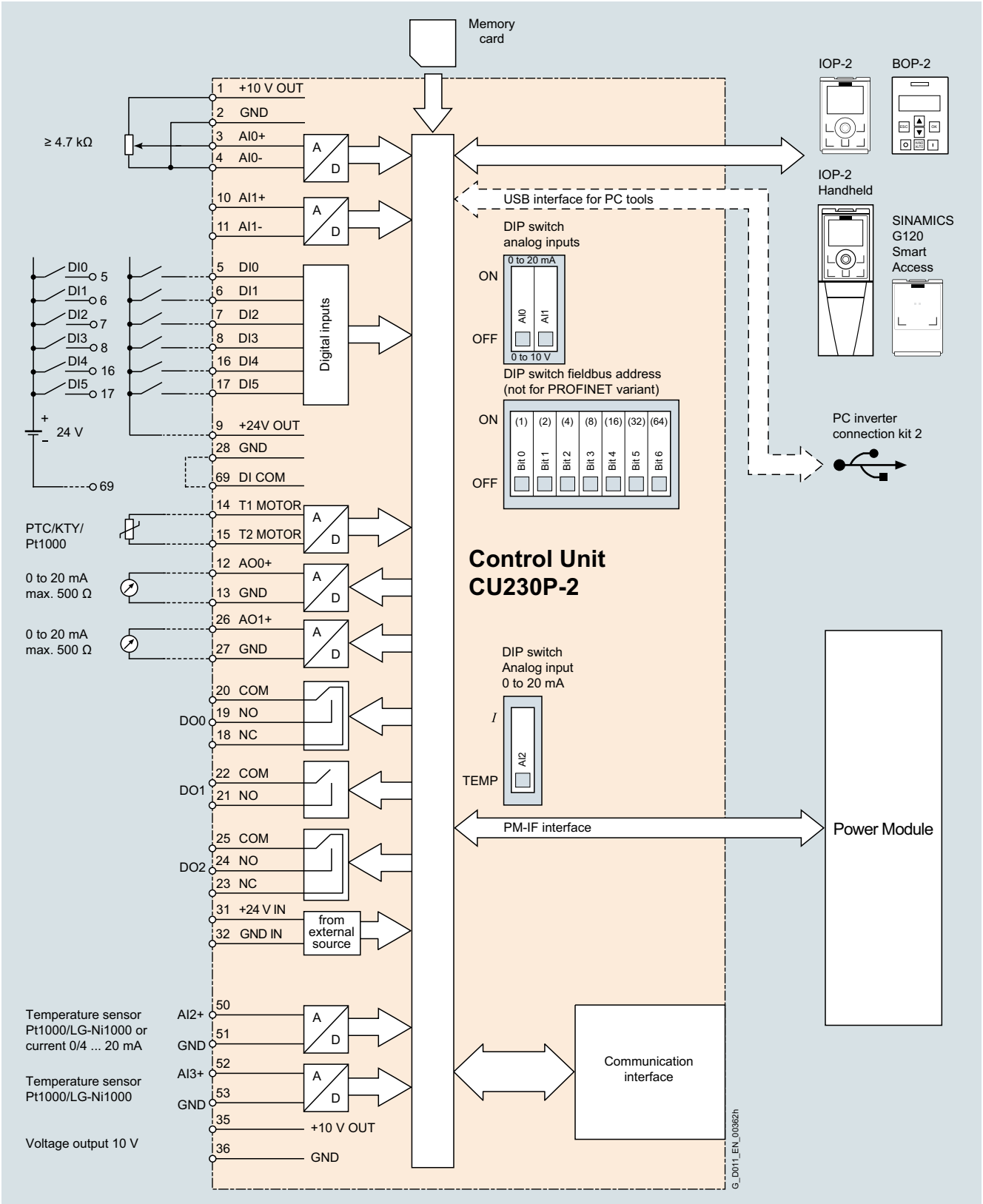
- Positioning (absolute, relative) and setting-up (endless closed-loop position control) using direct setpoint inputs (e.g. via the PLC using process data)
- It is always possible to influence the motion parameters during traversing (on-the-fly setpoint acceptance) as well as for on-the-fly changes between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

Jog mode

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

Further information can be found in the section Technology functions.

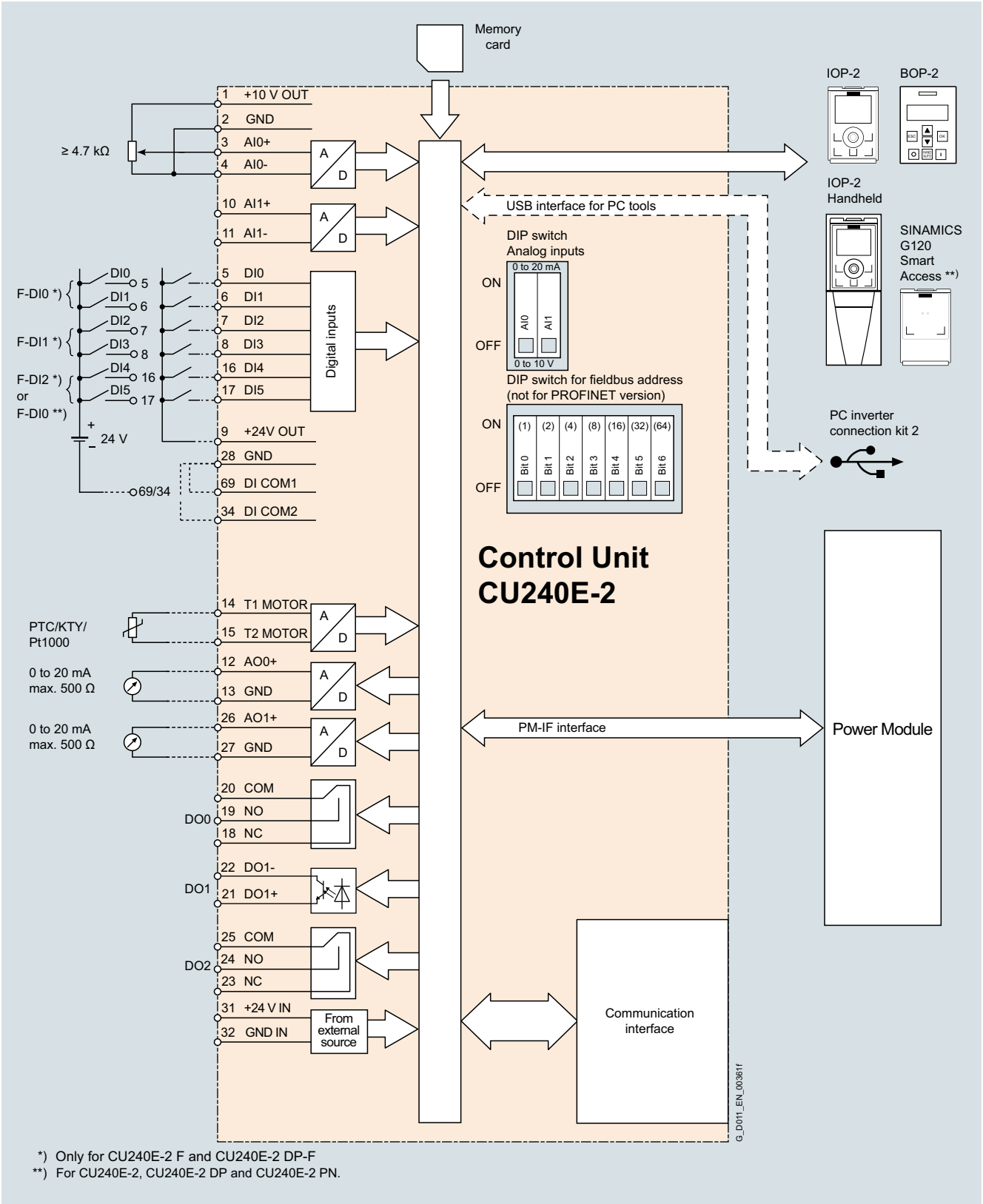
Integration



Connection example of a CU230P-2 series Control Unit

More information about the interfaces of the Control Unit is available on the Internet at:
https://support.industry.siemens.com/cs/document/109477360

Integration (continued)

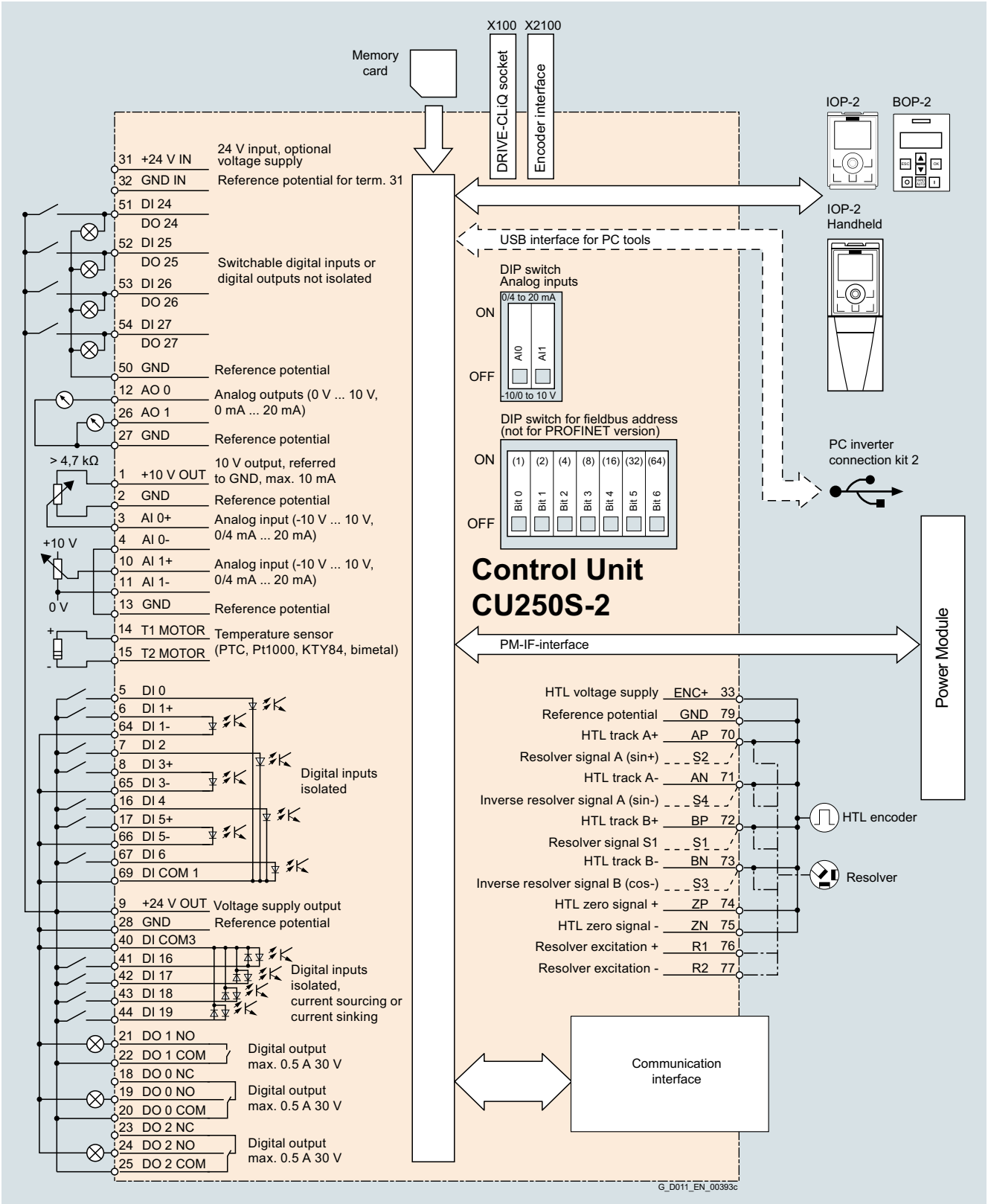


*) Only for CU240E-2 F and CU240E-2 DP-F
**) For CU240E-2, CU240E-2 DP and CU240E-2 PN.

Connection example of a CU240E-2 series Control Unit

More information about the interfaces of the Control Unit is available on the Internet at:
https://support.industry.siemens.com/cs/document/109477361

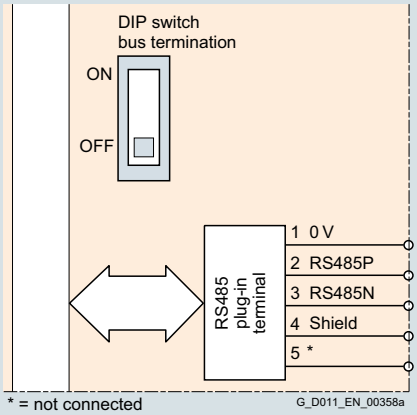
Integration (continued)



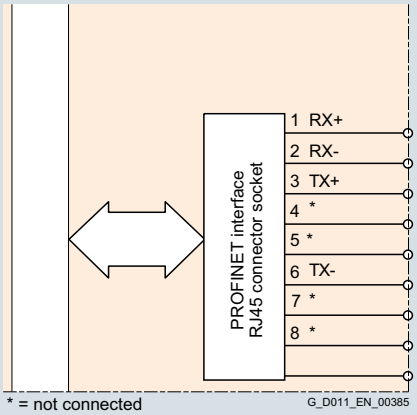
Connection example of a CU250S-2 series Control Unit

More information about the interfaces of the Control Unit is available on the Internet at:
https://support.industry.siemens.com/cs/document/99730303

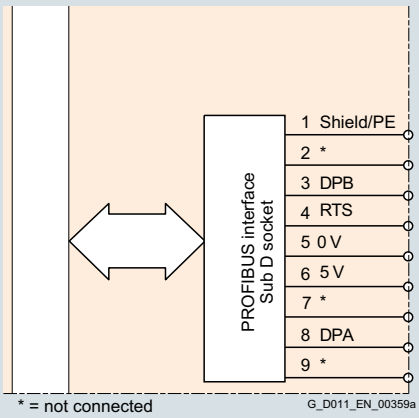
Integration (continued)



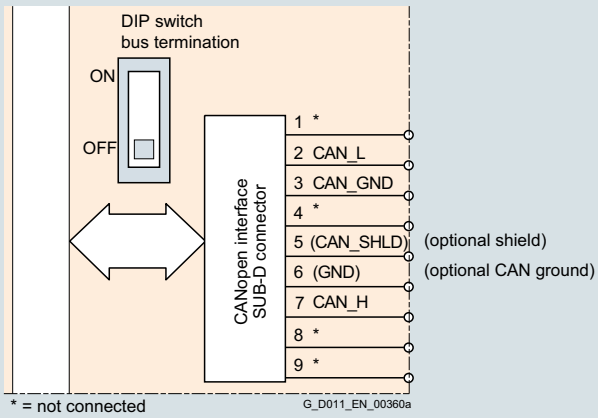
Communication interface USS, Modbus RTU, BACnet MS/TP, FLN P1 (BACnet MS/TP and FLN P1 for CU230P-2 HVAC only)



Communication interface PROFINET, EtherNet/IP



PROFIBUS DP communication interface



CANopen communication interface (only for CU250S-2)

Selection and ordering data

Description	Fieldbus	Profile	Inputs Outputs	Integrated safety technology	Fail-safe digital inputs digital outputs	**Control Unit** Article No.
CU230P-2 series – the specialist for pumps, fans, compressors, water, buildings Technology functions (selection): Free function blocks (FFB), 4 × PID controller, cascade connection, hibernation mode, essential service mode, multi-zone control						
CU230P-2 HVAC	• USS • Modbus RTU • BACnet MS/TP • FLN P1	–	6 DI 4 AI 3 DO 2 AO	–	–	**6SL3243-0BB30-1HA3**
CU230P-2 DP	• PROFIBUS DP	• PROFIdrive				**6SL3243-0BB30-1PA3**
CU230P-2 PN	• PROFINET	• PROFIdrive • PROFIenergy				**6SL3243-0BB30-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU240E-2 series – for standard applications in general machinery construction, such as conveyor belts, mixers and extruders – without encoder Technology functions (selection): Free function blocks (FFB), 1 × PID controller, motor holding brake						
CU240E-2	• USS • Modbus RTU	–	6 DI 2 AI 3 DO 2 AO	STO	1 F-DI (opt. for each 2 DI)	**6SL3244-0BB12-1BA1**
CU240E-2 DP	• PROFIBUS DP	• PROFIdrive • PROFIsafe				**6SL3244-0BB12-1PA1**
CU240E-2 PN	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3244-0BB12-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU240E-2 F	• USS • Modbus RTU	–		STO, SS1, SLS, SDI	3 F-DI (opt. for each 2 DI)	**6SL3244-0BB13-1BA1**
CU240E-2 DP-F	• PROFIBUS DP	• PROFIdrive • PROFIsafe		STO, SS1, SLS, SSM [1], SDI		**6SL3244-0BB13-1PA1**
CU240E-2 PN-F	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3244-0BB13-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU250S-2 series – for complex applications such as extruders and centrifuges – with and without encoder (basic positioner (EPos) optional) Technology functions (selection): Free function blocks (FFB), 1 × PID controller, motor holding brake						
CU250S-2	• USS • Modbus RTU	–	11 DI 2 AI 3 DO 2 AO 4 DI/DO (DI can be used as high-speed inputs)	STO, SBC, SS1	3 F-DI (opt. for each 2 DI) 1 F-DO (opt. for each 2 DO)	**6SL3246-0BA22-1BA0**
CU250S-2 DP	• PROFIBUS DP	• PROFIdrive • PROFIsafe				**6SL3246-0BA22-1PA0**
CU250S-2 PN	• PROFINET	• PROFIdrive • PROFIsafe • PROFIenergy				**6SL3246-0BA22-1FA0**
	• EtherNet/IP - ODVA AC drive - SINAMICS profile	–				
CU250S-2 CAN	• CANopen	–				**6SL3246-0BA22-1CA0**

[1] SSM is possible only with PROFIsafe.

Selection and ordering data (continued)

Optional memory card with firmware V4.7 SP10 for CU230P-2, CU240E-2 and CU250S-2 Control Units

Description	Suitable for		Article No.
SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10)	CU230P-2 CU240E-2 CU250S-2	NEW	**6SL3054-7TF00-2BA0**

Optional memory cards with licenses for CU250S-2 Control Units only

Description	**SINAMICS SD card 512 MB + licenses** Article No.	**SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10) + licenses** Article No.	**Licenses (without SD card) for upgrading license of an existing SD card** Article No.
License Extended Functions Basic positioner (EPos)	**6SL3054-4AG00-2AA0-Z E01**	**6SL3054-7TF00-2BA0-Z E01**	**6SL3074-7AA04-0AA0**
License Extended Functions Safety (SLS, SSM, SDI)	**6SL3054-4AG00-2AA0-Z F01**	**6SL3054-7TF00-2BA0-Z F01**	**6SL3074-0AA10-0AA0**
Licenses Extended Functions Basic positioner (EPos) + Safety (SLS, SSM, SDI)	**6SL3054-4AG00-2AA0-Z E01+F01**	**6SL3054-7TF00-2BA0-Z E01+F01**	**–**

More information on firmware V4.7 SP10:
https://support.industry.siemens.com/cs/document/109755811

For an overview and more information on all available firmware versions, see
https://support.industry.siemens.com/cs/document/67364620

Technical specifications

Control Unit	**CU230P-2 series** 6SL3243-0BB30-1 . A3 6SL3243-0BB30-1FA0	**CU240E-2 series** 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0	**CU250S-2 series** 6SL3246-0BA22-1 . A0
Electrical specifications			
Operating voltage	24 V DC via the Power Module or by connecting to an external 20.4 ... 28.8 V DC power supply		
Current consumption, max.	0.5 A	0.5 A	1.5 A
Protective insulation	PELV according to EN 50178 Protective separation from the line supply using double/reinforced insulation		
Power loss, max.	5 W	5 W	12 W
Interfaces			
Digital inputs – Standard	6 isolated inputs	6 isolated inputs	11 isolated inputs +4 switchable DI/DO, non-isolated (DI can be used as high-speed inputs)
	Optically isolated, free reference potential (own potential group), input current 5.5 mA NPN/PNP logic can be selected using the wiring Switching level: 0 → 1: 11 V Switching level: 1 → 0: 5 V		
Digital inputs – Fail-safe	–	1 (use of 2 × DI standard) Max. 3 (use of 6 × DI standard) for CU240E-2 F, CU240E-2 PN-F and CU240E-2 DP-F	1 (use of 2 × DI standard) Max. 3 (use of 6 × DI standard)
Digital outputs	2 relay changeover contacts 250 V AC, 2 A (inductive load), 30 V DC, 5 A (ohmic load) The following applies to systems complying with UL: A maximum of 3 A, 30 V DC or 2 A, 250 V AC may be connected via terminals 18 / 20 (DO0 NC) and 23 / 25 (DO2 NC) 1 relay NO contact 30 V DC, 0.5 A (ohmic load)	1 transistor 30 V DC, 0.5 A (ohmic load) 2 relay changeover contacts 30 V DC, 0.5 A (ohmic load)	2 relay changeover contacts 30 V DC, 0.5 A (ohmic load) 1 relay NO contact 30 V DC, 0.5 A (ohmic load)
Digital outputs – Fail-safe	–	–	1 (use of 2 × DO standard)
Analog inputs – standard	2 differential inputs	2 differential inputs	2 differential inputs
	Switchable using DIP switch between voltage and current: -10 ... +10 V, 0/4 ... 20 mA, 12-bit resolution (with CU250S-2: 13-bit resolution) The differential analog inputs can be configured as additional digital inputs. Switching thresholds: 0 → 1: Rated voltage 4 V 1 → 0: Rated voltage 1.6 V		
Analog inputs – switchable: Temperature sensor/current	1 non-isolated input, switchable using DIP switch between current 0/4 ... 20 mA and temperature sensor, type Pt1000/LG-Ni1000/DIN-Ni1000, 12-bit resolution	–	–
Analog inputs – temperature sensor	1 non-isolated input, temperature sensor, type Pt1000/LG-Ni1000/DIN-Ni1000, 12-bit resolution	–	–
Analog outputs	2 non-isolated outputs	2 non-isolated outputs	2 non-isolated outputs
	Switchable between voltage and current using parameter setting: 0 ... 10 V, 0/4 ... 20 mA Voltage mode: 10 V, min. burden 10 kΩ Current mode: 20 mA, max. burden 500 Ω The analog outputs have short-circuit protection		
PTC/KTY interface	1 motor temperature sensor input, connectable sensors PTC, Pt1000, KTY and bimetal, accuracy ±5 °C	1 motor temperature sensor input, connectable sensors PTC, Pt1000, KTY and bimetal, accuracy ±5 °C	2 motor temperature sensor inputs, connectable sensors PTC, Pt1000, KTY and bimetal, accuracy ±5 °C • 1 input via terminal 14/15 • 1 input via SUB-D encoder interface X2100
Removable terminal connector for I/O interface	–	✓	✓

Technical specifications (continued)

Control Unit	**CU230P-2 series** 6SL3243-0BB30-1 . A3 6SL3243-0BB30-1FA0	**CU240E-2 series** 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0	**CU250S-2 series** 6SL3246-0BA22-1 . A0
Integrated bus interface			
USS, Modbus RTU RS485 connected at a terminal, isolated, bus terminating resistor can be switched in, slave address can be set using DIP switches USS: max. 187.5 kBaud Modbus RTU:19.2 kBaud	CU230P-2 HVAC 6SL3243-0BB30-1HA3	CU240E-2 6SL3244-0BB12-1BA1 CU240E-2 F 6SL3244-0BB13-1BA1	CU250S-2 6SL3246-0BA22-1BA0
BACnet MS/TP, FLN P1 RS485 connected to a terminal, isolated, bus terminating resistor can be switched in Max. 187.5 kBaud	CU230P-2 HVAC 6SL3243-0BB30-1HA3	–	–
PROFIBUS DP - PROFIdrive profile 9-pin SUB-D socket, isolated, PROFIdrive profile V4.1, slave address can be set using DIP switches Max. 12 Mbit/s	CU230P-2 DP 6SL3243-0BB30-1PA3	CU240E-2 DP 6SL3244-0BB12-1PA1 incl. PROFIsafe CU240E-2 DP-F 6SL3244-0BB13-1PA1 incl. PROFIsafe	CU250S-2 DP 6SL3246-0BA22-1PA0 incl. PROFIsafe
PROFINET - PROFIdrive profile - PROFIenergy profile 2 × RJ45, PROFIdrive profile V4.1, device name can be stored on the device Max. 100 Mbit/s (full duplex)	CU230P-2 PN 6SL3243-0BB30-1FA0	CU240E-2 PN 6SL3244-0BB12-1FA0 incl. PROFIsafe CU240E-2 PN-F 6SL3244-0BB13-1FA0 incl. PROFIsafe	CU250S-2 PN 6SL3246-0BA22-1FA0 incl. PROFIsafe
EtherNet/IP - ODVA AC drive - SINAMICS profile	CU230P-2 PN 6SL3243-0BB30-1FA0	CU240E-2 PN 6SL3244-0BB12-1FA0 CU240E-2 PN-F 6SL3244-0BB13-1FA0	CU250S-2 PN 6SL3246-0BA22-1FA0
CANopen 9-pin SUB-D connector, isolated, slave address can be set using DIP switches, bus terminating resistor can be switched in Max. 1 Mbit/s	–	–	CU250S-2 CAN 6SL3246-0BA22-1CA0
Tool interfaces			
Memory card	SINAMICS SD card		
Operator panels	• IOP-2 supported connection options between Control Unit and IOP-2: Can be directly plugged on, door mounting or handheld • BOP-2 Supported connection options between Control Unit and BOP-2: can be directly plugged on or door-mounted • SINAMICS G120 Smart Access Supported connection options between CU230P-2 and CU240E-2 Control Units and SINAMICS G120 Smart Access: Can be directly plugged on for wireless commissioning, operation and diagnostics via mobile device		
PC interface	USB (connection via PC inverter connection kit 2)		
Open-loop/closed-loop control techniques			
V/f linear/square/parameterizable	✓		
V/f with flux current control (FCC)	✓		
V/f ECO; linear/square-law	✓		
Vector control, sensorless	✓		
Vector control, with sensor	–	–	✓
Torque control, sensorless	–	✓	✓
Torque control, with sensor	–	–	✓
Software functions			
Application macro	✓		
Setpoint input, can be parameterized	✓		
Fixed frequencies	16, parameterizable		
JOG	✓		
Digital motorized potentiometer (MOP)	✓		
Ramp smoothing	✓		
Extended ramp-function generator (with ramp smoothing OFF3)	✓		

Technical specifications (continued)

Control Unit	**CU230P-2 series** 6SL3243-0BB30-1 . A3 6SL3243-0BB30-1FA0	**CU240E-2 series** 6SL3244-0BB1 . -1 . A1 6SL3244-0BB1 . -1FA0	**CU250S-2 series** 6SL3246-0BA22-1 . A0
Software functions (continued)			
Slip compensation	✓		
Signal interconnection with BICO technology	✓		
Trace	✓		
Energy saving display	✓		
Switchable drive data sets (DDS)	✓ (4)		
Switchable command data sets (CDS)	✓ (4)		
Free function blocks (FFB) for logical and arithmetic operations	✓		
Technology controller (internal PID)	✓		
3 additional, free PID controllers	✓	–	–
2-zone controller	✓	–	–
Flying restart	✓		
Automatic restart after line supply failure or operating fault (AR)	✓		
Hibernation mode with internal/ external PID controller	✓	–	–
Belt monitoring with and without sensor (load torque monitoring)	✓	–	✓
Dry-running/overload protection monitoring (load torque monitoring)	✓	–	–
Thermal motor protection	✓ (I^2t, sensor: PTC/Pt1000/KTY/bimetal)		
Thermal inverter protection	✓		
Motor identification	✓		
Motor holding brake	–	✓	✓
Auto-ramping (V_{dc_max} controller)	✓		
Kinetic buffering (V_{dc_min} controller)	✓		
Braking functions for PM240-2			
• DC braking	✓		
• Compound braking	✓		
• Dynamic braking with integrated braking chopper and external braking resistor	✓		
Braking functions for PM250 Regenerative feedback	✓		
Mechanical specifications and ambient conditions			
Degree of protection	IP20		
Signal cable cross-section			
• Min.	0.15 mm^2 (AWG28)	0.2 mm^2 (AWG24)	0.2 mm^2 (AWG24)
• Max.	1.5 mm^2 (AWG16)	1.5 mm^2 (AWG16)	1.5 mm^2 (AWG16)
Operating temperature Derating of 3 K/1000 m applies to Control Units as of an installation altitude of 1000 m (3281 ft) above sea level.	-10 ... +60 °C (14 ... 140 °F) For CU230P-2 PN: -10 ... +55 °C (14 ... 131 °F) With IOP-2/BOP-2: 0 ... 50 °C (32 ... 122 °F)	-10 ... +55 °C (14 ... 131 °F) For CU240E-2 PN and CU240E-2 PN-F: -10 ... +53 °C (14 ... 127.4 °F) With IOP-2/BOP-2: 0 ... 50 °C (32 ... 122 °F)	-10 ... +50 °C (14 ... 122 °F) With IOP-2/BOP-2: 0 ... +50 °C (32 ... 122 °F)
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)		
Relative humidity	<95 % RH, condensation not permissible		
Dimensions			
• Width	73 mm (2.87 in)	73 mm (2.87 in)	73 mm (2.87 in)
• Height	199 mm (7.83 in)	199 mm (7.83 in)	199 mm (7.83 in)
• Depth	65.5 mm (2.58 in)	46 mm (1.81 in)	67 mm (2.64 in)
Weight, approx.	0.61 kg (1.34 lb)	0.49 kg (1.08 lb)	0.67 kg (1.48 lb)

Overview

PM240-2 Power Modules – 0.55 kW to 250 kW (0.75 hp to 400 hp), IP20 degree of protection

PM240-2 Power Modules, frame sizes FSA to FSG (with Control Unit and Operator Panel)

The PM240-2 Power Modules are based on a new hardware platform. This permits an increase in power density as well as the application of innovative cooling concepts (push-through technology) with especially high requirements in terms of control cabinet cooling.

Furthermore, the PM240-2 Power Module is also suitable for use in safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated Drive (see section Control Units).

The PM240-2 Power Modules in frame sizes FSA to FSF are available both with and without an integrated line filter class A of compact design for 200 V, 400 V and 690 V line voltages (except PM240-2 frame sizes FSD to FSF: 200 V). The PM240-2 Power Modules in frame size FSG are available with an integrated line filter Category C3 of compact design for 400 V and 690 V line voltages, also with integrated line filter Category C2 for a line voltage of 400 V. In addition, a DC link reactor is integrated in the PM240-2 Power Modules, frame sizes FSD to FSG, and therefore no line reactor is required.

The PM240-2 Power Modules with integrated line filter class A are suitable for connection to TN supply systems. Power Modules without integrated line filter can be connected to grounded TN/TT systems and non-grounded IT systems.

The PM240-2 Power Module has an integrated braking chopper. In generating mode, the excess energy of the DC link can be dissipated by means of an optional braking resistor.

The permissible cable lengths between inverter and motor are limited (for max. permissible cable lengths, see Integration). Longer cables can be used if output reactors are connected (see section Load-side power components).

Push-through variant

Example: PM240-2 Power Modules, degree of protection IP20, push-through variant, frame sizes FSD to FSF (with Control Unit and Operator Panel)

The push-through variants in the frame sizes FSA to FSF allow the cooling fins of the Power Modules to be pushed through the rear panel of the control cabinet. Push-through variants should be used in applications where the amount of power loss generated inside the control cabinet itself must be minimized.

Shield plates and shield connection kits are available for use in the wiring installation of Control Units and Power Modules to ensure that it complies with EMC guidelines.
For more information, see Shield connection kits for Control Units and Power Modules in section Supplementary system components.

Overview (continued)

PM250 Power Modules – 7.5 kW to 90 kW (10 hp to 125 hp), IP20 degree of protection

PM250 Power Modules, frame sizes FSC to FSF

PM250 Power Modules are suitable for a large number of applications in general mechanical engineering. Any braking energy is directly fed back into the line supply (four-quadrant applications – a braking chopper is not required).

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

Further, the innovative circuit design reduces the line harmonics. There is no need to use an optional line reactor at the supply infeed. This saves space and costs for engineering and procurement.

The permissible cable lengths between inverter and motor are limited (for max. permissible cable lengths, see Integration). Longer cables can be used if output reactors are connected (see section Load-side power components).

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

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

The PM250 Power Module is also designed for safety-oriented applications. In conjunction with a fail-safe Control Unit, the drive can be transformed into a Safety Integrated Drive (see section Control Units).

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

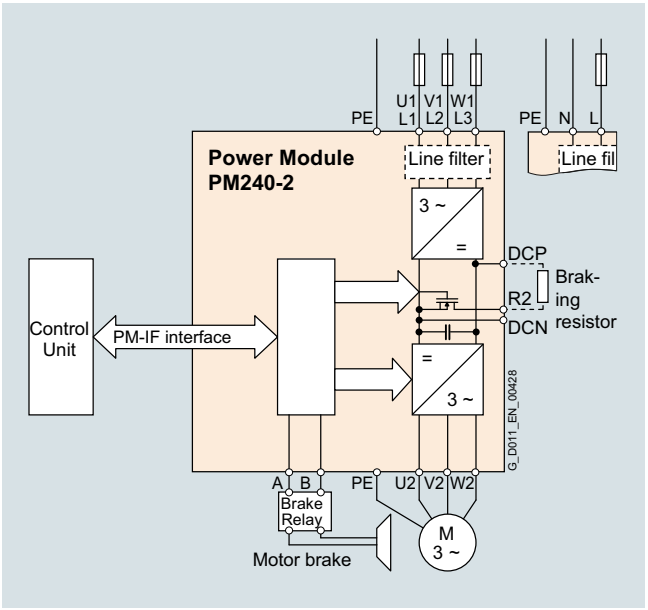
Note:

Shield plates and shield connection kits are available for use in the wiring installation of Control Units and Power Modules to ensure that it complies with EMC guidelines.
For more information, see Shield connection kits for Control Units and Power Modules in section Supplementary system components.

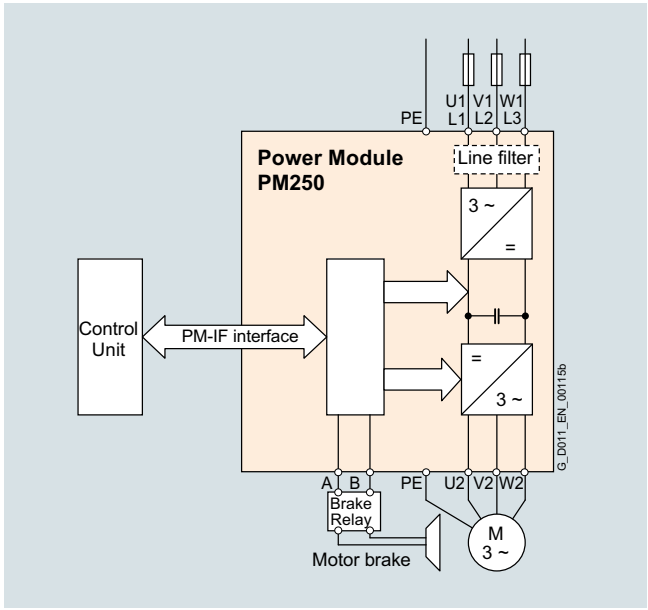
Integration

All Power Modules have the following connections and interfaces:

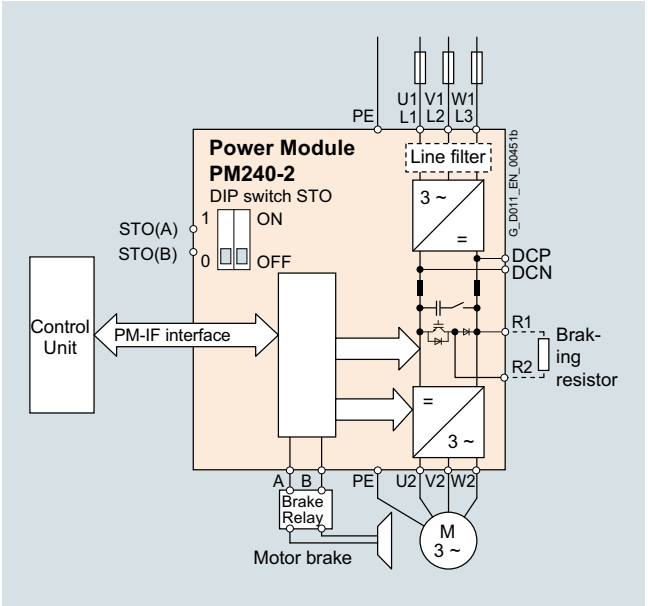
- PM-IF interface to connect the Power Module to the Control Unit. The Power Module also supplies power to the Control Unit using an integrated power supply
- Motor connection using screw-type terminals or screw studs
- 2 PE/protective conductor connections
- Shield connection plate



Connection example for PM240-2 Power Modules, frame sizes FSA to FSC, with or without integrated line filter



Connection example for PM250 Power Modules with or without integrated line filter



Connection example for PM240-2 Power Modules, frame sizes FSD to FSG, with or without integrated line filter

Integration (continued)

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

The following line-side 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**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 200 V versions	✓	✓	✓	✓ 1)	✓ 1)	✓ 1)	–
• 400 V versions	✓	✓	✓	✓	✓	✓	✓
• 690 V versions	–	–	–	✓ 2)	✓ 2)	✓	✓
Line-side components							
Line filter class A	**F**	**F**	**F**	**F** 1)	**F** 1)	**F** 1)	–
Line filter class B (only for 400 V versions)	**U** 3)	**U** 3)	**U** 3)	–	–	–	–
Line filters Category C2 or C3 (for 400 V versions frame size FSG)	–	–	–	–	–	–	**I**
Line filters Category C3 (for 690 V versions frame size FSG)	–	–	–	–	–	–	**I** 4)
Line reactor (only for 3 AC versions 5))	**S** 6)	**S** 6)	**S** 6)	**I**	**I**	**I**	**I**
DC link components							
Braking resistor	**S**	**S**	**S**	**S**	**S**	**S**	**S**
Load-side power components							
Output reactor	**S**	**S**	**S**	**S** 2)	**S** 2)	**S**	**S**
dv/dt filter plus VPL (for 400 V and 690 V versions only 9))	**S**	**S**	**S**	**S**	**S**	**S**	**S**
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side components							
Line filter class A	–	–	**I**	**F**	**F**	**F**	–
Line filter class B	–	–	**U**	–	–	–	–
Line reactor 7)	–	–	– 7)	– 7)	– 7)	– 7)	–
DC link components							
Braking resistor 8)	–	–	– 8)	– 8)	– 8)	– 8)	–
Load-side power components							
Output reactor	–	–	**U**	**S**	**S**	**S**	–
Sine-wave filter	–	–	**U**	**S**	**S**	**S**	–

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

1) The 200 V versions of the PM240-2 Power Modules, frame sizes FSD to FSF, are only available without integrated line filter.

2) There are no optional output reactors available for 690 V versions of PM240-2 Power Modules, frame sizes FSD and FSE.

3) Lateral mounting is the only possible option for push-through variants.

4) The 690 V versions of the PM240-2 Power Modules frame size FSG are only available with an integrated Category C3 filter. To operate the inverter also within TN systems with grounded outer conductor, you must remove the grounding screw.

5) With the appropriate wiring, the line reactors for 200 V 3 AC can be used for the 200 V versions for 200 V 1 AC. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109486005
https://support.industry.siemens.com/cs/document/109482011

6) For frame sizes FSA to FSC, for lines with u_k < 1 %, it is recommended that you use a line reactor or the next more powerful Power Module. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109482011

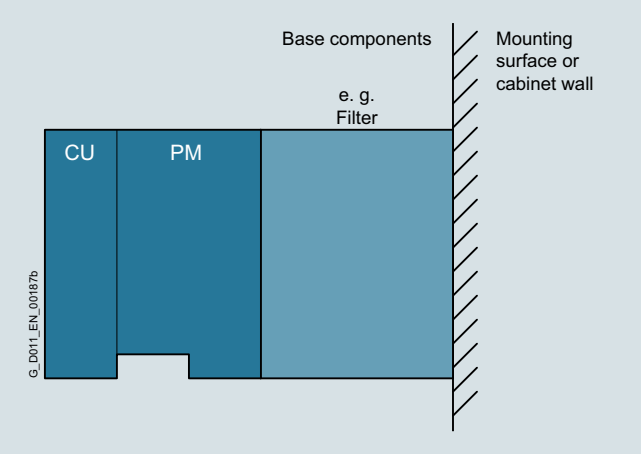
7) A line reactor is not required and must not be used in conjunction with a PM250 Power Module.

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

9) The 690 V versions of the PM240-2 Power Modules require motors with a suitable isolating system for 690 V inverter operation (IVIC-C premium). The VSD10 line with corresponding SIMOTICS GP 1LE109 General Purpose motors or SIMOTICS SD 1LE159 Severe Duty motors is ideally suited for inverter operation at 690 V.
More information is available in Catalog D 81.1.

Integration (continued)

General design information



Inverter comprising a Power Module (PM), a Control Unit (CU), and base components (side view)

- If at all possible, the line filter should be mounted directly below the inverter [1].
- With lateral mounting, the line-side components have to be mounted on the left side of the inverter, and the load-side components on the right side.
- Braking resistors have to be mounted directly on the control cabinet wall due to heating issues.

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

Power Module Frame size	Base	Lateral mounting **Left of the inverter (for line-side components)**	**Right of the inverter (for load-side power components and DC link components)**
FSA and FSB	Line filter	Line reactor	Output reactor or dv/dt filter plus VPL and/or braking resistor
FSC	Line filter [1]	Line reactor	Output reactor or dv/dt filter plus VPL and/or braking resistor
FSD and FSE	–	Line filter	Output reactor or sine-wave filter or dv/dt filter plus VPL and/or braking resistor
FSF and FSG	–	Line filter	Output reactor or sine-wave filter or dv/dt filter plus VPL and/or braking resistor

[1] With the PM250 Power Module, frame size FSC, the output reactor and sine-wave filter can be installed as base components. The output reactor or sine-wave filter should be mounted under the line filter.

Integration (continued)

Maximum permissible cable lengths from the motor to the inverter when using output reactors, dv/dt filters plus VPL or filters depending on the voltage range and the Power Module being used

	Maximum permissible motor cable lengths (shielded/unshielded) in m (ft)						
Frame size	**FSA**	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Without optional power components							
• 200 V versions without integrated line filter	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)	–
• 200 V versions with integrated line filter	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	–	–	–	–
• 400 V versions without integrated line filter	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)	300/450 (984/1476)
• 400 V versions with integrated line filter	50/100 (164/328)	100/100 (328/328) [1]	150/150 (492/492) [1]	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)	300/450 (984/1476)
• 690 V versions	–	–	–	200/300 (656/984)	200/300 (656/984)	300/450 (984/1476)	300/450 (984/1476)
With optional output reactor							
• At 200 ... 240 V 1 AC/3 AC	150/225 (492/738)	150/225 (492/738)	150/225 (492/738)	200/300 (656/984) [2]	200/300 (656/984) [2]	300/450 (984/1476) [2]	–
• At 380 ... 415 V 3 AC	150/225 (492/738)	150/225 (492/738)	150/225 (492/738)	200/300 (656/984) [2]	200/300 (656/984) [2]	300/450 (984/1476) [2]	300/450 (984/1476) [2]
• At 440 ... 480 V 3 AC	100/150 (328/492)	100/150 (328/492)	100/150 (328/492)	200/300 (656/984) [2]	200/300 (656/984) [2]	300/450 (984/1476) [2]	300/450 (984/1476) [2]
• At 500 ... 690 V 3 AC	–	–	–	200/300 (656/984) [2]	200/300 (656/984) [2]	300/450 (984/1476) [2]	300/450 (984/1476) [2]
With optional dv/dt filter plus VPL							
• At 380 ... 480 V 3 AC	350/525 (1148/1723)	350/525 (1148/1723)	350/525 (1148/1723)	30 kW: 350/525 (1148/1723) 37 kW: 450/650 (1476/2133) [3]	450/650 (1476/133) [3]	450/650 (1476/2133) [3]	–
• At 500 ... 690 V 3 AC	–	–	–	350/525 (1148/1723)	350/525 (1148/1723)	450/650 (1476/2133) [3]	450/650 (1476/2133) [3]
With integrated line filter According to EN 55011 to comply with radio interference emissions according to EN 61800-3 EMC Category C2							
• At 200 ... 240 V 1 AC/3 AC	50/– (164/–)	50/– (164/–)	50/– (164/–)	–	–	–	–
• At 380 ... 480 V 3 AC	50/– (164/–)	100/– (328/–) [4]	150/– (492/–) [4]	150/– (492/–)	150/– (492/–)	150/– (492/–)	150 /– (492/–) (Category C2) 300 /– (984/–) (Category C3)
• At 500 ... 690 V 3 AC	–	–	–	100/– (328/–)	100/– (328/–)	150 /– (492/-) (Category C3)	300 /– (984/-) (Category C3 [5])
With optional, external line filter class B According to EN 55011 to comply with conducted radio interference emissions according to EN 61800-3 EMC Category C1 [6], **together with unfiltered Power Module**							
• At 380 ... 480 V 3 AC	50/– (164/–)	50/– (164/–)	50/– (164/–)	–	–	–	–
With optional, external line filter class B According to EN 55011 **and optional output reactor** to comply with radio interference emissions according to EN 61800-3 EMC Category C2 [6], **together with unfiltered Power Module**							
• At 380 ... 415 V 3 AC	150/– (492/–)	150/– (492/–)	150/– (492/–)	–	–	–	–
• At 440 ... 480 V 3 AC	100/– (328/–)	100/– (328/–)	100/– (328/–)	–	–	–	–
PM250 Power Module with line-commutated energy recovery							
Without optional power components	–	–	25/100 (82/328)	50/100 (164/328) [7]	50/100 (164/328) [7]	50/100 (164/328) [7]	–
With optional output reactor							
• At 380 ... 400 V 3 AC	–	–	150/225 (492/738)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
• At 401 ... 480 V 3 AC	–	–	100/150 (328/492)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–
With optional sine-wave filter							
• At 380 ... 480 V 3 AC	–	–	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	200/300 (656/984)	–

1) The values apply with low-capacitance CY cables – the max. permissible motor cable length is 50 m (164 ft) (shielded) and 100 m (328 ft) (unshielded) as standard.

2) For frame sizes FSD to FSG the maximum permissible cable lengths are not increased with an output reactor. By means of the output reactor, the loading of the motor windings is reduced by lower rates of voltage rise (*dv/dt*). By means of two output reactors connected in series, the maximum permissible cable lengths for frame sizes FSD and FSE are increased to 350 m (1148 ft) (shielded) and 525 m (1723 ft) (unshielded), and for frame sizes FSF and FSG to 525 m (1723 ft) (shielded) and 800 m (2625 ft) (unshielded). There are no optional output reactors available for 690 V versions of PM240-2 Power Modules, frame sizes FSD and FSE.

3) Maximum overvoltage at the motor terminals <1350 V with cable lengths up to 450 m (1476 ft) shielded or 650 m (2133 ft) unshielded – maximum overvoltage at the motor terminals <1500 V with cable lengths up to 525 m (1723 ft) shielded or 800 m (2625 ft) unshielded.

4) The values apply with low-capacitance CY cables – the max. permissible motor cable length is 50 m (164 ft) (shielded) as standard.

5) The 690 V versions of the PM240-2 Power Modules frame size FSG are only available with an integrated Category C3 filter. To operate the inverter also within TN systems with grounded outer conductor, you must remove the grounding screw.

6) Further information is available on the Internet at www.siemens.com/sinamics-g120/documentation

7) Max. motor cable length 25 m (82 ft) (shielded) for Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2.

Selection and ordering data

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

- Rated output current for applications with low overload (LO)
- Base-load current for applications with high overload (HO)

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

PM240-2 Power Modules standard variant

Rated power [1]		Rated output current I_{rated} [2]	Power based on the base-load current [3]		Base-load current I_H [3]	Frame size	**PM240-2 Power Module standard variant without integrated line filter**	**PM240-2 Power Module standard variant with integrated line filter class A**
kW	hp	A	kW	hp	A		Article No.	Article No.
200 ... 240 V 1 AC/3 AC								
0.55	0.75	3.2	**0.37**	0.5	2.3	FSA	**6SL3210-1PB13-0UL0**	**6SL3210-1PB13-0AL0**
0.75	1	4.2	**0.55**	0.75	3.2	FSA	**6SL3210-1PB13-8UL0**	**6SL3210-1PB13-8AL0**
1.1	1.5	6	**0.75**	1	4.2	FSB	**6SL3210-1PB15-5UL0**	**6SL3210-1PB15-5AL0**
1.5	2	7.4	**1.1**	1.5	6	FSB	**6SL3210-1PB17-4UL0**	**6SL3210-1PB17-4AL0**
2.2	3	10.4	**1.5**	2	7.4	FSB	**6SL3210-1PB21-0UL0**	**6SL3210-1PB21-0AL0**
3	4	13.6	**2.2**	3	10.4	FSC	**6SL3210-1PB21-4UL0**	**6SL3210-1PB21-4AL0**
4	5	17.5	**3**	4	13.6	FSC	**6SL3210-1PB21-8UL0**	**6SL3210-1PB21-8AL0**
200 ... 240 V 3 AC								
5.5	7.5	22	**4**	5	17.5	FSC	**6SL3210-1PC22-2UL0**	**6SL3210-1PC22-2AL0**
7.5	10	28	**5.5**	7.5	22	FSC	**6SL3210-1PC22-8UL0**	**6SL3210-1PC22-8AL0**
11	15	42	**7.5**	10	35	FSD	**6SL3210-1PC24-2UL0**	–
15	20	54	**11**	15	42	FSD	**6SL3210-1PC25-4UL0**	–
18.5	25	68	**15**	20	54	FSD	**6SL3210-1PC26-8UL0**	–
22	30	80	**18.5**	25	68	FSE	**6SL3210-1PC28-0UL0**	–
30	40	104	**22**	30	80	FSE	**6SL3210-1PC31-1UL0**	–
37	50	130	**30**	40	104	FSF	**6SL3210-1PC31-3UL0**	–
45	60	154	**37**	50	130	FSF	**6SL3210-1PC31-6UL0**	–
55	75	178	**45**	60	154	FSF	**6SL3210-1PC31-8UL0**	–

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

[2] The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 200 V, 400 V or 690 V and are specified on the rating plate of the Power Module.

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

Selection and ordering data (continued)

Rated power [1]		Rated output current I_{rated} [2]	Power based on the base-load current [3]		Base-load current I_H [3]	Frame size	PM240-2 Power Module standard variant without integrated line filter	PM240-2 Power Module standard variant with integrated line filter class A
kW	hp	A	kW	hp	A		Article No.	Article No.
380 ... 480 V 3 AC [4]								
0.55	0.75	1.7	**0.37**	0.5	1.3	FSA	6SL3210-1PE11-8UL1	6SL3210-1PE11-8AL1
0.75	1	2.2	**0.55**	0.75	1.7	FSA	6SL3210-1PE12-3UL1	6SL3210-1PE12-3AL1
1.1	1.5	3.1	**0.75**	1	2.2	FSA	6SL3210-1PE13-2UL1	6SL3210-1PE13-2AL1
1.5	2	4.1	**1.1**	1.5	3.1	FSA	6SL3210-1PE14-3UL1	6SL3210-1PE14-3AL1
2.2	3	5.9	**1.5**	2	4.1	FSA	6SL3210-1PE16-1UL1	6SL3210-1PE16-1AL1
3	4	7.7	**2.2**	3	5.9	FSA	6SL3210-1PE18-0UL1	6SL3210-1PE18-0AL1
4	5	10.2	**3**	4	7.7	FSB	6SL3210-1PE21-1UL0	6SL3210-1PE21-1AL0
5.5	7.5	13.2	**4**	5	10.2	FSB	6SL3210-1PE21-4UL0	6SL3210-1PE21-4AL0
7.5	10	18	**5.5**	7.5	13.2	FSB	6SL3210-1PE21-8UL0	6SL3210-1PE21-8AL0
11	15	26	**7.5**	10	18	FSC	6SL3210-1PE22-7UL0	6SL3210-1PE22-7AL0
15	20	32	**11**	15	26	FSC	6SL3210-1PE23-3UL0	6SL3210-1PE23-3AL0
18.5	25	38	**15**	20	32	FSD	6SL3210-1PE23-8UL0	6SL3210-1PE23-8AL0
22	30	45	**18.5**	25	38	FSD	6SL3210-1PE24-5UL0	6SL3210-1PE24-5AL0
30	40	60	**22**	30	45	FSD	6SL3210-1PE26-0UL0	6SL3210-1PE26-0AL0
37	50	75	**30**	40	60	FSD	6SL3210-1PE27-5UL0	6SL3210-1PE27-5AL0
45	60	90	**37**	50	75	FSE	6SL3210-1PE28-8UL0	6SL3210-1PE28-8AL0
55	75	110	**45**	60	90	FSE	6SL3210-1PE31-1UL0	6SL3210-1PE31-1AL0
75	100	145	**55**	75	110	FSF	6SL3210-1PE31-5UL0	6SL3210-1PE31-5AL0
90	125	178	**75**	100	145	FSF	6SL3210-1PE31-8UL0	6SL3210-1PE31-8AL0
110	150	205	**90**	125	178	FSF	6SL3210-1PE32-1UL0	6SL3210-1PE32-1AL0
132	200	250	**110**	150	205	FSF	6SL3210-1PE32-5UL0	6SL3210-1PE32-5AL0
500 ... 690 V 3 AC								
11	10	14	**7.5**	7.5	11	FSD	6SL3210-1PH21-4UL0	6SL3210-1PH21-4AL0
15	15	19	**11**	10	14	FSD	6SL3210-1PH22-0UL0	6SL3210-1PH22-0AL0
18.5	20	23	**15**	15	19	FSD	6SL3210-1PH22-3UL0	6SL3210-1PH22-3AL0
22	25	27	**18.5**	20	23	FSD	6SL3210-1PH22-7UL0	6SL3210-1PH22-7AL0
30	30	35	**22**	25	27	FSD	6SL3210-1PH23-5UL0	6SL3210-1PH23-5AL0
37	40	42	**30**	30	35	FSD	6SL3210-1PH24-2UL0	6SL3210-1PH24-2AL0
45	50	52	**37**	40	42	FSE	6SL3210-1PH25-2UL0	6SL3210-1PH25-2AL0
55	60	62	**45**	50	52	FSE	6SL3210-1PH26-2UL0	6SL3210-1PH26-2AL0
75	75	80	**55**	60	62	FSF	6SL3210-1PH28-0UL0	6SL3210-1PH28-0AL0
90	100	100	**75**	75	80	FSF	6SL3210-1PH31-0UL0	6SL3210-1PH31-0AL0
110	100	115	**90**	100	100	FSF	6SL3210-1PH31-2UL0	6SL3210-1PH31-2AL0
132	125	142	**110**	100	115	FSF	6SL3210-1PH31-4UL0	6SL3210-1PH31-4AL0

Rated power [1]		Rated output current I_{rated} [2]	Power based on the base-load current [3]		Base-load current I_H [3]	Frame size	PM240-2 Power Module standard variant with integrated line filter Category C3	PM240-2 Power Module standard variant with integrated line filter Category C2
kW	hp	A	kW	hp	A		Article No.	Article No.
380 ... 480 V 3 AC [4]								
160	250	302	**132**	200	250	FSG NEW	6SL3210-1PE33-0CL0 NEW	6SL3210-1PE33-0AL0
200	300	370	**160**	250	302	FSG NEW	6SL3210-1PE33-7CL0 NEW	6SL3210-1PE33-7AL0
250	400	477	**200**	300	370	FSG NEW	6SL3210-1PE34-8CL0 NEW	6SL3210-1PE34-8AL0
500 ... 690 V 3 AC								
160	150	171	**132**	150	142	FSG [5] NEW	6SL3210-1PH31-7CL0	–
200	200	208	**160**	150	171	FSG [5] NEW	6SL3210-1PH32-1CL0	–
250	250	250	**200**	200	208	FSG [5] NEW	6SL3210-1PH32-5CL0	–

Selection and ordering data (continued)

PM240-2 Power Modules push-through variant

Rated power [1]		Rated output current I_{rated} [2]	Power based on the base-load current [3]		Base-load current I_H [3]	Frame size	PM240-2 Power Module push-through variant without integrated line filter	PM240-2 Power Module push-through variant with integrated line filter class A
kW	hp	A	kW	hp	A		Article No.	Article No.
200 ... 240 V 1 AC/3 AC								
0.75	1	4.2	**0.55**	0.75	3.2	FSA	**6SL3211-1PB13-8UL0**	**6SL3211-1PB13-8AL0**
2.2	3	10.4	**1.5**	2	7.4	FSB	**6SL3211-1PB21-0UL0**	**6SL3211-1PB21-0AL0**
4	5	17.5	**3**	4	13.6	FSC	**6SL3211-1PB21-8UL0**	**6SL3211-1PB21-8AL0**
200 ... 240 V 3 AC								
18.5	25	68	**15**	20	54	FSD	**6SL3211-1PC26-8UL0**	–
30	40	104	**22**	30	80	FSE	**6SL3211-1PC31-1UL0**	–
55	75	178	**45**	60	154	FSF	**6SL3211-1PC31-8UL0**	–
380 ... 480 V 3 AC								
3	4	7.7	**2.2**	7.5	5.9	FSA	**6SL3211-1PE18-0UL1**	**6SL3211-1PE18-0AL1**
7.5	10	18	**5.5**	7.5	13.2	FSB	**6SL3211-1PE21-8UL0**	**6SL3211-1PE21-8AL0**
15	20	32	**11**	15	26	FSC	**6SL3211-1PE23-3UL0**	**6SL3211-1PE23-3AL0**
37	50	75	**30**	40	60	FSD	**6SL3211-1PE27-5UL0**	**6SL3211-1PE27-5AL0**
55	75	110	**45**	60	90	FSE	**6SL3211-1PE31-1UL0**	**6SL3211-1PE31-1AL0**
132	200	250	**110**	150	205	FSF	**6SL3211-1PE32-5UL0**	**6SL3211-1PE32-5AL0**

PM250 Power Modules

Rated power [1]		Rated output current I_{rated} [2]	Power based on the base-load current [3]		Base-load current I_H [3]	Frame size	PM250 Power Module without integrated line filter	PM250 Power Module with integrated line filter class A
kW	hp	A	kW	hp	A		Article No.	Article No.
380 ... 480 V 3 AC								
7.5	10	18	**5.5**	7.5	13.2	FSC	–	**6SL3225-0BE25-5AA1**
11	15	25	**7.5**	10	19	FSC	–	**6SL3225-0BE27-5AA1**
15	20	32	**11**	15	26	FSC	–	**6SL3225-0BE31-1AA1**
18.5	25	38	**15**	20	32	FSD	**6SL3225-0BE31-5UA0**	**6SL3225-0BE31-5AA0**
22	30	45	**18.5**	25	38	FSD	**6SL3225-0BE31-8UA0**	**6SL3225-0BE31-8AA0**
30	40	60	**22**	30	45	FSD	**6SL3225-0BE32-2UA0**	**6SL3225-0BE32-2AA0**
37	50	75	**30**	40	60	FSE	**6SL3225-0BE33-0UA0**	**6SL3225-0BE33-0AA0**
45	60	90	**37**	50	75	FSE	**6SL3225-0BE33-7UA0**	**6SL3225-0BE33-7AA0**
55	75	110	**45**	60	90	FSF	**6SL3225-0BE34-5UA0**	**6SL3225-0BE34-5AA0**
75	100	145	**55**	75	110	FSF	**6SL3225-0BE35-5UA0**	**6SL3225-0BE35-5AA0**
90	125	178	**75**	100	145	FSF	**6SL3225-0BE37-5UA0**	**6SL3225-0BE37-5AA0**

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

2 The rated output current I_{rated} is based on the duty cycle for low overload (LO). These current values are valid for 200 V, 400 V or 690 V and are specified on the rating plate of the Power Module.

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

4 SIPLUS components for extreme requirements are available. Additional information is available on the Internet at www.siemens.com/siplus-drives

5 The 690 V versions of the PM240-2 Power Modules frame size FSG are only available with an integrated Category C3 filter. To operate the inverter also within TN systems with grounded outer conductor, you must remove the grounding screw.

Technical specifications

General technical specifications

Power Modules	PM240-2	PM250
System operating voltage	FSA ... FSC: 200 … 240 V 1 AC/3 AC ±10 % 380 … 480 V 3 AC ±10 % FSD ... FSG: 200 … 240 V 3 AC ±10 % (in operation -20 % < 1 min) 380 ... 480 V 3 AC ±10 % (in operation -20 % < 1 min) 500 … 690 V 3 AC ±10 % (in operation -20 % < 1 min)	380 ... 480 V 3 AC ±10 %
Line supply requirements **Short-circuit power ratio R_{SC}**	200 V: >25 With RSC >50 it is advisable for FSA to FSC to install a line reactor, or alternatively, to select a Power Module with the next-higher power rating. 400 V: >25 With RSC >100 it is advisable for FSA to FSC to install a line reactor, or alternatively, to select a Power Module with the next-higher power rating. 690 V: No restriction	>100
Input frequency	47 ... 63 Hz	
Output frequency		
• Control mode V/f	0 ... 550 Hz	
• Control mode Vector	0 ... 240 Hz	
Pulse frequency	200 V: 4 kHz 400 V: <75 kW: 4 kHz; ≥75 kW: 2 kHz 690 V: 2 kHz For higher pulse frequencies, see derating data	4 kHz For higher pulse frequencies, see derating data
Power factor λ	FSA ... FSC: 0.7 ... 0.85 FSD ... FSG: - 200 V: >0.95 - 400 V and 690 V: >0.9	0.9
Offset factor cos φ	FSA ... FSC: >0.96 FSD ... FSG: 0.98 ... 0.99	0.95 capacitive
Inverter efficiency	200 V: >96 % 400 V: >97 % 690 V: >98 %	95 ... 97 %
Output voltage, max. as % of input voltage	95 %	87 %
Overload capability		
• Low overload (LO) Note: No reduction in base-load current I_L for use of overload	1.5 × base-load current I_L (i.e. 150 % overload) for 3 s **plus** 1.1 × base-load current I_L (i.e. 110 % overload) for 57 s within a cycle time of 300 s	1.5 × base-load current I_L (i.e. 150 % overload) for 3 s **plus** 1.1 × base-load current I_L (i.e. 110 % overload) for 57 s within a cycle time of 300 s
• High overload (HO) Note: No reduction in base-load current I_H for use of overload	2 × base-load current I_H (i.e. 200 % overload) for 3 s **plus** 1.5 × base-load current I_H (i.e. 150 % overload) for 57 s within a cycle time of 300 s	2 × base-load current I_H (i.e. 200 % overload) for 3 s **plus** 1.5 × base-load current I_H (i.e. 150 % overload) for 57 s within a cycle time of 300 s

Technical specifications (continued)

Power Modules	PM240-2	PM250
Possible braking methods	DC braking Compound braking Dynamic braking with integrated braking chopper	Energy recovery in generator operation (max. with rated power based on high overload (HO))
Degree of protection	IP20 (standard or push-through)	IP20
Operating temperature		
• Low overload (LO)	Frame sizes FSA ... FSC: -10 ... +40 °C (14 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics Frame sizes FSD ... FSG: -20 ... +40 °C (-4 ... +104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
• High overload (HO)	Frame sizes FSA ... FSC: -10 ... +50 °C (14 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics Frame sizes FSD ... FSG: -20 ... +50 °C (-4 ... +122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics
Relative humidity	<95 % RH, condensation not permissible	
Cooling	Internal air cooling, power units with increased air cooling by built-in fans	Internal air cooling, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics
Protection functions	• Undervoltage • Overvoltage • Overload • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking	
Short-Circuit Current Rating SCCR according to UL (Short Circuit Current Rating) [1]	200 V: 100 kA 400 V: 100 kA 690 V: 100 kA	FSC: 40 kA FSD … FSF: 42 kA
Compliance with standards	CE, cULus, RCM, SEMI F47, RoHS, EAC, KC (only with internal or external line filters Category C2) For frame sizes FSD ... FSG also: WEEE (Waste Electrical & Electronic Equipment)	CE, UL, cUL, RCM, SEMI F47
CE marking	According to Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU	

[1] Applies to industrial control panel installations to NEC article 409 or UL 508A.

Technical specifications (continued)

PM240-2 Power Modules standard variant

Line voltage 200 ... 240 V 1 AC/3 AC		PM240-2 Power Modules standard variant				
Without integrated line filter		6SL3210-1PB13-0UL0	6SL3210-1PB13-8UL0	6SL3210-1PB15-5UL0	6SL3210-1PB17-4UL0	6SL3210-1PB21-0UL0
With integrated line filter class A		6SL3210-1PB13-0AL0	6SL3210-1PB13-8AL0	6SL3210-1PB15-5AL0	6SL3210-1PB17-4AL0	6SL3210-1PB21-0AL0
Output current at 50 Hz 230 V 1 AC						
• Rated current I_{rated} [1]	A	3.2	4.2	6	7.4	10.4
• Base-load current I_L [1]	A	3.2	4.2	6	7.4	10.4
• Base-load current I_H [2]	A	2.3	3.2	4.2	6	7.4
• Maximum current I_{max}	A	4.6	6	8.3	11.1	15.6
Rated power						
• Based on I_L	kW (hp)	0.55 (0.75)	0.75 (1)	1.1 (1.5)	1.5 (2)	2.2 (3)
• Based on I_H	kW (hp)	0.37 (0.50)	0.55 (0.75)	0.75 (1)	1.1 (1.5)	1.5 (2)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	>96	>96	>96	>96	>96
Power loss [3] At rated current	kW	0.04	0.04	0.05	0.07	0.12
Cooling air requirement	m^3/s (ft^3/s)	0.005 (0.18)	0.005 (0.18)	0.0092 (0.325)	0.0092 (0.325)	0.0092 (0.325)
Sound pressure level L_{pA} (1 m)	dB	<50	<50	<62	<62	<62
Input current [4]						
• Rated input current 1 AC/3 AC	A	7.5/4.2	9.6/5.5	13.5/7.8	18.1/9.7	24/13.6
• Based on I_H 1 AC/3 AC	A	6.6/3	8.4/4.2	11.8/5.5	15.8/7.8	20.9/9.7
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
Motor connection U2, V2, W2		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 2.5	1.5 ... 6	1.5 ... 6	1.5 ... 6
PE connection		Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector
Motor cable length, max.						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	73 (2.87)	73 (2.87)	100 (3.94)	100 (3.94)	100 (3.94)
• Height	mm (in)	196 (7.72)	196 (7.72)	292 (11.5)	292 (11.5)	292 (11.5)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)
Frame size		FSA	FSA	FSB	FSB	FSB
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.09)	1.4 (3.09)	2.8 (6.17)	2.8 (6.17)	2.8 (6.17)
• With integrated line filter	kg (lb)	1.6 (3.53)	1.6 (3.53)	3.1 (6.84)	3.1 (6.84)	3.1 (6.84)

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

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

3 Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

4 The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the Power Module.

Technical specifications (continued)

Line voltage 200 ... 240 V 1 AC/3 AC		**PM240-2 Power Modules standard variant**	
Without integrated line filter		6SL3210-1PB21-4UL0	6SL3210-1PB21-8UL0
With integrated line filter class A		6SL3210-1PB21-4AL0	6SL3210-1PB21-8AL0
Output current at 50 Hz 230 V 1 AC			
• Rated current I_{rated} [1]	A	13.6	17.5
• Base-load current I_L [1]	A	13.6	17.5
• Base-load current I_H [2]	A	10.4	13.6
• Maximum current I_{max}	A	20.8	27.2
Rated power			
• Based on I_L	kW (hp)	3 (4)	4 (5)
• Based on I_H	kW (hp)	2.2 (3)	3 (4)
Rated pulse frequency	kHz	4	4
Efficiency η	%	>96	>96
Power loss [3] At rated current	kW	0.14	0.18
Cooling air requirement	m^3/s (ft^3/s)	0.0185 (0.65)	0.0185 (0.65)
Sound pressure level L_{pA} (1 m)	dB	<65	<65
Input current [4]			
• Rated input current 1 AC/3 AC	A	35.9/17.7	43/22.8
• Based on I_H 1 AC/3 AC	A	31.3/13.6	37.5/17.7
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector
• Conductor cross-section	mm^2	6 ... 16	6 ... 16
Motor connection U2, V2, W2		Terminal connector	Terminal connector
• Conductor cross-section	mm^2	6 ... 16	6 ... 16
PE connection		Included in terminal connector	Included in terminal connector
Motor cable length, max.			
• Shielded	m (ft)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)
Degree of protection		IP20	IP20
Dimensions			
• Width	mm (in)	140 (5.51)	140 (5.51)
• Height	mm (in)	355 (13.98)	355 (13.98)
• Depth			
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	238 (9.37)	238 (9.37)
Frame size		FSC	FSC
Weight, approx.			
• Without integrated line filter	kg (lb)	5 (11)	5 (11)
• With integrated line filter	kg (lb)	5.2 (11.5)	5.2 (11.5)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

Technical specifications (continued)

Line voltage 200 ... 240 V 3 AC		**PM240-2 Power Modules standard variant**				
Without integrated line filter		6SL3210-1PC22-2UL0	6SL3210-1PC22-8UL0	6SL3210-1PC24-2UL0	6SL3210-1PC25-4UL0	6SL3210-1PC26-8UL0
With integrated line filter class A		6SL3210-1PC22-2AL0	6SL3210-1PC22-8AL0	–	–	–
Output current at 50 Hz 230 V 3 AC						
• Rated current I_{rated} [1]	A	22	28	42	54	68
• Base-load current I_L [1]	A	22	28	42	54	68
• Base-load current I_H [2]	A	17.5	22	35	42	54
• Maximum current I_{max}	A	35	44	70	84	108
Rated power						
• Based on I_L	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)	18.5 (25)
• Based on I_H	kW (hp)	4 (5)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	>97	>97	>97	>97	>97
Power loss [3] At rated current	kW	0.2	0.26	0.45	0.61	0.82
Cooling air requirement	m^3/s (ft^3/s)	0.0185 (0.65)	0.0185 (0.65)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)
Sound pressure level L_{pA} (1 m)	dB	<65	<65	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]
Input current [5]						
• Rated input current	A	28.6	36.4	40	51	64
• Based on I_H	A	22.8	28.6	36	43	56
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6 ... 16	6 ... 16	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2		Terminal connector	Terminal connector	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	6 ... 16	6 ... 16	10 ... 35	10 ... 35	10 ... 35
PE connection		Included in terminal connector	Included in terminal connector	Screw terminals	Screw terminals	Screw terminals
Motor cable length, max.						
• Shielded	m (ft)	50 (164)	50 (164)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	100 (328)	100 (328)	300 (984)	300 (984)	300 (984)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	140 (5.51)	140 (5.51)	200 (7.87)	200 (7.87)	200 (7.87)
• Height	mm (in)	355 (13.98)	355 (13.98)	472 (18.58)	472 (18.58)	472 (18.58)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	237 (9.33)	237 (9.33)	237 (9.33)
- With operator panel, max.	mm (in)	238 (9.37)	238 (9.37)	268 (10.55)	268 (10.55)	268 (10.55)
Frame size		FSC	FSC	FSD	FSD	FSD
Weight, approx.						
• Without integrated line filter	kg (lb)	5 (11)	5 (11)	17 (37.5)	17 (37.5)	17 (37.5)
• With integrated line filter	kg (lb)	5.2 (11.5)	5.2 (11.5)	–	–	–

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

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

3 Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

4 Values dependent on ambient temperature and utilization.

5 The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the Power Module.

Technical specifications (continued)

Line voltage 200 ... 240 V 3 AC		**PM240-2 Power Modules standard variant**				
Without integrated line filter		6SL3210-1PC28-0UL0	6SL3210-1PC31-1UL0	6SL3210-1PC31-3UL0	6SL3210-1PC31-6UL0	6SL3210-1PC31-8UL0
With integrated line filter class A		–	–	–	–	–
Output current at 50 Hz 230 V 3 AC						
• Rated current I_{rated} [1]	A	80	104	130	154	178
• Base-load current I_L [1]	A	80	104	130	154	178
• Base-load current I_H [2]	A	68	80	104	130	154
• Maximum current I_{max}	A	136	160	208	260	308
Rated power						
• Based on I_L	kW (hp)	22 (30)	30 (40)	37 (50)	45 (60)	55 (75)
• Based on I_H	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	>97	>97	>97	>97	>97
Power loss [3] At rated current	kW	0.92	1.28	1.38	1.72	2.09
Cooling air requirement	m^3/s (ft^3/s)	0.083 (2.93)	0.083 (2.93)	0.153 (5.4)	0.153 (5.4)	0.153 (5.4)
Sound pressure level L_{pA} (1 m)	dB	44 ... 62 [4]	44 ... 62 [4]	56 ... 68 [4]	56 ... 68 [4]	56 ... 68 [4]
Input current [5]						
• Rated input current	A	76	98	126	149	172
• Based on I_H	A	71	83	110	138	164
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	25 ... 70	25 ... 70	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
Motor connection U2, V2, W2		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	25 ... 70	25 ... 70	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
PE connection		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud
Motor cable length, max.						
• Shielded	m (ft)	200 (656)	200 (656)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	300 (984)	300 (984)	450 (1476)	450 (1476)	450 (1476)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	275 (10.83)	275 (10.83)	305 (12.01)	305 (12.01)	305 (12.01)
• Height	mm (in)	551 (21.69)	551 (21.69)	708 (27.87)	708 (27.87)	708 (27.87)
• Depth						
- Without operator panel	mm (in)	237 (9.33)	237 (9.33)	357 (14.06)	357 (14.06)	357 (14.06)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	388 (15.28)	388 (15.28)	388 (15.28)
Frame size		FSE	FSE	FSF	FSF	FSF
Weight, approx.						
• Without integrated line filter	kg (lb)	26 (57.3)	26 (57.3)	57 (126)	57 (126)	57 (126)
• With integrated line filter	kg (lb)	–	–	–	–	–

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

[4] Values dependent on ambient temperature and utilization.

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

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM240-2 Power Modules standard variant**					
Without integrated line filter		6SL3210-1PE11-8UL1	6SL3210-1PE12-3UL1	6SL3210-1PE13-2UL1	6SL3210-1PE14-3UL1	6SL3210-1PE16-1UL1	6SL3210-1PE18-0UL1
With integrated line filter class A		6SL3210-1PE11-8AL1	6SL3210-1PE12-3AL1	6SL3210-1PE13-2AL1	6SL3210-1PE14-3AL1	6SL3210-1PE16-1AL1	6SL3210-1PE18-0AL1
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} [1]	A	1.7	2.2	3.1	4.1	5.9	7.7
• Base-load current I_L [1]	A	1.7	2.2	3.1	4.1	5.9	7.7
• Base-load current I_H [2]	A	1.3	1.7	2.2	3.1	4.1	5.9
• Maximum current I_{max}	A	2.6	3.4	4.7	6.2	8.9	11.8
Rated power							
• Based on I_L	kW (hp)	0.55 (0.75)	0.75 (1)	1.1 (1.5)	1.5 (2)	2.2 (3)	3 (4)
• Based on I_H	kW (hp)	0.37 (0.50)	0.55 (0.75)	0.75 (1)	1.1 (1.5)	1.5 (2)	2.2 (3)
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η	%	>96	>96	>96	>96	>96	>96
Power loss [3] At rated current	kW	0.04	0.04	0.04	0.07	0.1	0.12
Cooling air requirement	m^3/s (ft^3/s)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)	0.005 (0.18)
Sound pressure level L_{pA} (1 m)	dB	<50	<50	<50	<50	<57	<57
Input current [4]							
• Rated input current	A	2.3	2.9	4.1	5.5	7.7	10.1
• Based on I_H	A	2	2.6	3.3	4.7	6.1	8.8
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
Motor connection U2, V2, W2		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5	1 ... 2.5
PE connection		Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector
Motor cable length, max.							
• Without filter, shielded/unshielded	m (ft)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)
• With integrated filter class A, shielded/unshielded	m (ft)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)	50/100 (164/328)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)	73 (2.87)
• Height	mm (in)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)	196 (7.72)
• Depth							
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)
Frame size		FSA	FSA	FSA	FSA	FSA	FSA
Weight, approx.							
• Without integrated line filter	kg (lb)	1.3 (2.87)	1.3 (2.87)	1.3 (2.87)	1.4 (3.09)	1.4 (3.09)	1.4 (3.09)
• With integrated line filter	kg (lb)	1.5 (3.31)	1.5 (3.31)	1.5 (3.31)	1.6 (3.53)	1.6 (3.53)	1.6 (3.53)

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

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

3 Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

4 The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the Power Module.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM240-2 Power Modules standard variant**				
Without integrated line filter		6SL3210-1PE21-1UL0	6SL3210-1PE21-4UL0	6SL3210-1PE21-8UL0	6SL3210-1PE22-7UL0	6SL3210-1PE23-3UL0
With integrated line filter class A		6SL3210-1PE21-1AL0	6SL3210-1PE21-4AL0	6SL3210-1PE21-8AL0	6SL3210-1PE22-7AL0	6SL3210-1PE23-3AL0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	10.2	13.2	18	26	32
• Base-load current I_L [1]	A	10.2	13.2	18	26	32
• Base-load current I_H [2]	A	7.7	10.2	13.2	18	26
• Maximum current I_{max}	A	15.4	20.4	27	39	52
Rated power						
• Based on I_L	kW (hp)	4 (5)	5.5 (7.5)	7.5 (10)	11 (15)	15 (20)
• Based on I_H	kW (hp)	3 (4)	4 (5)	5.5 (7.5)	7.5 (10)	11 (15)
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	>97	>97	>97	>97	>97
Power loss [3] At rated current	kW	0.11	0.15	0.2	0.3	0.37
Cooling air requirement	m^3/s (ft^3/s)	0.0092 (0.325)	0.0092 (0.325)	0.0092 (0.325)	0.0185 (0.65)	0.0185 (0.65)
Sound pressure level L_{pA} (1 m)	dB	<62	<62	<62	<65	<65
Input current [4]						
• Rated input current	A	13.3	17.2	22.2	32.6	39.9
• Based on I_H	A	11.6	15.3	19.8	27	36
Line supply connection U1/L1, V1/L2, W1/L3		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1.5 ... 6	1.5 ... 6	1.5 ... 6	6 ... 16	6 ... 16
Motor connection U2, V2, W2		Terminal connector	Terminal connector	Terminal connector	Terminal connector	Terminal connector
• Conductor cross-section	mm^2	1.5 ... 6	1.5 ... 6	1.5 ... 6	6 ... 16	6 ... 16
PE connection		Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector	Included in terminal connector
Motor cable length, max.						
• Without filter, shielded/unshielded	m (ft)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)
• With integrated filter class A, shielded/unshielded	m (ft)	100/100 (328/328) [5]	100/100 (328/328) [5]	100/100 (328/328) [5]	150/150 (492/492) [5]	150/150 (492/492) [5]
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)	140 (5.51)
• Height	mm (in)	292 (11.5)	292 (11.5)	292 (11.5)	355 (13.98)	355 (13.98)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)	165 (6.50)
- With operator panel, max.	mm (in)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)	238 (9.37)
Frame size		FSB	FSB	FSB	FSC	FSC
Weight, approx.						
• Without integrated line filter	kg (lb)	2.9 (6.39)	2.9 (6.39)	3 (6.62)	4.7 (10.4)	4.8 (10.6)
• With integrated line filter	kg (lb)	3.1 (6.84)	3.1 (6.84)	3.2 (7.06)	5.3 (11.7)	5.4 (11.9)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

[5] The values apply with low-capacitance CY cables – the max. permissible motor cable length is 50 m (164 ft) (shielded) and 100 m (328 ft) (unshielded) as standard.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM240-2 Power Modules standard variant**					
Without integrated line filter		6SL3210-1PE23-8UL0	6SL3210-1PE24-5UL0	6SL3210-1PE26-0UL0	6SL3210-1PE27-5UL0	6SL3210-1PE28-8UL0	6SL3210-1PE31-1UL0
With integrated line filter class A		6SL3210-1PE23-8AL0	6SL3210-1PE24-5AL0	6SL3210-1PE26-0AL0	6SL3210-1PE27-5AL0	6SL3210-1PE28-8AL0	6SL3210-1PE31-1AL0
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} [1]	A	38	45	60	75	90	110
• Base-load current I_L [1]	A	38	45	60	75	90	110
• Base-load current I_H [2]	A	32	38	45	60	75	90
• Maximum current I_{max}	A	64	76	90	120	150	180
Rated power							
• Based on I_L	kW (hp)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)	55 (75)
• Based on I_H	kW (hp)	15 (20)	18.5 (25)	22 (30)	30 (40)	37 (50)	45 (60)
Rated pulse frequency	kHz	4	4	4	4	4	4
Efficiency η	%	>97	>97	>97	>97	>97	>97
Power loss [3] At rated current							
• Without integrated line filter	kW	0.57	0.7	0.82	1.09	1.29	1.65
• With integrated line filter	kW	0.58	0.71	0.83	1.1	1.3	1.67
Cooling air requirement	m^3/s (ft^3/s)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.083 (2.93)	0.083 (2.93)
Sound pressure level L_{pA} (1 m)	dB	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]	44 ... 62 [4]	44 ... 62 [4]
Input current [5]							
• Rated input current	A	36	42	57	70	86	104
• Based on I_H	A	33	38	47	62	78	94
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
PE connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
Motor cable length, max.							
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	275 (10.83)	275 (10.83)
• Height	mm (in)	472 (18.58)	472 (18.58)	472 (18.58)	472 (18.58)	551 (21.69)	551 (21.69)
• Depth							
- Without operator panel	mm (in)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)
Frame size		FSD	FSD	FSD	FSD	FSE	FSE
Weight, approx.							
• Without integrated line filter	kg (lb)	16 (35.3)	16 (35.3)	17 (37.5)	17 (37.5)	26 (57.3)	26 (57.3)
• With integrated line filter	kg (lb)	17.5 (38.6)	17.5 (38.6)	18.5 (40.8)	18.5 (40.8)	28 (61.7)	28 (61.7)

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

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

3 Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

4 Values dependent on ambient temperature and utilization.

5 The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the Power Module.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM240-2 Power Modules standard variant**			
Without integrated line filter		6SL3210-1PE31-5UL0	6SL3210-1PE31-8UL0	6SL3210-1PE32-1UL0	6SL3210-1PE32-5UL0
With integrated line filter class A		6SL3210-1PE31-5AL0	6SL3210-1PE31-8AL0	6SL3210-1PE32-1AL0	6SL3210-1PE32-5AL0
Output current at 50 Hz 400 V 3 AC					
• Rated current I_{rated} [1]	A	145	178	205	250
• Base-load current I_L [1]	A	145	178	205	250
• Base-load current I_H [2]	A	110	145	178	205
• Maximum current I_{max}	A	220	290	356	410
Rated power					
• Based on I_L	kW (hp)	75 (100)	90 (125)	110 (150)	132 (200)
• Based on I_H	kW (hp)	55 (75)	75 (100)	90 (125)	110 (150)
Rated pulse frequency	kHz	2	2	2	2
Efficiency η	%	>97	>97	>97	>97
Power loss [3] At rated current					
• Without integrated line filter	kW	1.91	2.46	2.28	2.98
• With integrated line filter	kW	1.93	2.48	2.3	3.02
Cooling air requirement	m^3/s (ft^3/s)	0.153 (5.4)	0.153 (5.4)	0.153 (5.4)	0.153 (5.4)
Sound pressure level L_{pA} (1 m)	dB	56 ... 68 [4]	56 ... 68 [4]	56 ... 68 [4]	56 ... 68 [4]
Input current [5]					
• Rated input current	A	140	172	198	242
• Based on I_H	A	117	154	189	218
Line supply connection U1/L1, V1/L2, W1/L3		M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
Motor connection U2, V2, W2		M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
PE connection		M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
Motor cable length, max.					
• Shielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)	450 (1476)
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)	305 (12.01)
• Height	mm (in)	708 (27.87)	708 (27.87)	708 (27.87)	708 (27.87)
• Depth					
- Without operator panel	mm (in)	357 (14.06)	357 (14.06)	357 (14.06)	357 (14.06)
- With operator panel, max.	mm (in)	388 (15.28)	388 (15.28)	388 (15.28)	388 (15.28)
Frame size		FSF	FSF	FSF	FSF
Weight, approx.					
• Without integrated line filter	kg (lb)	57 (126)	57 (126)	61 (135)	61 (135)
• With integrated line filter	kg (lb)	63 (139)	63 (139)	65 (143)	65 (143)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

[4] Values dependent on ambient temperature and utilization.

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

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM240-2 Power Modules standard variant		
With integrated line filter Category C2		6SL3210-1PE33-0AL0	6SL3210-1PE33-7AL0	6SL3210-1PE34-8AL0
With integrated line filter Category C3		6SL3210-1PE33-0CL0	6SL3210-1PE33-7CL0	6SL3210-1PE34-8CL0
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	302	370	477
• Base-load current I_L [1]	A	302	370	477
• Base-load current I_H [2]	A	250	302	370
• Maximum current I_{max}	A	500	604	740
Rated power				
• Based on I_L	kW (hp)	160 (250)	200 (300)	250 (400)
• Based on I_H	kW (hp)	132 (200)	160 (250)	200 (300)
Rated pulse frequency	kHz	2	2	2
Efficiency η	%	>98	>98	>98
Power loss [3] at rated current	kW	3.67	4.62	6.18
Cooling air requirement	m^3/s (ft^3/s)	0.21 (7.42)	0.21 (7.42)	0.21 (7.42)
Sound pressure level L_{pA} (1 m)	dB	<74.7	<74.7	<74.7
Input current [4]				
• Rated input current	A	300	365	470
• Based on I_H	A	275	330	400
Line supply connection U1/L1, V1/L2, W1/L3		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 185	35 ... 2 × 185	35 ... 2 × 185
Motor connection U2, V2, W2		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 185	35 ... 2 × 185	35 ... 2 × 185
PE connection		M10 screw stud	M10 screw stud	M10 screw stud
Motor cable length, max.				
• Shielded	m (ft)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)
• Height	mm (in)	1000 (39.37)	1000 (39.37)	1000 (39.37)
• Depth				
- Without operator panel	mm (in)	357 (14.06)	357 (14.06)	357 (14.06)
- With operator panel	mm (in)	388 (15.28)	388 (15.28)	388 (15.28)
Frame size		FSG	FSG	FSG
Weight, approx.				
• With integrated line filter Category C2	kg (lb)	107 (236)	114 (251)	122 (269)
• With integrated line filter Category C3	kg (lb)	105 (231)	113 (249)	120 (265)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

Technical specifications (continued)

Line voltage 500 ... 690 V 3 AC		**PM240-2 Power Modules standard variant**					
Without integrated line filter		6SL3210-1PH21-4UL0	6SL3210-1PH22-0UL0	6SL3210-1PH22-3UL0	6SL3210-1PH22-7UL0	6SL3210-1PH23-5UL0	6SL3210-1PH24-2UL0
With integrated line filter class A		6SL3210-1PH21-4AL0	6SL3210-1PH22-0AL0	6SL3210-1PH22-3AL0	6SL3210-1PH22-7AL0	6SL3210-1PH23-5AL0	6SL3210-1PH24-2AL0
Output current at 50 Hz 690 V 3 AC							
• Rated current I_{rated} [1]	A	14	19	23	27	35	42
• Base-load current I_L [1]	A	14	19	23	27	35	42
• Base-load current I_H [2]	A	11	14	19	23	27	35
• Maximum current I_{max}	A	22	29	38	46	54	70
Rated power							
• Based on I_L	kW (hp)	11 (10)	15 (15)	18.5 (20)	22 (25)	30 (30)	37 (40)
• Based on I_H	kW (hp)	7.5 (7.5)	11 (10)	15 (15)	18.5 (20)	22 (25)	30 (30)
Rated pulse frequency	kHz	2	2	2	2	2	2
Efficiency η	%	>98	>98	>98	>98	>98	>98
Power loss [3] At rated current							
• Without integrated line filter	kW	0.35	0.44	0.52	0.6	0.77	0.93
• With integrated line filter	kW	0.35	0.45	0.52	0.6	0.78	0.94
Cooling air requirement	m^3/s (ft^3/s)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)	0.055 (1.94)
Sound pressure level L_{pA} (1 m)	dB	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]	45 ... 65 [4]
Input current [5]							
• Rated input current	A	14	18	22	25	33	40
• Based on I_H	A	11	14	20	24	28	36
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35	10 ... 35	10 ... 35	10 ... 35
PE connection		Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals	Screw terminals
Motor cable length, max.							
• Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
• Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
• Height	mm (in)	472 (18.58)	472 (18.58)	472 (18.58)	472 (18.58)	472 (18.58)	472 (18.58)
• Depth							
- Without operator panel	mm (in)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)	268 (10.55)
Frame size		FSD	FSD	FSD	FSD	FSD	FSD
Weight, approx.							
• Without integrated line filter	kg (lb)	17 (37.5)	17 (37.5)	17 (37.5)	17 (37.5)	17 (37.5)	17 (37.5)
• With integrated line filter	kg (lb)	18.5 (40.8)	18.5 (40.8)	18.5 (40.8)	18.5 (40.8)	18.5 (40.8)	18.5 (40.8)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

[4] Values dependent on ambient temperature and utilization.

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

Technical specifications (continued)

Line voltage 500 ... 690 V 3 AC		**PM240-2 Power Modules standard variant**					
Without integrated line filter		6SL3210-1PH25-2UL0	6SL3210-1PH26-2UL0	6SL3210-1PH28-0UL0	6SL3210-1PH31-0UL0	6SL3210-1PH31-2UL0	6SL3210-1PH31-4UL0
With integrated line filter class A		6SL3210-1PH25-2AL0	6SL3210-1PH26-2AL0	6SL3210-1PH28-0AL0	6SL3210-1PH31-0AL0	6SL3210-1PH31-2AL0	6SL3210-1PH31-4AL0
Output current at 50 Hz 690 V 3 AC							
• Rated current I_{rated} [1]	A	52	62	80	100	115	142
• Base-load current I_L [1]	A	52	62	80	100	115	142
• Base-load current I_H [2]	A	42	52	62	80	100	115
• Maximum current I_{max}	A	84	104	124	160	200	230
Rated power							
• Based on I_L	kW (hp)	45 (50)	55 (60)	75 (75)	90 (100)	110 (100)	132 (125)
• Based on I_H	kW (hp)	37 (40)	45 (50)	55 (60)	75 (75)	90 (100)	110 (100)
Rated pulse frequency	kHz	2	2	2	2	2	2
Efficiency η	%	>98	>98	>98	>98	>98	>98
Power loss [3] At rated current							
• Without integrated line filter	kW	1.07	1.3	1.37	1.74	1.95	2.48
• With integrated line filter	kW	1.08	1.31	1.38	1.76	1.97	2.51
Cooling air requirement	m^3/s (ft^3/s)	0.083 (2.93)	0.083 (2.93)	0.153 (5.4)	0.153 (5.4)	0.153 (5.4)	0.153 (5.4)
Sound pressure level L_{pA} (1 m)	dB	44 ... 62 [4]	44 ... 62 [4]	56 ... 68 [4]	56 ... 68 [4]	56 ... 68 [4]	56 ... 68 [4]
Input current [5]							
• Rated input current	A	50	59	78	97	111	137
• Based on I_H	A	44	54	66	85	106	122
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	25 ... 70	25 ... 70	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
Motor connection U2, V2, W2		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	25 ... 70	25 ... 70	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120	35 ... 2 × 120
PE connection		Screw terminals	Screw terminals	M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
Motor cable length, max.							
• Shielded	m (ft)	200 (656)	200 (656)	300 (984)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	300 (984)	300 (984)	450 (1476)	450 (1476)	450 (1476)	450 (1476)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	275 (10.83)	275 (10.83)	305 (12.01)	305 (12.01)	305 (12.01)	305 (12.01)
• Height	mm (in)	551 (21.69)	551 (21.69)	708 (27.87)	708 (27.87)	708 (27.87)	708 (27.87)
• Depth							
- Without operator panel	mm (in)	237 (9.33)	237 (9.33)	357 (14.06)	357 (14.06)	357 (14.06)	357 (14.06)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	388 (15.28)	388 (15.28)	388 (15.28)	388 (15.28)
Frame size		FSE	FSE	FSF	FSF	FSF	FSF
Weight, approx.							
• Without integrated line filter	kg (lb)	26 (57.3)	26 (57.3)	60 (132)	60 (132)	60 (132)	60 (132)
• With integrated line filter	kg (lb)	28 (61.7)	28 (61.7)	64 (141)	64 (141)	64 (141)	64 (141)

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

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

3 Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

4 Values dependent on ambient temperature and utilization.

5 The input current depends on the motor load and line impedance. The input currents apply for a load at rated power (based on I_{rated}) for a line impedance corresponding to u_K = 1 %. The current values are specified on the rating plate of the Power Module.

Technical specifications (continued)

Line voltage 500 ... 690 V 3 AC		**PM240-2 Power Modules standard variant**		
With integrated line filter Category C3		6SL3210-1PH31-7CL0	6SL3210-1PH32-1CL0	6SL3210-1PH32-5CL0
Output current at 50 Hz 690 V 3 AC				
• Rated current I_{rated} [1]	A	171	208	250
• Base-load current I_L [1]	A	171	208	250
• Base-load current I_H [2]	A	144	171	208
• Maximum current I_{max}	A	288	342	416
Rated power				
• Based on I_L	kW (hp)	160 (150)	200 (200)	250 (250)
• Based on I_H	kW (hp)	132 (150)	160 (150)	200 (200)
Rated pulse frequency	kHz	2	2	2
Efficiency η	%	>98	>98	>98
Power loss [3] at rated current	kW	2.94	3.7	4.64
Cooling air requirement	m^3/s (ft^3/s)	0.21 (7.42)	0.21 (7.42)	0.21 (7.42)
Sound pressure level L_{pA} (1 m)	dB	<74.7	<74.7	<74.7
Input current [4]				
• Rated input current	A	170	205	250
• Based on I_H	A	160	185	225
Line supply connection U1/L1, V1/L2, W1/L3		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 185	35 ... 2 × 185	35 ... 2 × 185
Motor connection U2, V2, W2		M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm^2	35 ... 2 × 185	35 ... 2 × 185	35 ... 2 × 185
PE connection		M10 screw stud	M10 screw stud	M10 screw stud
Motor cable length, max.				
• Shielded	m (ft)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)
• Height	mm (in)	1000 (39.37)	1000 (39.37)	1000 (39.37)
• Depth				
- Without operator panel	mm (in)	357 (14.06)	357 (14.06)	357 (14.06)
- With operator panel	mm (in)	388 (15.28)	388 (15.28)	388 (15.28)
Frame size		FSG	FSG	FSG
Weight, approx.	kg (lb)	114 (251)	114 (251)	114 (251)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

Technical specifications (continued)

PM240-2 Power Modules push-through variant

Line voltage 200 ... 240 V 1 AC/3 AC		PM240-2 Power Modules push-through variant		
Without integrated line filter		6SL3211-1PB13-8UL0	6SL3211-1PB21-0UL0	6SL3211-1PB21-8UL0
With integrated line filter class A		6SL3211-1PB13-8AL0	6SL3211-1PB21-0AL0	6SL3211-1PB21-8AL0
Output current At 50 Hz 230 V 1 AC/3 AC				
• Rated current I_{rated} [1]	A	4.2	10.4	17.5
• Base-load current I_L [1]	A	4.2	10.4	17.5
• Base-load current I_H [2]	A	3.2	7.4	13.6
• Maximum current I_{max}	A	6.4	15.6	27.2
Rated power				
• Based on I_L	kW (hp)	0.75 (1)	2.2 (3)	4 (5)
• Based on I_H	kW (hp)	0.55 (0.75)	1.5 (2)	3 (4)
Rated pulse frequency	kHz	4	4	4
Efficiency η	%	>96	>96	>96
Power loss [3] At rated current	kW	0.04	0.12	0.18
Cooling air requirement	m^3/s (ft^3/s)	0.005 (0.18)	0.0092 (0.325)	0.0185 (0.65)
Sound pressure level L_{pA} (1 m)	dB	<56	<62	<65
Input current [4]				
• Rated input current 1 AC/3 AC	A	9.6/5.5	24/13.6	43/22.8
• Based on I_H 1 AC/3 AC	A	8.4/4.2	20.9/9.7	37.5/17.7
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	6 ... 16
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	6 ... 16
Motor cable length, max.				
• Shielded	m (ft)	150 (492)	150 (492)	150 (492)
• Unshielded	m (ft)	150 (492)	150 (492)	150 (492)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	126 (4.96)	154 (6.06)	200 (7.87)
• Height	mm (in)	238 (9.37)	345 (13.58)	411 (16.18)
• Depth				
- Without operator panel	mm (in)	171 (6.73)	171 (6.73)	171 (6.73)
- With operator panel, max.	mm (in)	244 (9.61)	244 (9.61)	244 (9.61)
Frame size		FSA	FSB	FSC
Weight, approx.				
• Without integrated line filter	kg (lb)	1.8 (3.97)	3.4 (7.50)	5.9 (13.0)
• With integrated line filter	kg (lb)	2 (4.41)	3.7 (8.16)	6.2 (13.7)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

Technical specifications (continued)

Line voltage 200 ... 240 V 3 AC		**PM240-2 Power Modules push-through variant**		
Without integrated line filter		6SL3210-1PC26-8UL0	6SL3211-1PC31-1UL0	6SL3211-1PC31-8UL0
With integrated line filter class A		–	–	–
Output current at 50 Hz 230 V 3 AC				
• Rated current I_{rated} [1]	A	68	104	178
• Base-load current I_L [1]	A	68	104	178
• Base-load current I_H [2]	A	54	80	154
• Maximum current I_{max}	A	108	160	308
Rated power				
• Based on I_L	kW (hp)	18.5 (25)	30 (40)	55 (75)
• Based on I_H	kW (hp)	15 (20)	22 (30)	45 (60)
Rated pulse frequency	kHz	4	4	4
Efficiency η	%	>97	>97	>97
Power loss [3] at rated current	kW	0.82	1.28	2.09
Cooling air requirement	m^3/s (ft^3/s)	0.055 (1.94)	0.083 (2.93)	0.153 (5.40)
Sound pressure level L_{pA} (1 m)	dB	45 ... 65 [4]	44 ... 62 [4]	56 ... 68 [4]
Input current [5]				
• Rated input current	A	64	98	172
• Based on I_H	A	56	83	164
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	M10 screw stud
• Conductor cross-section	mm^2	10 ... 35	25 ... 70	35 ... 2 × 120
Motor connection U2, V2, W2		Screw terminals	Screw terminals	M10 screw stud
• Conductor cross-section	mm^2	10 ... 35	25 ... 70	35 ... 2 × 120
PE connection		Screw terminals	Screw terminals	M10 screw stud
Motor cable length, max.				
• Shielded	m (ft)	200 (656)	200 (656)	300 (984)
• Unshielded	m (ft)	300 (984)	300 (984)	450 (1476)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	275 (10.83)	354 (13.94)	384 (15.12)
• Height	mm (in)	517 (20.35)	615 (24.21)	785 (30.91)
• Depth				
- Without operator panel	mm (in)	238.5 (9.39)	238.5 (9.39)	358 (14.09)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	388 (15.28)
Frame size		FSD	FSE	FSF
Weight, approx.				
• Without integrated line filter	kg (lb)	19.5 (43.0)	29 (63.9)	60 (132)
• With integrated line filter	kg (lb)	–	–	–

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

[4] Values dependent on ambient temperature and utilization.

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

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM240-2 Power Modules push-through variant**					
Without integrated line filter		6SL3211-1PE18-0UL1	6SL3211-1PE21-8UL0	6SL3211-1PE23-3UL0	6SL3211-1PE27-5UL0	6SL3211-1PE31-1UL0	6SL3211-1PE32-5UL0
With integrated line filter class A		6SL3211-1PE18-0AL1	6SL3211-1PE21-8AL0	6SL3211-1PE23-3AL0	6SL3211-1PE27-5AL0	6SL3211-1PE31-1AL0	6SL3211-1PE32-5AL0
Output current at 50 Hz 400 V 3 AC							
• Rated current I_{rated} [1]	A	7.7	18	32	75	110	250
• Base-load current I_L [1]	A	7.7	18	32	75	110	250
• Base-load current I_H [2]	A	5.9	13.2	26	60	90	205
• Maximum current I_{max}	A	11.8	27	52	120	180	410
Rated power							
• Based on I_L	kW (hp)	3 (4)	7.5 (10)	15 (20)	37 (50)	55 (75)	132 (200)
• Based on I_H	kW (hp)	2.2 (7.5)	5.5 (7.5)	11 (15)	30 (40)	45 (60)	110 (150)
Rated pulse frequency	kHz	4	4	4	4	4	2
Efficiency η	%	>96	>97	>97	>97	>97	>97
Power loss [3] At rated current	kW	0.12	0.2	0.37	1.09	1.65	2.98
Cooling air requirement	m^3/s (ft^3/s)	0.007 (0.25)	0.0092 (0.325)	0.0185 (0.65)	0.055 (1.94)	0.083 (2.93)	0.153 (5.40)
Sound pressure level L_{pA} (1 m)	dB	<56	<62	<65	45 ... 65 [4]	44 ... 62 [4]	56 ... 68 [4]
Input current [4]							
• Rated input current	A	10.1	22.2	39.9	70	104	242
• Based on I_H	A	8.8	19.8	36	62	94	218
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals	Screw terminals	M10 screw stud
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	6 ... 16	10 ... 35	25 ... 70	35 ... 2 × 120
Motor connection U2, V2, W2		Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals, plug-in	Screw terminals	Screw terminals	M10 screw stud
• Conductor cross-section	mm^2	1.5 ... 2.5	1.5 ... 6	6 ... 16	10 ... 35	25 ... 70	35 ... 2 × 120
Motor cable length, max.							
• Without filter, shielded/unshielded	m (ft)	150/150 (492/492)	150/150 (492/492)	150/150 (492/492)	200 (656)	200 (656)	300 (984)
• With integrated filter class A, shielded/unshielded	m (ft)	50/100 (164/328)	100/100 (328/328) [5]	150/150 (492/492) [5]	300 (984)	300 (984)	450 (1476)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	126 (4.96)	154 (6.06)	200 (7.87)	275 (10.83)	354 (13.94)	384 (15.12)
• Height	mm (in)	238 (9.37)	345 (13.58)	411 (16.18)	517 (20.35)	615 (24.21)	785 (30.91)
• Depth							
- Without operator panel	mm (in)	171 (6.73)	171 (6.73)	171 (6.73)	238.5 (9.39)	238.5 (9.39)	358 (14.09)
- With operator panel, max.	mm (in)	244 (9.61)	244 (9.61)	244 (9.61)	268 (10.55)	268 (10.55)	388 (15.28)
Frame size		FSA	FSB	FSC	FSD	FSE	FSF
Weight, approx.							
• Without integrated line filter	kg (lb)	1.8 (3.97)	3.6 (7.94)	5.8 (12.8)	20 (44.1)	30.5 (67.2)	63.5 (85.2)
• With integrated line filter	kg (lb)	2 (4.41)	3.9 (8.60)	6.3 (13.9)	21.5 (47.4)	32 (70.5)	68 (150)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

[5] The values apply with low-capacitance CY cables – the max. permissible motor cable length is 50 m (164 ft) (shielded) and 100 m (328 ft) (unshielded) as standard.

Technical specifications (continued)

PM250 Power Modules

Line voltage 380 ... 480 V 3 AC		**PM250 Power Modules**		
With integrated line filter		6SL3225-0BE25-5AA1	6SL3225-0BE27-5AA1	6SL3225-0BE31-1AA1
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	18	25	32
• Base-load current I_L [1]	A	18	25	32
• Base-load current I_H [2]	A	13.2	19	26
• Maximum current I_{max}	A	26.4	38	52
Rated power				
• Based on I_L	kW (hp)	7.5 (10)	11 (15)	15 (20)
• Based on I_H	kW (hp)	5.5 (7.5)	7.5 (10)	11 (15)
Rated pulse frequency	kHz	4	4	4
Efficiency η	%	95	95	95
Power loss [3] At rated current	kW	0.298	0.488	0.472
Cooling air requirement	m^3/s (ft^3/s)	0.038 (1.34)	0.038 (1.34)	0.038 (1.34)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<60
Input current [4]				
• Rated input current	A	18	25	32
• Based on I_H	A	13.2	19	26
Line supply connection U1/L1, V1/L2, W1/L3		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	2.5 ... 10	2.5 ... 10	2.5 ... 10
Motor connection U2, V2, W2		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	2.5 ... 10	2.5 ... 10	2.5 ... 10
PE connection		On housing with M5 screw	On housing with M5 screw	On housing with M5 screw
Motor cable length, max.				
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	189 (7.44)	189 (7.44)	189 (7.44)
• Height	mm (in)	334 (13.15)	334 (13.15)	334 (13.15)
• Depth				
- Without operator panel	mm (in)	185 (7.28)	185 (7.28)	185 (7.28)
- With operator panel, max.	mm (in)	258 (10.16)	258 (10.16)	258 (10.16)
Frame size		FSC	FSC	FSC
Weight, approx.	kg (lb)	7.5 (16.5)	7.5 (16.5)	7.5 (16.5)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM250 Power Modules		
Without integrated line filter		6SL3225-0BE31-5UA0	6SL3225-0BE31-8UA0	6SL3225-0BE32-2UA0
With integrated line filter		6SL3225-0BE31-5AA0	6SL3225-0BE31-8AA0	6SL3225-0BE32-2AA0
Output current at 50 Hz 400 V 3 AC				
• Rated current I_{rated} [1]	A	38	45	60
• Base-load current I_L [1]	A	38	45	60
• Base-load current I_H [2]	A	32	38	45
• Maximum current 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	%	>97	>97	>97
Power loss [3] At rated current	kW	0.576	0.693	0.918
Cooling air requirement	m^3/s (ft^3/s)	0.022 (0.78)	0.022 (0.78)	0.039 (1.38)
Sound pressure level L_{pA} (1 m)	dB	<60	<60	<61
Input current [4]				
• Rated input current	A	36	42	56
• Based on I_H	A	30	36	42
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M6 screw studs
• Conductor cross-section	mm^2	10 ... 35	10 ... 35	10 ... 35
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M6 screw
Motor cable length [5], **max.**				
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	275 (10.83)	275 (10.83)	275 (10.83)
• Height				
- Without integrated line filter	mm (in)	419 (16.50)	419 (16.50)	419 (16.50)
- With integrated line filter	mm (in)	512 (20.16)	512 (20.16)	512 (20.16)
• Depth				
- Without operator panel	mm (in)	204 (8.03)	204 (8.03)	204 (8.03)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	268 (10.55)
Frame size		FSD	FSD	FSD
Weight, approx.				
• Without integrated line filter	kg (lb)	13 (28.7)	13 (28.7)	13 (28.7)
• With integrated line filter	kg (lb)	15 (33.1)	15 (33.1)	16 (35.3)

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

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

[3] Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

[5] Max. motor cable length 25 m (82 ft) (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**PM250 Power Modules**				
Without integrated line filter		6SL3225-0BE33-0UA0	6SL3225-0BE33-7UA0	6SL3225-0BE34-5UA0	6SL3225-0BE35-5UA0	6SL3225-0BE37-5UA0
With integrated line filter		6SL3225-0BE33-0AA0	6SL3225-0BE33-7AA0	6SL3225-0BE34-5AA0	6SL3225-0BE35-5AA0	6SL3225-0BE37-5AA0
Output current at 50 Hz 400 V 3 AC						
• Rated current I_{rated} [1]	A	75	90	110	145	178
• Base-load current I_L [1]	A	75	90	110	145	178
• Base-load current I_H [2]	A	60	75	90	110	145
• Maximum current 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	%	>97	>97	>97	>97	>97
Power loss [3] At rated current	kW	1.01	1.217	1.605	2.234	2.638
Cooling air requirement	m^3/s (ft^3/s)	0.022 (0.78)	0.039 (1.38)	0.094 (3.32)	0.094 (3.32)	0.117 (4.13)
Sound pressure level L_{pA} (1 m)	dB	<60	<62	<60	<60	<65
Input current [4]						
• Rated input current	A	70	84	102	135	166
• Based on I_H	A	56	70	84	102	135
Line supply connection U1/L1, V1/L2, W1/L3		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section, max.	mm^2	10 ... 50	10 ... 50	25 ... 120	25 ... 120	25 ... 120
Motor connection U2, V2, W2		M6 screw studs	M6 screw studs	M8 screw studs	M8 screw studs	M8 screw studs
• Conductor cross-section, max.	mm^2	10 ... 50	10 ... 50	25 ... 120	25 ... 120	25 ... 120
PE connection		On housing with M6 screw	On housing with M6 screw	On housing with M8 screw	On housing with M8 screw	On housing with M8 screw
Motor cable length [5], **max.**						
• Shielded	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	50 (164)
• Unshielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)	100 (328)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	275 (10.83)	275 (10.83)	350 (13.78)	350 (13.78)	350 (13.78)
• Height						
- Without integrated line filter	mm (in)	499 (19.65)	499 (19.65)	634 (24.96)	634 (24.96)	634 (24.96)
- With integrated line filter	mm (in)	635 (25.0)	635 (25.0)	934 (36.77)	934 (36.77)	934 (36.77)
• Depth						
- Without operator panel	mm (in)	204 (8.03)	204 (8.03)	316 (12.44)	316 (12.44)	316 (12.44)
- With operator panel, max.	mm (in)	268 (10.55)	268 (10.55)	380 (14.96)	380 (14.96)	380 (14.96)
Frame size		FSE	FSE	FSF	FSF	FSF
Weight, approx.						
• Without integrated line filter	kg (lb)	14 (30.9)	14 (30.9)	35 (77.2)	35 (77.2)	35 (77.2)
• With integrated line filter	kg (lb)	21 (46.3)	21 (46.3)	51 (112.5)	51 (112.5)	51 (112.5)

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

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

3) Typical values. You can find more information on the Internet at: https://support.industry.siemens.com/cs/document/94059311

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

5) Max. motor cable length 25 m (82 ft) (shielded) for PM250 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Characteristic curves

Derating data, PM240-2 Power Modules

Pulse frequency

Rated power [1] at 50 Hz 200 V 1 AC/3 AC		**Rated output current in A** for a pulse frequency of							
kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.55	0.75	3.2	3.2	2.7	2.2	1.9	1.6	1.4	1.3
0.75	1	4.2	4.2	3.6	2.9	2.5	2.1	1.9	1.7
1.1	1.5	6	6	5.1	4.2	3.6	2.3	2.7	2.4
1.5	2	7.4	7.4	6.3	5.2	4.4	3.7	3.3	3
2.2	3	10.4	10.4	8.8	7.3	6.2	5.2	4.7	4.2
3	4	13.6	13.6	11.6	9.5	8.2	6.8	6.1	5.4
4	5	17.5	17.5	14.9	12.3	10.5	8.8	7.9	7
5.5	7.5	22	22	18.7	15.4	13.2	11	9.9	8.8
7.5	10	28	28	23.8	19.6	16.8	14	12.6	11.2
11	15	42	42	35.7	29.4	25.2	21	18.9	16.8
15	20	54	54	45.9	37.8	32.4	27	24.3	21.6
18.5	25	68	68	57.8	47.6	40.8	34	30.6	27.2
22	30	80	80	68	56	48	40	36	32
30	40	104	104	88.4	72.8	62.4	52	46.8	41.6
37	50	130	130	110.5	91	–	–	–	–
45	60	154	154	130.9	107.8	–	–	–	–
55	75	178	178	151.3	124.6	–	–	–	–

Rated power [1] at 50 Hz 400 V 3 AC		**Rated output current in A** for a pulse frequency of							
kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
0.55	0.75	1.7	1.7	1.4	1.2	1	0.9	0.8	0.7
0.75	1	2.2	2.2	1.9	1.5	1.3	1.1	1	0.9
1.1	1.5	3.1	3.1	2.6	2.2	1.9	1.6	1.4	1.2
1.5	2	4.1	4.1	3.5	2.9	2.5	2.1	1.8	1.6
2.2	3	5.9	5.9	5	4.1	3.5	3	2.7	2.4
3	4	7.7	7.7	6.5	5.4	4.6	3.9	3.5	3.1
4	5	10.2	10.2	8.7	7.1	6.1	5.1	4.6	4.1
5.5	7.5	13.2	13.2	11.2	9.2	7.9	6.6	5.9	5.3
7.5	10	18	18	15.3	12.6	10.8	9	8.1	7.2
11	15	26	26	22.1	18.2	15.6	13	11.7	10.4
15	20	32	32	27.2	22.4	19.2	16	14.4	12.8
18.5	25	38	38	32.3	26.6	22.8	19	17.1	15.2
22	30	45	45	38.3	31.5	27	22.5	20.3	18
30	40	60	60	51	42	36	30	27	24
37	50	75	75	63.8	52.5	45	37.5	33.8	30
45	60	90	90	76.5	63	54	45	40.5	36
55	75	110	110	93.5	77	–	–	–	–
75	100	145	145	123.3	101.5	–	–	–	–
90	125	178	178	151.3	124.6	–	–	–	–
110	150	205	143.5	–	–	–	–	–	–
132	200	250	175	–	–	–	–	–	–
160	250	302	211.4	151	120.8	–	–	–	–
200	300	370	259	185	148	–	–	–	–
250	400	477	333.9	238.5	190.8	–	–	–	–

The permissible motor cable length depends on the cable type and the pulse frequency.

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

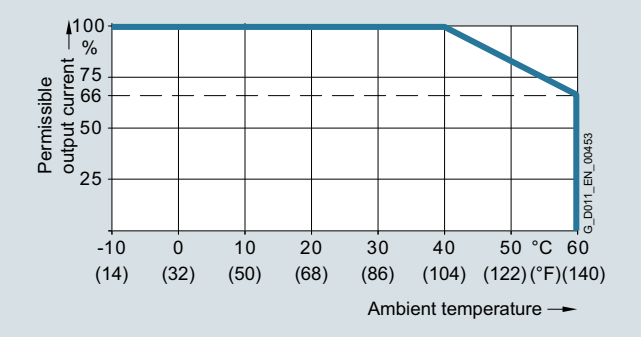
Characteristic curves (continued)

Derating data, PM240-2 Power Modules (continued)

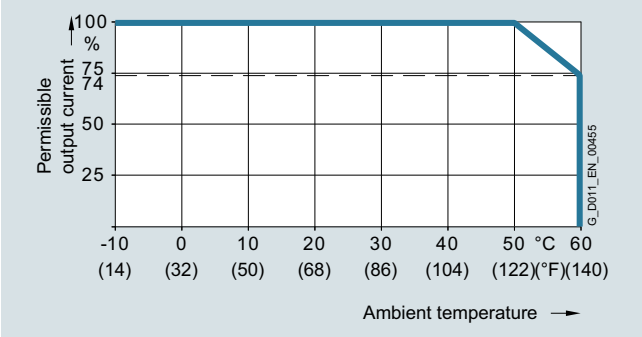
Rated power [1] at 50 Hz 690 V 3 AC		**Rated output current in A** for a pulse frequency of							
kW	hp	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
11	10	14	8.4	–	–	–	–	–	–
15	15	19	11.4	–	–	–	–	–	–
18.5	20	23	13.8	–	–	–	–	–	–
22	25	27	16.2	–	–	–	–	–	–
30	30	35	21	–	–	–	–	–	–
37	40	42	25.2	–	–	–	–	–	–
45	50	52	31.2	–	–	–	–	–	–
55	60	62	37.2	–	–	–	–	–	–
75	75	80	48	–	–	–	–	–	–
90	100	100	60	–	–	–	–	–	–
110	100	115	69	–	–	–	–	–	–
132	125	142	85.2	–	–	–	–	–	–
160	150	171	102.6	–	–	–	–	–	–
200	200	208	124.8	–	–	–	–	–	–
250	250	250	150	–	–	–	–	–	–

The permissible motor cable length depends on the cable type and the pulse frequency.

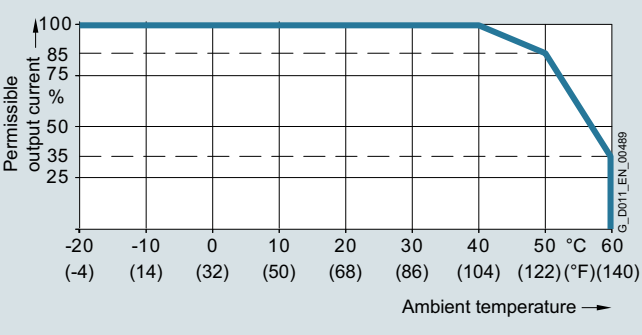
Ambient temperature



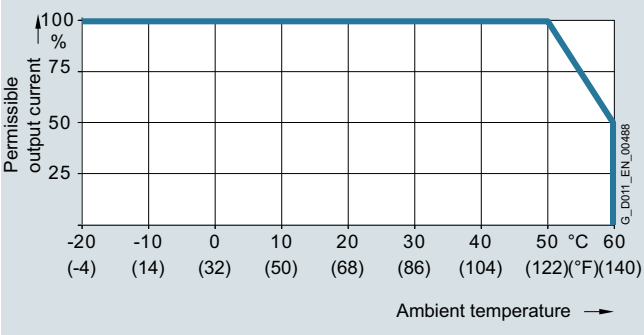
Permissible output current as a function of ambient temperature for low overload (LO) for PM240-2 Power Modules, frame sizes FSA to FSC



Permissible output current as a function of ambient temperature for high overload (HO) for PM240-2 Power Modules, frame sizes FSA to FSC



Permissible output current as a function of ambient temperature for low overload (LO) for PM240-2 Power Modules, frame sizes FSD to FSG



Permissible output current as a function of ambient temperature for high overload (HO) for PM240-2 Power Modules, frame sizes FSD to FSG

The operating temperature ranges of the Control Units should be taken into account. The temperature ranges are specified in the section Technical specifications under Control Units.

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

Characteristic curves (continued)

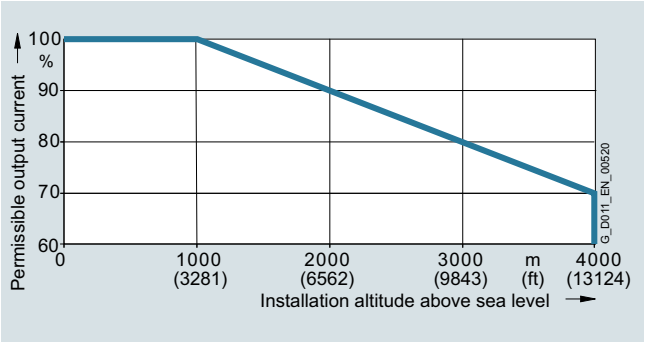
Derating data, PM240-2 Power Modules (continued)

Installation altitude

Permissible line supplies as a function of the installation altitude

- Installation altitude up to 2000 m (6562 ft) above sea level
  - Connection to every supply system permitted for the inverter
- Installation altitudes between 2000 m (6562 ft) and 4000 m (13124 ft) above sea level
  - Connection only to a TN system with grounded neutral point
  - TN systems with grounded line conductor are not permitted
  - The TN line system with grounded neutral point can also be supplied using an isolation transformer
  - The phase-to-phase voltage does not have to be reduced

The connected motors, power elements and components must be considered separately.



Permissible output current as a function of the installation altitude for PM240-2 Power Modules at 40 °C for low overload (LO)

System operating voltage

The rated output current remains constant over the 380 V to 480 V 3 AC voltage range.

More information on the derating data of the PM240-2 Power Modules is available in the Hardware Installation Manual on the Internet at:
www.siemens.com/sinamics-g120/documentation

1

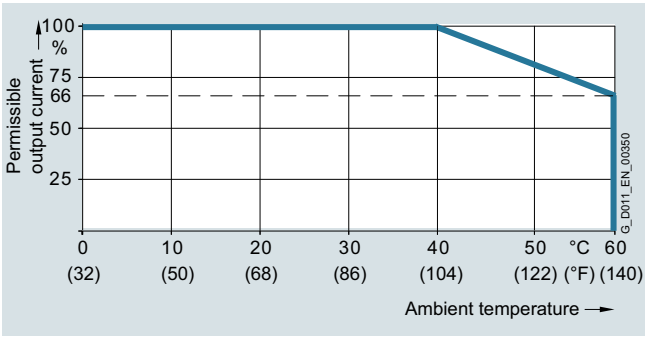
Characteristic curves (continued)

Derating data, PM250 Power Modules

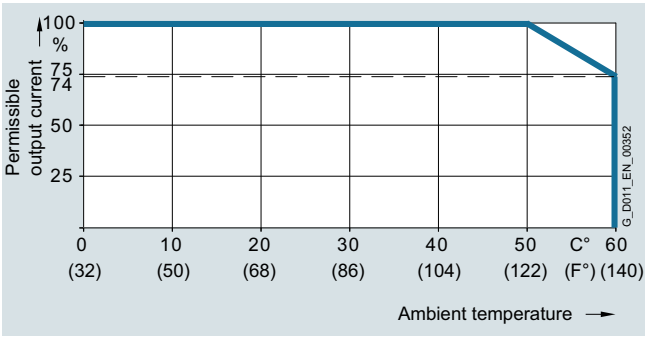
Pulse frequency

Rated power at 400 V 3 AC		**Rated output current in A** for a pulse frequency of						
kW	hp	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	14 kHz	16 kHz
7.5	10	18	12.5	11.9	10.6	9.2	7.9	6.6
11	15	25	18.1	17.1	15.2	13.3	11.4	9.5
15	20	32	24.7	23.4	20.8	18.2	15.6	13
18.5	25	38	32	27	23	19	17	15
22	30	45	38	32	27	23	20	18
30	40	60	51	42	36	30	27	24
37	50	75	64	53	45	38	34	30
45	60	90	77	63	54	45	41	36
55	75	110	94	77	–	–	–	–
75	100	145	123	102	–	–	–	–
90	125	178	151	125	–	–	–	–

Ambient temperature



Permissible output current as a function of ambient temperature for low overload (LO) for PM250 Power Modules, frame sizes FSC to FSF



Permissible output current as a function of ambient temperature for high overload (HO) for PM250 Power Modules, frame sizes FSC to FSF

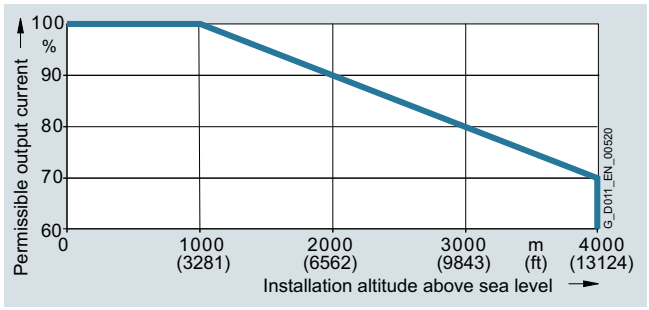
The operating temperature ranges of the Control Units should be taken into account. The temperature ranges are specified in the section Technical specifications under Control Units.

Installation altitude

Permissible line supplies as a function of the installation altitude

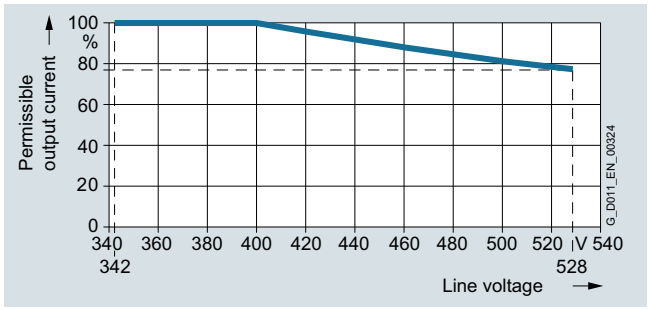
- Installation altitude up to 2000 m (6562 ft) above sea level
  - Connection to every supply system permitted for the inverter
- Installation altitudes between 2000 m (6562 ft) and 4000 m (13124 ft) above sea level
  - Connection only to a TN system with grounded neutral point
  - TN systems with grounded line conductor are not permitted
  - The TN line system with grounded neutral point can also be supplied using an isolation transformer
  - The phase-to-phase voltage does not have to be reduced

The connected motors, power elements and components must be considered separately.

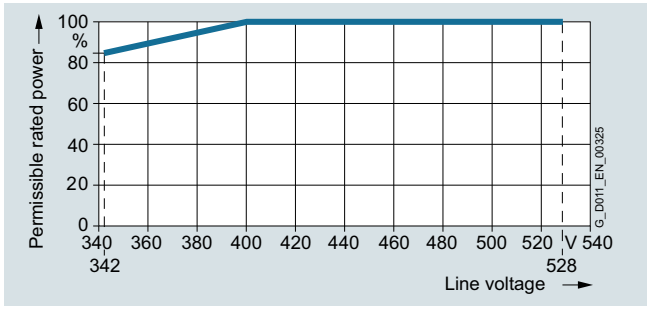


Permissible output current as a function of the installation altitude for PM250 Power Modules, frame sizes FSC to FSF

System operating voltage



Permissible output current as a function of the line voltage for PM250 Power Modules, frame sizes FSC to FSF

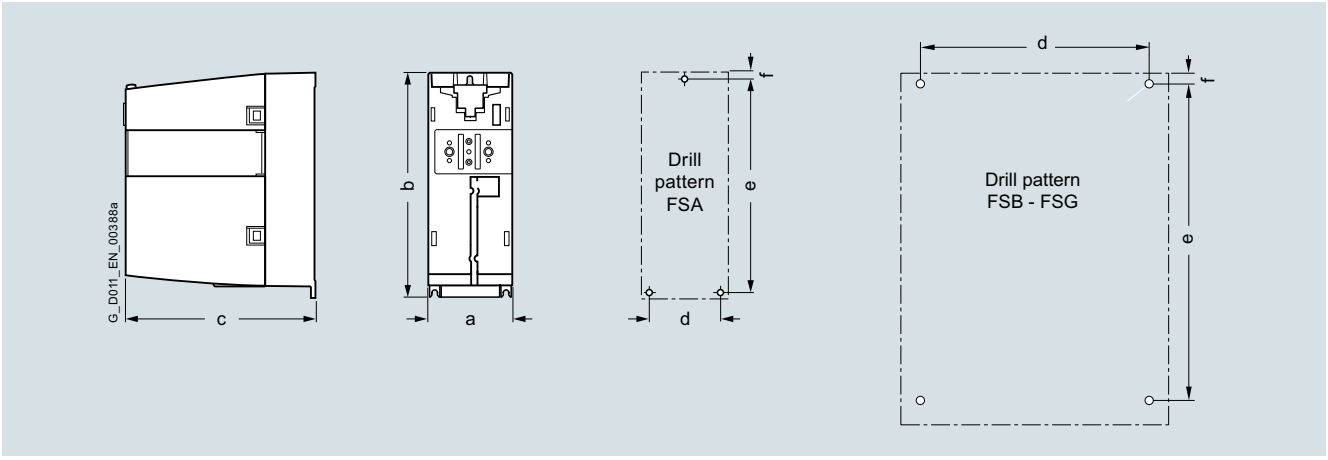


Permissible rated power as a function of the line voltage for PM250 Power Modules, frame sizes FSC to FSF

More information on the derating data of the PM250 Power Modules is available in the Hardware Installation Manual on the Internet at:
www.siemens.com/sinamics-g120/documentation

Dimensional drawings

PM240-2 Power Modules, standard variant



Principle dimension drawing and drill pattern for PM240-2 Power Modules, standard variant, with/without integrated line filter

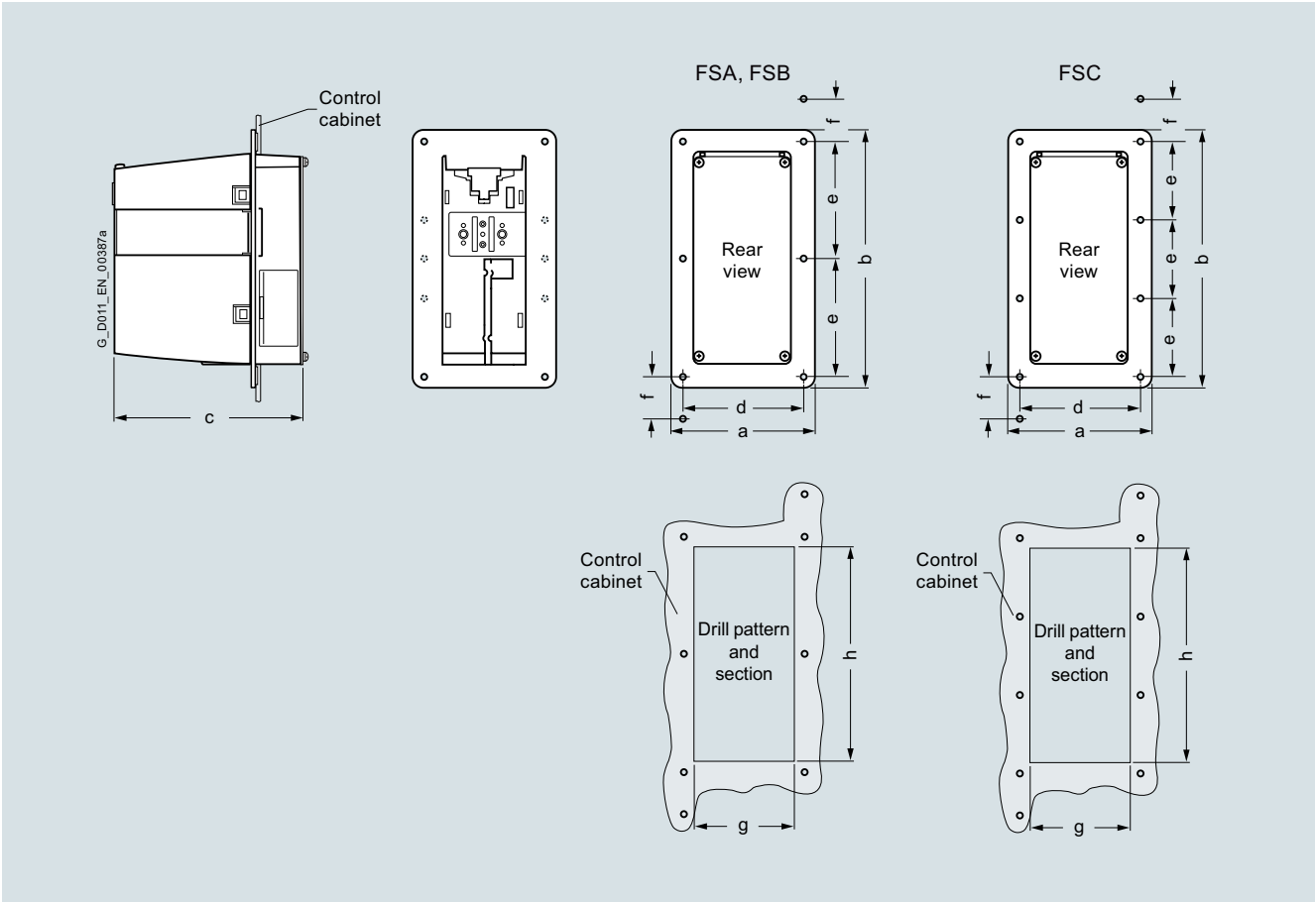
Frame size	**Dimensions** in mm (inches)			**Drilling dimensions** in mm (inches)			**Cooling clearance** [2] in mm (inches)			**Mounting**
	a (width)	b (height)	c (depth) [1]	d	e	f	top	bottom	front	With bolts
PM240-2 Power Modules, standard variant, with/without integrated line filter										
FSA	73 (2.87)	196 (7.72)	165 (6.5)	62.3 (2.45)	186 (7.32)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	3 × M4
FSB	100 (3.94)	292 (11.5)	165 (6.5)	80 (3.15)	281 (11.06)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M4
FSC	140 (5.51)	355 (13.98)	165 (6.5)	120 (4.72)	343 (13.5)	6 (0.24)	80 (3.15)	100 (3.94)	0 (0)	4 × M5
FSD	200 (7.87)	472 (18.58)	237 (9.33)	170 (6.69)	430 (16.93)	7 (0.28)	300 (11.81)	350 (13.78)	100 (3.94)	4 × M5
FSE	275 (10.83)	551 (21.69)	237 (9.33)	230 (9.06)	509 (20.04)	8.5 (0.33)	300 (11.81)	350 (13.78)	100 (3.94)	4 × M6
FSF	305 (12.01)	708 (27.87)	357 (14.06)	270 (10.63)	680 (26.77)	13 (0.51)	300 (11.81)	350 (13.78)	100 (3.94)	4 × M8
FSG	305 (12.01)	1000 (39.37)	357 (14.06)	265 (10.43)	970.5 (38.21)	15 (0.59)	300 (11.81)	350 (13.78)	100 (3.94)	4 × M10

[1] Increased depth:
- When the CU230P-2 Control Unit is plugged on, the depth increases by
  - 58 mm (2.28 in) for frame sizes FSA to FSC
  - 16 mm (0.63 in) for PM240-2, frame sizes FSD to FSG
- When the CU240E-2 Control Unit is plugged on, the depth increases by
  - 41 mm (1.61 in) for frame sizes FSA to FSC
  - 0 mm (0 in) for PM240-2, frame sizes FSD to FSG
- When the CU250S-2 Control Unit is plugged in, the depth increases by
  - 62 mm (2.44 in) for frame sizes FSA to FSC
  - 19 mm (0.75 in) for PM240-2, frame sizes FSD to FSG
- When the IOP-2/BOP-2 is plugged on, the depth increases by a further 11 mm (0.43 in)

[2] The Power Modules can be mounted side by side. A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

Dimensional drawings (continued)

PM240-2 Power Modules, push-through variant



Principle dimension drawing and drill pattern for PM240-2 Power Modules, frame sizes FSA to FSC, push-through variant, with/without integrated line filter class A

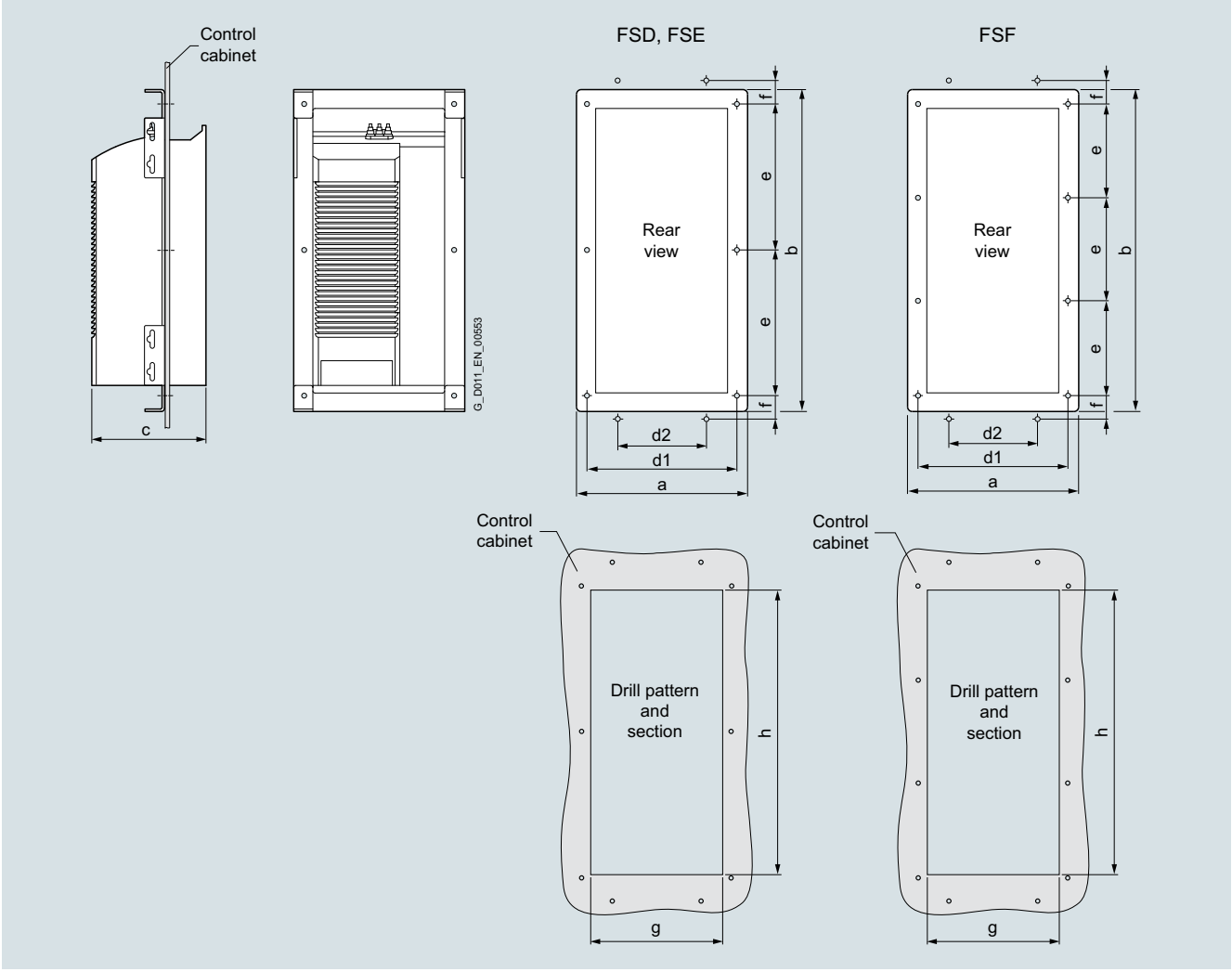
Frame size	**Dimensions** in mm (inches)			**Drilling dimensions** in mm (inches)			**Section of cabinet** in mm (inches)		**Cooling clearance** in mm (inches)			**Mounting**
	a (width)	b (height)	c (depth) [1]	d	e	f	g (width)	h (height)	top	bottom	side [2]	With bolts
PM240-2 Power Modules, IP20 degree of protection, push-through variant, with/without integrated line filter class A												
FSA	126 (4.96)	238 (9.37)	171 (6.73)	106 (4.17)	103 (4.06)	27 (1.06)	88 (3.46)	198 (7.8)	80 (3.15)	100 (3.94)	0 (0)	8 × M5
FSB	154 (6.06)	345 (13.58)	171 (6.73)	134 (5.28)	148 (5.83)	34.5 (1.36)	116 (4.57)	304 (11.97)	80 (3.15)	100 (3.94)	0 (0)	8 × M5
FSC	200 (7.87)	411 (16.18)	171 (6.73)	174 (6.85)	123 (4.84)	30.5 (1.2)	156 (6.14)	365 (14.37)	80 (3.15)	100 (3.94)	0 (0)	10 × M5

[1] Overall depth, of which 117.7 mm (4.63 in) is inside and 53.1 mm (2.09 in) is outside the control cabinet. Increased depth:
- When the CU230P-2 Control Unit is plugged on, the depth increases by 58 mm (2.28 in)
- When the CU240E-2 Control Unit is plugged on, the depth increases by 41 mm (1.61 in)
- When the CU250S-2 Control Unit is plugged on, the depth increases by 62 mm (2.44 in)
- When the IOP-2/BOP-2 is plugged on, the depth increases by a further 11 mm (0.43 in)

[2] The Power Modules can be mounted side by side (mounting frame to mounting frame). A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

Dimensional drawings (continued)

PM240-2 Power Modules, push-through variant (continued)



Principle dimension drawing and drill pattern for PM240-2 Power Modules, frame sizes FSD to FSF, push-through variant, with/without integrated line filter class A

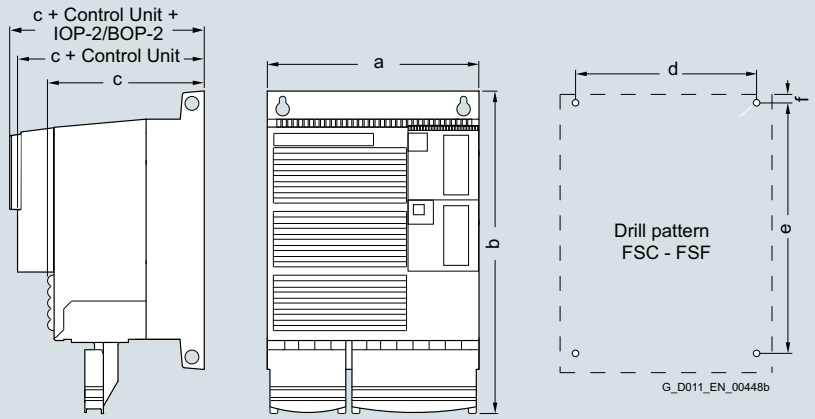
Frame size	**Dimensions** in mm (inches)			**Drilling dimensions** in mm (inches)				**Section of cabinet** in mm (inches)		**Cooling clearance** in mm (inches)				**Mounting**
	a (width)	b (height)	c (depth) [1]	d1	d2	e	f	g (width)	h (height)	top	bottom	side [2]	front	With bolts
PM240-2 Power Modules, IP20 degree of protection, push-through variant, with/without integrated line filter class A														
FSD	275 (10.83)	517 (20.35)	238.5 (9.39)	276 (10.87)	145 (5.71)	240 (9.45)	39 (1.54)	216 (8.5)	468 (18.43)	350 (13.78)	350 (13.78)	0 (0)	29 (1.14)	10 × M5
FSE	354 (13.94)	615 (24.21)	238.5 (9.39)	302.5 (11.91)	230 (9.06)	297.5 (11.71)	45 (1.77)	285 (11.22)	545 (21.46)	350 (13.78)	350 (13.78)	0 (0)	29 (1.14)	10 × M5
FSF	384 (15.12)	785 (30.91)	358 (14.09)	350 (13.78)	223 (8.78)	227 (8.94)	48 (1.89)	315 (12.4)	690 (27.17)	80 (3.15)	100 (3.94)	0 (0)	100 (3.94)	12 × M5

[1] Overall depth, of which for FSD and FSE 141 mm (5.55 in) is inside and 97.5 mm (3.84 in) outside the control cabinet, and for frame size FSF 177.5 mm (6.99 in) inside and 180.5 mm (7.1 in) outside the control cabinet. Increased depth:
- When the CU230P-2 Control Unit is plugged on, the depth increases by 15.5 mm (0.61 in), and with blanking cover, IOP-2 or BOP-2 by a further 11 mm (0.43 in)
- When the CU240E-2 Control Unit is plugged on, the depth does not increase, and with blanking cover, IOP-2 or BOP-2 by 11 mm (0.43 in)
- When the CU250S-2 Control Unit is plugged on, the depth increases by 18.5 mm (0.73 in), and with blanking cover, IOP-2 or BOP-2 by a further 11 mm (0.43 in)

[2] The Power Modules can be mounted side by side (mounting frame to mounting frame). A side clearance of 1 mm (0.04 in) is recommended for tolerance-related reasons.

Dimensional drawings (continued)

PM250 Power Modules – IP20 degree of protection



Principle dimension drawing and drill pattern for PM250 Power Modules, IP20 degree of protection, with/without integrated line filter class A

Frame size	**Dimensions** in mm (inches)			**Drilling dimensions** in mm (inches)			**Cooling clearance** in mm (inches)			**Mounting**
	a (width)	b (height)	c (depth) [1]	d	e	f	top/bottom	side	front	With bolts, nuts and washers
PM250 Power Modules, IP20 degree of protection, with/without integrated line filter class A										
FSC	189 (7.44)	334 (13.15)	185 (7.28)	167 (6.57)	323 (12.72)	6 (0.24)	125 (4.92)	50 (1.97) [2]	0 (0)	4 × M5
FSD	275 (10.83)	419/512 (16.5/20.16)	204 (8.03)	235 (9.25)	325/419 (12.8/16.5)	11 (0.43)	300 (11.81)	0 (0)	0 (0)	4 × M8
FSE	275 (10.83)	499/635 (19.65/25)	204 (8.03)	235 (9.25)	405/541 (15.94/21.3)	11 (0.43)	300 (11.81)	0 (0)	0 (0)	4 × M8
FSF	350 (13.78)	634/934 (24.96/36.77)	316 (12.44)	300 (11.81)	598/899 (23.54/35.39)	11 (0.43)	350 (13.78)	0 (0)	0 (0)	4 × M8

[1] Increased depth:
- When the CU230P-2 Control Unit is plugged on, the depth increases by
  - 58 mm (2.28 in) for frame size FSC
  - 49 mm (1.93 in) for frame sizes FSD to FSF
- When the CU240E-2 Control Unit is plugged on, the depth increases by
  - 40 mm (1.57 in) for frame size FSC
  - 31 mm (1.22 in) for frame sizes FSD to FSF
- When the CU250S-2 Control Unit is plugged in, the depth increases by
  - 61 mm (2.4 in) for frame size FSC
  - 52 mm (2.05 in) for frame sizes FSD to FSF
- When the IOP-2/BOP-2 is plugged on, the depth increases by a further 12 mm (0.47 in)

[2] Up to 40 °C (104 °F) without any lateral clearance.

Overview

Line filter for PM240-2 Power Modules, frame size FSA

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

Integration

PM250 Power Modules, frame size FSC, are available only with integrated line filter class A. To achieve class B, these Power Modules must be additionally fitted with a base filter class B.

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

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 200 V versions	✓	✓	✓	✓ 2)	✓ 2)	✓ 2)	–
• 400 V versions	✓	✓	✓	✓	✓	✓	✓
• 690 V versions	–	–	–	✓	✓	✓	✓
Line-side components							
Line filter class A	**F**	**F**	**F**	**F** 2)	**F** 2)	**F** 2)	–
Line filter class B (only for 400 V versions)	**U** 1)	**U** 1)	**U** 1)	–	–	–	–
Line filters Category C2 or C3 (for 400 V versions frame size FSG)	–	–	–	–	–	–	**I**
Line filters Category C3 (for 690 V versions frame size FSG)	–	–	–	–	–	–	**I** 3)
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Line-side components							
Line filter class A	–	–	**I**	**F**	**F**	**F**	–
Line filter class B	–	–	**U**	–	–	–	–

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

1) Lateral mounting is the only possible option for push-through variants.

2) PM240-2 200 V versions, frame sizes FSD to FSF are only available without integrated line filter.

3) The 690 V versions of the Power Modules PM240-2 frame size FSG are only available with an integrated Categroy C3 filter. To operate the inverter also within TN systems with grounded outer conductor, you must remove the grounding screw.

Selection and ordering data

Rated power		PM240-2 Power Module standard variant		Line filter class B according to EN 55011
kW	hp	Type 6SL3210-...	Frame size	Article No.
380 ... 480 V 3 AC				
0.55	0.75	1PE11-8UL1	FSA	**6SL3203-0BE17-7BA0**
0.75	1	1PE12-3UL1		
1.1	1.5	1PE13-2UL1		
1.5	2	1PE14-3UL1		
2.2	3	1PE16-1UL1		
3	4	1PE18-0UL1		
4	5	1PE21-1UL0	FSB	**6SL3203-0BE21-8BA0**
5.5	7.5	1PE21-4UL0		
7.5	10	1PE21-8UL0		
11	15	1PE22-7UL0	FSC	**6SL3203-0BE23-8BA0**
15	20	1PE23-3UL0		

Rated power		PM240-2 Power Module push-through variant		Line filter class B according to EN 55011
kW	hp	Type 6SL3211-...	Frame size	Article No.
380 ... 480 V 3 AC				
3	4	1PE18-0UL1	FSA	**6SL3203-0BE17-7BA0**
7.5	10	1PE21-8UL0	FSB	**6SL3203-0BE21-8BA0**
15	20	1PE23-3UL0	FSC	**6SL3203-0BE23-8BA0**

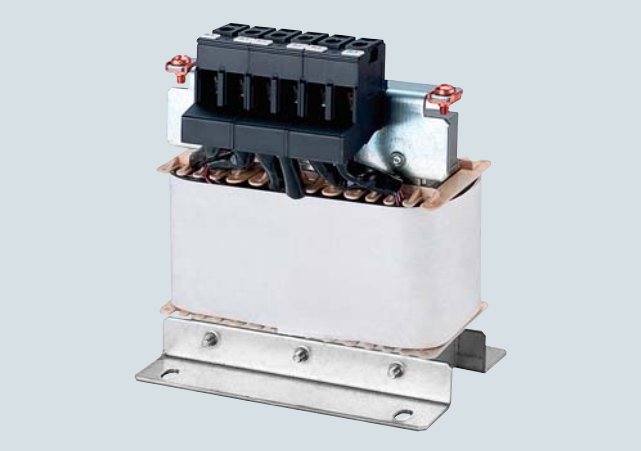
Rated power		PM250 Power Module		Line filter class B according to EN 55011
kW	hp	Type 6SL3225-...	Frame size	Article No.
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA1	FSC	**6SL3203-0BD23-8SA0**
11	15	0BE27-5AA1		
15	20	0BE31-1AA1		

Technical specifications

Line voltage 380 ... 480 V 3 AC		**Line filter class B**		
		6SL3203-0BE17-7BA0	6SL3203-0BE21-8BA0	6SL3203-0BE23-8BA0
Rated current	A	11.4	23.5	49.4
Pulse frequency	kHz	4 ... 16	4 ... 16	4 ... 16
Line supply connection L1, L2, L3		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	1 ... 2.5	2.5 ... 6	6 ... 16
Load connection U, V, W		Shielded cable	Shielded cable	Shielded cable
• Cable cross-section	mm^2	1.5	4	10
• Length	m (ft)	0.45 (1.48)	0.5 (1.64)	0.54 (1.77)
PE connection		On housing via M5 screw stud	On housing via M5 screw stud	On housing via M6 screw studs
• Conductor cross-section	mm^2	1 ... 2.5	2.5 ... 6	6 ... 16
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	73 (2.87)	100 (3.94)	140 (5.51)
• Height	mm (in)	202 (7.95)	297 (11.7)	359 (14.1)
• Depth	mm (in)	65 (2.56)	85 (3.35)	95 (3.74)
Possible as base component		Yes	Yes	Yes
Weight, approx.	kg (lb)	1.75 (3.86)	4 (8.82)	7.3 (16.1)
Suitable for **PM240-2 Power Module** **standard variant** **380 ... 480 V 3 AC**	Type	6SL3210-1PE11-8UL1 6SL3210-1PE12-3UL1 6SL3210-1PE13-2UL1 6SL3210-1PE14-3UL1 6SL3210-1PE16-1UL1 6SL3210-1PE18-0UL1	6SL3210-1PE21-1UL0 6SL3210-1PE21-4UL0 6SL3210-1PE21-8UL0	6SL3210-1PE22-7UL0 6SL3210-1PE23-3UL0
Suitable for **PM240-2 Power Module** **push-through variant** **380 ... 480 V 3 AC** **(lateral mounting only)**	Type	6SL3211-1PE18-0UL1	6SL3211-1PE21-8UL0	6SL3211-1PE23-3UL0
• Frame size		FSA	FSB	FSC

Line voltage 380 ... 480 V 3 AC		**Line filter class B**
		6SL3203-0BD23-8SA0
Rated current	A	39.4
Line supply connection L1, L2, L3		Screw-type terminals
• Conductor cross-section	mm^2	4
Load connection U, V, W		Shielded cable
• Conductor cross-section	mm^2	3 × 4
• Length	m (ft)	0.4 (1.31)
PE connection		On housing via M4 screw stud
Degree of protection		IP20
Dimensions		
• Width	mm (in)	190 (7.48)
• Height	mm (in)	362 (14.25)
• Depth	mm (in)	55 (2.17)
Possible as base component		Yes
Weight, approx.	kg (lb)	2.3 (5.07)
Suitable for **PM250 Power Module**	Type	6SL3225-0BE25-5AA1 6SL3225-0BE27-5AA1 6SL3225-0BE31-1AA1
• Frame size		FSC

Overview



Line reactor for PM240-2 Power Modules, frame size FSA

Line reactors smooth the current drawn by the inverter and thus reduce harmonic components in the line current. Through the reduction of the current harmonics, the thermal load on the power components in the rectifier and in the DC link capacitors is reduced as well as the harmonic effects on the supply. The use of a line reactor increases the service life of the inverter.

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

Integration

A DC link reactor is integrated in the PM240-2 Power Modules, frame sizes FSD to FSG, and therefore no line reactor is required.

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

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 200 V versions	✓	✓	✓	✓	✓	✓	–
• 400 V versions	✓	✓	✓	✓	✓	✓	✓
• 690 V versions	–	–	–	✓	✓	✓	✓
Line-side components							
Line reactors (only for 3-AC versions [1])	**S** [2]	**S** [2]	**S** [2]	**I**	**I**	**I**	**I**

S = Lateral mounting
I = Integrated
– = Not possible

[1] With the appropriate wiring, the line reactors for 200 V 3 AC can be used for the 200 V versions for 200 V 1 AC. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109486005
https://support.industry.siemens.com/cs/document/109482011

[2] For frame sizes FSA to FSC, for lines with u_k < 1 %, it is recommended that you use a line reactor or the next more powerful Power Module. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109482011

Selection and ordering data

Rated power		PM240-2 Power Module standard variant		Line reactor
kW	hp	Type 6SL3210-...	Frame size	Article No.
200 ... 240 V 3 AC [1]				
0.55	0.75	1PB13-0 . L0	FSA	**6SL3203-0CE13-2AA0**
0.75	1	1PB13-8 . L0		
1.1	1.5	1PB15-5 . L0	FSB	**6SL3203-0CE21-0AA0**
1.5	2	1PB17-4 . L0		
2.2	3	1PB21-0 . L0		
3	4	1PB21-4 . L0	FSC	**6SL3203-0CE21-8AA0**
4	5	1PB21-8 . L0		
5.5	7.5	1PC22-2 . L0	FSC	**6SL3203-0CE23-8AA0**
7.5	10	1PC22-8 . L0		
380 ... 480 V 3 AC				
0.55	0.75	1PE11-8 . L1	FSA	**6SL3203-0CE13-2AA0**
0.75	1	1PE12-3 . L1		
1.1	1.5	1PE13-2 . L1		
1.5	2	1PE14-3 . L1	FSA	**6SL3203-0CE21-0AA0**
2.2	3	1PE16-1 . L1		
3	4	1PE18-0 . L1		
4	5	1PE21-1 . L0	FSB	**6SL3203-0CE21-8AA0**
5.5	7.5	1PE21-4 . L0		
7.5	10	1PE21-8 . L0		
11	15	1PE22-7 . L0	FSC	**6SL3203-0CE23-8AA0**
15	20	1PE23-3 . L0		

Rated power		PM240-2 Power Module push-through variant		Line reactor
kW	hp	Type 6SL3211-...	Frame size	Article No.
200 ... 240 V 3 AC [1]				
0.75	1	1PB13-8 . L0	FSA	**6SL3203-0CE13-2AA0**
2.2	3	1PB21-0 . L0	FSB	**6SL3203-0CE21-0AA0**
4	5	1PB21-8 . L0	FSC	**6SL3203-0CE21-8AA0**
380 ... 480 V 3 AC				
3	4	1PE18-0 . L1	FSA	**6SL3203-0CE21-0AA0**
7.5	10	1PE21-8 . L0	FSB	**6SL3203-0CE21-8AA0**
15	20	1PE23-3 . L0	FSC	**6SL3203-0CE23-8AA0**

[1] With the appropriate wiring, the line reactors for 200 V 3 AC can be used for the 200 V versions for 200 V 1 AC. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109486005
https://support.industry.siemens.com/cs/document/109482011

Technical specifications

Line voltage 200 … 240 V 3 AC [1] or 380 ... 480 V 3 AC		**Line reactor**			
		6SL3203-0CE13-2AA0	6SL3203-0CE21-0AA0	6SL3203-0CE21-8AA0	6SL3203-0CE23-8AA0
Rated current	A	4	11.3	22.3	47
Power loss at 50/60 Hz	W	23/26	36/40	53/59	88/97
Line supply/load connection 1L1, 1L2, 1L3 2L1, 2L2, 2L3		Screw terminals	Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section	mm^2	4	4	10	16
PE connection		M4 × 8; U washer; spring lock washer	M4 × 8; U washer; spring lock washer	M5 × 10; U washer; spring lock washer	M5 × 10; U washer; spring lock washer
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	125 (4.92)	125 (4.92)	125 (4.92)	190 (7.48)
• Height	mm (in)	120 (4.72)	140 (5.51)	145 (5.71)	220 (8.66)
• Depth	mm (in)	71 (2.8)	71 (2.8)	91 (3.58)	91 (3.58)
Weight, approx.	kg (lb)	1.1 (2.43)	2.1 (4.63)	2.95 (6.5)	7.8 (17.2)
Suitable for PM240-2 Power Module standard variant 200 ... 240 V 3 AC [1]	Type	6SL3210-1PB13-0 . L0 6SL3210-1PB13-8 . L0	6SL3210-1PB15-5 . L0 6SL3210-1PB17-4 . L0 6SL3210-1PB21-0 . L0	6SL3210-1PB21-4 . L0 6SL3210-1PB21-8 . L0	6SL3210-1PC22-2 . L0 6SL3210-1PC22-8 . L0
• Frame size		FSA	FSB	FSC	FSC
Suitable for PM240-2 Power Module standard variant 380 ... 480 V 3 AC	Type	6SL3210-1PE11-8 . L1 6SL3210-1PE12-3 . L1 6SL3210-1PE13-2 . L1	6SL3210-1PE14-3 . L1 6SL3210-1PE16-1 . L1 6SL3210-1PE18-0 . L1	6SL3210-1PE21-1 . L0 6SL3210-1PE21-4 . L0 6SL3210-1PE21-8 . L0	6SL3210-1PE22-7 . L0 6SL3210-1PE23-3 . L0
• Frame size		FSA	FSA	FSB	FSC
Suitable for PM240-2 Power Module, push-through variant 200 ... 240 V 3 AC [1]	Type	6SL3211-1PB13-8 . L0	6SL3211-1PB21-0 . L0	6SL3211-1PB21-8 . L0	–
• Frame size		FSA	FSB	FSC	–
Suitable for PM240-2 Power Module push-through variant 380 ... 480 V 3 AC	Type	–	6SL3211-1PE18-0 . L1	6SL3211-1PE21-8 . L0	6SL3211-1PE23-3 . L0
• Frame size		–	FSA	FSB	FSC

[1] With the appropriate wiring, the line reactors for 200 V 3 AC can be used for the 200 V versions for 200 V 1 AC. Further information can be found on the Internet at:
https://support.industry.siemens.com/cs/document/109486005
https://support.industry.siemens.com/cs/document/109482011

Selection and ordering data

Recommended line-side overcurrent protection devices for PM240-2 Power Modules

Overcurrent protection devices are absolutely necessary for the operation of the inverters. The following tables list recommendations for fuses.

Siemens fuses of type 3NA3 and 3NE1 for use in the area of validity of IEC

UL-listed fuses Class J or Siemens 3NE1 fuses for use in the USA and Canada

Recommendations on further overcurrent protection devices are available at:
https://support.industry.siemens.com/cs/document/109486009

The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations to NEC Article 409 or UL 508A/508C or UL 61800-5-1 is as follows for Class J fuses for

- PM240-2 Power Modules for SINAMICS G120: 100 kA

SCCR and ICC values for combination with further overcurrent protection devices are available at:
https://support.industry.siemens.com/cs/document/109486009

Notes for installations in Canada:

The inverters are intended for line supply systems with overvoltage category III. More information is available in the technical documentation on the Internet at:
www.siemens.com/sinamics-g120/documentation

More information about the listed Siemens fuses is available in Catalog LV 10 as well as in the Industry Mall.

Rated power [1]		**PM240-2 Power Module standard variant**		**IEC-compliant**		**UL/cUL-compliant**	
				Fuse		**Fuse type** Rated voltage 600 V AC	
		Type		Current			Current
kW	hp	6SL3210-...	Frame size	A	Article No.	Class	A
200 ... 240 V 1 AC/3 AC							
0.55	0.75	1PB13-0 . L0	FSA	16	**3NA3805**	J	15
0.75	1	1PB13-8 . L0	FSA	16	**3NA3805**	J	15
1.1	1.5	1PB15-5 . L0	FSB	32	**3NA3812**	J	35
1.5	2	1PB17-4 . L0	FSB	32	**3NA3812**	J	35
2.2	3	1PB21-0 . L0	FSB	32	**3NA3812**	J	35
3	4	1PB21-4 . L0	FSC	50	**3NA3820**	J	50
4	5	1PB21-8 . L0	FSC	50	**3NA3820**	J	50
200 ... 240 V 3 AC							
5.5	7.5	1PC22-2 . L0	FSC	50	**3NA3820**	J	50
7.5	10	1PC22-8 . L0	FSC	50	**3NA3820**	J	50
11	15	1PC24-2UL0	FSD	63	**3NA3822**	J	60
15	20	1PC25-4UL0	FSD	80	**3NA3824**	J	70
18.5	25	1PC26-8UL0	FSD	100	**3NA3830**	J	90
22	30	1PC28-0UL0	FSE	100	**3NA3830**	J	100
30	40	1PC31-1UL0	FSE	160	**3NA3836**	J	150
37	50	1PC31-3UL0	FSF	200	**3NA3140**	J	175
45	60	1PC31-6UL0	FSF	200	**3NA3140**	J	200
55	75	1PC31-8UL0	FSF	224	**3NA3142**	J	250

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

Selection and ordering data (continued)

Rated power [1]		PM240-2 Power Module standard variant		IEC-compliant		UL/cUL-compliant	
				Fuse		Fuse type Rated voltage 600 V AC	
		Type		Current			Current
kW	hp	6SL3210-...	Frame size	A	Article No.	Class	A
380 ... 480 V 3 AC							
0.55	0.75	1PE11-8 . L1	FSA	10	**3NA3803**	J	10
0.75	1	1PE12-3 . L1	FSA	10	**3NA3803**	J	10
1.1	1.5	1PE13-2 . L1	FSA	16	**3NA3805**	J	15
1.5	2	1PE14-3 . L1	FSA	16	**3NA3805**	J	15
2.2	3	1PE16-1 . L1	FSA	16	**3NA3805**	J	15
3	4	1PE18-0 . L1	FSA	16	**3NA3805**	J	15
4	5	1PE21-1 . L0	FSB	32	**3NA3812**	J	35
5.5	7.5	1PE21-4 . L0	FSB	32	**3NA3812**	J	35
7.5	10	1PE21-8 . L0	FSB	32	**3NA3812**	J	35
11	15	1PE22-7 . L0	FSC	50	**3NA3820**	J	50
15	20	1PE23-3 . L0	FSC	50	**3NA3820**	J	50
18.5	25	1PE23-8 . L0	FSD	63	**3NA3822**	J	60
22	30	1PE24-5 . L0	FSD	80	**3NA3824**	J	70
30	40	1PE26-0 . L0	FSD	100	**3NA3830**	J	90
37	50	1PE27-5 . L0	FSD	100	**3NA3830**	J	100
45	60	1PE28-8 . L0	FSE	125	**3NA3832**	J	125
55	75	1PE31-1 . L0	FSE	160	**3NA3836**	J	150
75	100	1PE31-5 . L0	FSF	200	**3NA3140**	J	200
90	125	1PE31-8 . L0	FSF	224	**3NA3142**	J	250
110	150	1PE32-1 . L0	FSF	300	**3NA3250**	J	300
132	200	1PE32-5 . L0	FSF	315	**3NA3252**	J	350
160	250	1PE33-0 . L0	FSG	355	**3NA3254**	J	400
200	300	1PE33-7 . L0	FSG	400	**3NA3260**	J	500
250	400	1PE34-8 . L0	FSG	630	**3NA3372**	J	600
500 ... 690 V 3 AC							
11	10	1PH21-4 . L0	FSD	20	**3NA3807-6**	J	20
15	15	1PH22-0 . L0	FSD	25	**3NA3810-6**	J	25
18.5	20	1PH22-3 . L0	FSD	32	**3NA3812-6**	J	30
22	25	1PH22-7 . L0	FSD	40	**3NA3817-6KJ**	J	35
30	30	1PH23-5 . L0	FSD	50	**3NA3820-6KJ**	J	50
37	40	1PH24-2 . L0	FSD	63	**3NA3822-6**	J	60
45	50	1PH25-2 . L0	FSE	80	**3NA3824-6**	J	80
55	60	1PH26-2 . L0	FSE	80	**3NA3824-6**	J	80
75	75	1PH28-0 . L0	FSF	100	**3NA3830-6**	J	110
90	100	1PH31-0 . L0	FSF	125	**3NA3132-6**	J	150
110	100	1PH31-2 . L0	FSF	160	**3NA3136-6**	J	150
132	125	1PH31-4 . L0	FSF	200	**3NA3140-6**	J	200
				IEC and UL-compliant			
				Fuse		**Fuse**	
				Current		Current	
				A	Article No.	A	Article No.
160	150	1PH31-7CL0	FSG	250	**3NE1331-0**	250	**3NE1331-0**
200	200	1PH32-1CL0	FSG	315	**3NE1230-0**	315	**3NE1230-0**
250	250	1PH32-5CL0	FSG	355	**3NE1331-0**	355	**3NE1331-0**

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

Selection and ordering data (continued)

Rated power [1]		PM240-2 Power Module push-through variant		IEC-compliant Fuse		UL/cUL-compliant Fuse type Rated voltage 250 V AC or 600 V AC	
		Type		Current			Current
kW	hp	6SL3211-...	Frame size	A	Article No.	Class	A
200 ... 240 V 1 AC/3 AC							
0.75	1	1PB13-8 . L0	FSA	16	**3NA3805**	J	15
2.2	3	1PB21-0 . L0	FSB	32	**3NA3812**	J	35
4	5	1PB21-8 . L0	FSC	50	**3NA3820**	J	50
200 ... 240 V 3 AC							
18.5	25	1PC26-8UL0	FSD	100	**3NA3830**	J	90
30	40	1PC31-1UL0	FSE	160	**3NA3836**	J	150
55	75	1PC31-8UL0	FSF	224	**3NA3142**	J	250
380 ... 480 V 3 AC							
3	4	1PE18-0 . L1	FSA	16	**3NA3805**	J	15
7.5	10	1PE21-8 . L0	FSB	32	**3NA3812**	J	35
15	20	1PE23-3 . L0	FSC	50	**3NA3820**	J	50
37	50	1PE27-5 . L0	FSD	100	**3NA3830**	J	100
55	75	1PE31-1 . L0	FSE	160	**3NA3836**	J	150
132	200	1PE32-5 . L0	FSF	315	**3NA3252**	J	350

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

Selection and ordering data (continued)

Recommended line-side overcurrent protection devices for PM250 Power Modules

Overcurrent protection devices are absolutely necessary for the operation of the inverters. The following tables list recommendations for fuses.

Notes for use in compliance with IEC standards:

The Siemens 3NA3 or 3NE1 fuses and the Siemens 3RV or 3VL circuit breakers are recommended for European countries.

Notes for use in compliance with UL regulations:

UL-listed fuses Class J or Siemens 3NE1 fuses with 600 V AC rated voltage (UL-compliant – corresponds to) are required for North America.

The Short Circuit Current Rating (SCCR) according to UL for industrial control panel installations according to NEC Article 409 or UL 508A/508C is specified as follows:

- PM250: 40 kA (frame size FSC),
  42 kA (frame sizes FSD to FSF)

Notes for installations in Canada:

Overvoltage protection devices in accordance with overvoltage category III and with the following ratings must be connected on the line side of the inverter:

- Rated voltage 480 V (phase-phase), 480 V (phase-ground)
- Voltage limit 4 kV (phase-phase) and 6 kV (phase-ground)

All overvoltage protection devices used must comply with Canadian standards for industrial installations.

More information is available in the technical documentation on the Internet at:
www.siemens.com/sinamics-g120/documentation

More information about the listed Siemens fuses and circuit breakers is available in Catalog LV 10 as well as in the Industry Mall.

Rated power [1]		**PM250 Power Module**		**IEC-compliant**			**UL/cUL-compliant**		
				Fuse		**Circuit breaker**	**Fuse**	**Fuse type** Rated voltage 600 V AC	
		Type		Current	**Type 3NA3**		**Type 3NE1 ( )**		Current
kW	hp	6SL3225-...	Frame size	A	Article No.	Article No.	Article No.	Class	A
380 ... 480 V 3 AC									
7.5	10	0BE25-5AA1	FSC	20	**3NA3807**	**3RV2031-4EA10**	–	K5 [2]	50
11	15	0BE27-5AA1	FSC	32	**3NA3812**	**3RV2031-4UA10**	–	K5 [2]	50
15	20	0BE31-1AA1	FSC	35	**3NA3814**	**3RV2031-4VA10**	–	K5 [2]	50
18.5	25	0BE31-5UA0	FSD	50	**3NA3820**	**3RV2042-4KA10**	–	–	–
		0BE31-5AA0					**3NE1817-0**	J	50
22	30	0BE31-8UA0	FSD	63	**3NA3822**	**3RV2042-4KA10**	–	–	–
		0BE31-8AA0					**3NE1818-0**	J	63
30	40	0BE32-2UA0	FSD	80	**3NA3824**	**3RV2042-4MA10**	–	–	–
		0BE32-2AA0					**3NE1820-0**	J	80
37	50	0BE33-0UA0	FSE	100	**3NA3830**	**3VA1112-5ED32-....** [*]	–	–	–
		0BE33-0AA0					**3NE1021-0**	J	100
45	60	0BE33-7UA0	FSE	125	**3NA3832**	**3VA1116-5ED32-....** [*]	–	–	–
		0BE33-7AA0					**3NE1022-0**	J	125
55	75	0BE34-5UA0	FSF	160	**3NA3836**	**3VA1220-5EF32-....** [*]	–	–	–
		0BE34-5AA0					**3NE1224-0**	J	160
75	100	0BE35-5UA0	FSF	200	**3NA3140**	**3VA1225-5EF32-....** [*]	–	–	–
		0BE35-5AA0					**3NE1225-0**	J	200
90	125	0BE37-5UA0	FSF	250	**3NA3144**	**3VA2340-5HL32-....** [*]	–	–	–
		0BE37-5AA0					**3NE1227-0**	J	250

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

[2] Any UL-listed fuse may be used, e.g. Class K5, Class J, etc.

[*] See Catalog LV 10 for Article No. supplements.

Overview

Braking resistor for PM240-2 Power Modules, frame size FSD

Braking resistor for PM240-2 Power Modules, frame size FSG

Excess energy in the DC link is dissipated in the braking resistor. The braking resistors are intended for use with PM240-2 Power Modules which feature an integrated braking 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 laterally next to the PM240-2 Power Modules. The braking resistors for the Power Modules, frame sizes FSD to FSG, should be placed outside the control cabinet or outside the switchgear room so that the heat is dissipated away from the Power Modules. The level of air conditioning required is therefore reduced.

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

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

Note:

For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

For more information, see Shield connection kits in the section Supplementary system components.

Integration

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

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 200 V versions	✓	✓	✓	✓	✓	✓	–
• 400 V versions	✓	✓	✓	✓	✓	✓	✓
• 690 V versions	–	–	–	✓	✓	✓	✓
DC link components							
Braking resistor	**S**	**S**	**S**	**S**	**S**	**S**	**S**

S = Lateral mounting
– = Not possible

Selection and ordering data

Rated power		PM240-2 Power Module standard variant		Braking resistor
kW	hp	Type 6SL3210-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.55	0.75	1PB13-0 . L0	FSA	**JJY:023146720008**
0.75	1	1PB13-8 . L0		
1.1	1.5	1PB15-5 . L0	FSB	**JJY:023151720007**
1.5	2	1PB17-4 . L0		
2.2	3	1PB21-0 . L0		
3	4	1PB21-4 . L0	FSC	**JJY:023163720018**
4	5	1PB21-8 . L0		
200 ... 240 V 3 AC				
5.5	7.5	1PC22-2 . L0	FSC	**JJY:023433720001**
7.5	10	1PC22-8 . L0		
11	15	1PC24-2UL0	FSD	**JJY:023422620002**
15	20	1PC25-4UL0		
18.5	25	1PC26-8UL0		
22	30	1PC28-0UL0	FSE	**JJY:023423320001**
30	40	1PC31-1UL0		
37	50	1PC31-3UL0	FSF	**JJY:023434020003**
45	60	1PC31-6UL0		
55	75	1PC31-8UL0		
380 ... 480 V 3 AC				
0.55	0.75	1PE11-8 . L1	FSA	**6SL3201-0BE14-3AA0**
0.75	1	1PE12-3 . L1		
1.1	1.5	1PE13-2 . L1		
1.5	2	1PE14-3 . L1		
2.2	3	1PE16-1 . L1	FSA	**6SL3201-0BE21-0AA0**
3	4	1PE18-0 . L1		
4	5	1PE21-1 . L0	FSB	**6SL3201-0BE21-8AA0**
5.5	7.5	1PE21-4 . L0		
7.5	10	1PE21-8 . L0		
11	15	1PE22-7 . L0	FSC	**6SL3201-0BE23-8AA0**
15	20	1PE23-3 . L0		
18.5	25	1PE23-8 . L0	FSD	**JJY:023422620001**
22	30	1PE24-5 . L0		
30	40	1PE26-0 . L0	FSD	**JJY:023424020001**
37	50	1PE27-5 . L0		
45	60	1PE28-8 . L0	FSE	**JJY:023434020001**
55	75	1PE31-1 . L0		
75	100	1PE31-5 . L0	FSF	**JJY:023454020001**
90	125	1PE31-8 . L0		
110	150	1PE32-1 . L0	FSF	**JJY:023464020001**
132	200	1PE32-5 . L0		
160	250	1PE33-0 . L0	FSG	**6SL3000-1BE32-5AA0**
200	300	1PE33-7 . L0		
250	400	1PE34-8 . L0		

Selection and ordering data (continued)

Rated power		PM240-2 Power Module standard variant		Braking resistor
kW	hp	Type 6SL3210-...	Frame size	Article No.
500 ... 690 V 3 AC				
11	10	1PH21-4 . L0	FSD	**JJY:023424020002**
15	15	1PH22-0 . L0		
18.5	20	1PH22-3 . L0		
22	25	1PH22-7 . L0		
30	30	1PH23-5 . L0		
37	40	1PH24-2 . L0		
45	50	1PH25-2 . L0	FSE	**JJY:023434020002**
55	60	1PH26-2 . L0		
75	75	1PH28-0 . L0	FSF	**JJY:023464020002**
90	100	1PH31-0 . L0		
110	100	1PH31-2 . L0		
132	125	1PH31-4 . L0		
160	150	1PH31-7CL0	FSG	**6SL3000-1BH32-5AA0**
200	200	1PH32-1CL0		
250	250	1PH32-5CL0		

Rated power		PM240-2 Power Module push-through variant		Braking resistor
kW	hp	Type 6SL3211-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.75	1	1PB13-8 . L0	FSA	**JJY:023146720008**
2.2	3	1PB21-0 . L0	FSB	**JJY:023151720007**
4	5	1PB21-8 . L0	FSC	**JJY:023163720018**
200 ... 240 V 3 AC				
18.5	25	1PC26-8UL0	FSD	**JJY:023422620002**
30	40	1PC31-1UL0	FSE	**JJY:023423320001**
55	75	1PC31-8UL0	FSF	**JJY:023434020003**
380 ... 480 V 3 AC				
3	4	1PE18-0 . L1	FSA	**6SL3201-0BE21-0AA0**
7.5	10	1PE21-8 . L0	FSB	**6SL3201-0BE21-8AA0**
15	20	1PE23-3 . L0	FSC	**6SL3201-0BE23-8AA0**
37	50	1PE27-5 . L0	FSD	**JJY:023424020001**
55	75	1PE31-1 . L0	FSE	**JJY:023434020001**
132	200	1PE32-5 . L0	FSF	**JJY:023464020001**

Technical specifications

Line voltage 200 ... 240 V 1 AC/3 AC		Braking resistor		
		JJY:023146720008	JJY:023151720007	JJY:023163720018
Resistance	Ω	200	68	37
Rated power P_{DB} (Continuous braking power)	kW	0.0375	0.11	0.2
Peak power P_{max} (load duration t_a = 12 s with period t = 240 s)	kW	0.75	2.2	4
Power connection		Cable	Cable	Cable
Thermostatic switch		Integrated	Integrated	Integrated
Degree of protection		IP20	IP20	IP20
Dimensions				
• Width	mm (in)	60 (2.36)	60 (2.36)	60 (2.36)
• Height	mm (in)	167 (6.57)	217 (8.54)	337 (13.27)
• Depth	mm (in)	30 (1.18)	30 (1.18)	30 (1.18)
Weight, approx.	kg (lb)	0.5 (1.10)	0.7 (1.54)	1.1 (2.43)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PB13-0 . L0 6SL3210-1PB13-8 . L0	6SL3210-1PB15-5 . L0 6SL3210-1PB17-4 . L0 6SL3210-1PB21-0 . L0	6SL3210-1PB21-4 . L0 6SL3210-1PB21-8 . L0
Suitable for PM240-2 Power Module push-through variant	Type	6SL3211-1PB13-8 . L0	6SL3211-1PB21-0 . L0	6SL3211-1PB21-8 . L0
• Frame size		FSA	FSB	FSC

Line voltage 200 ... 240 V 3 AC		Braking resistor			
		JJY:023433720001	JJY:023422620002	JJY:023423320001	JJY:023434020003
Resistance	Ω	20	7.5	4.5	2.5
Rated power P_{DB} (Continuous braking power)	kW	0.375	0.93	1.5	2.75
Peak power P_{max} (load duration t_a = 12 s with period t = 240 s)	kW	7.5	18.5	30	55
Power connection		Cable	Cable	Cable	Cable
Thermostatic switch		Integrated	Integrated	Integrated	Integrated
Degree of protection		IP20	IP21	IP21	IP21
Dimensions					
• Width	mm (in)	337 (13.27)	220 (8.66)	220 (8.66)	350 (13.78)
• Height	mm (in)	120 (4.72)	470 (18.5)	560 (22.05)	630 (24.8)
• Depth	mm (in)	30 (1.18)	180 (7.09)	180 (7.09)	180 (7.09)
Weight, approx.	kg (lb)	2 (4.41)	7 (15.4)	8.5 (18.7)	13.5 (29.8)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PC22-2 . L0 6SL3210-1PC22-8 . L0	6SL3210-1PC24-2UL0 6SL3210-1PC25-4UL0 6SL3210-1PC26-8UL0	6SL3210-1PC28-0UL0 6SL3210-1PC31-1UL0	6SL3210-1PC31-3UL0 6SL3210-1PC31-6UL0 6SL3210-1PC31-8UL0
Suitable for PM240-2 Power Module push-through variant	Type	–	6SL3211-1PC26-8UL0	6SL3211-1PC31-1UL0	6SL3211-1PC31-8UL0
• Frame size		FSC	FSD	FSE	FSF

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		Braking resistor			
		6SL3201-0BE14-3AA0	6SL3201-0BE21-0AA0	6SL3201-0BE21-8AA0	6SL3201-0BE23-8AA0
Resistance	Ω	370	140	75	30
Rated power P_{DB} (Continuous braking power)	kW	0.075	0.2	0.375	0.925
Peak power P_{max} (load duration t_a = 12 s with period t = 240 s)	kW	1.5	4	7.5	18.5
Power connection		Terminal block	Terminal block	Terminal block	Terminal block
• Conductor cross-section	mm^2	2.5	2.5	2.5	6
Thermostatic switch		NC contact	NC contact	NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A	250 V AC/2.5 A
• Conductor cross-section	mm^2	2.5	2.5	2.5	2.5
PE connection					
• Via terminal block		Yes	Yes	Yes	Yes
• PE connection on housing		M4 screw	M4 screw	M4 screw	M4 screw
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
• Width	mm (in)	105 (4.13)	105 (4.13)	175 (6.89)	250 (9.84)
• Height	mm (in)	295 (11.61)	345 (13.58)	345 (13.58)	490 (19.29)
• Depth	mm (in)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)
Weight, approx.	kg (lb)	1.48 (3.26)	1.8 (3.97)	2.73 (6.02)	6.2 (13.7)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PE11-8 . L1 6SL3210-1PE12-3 . L1 6SL3210-1PE13-2 . L1 6SL3210-1PE14-3 . L1	6SL3210-1PE16-1 . L1 6SL3210-1PE18-0 . L1	6SL3210-1PE21-1 . L0 6SL3210-1PE21-4 . L0 6SL3210-1PE21-8 . L0	6SL3210-1PE22-7 . L0 6SL3210-1PE23-3 . L0
Suitable for PM240-2 Power Module push-through variant	Type	–	6SL3211-1PE18-0 . L1	6SL3211-1PE21-8 . L0	6SL3211-1PE23-3 . L0
• Frame size		FSA	FSA	FSB	FSC

Line voltage 380 ... 480 V 3 AC		Braking resistor				
		JJY:023422620001	JJY:023424020001	JJY:023434020001	JJY:023454020001 [1]	JJY:023464020001 [2]
Resistance	Ω	25	15	10	7.1	5
Rated power P_{DB} (Continuous braking power)	kW	1.1	1.85	2.75	3.85	5.5
Peak power P_{max} (load duration t_a = 12 s with period t = 240 s)	kW	22	37	55	77	110
Power connection		Cable	Cable	Cable	Cable	Cable
Thermostatic switch		Integrated	Integrated	Integrated	Integrated	Integrated
Degree of protection		IP21	IP21	IP21	IP21	IP21
Dimensions						
• Width	mm (in)	220 (8.66)	220 (8.66)	350 (13.78)	[1]	[2]
• Height	mm (in)	470 (18.5)	610 (24.02)	630 (24.8)	[1]	[2]
• Depth	mm (in)	180 (7.09)	180 (7.09)	180 (7.09)	[1]	[2]
Weight, approx.	kg (lb)	7 (15.4)	9.5 (20.9)	13.5 (29.8)	20.5 (45.2)	27 (59.5)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PE23-8 . L0 6SL3210-1PE24-5 . L0	6SL3210-1PE26-0 . L0 6SL3210-1PE27-5 . L0	6SL3210-1PE28-8 . L0 6SL3210-1PE31-1 . L0	6SL3210-1PE31-5 . L0 6SL3210-1PE31-8 . L0	6SL3210-1PE32-1 . L0 6SL3210-1PE32-5 . L0
Suitable for PM240-2 Power Module push-through variant	Type	–	6SL3211-1PE27-5 . L0	6SL3211-1PE31-1 . L0	–	6SL3211-1PE32-5 . L0
• Frame size		FSD	FSD	FSE	FSF	FSF

[1] This braking resistor consists of the two braking resistors, JJY:023422620001 and JJY:023434020001, which must be connected in parallel on the plant/system side.

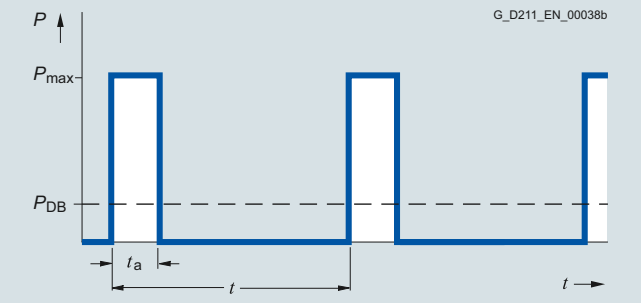
[2] This braking resistor consists of two JJY:023434020001 braking resistors, which must be connected in parallel on the plant/system side.

Technical specifications (continued)

Line voltage 500 ... 690 V 3 AC		Braking resistor		
		JJY:023424020002	JJY:023434020002	JJY:023464020002 [1]
Resistance	Ω	31	21	10.5
Rated power P_{DB} (Continuous braking power)	kW	1.85	2.75	5.5
Peak power P_{max} (load duration t_a = 12 s with period t = 240 s)	kW	37	55	110
Power connection		Cable	Cable	Cable
Thermostatic switch		Integrated	Integrated	Integrated
Degree of protection		IP21	IP21	IP21
Dimensions				
• Width	mm (in)	220 (8.66)	350 (13.78)	[1]
• Height	mm (in)	610 (24.02)	630 (24.8)	[1]
• Depth	mm (in)	180 (7.09)	180 (7.09)	[1]
Weight, approx.	kg (lb)	9.5 (20.9)	13.5 (29.8)	27 (59.5)
Suitable for PM240-2 Power Module	Type	6SL3210-1PH21-4 . L0 6SL3210-1PH22-0 . L0 6SL3210-1PH22-3 . L0 6SL3210-1PH22-7 . L0 6SL3210-1PH23-5 . L0 6SL3210-1PH24-2 . L0	6SL3210-1PH25-2 . L0 6SL3210-1PH26-2 . L0	6SL3210-1PH28-0 . L0 6SL3210-1PH31-0 . L0 6SL3210-1PH31-2 . L0 6SL3210-1PH31-4 . L0
• Frame size		FSD	FSE	FSF

Line voltage 380 ... 480 V 3 AC or 500 ... 690 V 3 AC		Braking resistor	
		6SL3000-1BE32-5AA0	6SL3000-1BH32-5AA0
Resistance	Ω	2.2	4.4
Rated power P_{DB} (Continuous braking power)	kW	50	50
Peak power P_{max} (load duration t_a = 15 s with period t = 90 s)	kW	250	250
Power connection		M10 screw stud	M10 screw stud
Thermostatic switch		NC contact	NC contact
• Contact load, max.		250 V AC/2.5 A	250 V AC/2.5 A
Degree of protection		IP20	IP20
Dimensions			
• Width	mm (in)	810 (31.89)	810 (31.89)
• Height	mm (in)	1325 (52.17)	1325 (52.17)
• Depth	mm (in)	485 (19.09)	485 (19.09)
Weight, approx.	kg (lb)	120 (265)	120 (265)
Suitable for PM240-2 Power Module	Type	400 V: 6SL3210-1PE33-0 . L0 6SL3210-1PE33-7 . L0 6SL3210-1PE34-8 . L0	690 V: 6SL3210-1PH31-7CL0 6SL3210-1PH32-1CL0 6SL3210-1PH32-5CL0
• Frame size		FSG	FSG

Characteristic curves

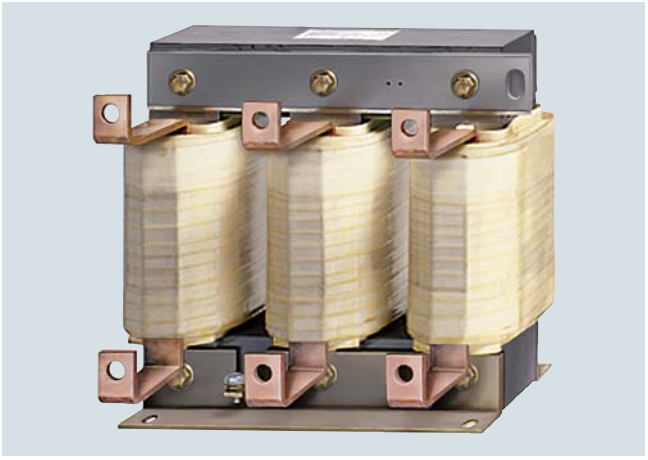


Load diagram for the braking resistors

t_a = 12 s or 15 s (see section Technical specifications)
t = 240 s or 90 s (see section Technical specifications)

[1] This braking resistor consists of two JJY:023434020002 braking resistors, which must be connected in parallel on the plant/system side.

Overview



Output reactor for PM240-2 Power Modules, frame size FSG

Output reactors reduce the rate of voltage rise (*dv/dt*) and the height of the current peaks, and enable longer motor cables to be connected.

Owing to the high rates of voltage rise of the fast-switching IGBTs, the capacitance of long motor cables reverses polarity very quickly with every switching operation in the inverter. As a result, the inverter is loaded with additional current peaks of substantial magnitude.

Output reactors reduce the magnitude of these additional peaks because the cable capacitance reverses polarity more slowly across the reactor inductance, thereby attenuating the amplitudes of the current peaks.

When using output reactors, the following should be observed:

- Max. permissible output frequency 150 Hz
- Max. permissible pulse frequency 4 kHz
- The output reactor must be installed as close as possible to the Power Module

Integration

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

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 200 V versions	✓	✓	✓	✓	✓	✓	–
• 400 V versions	✓	✓	✓	✓	✓	✓	✓
• 690 V versions	–	–	–	✓ [1]	✓ [1]	✓	✓
Load-side power components							
Output reactor	**S**	**S**	**S**	**S** [1]	**S** [1]	**S**	**S**
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Output reactor	–	–	**U**	**S**	**S**	**S**	–

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

[1] There are no optional output reactors available for 690 V versions of PM240-2 Power Modules, frame sizes FSD and FSE.

Selection and ordering data

Rated power		PM240-2 Power Module standard variant		Output reactor
kW	hp	Type 6SL3210-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.55	0.75	1PB13-0 . L0	FSA	**6SL3202-0AE16-1CA0**
0.75	1	1PB13-8 . L0		
1.1	1.5	1PB15-5 . L0	FSB	**6SL3202-0AE16-1CA0**
1.5	2	1PB17-4 . L0	FSB	**6SL3202-0AE18-8CA0**
2.2	3	1PB21-0 . L0	FSB	**6SL3202-0AE21-8CA0**
3	4	1PB21-4 . L0	FSC	**6SL3202-0AE21-8CA0**
4	5	1PB21-8 . L0		
200 ... 240 V 3 AC				
5.5	7.5	1PC22-2 . L0	FSC	**6SL3202-0AE23-8CA0**
7.5	10	1PC22-8 . L0		
11	15	1PC24-2UL0	FSD	**6SE6400-3TC07-5ED0**
15	20	1PC25-4UL0		
18.5	25	1PC26-8UL0		
22	30	1PC28-0UL0	FSE	**6SE6400-3TC14-5FD0**
30	40	1PC31-1UL0		
37	50	1PC31-3UL0	FSF	**6SE6400-3TC14-5FD0**
45	60	1PC31-6UL0		
55	75	1PC31-8UL0		
380 ... 480 V 3 AC				
0.55	0.75	1PE11-8 . L1	FSA	**6SL3202-0AE16-1CA0**
0.75	1	1PE12-3 . L1		
1.1	1.5	1PE13-2 . L1		
1.5	2	1PE14-3 . L1		
2.2	3	1PE16-1 . L1		
3	4	1PE18-0 . L1	FSA	**6SL3202-0AE18-8CA0**
4	5	1PE21-1 . L0	FSB	**6SL3202-0AE21-8CA0**
5.5	7.5	1PE21-4 . L0		
7.5	10	1PE21-8 . L0		
11	15	1PE22-7 . L0	FSC	**6SL3202-0AE23-8CA0**
15	20	1PE23-3 . L0		
18.5	25	1PE23-8 . L0	FSD	**6SE6400-3TC07-5ED0**
22	30	1PE24-5 . L0		
30	40	1PE26-0 . L0		
37	50	1PE27-5 . L0		
45	60	1PE28-8 . L0	FSE	**6SE6400-3TC14-5FD0**
55	75	1PE31-1 . L0		
75	100	1PE31-5 . L0	FSF	**6SE6400-3TC14-5FD0**
90	125	1PE31-8 . L0		
110	150	1PE32-1 . L0	FSF	**6SL3000-2BE32-1AA0**
132	200	1PE32-5 . L0	FSF	**6SL3000-2BE32-6AA0**
160	250	1PE33-0 . L0	FSG	**6SL3000-2BE33-2AA0**
200	300	1PE33-7 . L0	FSG	**6SL3000-2BE33-8AA0**
250	400	1PE34-8 . L0	FSG	**6SL3000-2BE35-0AA0**
500 ... 690 V 3 AC				
75	75	1PH28-0 . L0	FSF	**6SL3000-2AH31-0AA0**
90	100	1PH31-0 . L0		
110	100	1PH31-2 . L0	FSF	**6SL3000-2AH31-5AA0**
132	125	1PH31-4 . L0		
160	150	1PH31-7CL0	FSG	**6SL3000-2AH31-8AA0**
200	200	1PH32-1CL0	FSG	**6SL3000-2AH32-4AA0**
250	250	1PH32-5CL0	FSG	**6SL3000-2AH32-6AA0**

Selection and ordering data (continued)

Rated power		PM240-2 Power Module push-through variant		Output reactor
kW	hp	Type 6SL3211-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.75	1	1PB13-8 . L0	FSA	**6SL3202-0AE16-1CA0**
2.2	3	1PB21-0 . L0	FSB	**6SL3202-0AE21-8CA0**
4	5	1PB21-8 . L0	FSC	**6SL3202-0AE21-8CA0**
200 ... 240 V 3 AC				
18.5	25	1PC26-8UL0	FSD	**6SE6400-3TC07-5ED0**
3	40	1PC31-1UL0	FSE	**6SE6400-3TC14-5FD0**
55	75	1PC31-8UL0	FSF	**6SE6400-3TC14-5FD0**
380 ... 480 V 3 AC				
3	4	1PE18-0 . L1	FSA	**6SL3202-0AE18-8CA0**
7.5	10	1PE21-8 . L0	FSB	**6SL3202-0AE21-8CA0**
15	20	1PE23-3 . L0	FSC	**6SL3202-0AE23-8CA0**
37	50	1PE27-5 . L0	FSD	**6SE6400-3TC07-5ED0**
55	75	1PE31-1 . L0	FSE	**6SE6400-3TC14-5FD0**
132	200	1PE32-5 . L0	FSF	**6SL3000-2BE32-6AA0**

Rated power		PM250 Power Module		Output reactor
kW	hp	Type 6SL3225-...	Frame size	Article No.
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA1	FSC	**6SL3202-0AJ23-2CA0**
11	15	0BE27-5AA1		
15	20	0BE31-1AA1		
18.5	25	0BE31-5 . A0	FSD	**6SE6400-3TC05-4DD0**
22	30	0BE31-8 . A0	FSD	**6SE6400-3TC03-8DD0**
30	40	0BE32-2 . A0	FSD	**6SE6400-3TC05-4DD0**
37	50	0BE33-0 . A0	FSE	**6SE6400-3TC08-0ED0**
45	60	0BE33-7 . A0	FSE	**6SE6400-3TC07-5ED0**
55	75	0BE34-5 . A0	FSF	**6SE6400-3TC14-5FD0**
75	100	0BE35-5 . A0	FSF	**6SE6400-3TC15-4FD0**
90	125	0BE37-5 . A0	FSF	**6SE6400-3TC14-5FD0**

Technical specifications

Line voltage 200 ... 240 V 1 AC/3 AC or 380 ... 480 V 3 AC		**Output reactor (for a 4 kHz pulse frequency)**			
		6SL3202-0AE16-1CA0	6SL3202-0AE18-8CA0	6SL3202-0AE21-8CA0	6SL3202-0AE23-8CA0
Rated current	A	6.1	9	18.5	39
Power loss	kW	0.09	0.08	0.08	0.11
Connection to the Power Module/ motor connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	4	4	10	16
PE connection		M4 screw stud	M4 screw stud	M5 screw stud	M5 screw stud
Cable length, max. between output reactor and motor					
• 200 -10 % ... 240 V +10 % 3 AC and 380 -10 % ... 415 V +10 % 3 AC					
- Shielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)
- Unshielded	m (ft)	225 (738)	225 (738)	225 (738)	225 (738)
• 440 ... 480 V 3 AC +10 %					
- Shielded	m (ft)	100 (328)	100 (328)	100 (328)	100 (328)
- Unshielded	m (ft)	150 (492)	150 (492)	150 (492)	150 (492)
Dimensions					
• Width	mm (in)	207 (8.15)	207 (8.15)	247 (9.72)	257 (10.12)
• Height	mm (in)	175 (6.89)	180 (7.09)	215 (8.46)	235 (9.25)
• Depth	mm (in)	72.5 (2.85)	72.5 (2.85)	100 (3.94)	114.7 (4.52)
Degree of protection		IP20	IP20	IP20	IP20
Weight, approx.	kg (lb)	3.4 (7.5)	3.9 (8.6)	10.1 (22.3)	11.2 (24.7)
Suitable for PM240-2 standard variant 200 ... 240 V 1 AC/3 AC	Type	6SL3210-1PB13-0 . L0 FSA 6SL3210-1PB13-8 . L0 FSA 6SL3210-1PB15-5 . L0 FSB	6SL3210-1PB17-4 . L0 FSB	6SL3210-1PB21-0 . L0 FSB 6SL3210-1PB21-4 . L0 FSC 6SL3210-1PB21-8 . L0 FSC	6SL3210-1PC22-2 . L0 FSC 6SL3210-1PC22-8 . L0 FSC
Suitable for PM240-2 standard variant 380 ... 480 V 3 AC	Type	6SL3210-1PE11-8 . L1 FSA 6SL3210-1PE12-3 . L1 FSA 6SL3210-1PE13-2 . L1 FSA 6SL3210-1PE14-3 . L1 FSA 6SL3210-1PE16-1 . L1 FSA	6SL3210-1PE18-0 . L1 FSA	6SL3210-1PE21-1 . L0 FSB 6SL3210-1PE21-4 . L0 FSB 6SL3210-1PE21-8 . L0 FSB	6SL3210-1PE22-7 . L0 FSC 6SL3210-1PE23-3 . L0 FSC
Suitable for PM240-2 push-through variant 200 ... 240 V 1 AC/3 AC	Type	6SL3211-1PB13-8 . L0 FSA	–	6SL3211-1PB21-0 . L0 FSB 6SL3211-1PB21-8 . L0 FSC	–
Suitable for PM240-2 push-through variant 380 ... 480 V 3 AC	Type	–	6SL3211-1PE18-0 . L1 FSA	6SL3211-1PE21-8 . L0 FSB	6SL3211-1PE23-3 . L0 FSC

Technical specifications (continued)

Line voltage 200 ... 240 V 3 AC or 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)			
		6SE6400-3TC07-5ED0	6SE6400-3TC14-5FD0	6SL3000-2BE32-1AA0	6SL3000-2BE32-6AA0
Rated current	A	90	178	210	260
Power loss, max.	kW	0.27	0.47	0.49	0.5
Connection to the Power Module/ motor connection		Flat connector for M6 screw	Flat connector for M8 screw	Flat connector for M10 screw	Flat connector for M10 screw
PE connection		M6 screw	M8 screw	M8 screw	M8 screw
Cable length, max. between output reactor and motor					
• Shielded	m (ft)	200 (656)	200 (656)	300 (984)	300 (984)
• Unshielded	m (ft)	300 (984)	300 (984)	450 (1476)	450 (1476)
Dimensions					
• Width	mm (in)	270 (10.63)	350 (13.78)	300 (11.81)	300 (11.81)
• Height	mm (in)	248 (9.76)	321 (12.64)	285 (11.22)	315 (12.4)
• Depth	mm (in)	209 (8.23)	288 (11.34)	257 (10.12)	277 (10.91)
Degree of protection		IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	27 (59.5)	57 (126)	60 (132)	66 (146)
Suitable for PM240-2 standard variant 200 ... 240 V 3 AC	Type	6SL3210-1PC24-2UL0 6SL3210-1PC25-4UL0 6SL3210-1PC26-8UL0 FSD	6SL3210-1PC28-0UL0 6SL3210-1PC31-1UL0 FSE 6SL3210-1PC31-3UL0 6SL3210-1PC31-6UL0 6SL3210-1PC31-8UL0 FSF	–	–
Suitable for PM240-2 standard variant 380 ... 480 V 3 AC	Type	6SL3210-1PE23-8 . L0 6SL3210-1PE24-5 . L0 6SL3210-1PE26-0 . L0 6SL3210-1PE27-5 . L0 FSD	6SL3210-1PE28-8 . L0 6SL3210-1PE31-1 . L0 FSE 6SL3210-1PE31-5 . L0 6SL3210-1PE31-8 . L0 FSF	6SL3210-1PE32-1 . L0 FSF	6SL3210-1PE32-5 . L0 FSF
Suitable for PM240-2 push-through variant 200 ... 240 V 3 AC	Type	6SL3211-1PC26-8UL0 FSD	6SL3211-1PC31-1UL0 FSE 6SL3211-1PC31-8UL0 FSF	–	–
Suitable for PM240-2 push-through variant 380 ... 480 V 3 AC	Type	6SL3211-1PE27-5 . L0 FSD	6SL3211-1PE31-1 . L0 FSE	–	6SL3211-1PE32-5 . L0 FSF

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)		
		6SL3000-2BE33-2AA0	6SL3000-2BE33-8AA0	6SL3000-2BE35-0AA0
Rated current	A	310	380	490
Power loss	kW	0.47	0.5	0.5
Connection to the Power Module		1 × hole for M10	1 × hole for M10	1 × hole for M12
PE connection		M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor				
• Shielded	m (ft)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)
Dimensions				
• Width	mm (in)	300 (11.81)	300 (11.81)	300 (11.81)
• Height	mm (in)	285 (11.22)	285 (11.22)	365 (14.37)
• Depth	mm (in)	257 (10.12)	277 (10.91)	277 (10.91)
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	66 (146)	73 (161)	100 (220)
Suitable for PM240-2 Power Module standard variant	Type	6SL3210-1PE33-0 . L0 FSG	6SL3210-1PE33-7 . L0 FSG	6SL3210-1PE34-8 . L0 FSG

Technical specifications (continued)

Line voltage 500 ... 690 V 3 AC		Output reactor (for a 4 kHz pulse frequency)				
		6SL3000-2AH31-0AA0	6SL3000-2AH31-5AA0	6SL3000-2AH31-8AA0	6SL3000-2AH32-4AA0	6SL3000-2AH32-6AA0
Rated current	A	100	150	175	215	260
Power loss, max.	kW	0.3	0.34	0.4	0.425	0.44
Connection to the Power Module/ motor connection		Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw	Flat connector for M10 screw
PE connection		M6 screw	M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor						
• Shielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
• Unshielded	m (ft)	450 (1476)	450 (1476)	450 (1476)	450 (1476)	450 (1476)
Dimensions						
• Width	mm (in)	270 (10.63)	270 (10.63)	300 (11.81)	300 (11.81)	300 (11.81)
• Height	mm (in)	248 (9.76)	248 (9.76)	285 (11.22)	285 (11.22)	285 (11.22)
• Depth	mm (in)	200 (7.87)	200 (7.87)	212 (8.35)	212 (8.35)	212 (8.35)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	25 (55.1)	25.8 (56.9)	34 (75)	34 (75)	40 (88.2)
Suitable for PM240-2 standard variant	Type	6SL3210-1PH28-0 . L0 6SL3210-1PH31-0 . L0 FSF	6SL3210-1PH31-2 . L0 6SL3210-1PH31-4 . L0 FSF	6SL3210-1PH31-7CL0 FSG	6SL3210-1PH32-1CL0 FSG	6SL3210-1PH32-5CL0 FSG

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)
		6SL3202-0AJ23-2CA0
Rated current	A	32
Power loss	kW	0.06
Connection to the Power Module		Cable
• Conductor cross-section		4 × AWG14 (1.5 mm^2)
• Length, approx.	m (ft)	0.35 (1.15)
Motor connection		Screw-type terminals
• Conductor cross-section	mm^2	6
PE connection		M5 screw stud
Cable length, max. between output reactor and motor		
• 380 -10 % ... 400 V 3 AC		
- Shielded	m (ft)	150 (492)
- Unshielded	m (ft)	225 (738)
• 401 ... 480 V 3 AC +10 %		
- Shielded	m (ft)	100 (328)
- Unshielded	m (ft)	150 (492)
Dimensions		
• Width	mm (in)	189 (7.44)
• Height	mm (in)	334 (13.15)
• Depth	mm (in)	80 (3.15)
Possible as base component		Yes
Degree of protection		IP00
Weight, approx.	kg (lb)	9.1 (20.1)
Suitable for PM250 Power Module	Type	6SL3225-0BE25-5AA1 6SL3225-0BE27-5AA1 6SL3225-0BE31-1AA1 FSC

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)			
		6SE6400-3TC05-4DD0	6SE6400-3TC03-8DD0	6SE6400-3TC08-0ED0	6SE6400-3TC07-5ED0
Rated current	A	68 [1]	45 [1]	104 [1]	90 [1]
Power loss	kW	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
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
PE connection		M6 screw	M6 screw	M6 screw	M6 screw
Cable length, max. between output reactor and motor					
• 380 -10 % ... 400 V 3 AC					
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %					
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions					
• Width	mm (in)	225 (8.86)	225 (8.86)	225 (8.86)	270 (10.63)
• Height	mm (in)	210 (8.27)	210 (8.27)	210 (8.27)	248 (9.76)
• Depth	mm (in)	150 (5.91)	179 (7.05)	150 (5.91)	209 (8.23)
Degree of protection		IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	10.7 (23.6)	16.1 (35.5)	10.4 (22.9)	24.9 (54.9)
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0 6SL3225-0BE32-2 . A0 FSD	6SL3225-0BE31-8 . A0 FSD	6SL3225-0BE33-0 . A0 FSE	6SL3225-0BE33-7 . A0 FSE

Line voltage 380 ... 480 V 3 AC		Output reactor (for a 4 kHz pulse frequency)	
		6SE6400-3TC14-5FD0	6SE6400-3TC15-4FD0
Rated current	A	178 [1]	178 [1]
Power loss	kW	0.47	0.25
Connection to the Power Module		Flat connector for M8 cable lug	Flat connector for M8 cable lug
Motor connection		Flat connector for M8 cable lug	Flat connector for M8 cable lug
PE connection		M8 screw	M6 screw
Cable length, max. between output reactor and motor			
• 380 -10 % ... 400 V 3 AC			
- Shielded	m (ft)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)
• 401 ... 480 V 3 AC +10 %			
- Shielded	m (ft)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)
Dimensions			
• Width	mm (in)	350 (13.78)	270 (10.63)
• Height	mm (in)	321 (12.64)	248 (9.76)
• Depth	mm (in)	288 (11.34)	209 (8.23)
Degree of protection		IP00	IP00
Weight, approx.	kg (lb)	51.5 (114)	24 (52.9)
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0 6SL3225-0BE37-5 . A0 FSF	6SL3225-0BE35-5 . A0 FSF

[1] On the rating plate of the reactor the current is specified according to the duty cycle for high overload (HO). This is lower than the current specified according to the duty cycle for low overload (LO) of the Power Module.

Overview

Sine-wave filter

Sine-wave filters limit the rate of voltage rise (*dv/dt*) and the peak voltages on the motor winding. Similar to an output reactor, they enable the connection of longer motor cables.

Bearing currents are also reduced significantly. Using these filters therefore allows standard motors with standard insulation and without insulated bearings to be operated on SINAMICS. As a result, the voltage load on the motor winding is virtually identical to the load on windings of directly mains-fed motors.

Owing to the very low rates of voltage rise on the motor cable, the sine-wave filter also has a positive impact in terms of electromagnetic compatibility which means that it is not absolutely essential to use shielded cables for short motor cables to achieve the required standard of EMC.

Since the voltage applied to the motor is not pulsed, the inverter-related stray losses and additional noise in the motor are also reduced considerably and the noise level of the motor is similar to the level produced by directly mains-fed motors.

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

- Pulse frequencies of between 4 kHz and 8 kHz are permissible for rated outputs up to and including 90 kW
- The output frequency is limited to 150 Hz.
- Operation and commissioning may only be performed with the motor connected as the sine-wave filter is not no-load proof
- It must be ensured that the automatic pulse frequency reduction functions are also deactivated

Integration

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

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM250 Power Module with line-commutated energy recovery							
Available frame sizes	–	–	✓	✓	✓	✓	–
Load-side power components							
Sine-wave filter	–	–	**U**	**S**	**S**	**S**	–

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

Selection and ordering data

Rated power		PM250 Power Module		Sine-wave filter
kW	hp	Type 6SL3225-...	Frame size	Article No.
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA1	FSC	**6SL3202-0AE22-0SA0**
11	15	0BE27-5AA1	FSC	**6SL3202-0AE23-3SA0**
15	20	0BE31-1AA1		
18.5	25	0BE31-5 . A0	FSD	**6SL3202-0AE24-6SA0**
22	30	0BE31-8 . A0		
30	40	0BE32-2 . A0	FSD	**6SL3202-0AE26-2SA0**
37	50	0BE33-0 . A0	FSE	**6SL3202-0AE28-8SA0**
45	60	0BE33-7 . A0		
55	75	0BE34-5 . A0	FSF	**6SL3202-0AE31-5SA0**
75	100	0BE35-5 . A0		
90	125	0BE37-5 . A0	FSF	**6SL3202-0AE31-8SA0**

Technical specifications

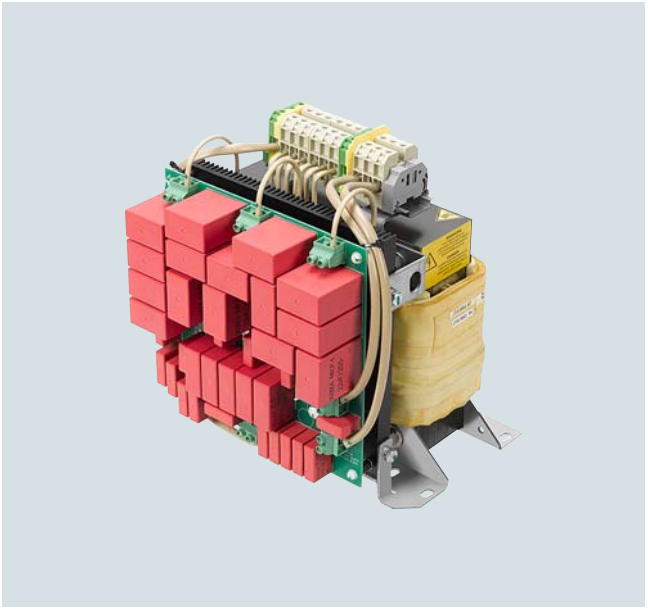
Line voltage 380 ... 480 V 3 AC		**Sine-wave filter**		
		6SL3202-0AE22-0SA0	6SL3202-0AE23-3SA0	
Rated current	A	20	33	33
Power loss	kW	0.099	0.151	0.151
Connection to the Power Module		Cable	Cable	Cable
• Conductor cross-section	mm^2	10	10	10
• Length, approx.	m (ft)	0.5 (1.64)	0.5 (1.64)	0.5 (1.64)
Motor connection		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	6	6	6
PE connection		M5 screw stud	M5 screw stud	M5 screw stud
Cable length, max. between sine-wave filter and motor				
• 380 ... 480 V 3 AC ±10 %				
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Dimensions				
• Width	mm (in)	189 (7.44)	189 (7.44)	189 (7.44)
• Height	mm (in)	336 (13.23)	336 (13.23)	336 (13.23)
• Depth	mm (in)	140 (5.51)	140 (5.51)	140 (5.51)
Possible as base component		Yes	Yes	Yes
Degree of protection		IP20	IP20	IP20
Weight, approx.	kg (lb)	12 (26.5)	23 (50.7)	23 (50.7)
Suitable for PM250 Power Module	Type	6SL3225-0BE25-5AA1	6SL3225-0BE27-5AA1	6SL3225-0BE31-1AA1
• Rated power of the Power Module	kW	7.5	11	15
• Rated current I_{rated} of the Power Module	A	18	25	32
• Frame size		FSC	FSC	FSC

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		**Sine-wave filter**				
		6SL3202-0AE24-6SA0		6SL3202-0AE26-2SA0	6SL3202-0AE28-8SA0	
Rated current	A	47	47	61.8	92	92
Power loss	kW	0.185	0.185	0.152	0.251	0.251
Connection to the Power Module		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	50	50	50	95	95
Motor connection		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	50	50	50	95	95
PE connection		M6 screw	M6 screw	M6 screw	M8 screw	M8 screw
Cable length, max. between sine-wave filter and motor						
• 380 ... 480 V 3 AC ±10 %						
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)	300 (984)
Dimensions						
• Width	mm (in)	250 (9.84)	250 (9.84)	250 (9.84)	275 (10.83)	275 (10.83)
• Height	mm (in)	315 (12.40)	315 (12.40)	305 (12.01)	368 (14.49)	368 (14.49)
• Depth	mm (in)	262 (10.31)	262 (10.31)	262 (10.31)	275 (10.83)	275 (10.83)
Degree of protection		IP00	IP00	IP00	IP00	IP00
Weight, approx.	kg (lb)	24 (52.9)	24 (52.9)	34 (75)	45 (99.2)	45 (99.2)
Suitable for PM250 Power Module	Type	6SL3225-0BE31-5 . A0	6SL3225-0BE31-8 . A0	6SL3225-0BE32-2 . A0	6SL3225-0BE33-0 . A0	6SL3225-0BE33-7 . A0
• Rated power of the Power Module	kW	18.5	22	30	37	45
• Rated current I_{rated} of the Power Module	A	38	45	60	75	90
• Frame size		FSD	FSD	FSD	FSE	FSE

Line voltage 380 ... 480 V 3 AC		**Sine-wave filter** (for pulse frequencies 4 ... 8 kHz, only 4 kHz permissible at 110 kW and above – note additional current derating as compared with rated pulse frequency of 2 kHz, see derating data)		
		6SL3202-0AE31-5SA0		6SL3202-0AE31-8SA0
Rated current	A	150	150	182
Power loss	kW	0.43	0.43	0.47
Connection to the Power Module		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	150	150	150
Motor connection		Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm^2	150	150	150
PE connection		M8 screw	M6 screw	M8 screw
Cable length, max. between sine-wave filter and motor				
• 380 ... 480 V 3 AC ±10 %				
- Shielded	m (ft)	200 (656)	200 (656)	200 (656)
- Unshielded	m (ft)	300 (984)	300 (984)	300 (984)
Dimensions				
• Width	mm (in)	350 (13.78)	350 (13.78)	350 (13.78)
• Height	mm (in)	440 (17.32)	440 (17.32)	468 (18.43)
• Depth	mm (in)	305 (12.01)	305 (12.01)	305 (12.01)
Degree of protection		IP00	IP00	IP00
Weight, approx.	kg (lb)	63 (139)	63 (139)	80 (176)
Suitable for PM250 Power Module	Type	6SL3225-0BE34-5 . A0	6SL3225-0BE35-5 . A0	6SL3225-0BE37-5 . A0
• Rated power of the Power Module	kW	55	75	90
• Rated current I_{rated} of the Power Module	A	110	145	178
• Frame size		FSF	FSF	FSF

Overview



dv/dt filter plus VPL

dv/dt filters plus VPL (**V**oltage **P**eak **L**imiter) limit the voltage rate-of-rise *dv/dt* to values < 500 V/µs and the typical voltage peaks to the following values according to the limit value curve to IEC/TS 60034-17: 2006:

- < 1350 V phase/phase at the motor terminals with a nominal DC link voltage of 935 V
- < 1100 V phase/ground at the motor terminals with a nominal DC link voltage of 935 V

Standard motors with standard insulation and without insulated bearings can be used for inverter operation if a dv/dt filter plus VPL is used.

JTA dv/dt filters can be operated with SINAMICS G120 firmware V4.7 SP10 or higher.

Design

In terms of function, the dv/dt filter plus VPL consists of two components:

- dv/dt reactor
- Voltage limiting network, which cuts off the voltage peaks and feeds the energy back into the DC link.

Integration

dv/dt filters plus VPL that are available depending on the Power Module used

	Frame size						
	FSA	**FSB**	**FSC**	**FSD**	**FSE**	**FSF**	**FSG**
PM240-2 Power Module with integrated braking chopper							
Available frame sizes							
• 400 V versions	✓	✓	✓	✓	✓	✓	–
• 690 V versions	–	–	–	✓	✓	✓	✓
Load-side power components							
dv/dt filter plus VPL [1]	**S**	**S**	**S**	**S**	**S**	**S**	**S**

S = Lateral mounting
– = Not possible

[1] The 690 V versions of the PM240-2 Power Modules require motors with a suitable isolating system for 690 V inverter operation (IVIC-C premium). The VSD10 line with corresponding SIMOTICS GP 1LE109 General Purpose motors or SIMOTICS SD 1LE159 Severe Duty motors is ideally suited for inverter operation at 690 V
More information is available in Catalog D 81.1.

Selection and ordering data

Rated power		PM240-2 Power Module standard variant			dv/dt filter plus VPL
kW	hp	Type 6SL3210-...	Frame size		Article No.
380 ... 480 V 3 AC					
0.55	0.75	1PE11-8 . L1	FSA	NEW	JTA:TEF1203-0GB
0.75	1	1PE12-3 . L1			
1.1	1.5	1PE13-2 . L1			
1.5	2	1PE14-3 . L1			
2.2	3	1PE16-1 . L1			
3	4	1PE18-0 . L1			
4	5	1PE21-1 . L0	FSB		
5.5	7.5	1PE21-4 . L0			
7.5	10	1PE21-8 . L0			
11	15	1PE22-7 . L0	FSC	NEW	JTA:TEF1203-0HB
15	20	1PE23-3 . L0			
18.5	25	1PE23-8 . L0	FSD		
22	30	1PE24-5 . L0	FSD	NEW	JTA:TEF1203-0JB
30	40	1PE26-0 . L0			
37	50	1PE27-5 . L0	FSD	NEW	JTA:TEF1203-0KB
45	60	1PE28-8 . L0	FSE		
55	75	1PE31-1 . L0	FSE	NEW	JTA:TEF1203-0LB
75	100	1PE31-5 . L0	FSF		
90	125	1PE31-8 . L0	FSF	NEW	JTA:TEF1203-0MB
110	150	1PE32-1 . L0	FSF		
132	200	1PE32-5 . L0	FSF		
500 ... 690 V 3 AC					
11	10	1PH21-4 . L0	FSD	NEW	JTA:TEF1203-0GB
15	15	1PH22-0 . L0			
18.5	20	1PH22-3 . L0			
22	25	1PH22-7 . L0	FSD	NEW	JTA:TEF1203-0HB
30	30	1PH23-5 . L0			
37	40	1PH24-2 . L0			
45	50	1PH25-2 . L0	FSE	NEW	JTA:TEF1203-0JB
55	60	1PH26-2 . L0			
75	75	1PH28-0 . L0	FSF	NEW	JTA:TEF1203-0KB
90	100	1PH31-0 . L0			
110	100	1PH31-2 . L0	FSF	NEW	JTA:TEF1203-0LB
132	125	1PH31-4 . L0			
160	150	1PH31-7CL0	FSG	NEW	JTA:TEF1203-0MB
200	200	1PH32-1CL0			
250	250	1PH32-5CL0			

Rated power		PM240-2 Power Module push-through variant			dv/dt filters plus VPL
kW	hp	Type 6SL3211-...	Frame size		Article No.
380 ... 480 V 3 AC					
3	4	1PE18-0 . L1	FSA	NEW	JTA:TEF1203-0GB
7.5	10	1PE21-8 . L0	FSB		
15	20	1PE23-3 . L0	FSC	NEW	JTA:TEF1203-0HB
37	50	1PE27-5 . L0	FSD	NEW	JTA:TEF1203-0KB
55	75	1PE31-1 . L0	FSE	NEW	JTA:TEF1203-0LB
132	200	1PE32-5 . L0	FSF	NEW	JTA:TEF1203-0MB

Technical specifications

Line voltage 3 AC 380 ... 480 V or 3 AC 500 ... 690 V		**dv/dt filters plus VPL** (for rated pulse frequency 2 kHz – max. pulse frequency 4 kHz – max. output frequency 150 Hz)		
		JTA:TEF1203-0GB	JTA:TEF1203-0HB	JTA:TEF1203-0JB
Rated current	A	24	44	64
$I_{th\ max}$	A	38	70	104
Power loss at 150 Hz 690 V	kW	0.125	0.303	0.404
Power connection input and output side		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section, max.	mm^2	16	35	50
DC link connection [1] DCPS, DCNS		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section, max.	mm^2	16	16	16
PE connection		Screw terminals	Screw terminals	Screw terminals
• Conductor cross-section, max.	mm^2	16	35	50
Motor cable length, max.				
• Shielded	m (ft)	350 (1148)	350 (1148)	350 (1148)
• Unshielded	m (ft)	525 (1723)	525 (1723)	525 (1723)
Cable length, max. between the dv/dt filter plus VPL and the Power Module	m (ft)	5 (16.4)	5 (16.4)	5 (16.4)
Ambient temperature	°C (°F)	-20 ... +40 (-4 ... +104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K	-20 ... +40 (-4 ... +104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K	-20 ... +40 (-4 ... +104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm (in)	264 (10.39)	264 (10.39)	310 (12.20)
• Height	mm (in)	260 (10.24)	275 (10.83)	375 (14.76)
• Depth	mm (in)	220 (8.66)	245 (9.65)	280 (11.02)
Weight, approx.	kg (lb)	20 (44.1)	29 (63.9)	46 (101)
Conformity		CE	CE	CE
Certificates of suitability		cURus, EAC	cURus, EAC	cURus, EAC
Suitable for PM240-2 standard variant 380 ... 480 V 3 AC	Type	6SL3210-1PE11-8 . L1 6SL3210-1PE12-3 . L1 6SL3210-1PE13-2 . L1 6SL3210-1PE14-3 . L1 6SL3210-1PE16-1 . L1 6SL3210-1PE18-0 . L1 FSA 6SL3210-1PE21-1 . L0 6SL3210-1PE21-4 . L0 6SL3210-1PE21-8 . L0 FSB	6SL3210-1PE22-7 . L0 6SL3210-1PE23-3 . L0 FSC 6SL3210-1PE23-8 . L0 FSD	6SL3210-1PE24-5 . L0 6SL3210-1PE26-0 . L0 FSD
Suitable for PM240-2 push-through variant 380 ... 480 V 3 AC	Type	6SL3211-1PE18-0 . L1 FSA 6SL3211-1PE21-8 . L0 FSB	6SL3211-1PE23-3 . L0 FSC	–
Suitable for PM240-2 Power Modules 500 ... 690 V 3 AC	Type	6SL3210-1PH21-4 . L0 6SL3210-1PH22-0 . L0 6SL3210-1PH22-3 . L0 FSD	6SL3210-1PH22-7 . L0 6SL3210-1PH23-5 . L0 6SL3210-1PH24-2 . L0 FSD	6SL3210-1PH25-2 . L0 6SL3210-1PH26-2 . L0 FSE

Technical specifications (continued)

Line voltage 3 AC 380 ... 480 V or 3 AC 500 ... 690 V		**dv/dt filters plus VPL** (for rated pulse frequency 2 kHz – max. pulse frequency 4 kHz – max. output frequency 150 Hz)		
		JTA:TEF1203-0KB	JTA:TEF1203-0LB	JTA:TEF1203-0MB
Rated current	A	103	146	260
$I_{th\ max}$	A	160	230	416
Power loss at 150 Hz 690 V	kW	0.415	0.520	0.857
Power connection input and output side		Flat connector for M8 cable lug	Flat connector for M10 cable lug	Flat connector for M10 cable lug
• Conductor cross-section, max.	mm^2	95	120	2 × 120 or 1 × 185
DC link connection [1] DCPS, DCNS		M8 cable lug	M8 cable lug	M8 cable lug
• Conductor cross-section, max.	mm^2	25	25	50
PE connection		M6 screw stud	M6 screw stud	M6 screw stud
• Conductor cross-section, max.	mm^2	50	70	95
Motor cable length, max.				
• Shielded	m (ft)	450/525 (1476/1723) [2]	450/525 (1476/1723) [2]	450/525 (1476/1723) [2]
• Unshielded	m (ft)	650/800 (2133/2625) [2]	650/800 (2133/2625) [2]	650/800 (2133/2625) [2]
Cable length, max. between the dv/dt filter plus VPL and the Power Module	m (ft)	5 (16.4)	5 (16.4)	5 (16.4)
Ambient temperature	°C (°F)	-20 ... +40 (-4 ... +104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K	-20 ... +40 (-4 ... 104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K	-20 ... +40 (-4 ... +104) 40 ... 50 (104 ... 122) with current derating 1.5 % per 1 K 50 ... 60 (122 ... 140) with current derating 1.9 % per 1 K
Degree of protection		IP00	IP00	IP00
Dimensions				
• Width	mm (in)	400 (15.75)	400 (15.75)	460 (18.11)
• Height	mm (in)	325 (12.80)	360 (14.17)	435 (17.13)
• Depth	mm (in)	355 (13.98)	380 (14.96)	445 (17.52)
Weight, approx.	kg (lb)	77 (170)	97 (214)	172 (379)
Conformity		CE	CE	CE
Certificates of suitability		cURus, EAC	cURus, EAC	cURus, EAC
Suitable for PM240-2 standard variant 380 ... 480 V 3 AC	Type	6SL3210-1PE27-5 . L0 FSD 6SL3210-1PE28-8 . L0 FSE	6SL3210-1PE31-1 . L0 FSE 6SL3210-1PE31-5 . L0 FSF	6SL3210-1PE31-8 . L0 6SL3210-1PE32-1 . L0 6SL3210-1PE32-5 . L0 FSF
Suitable for PM240-2 push-through variant 380 ... 480 V 3 AC	Type	6SL3211-1PE27-5 . L0 FSD	6SL3211-1PE31-1 . L0 FSE	6SL3211-1PE32-5 . L0 FSF
Suitable for PM240-2 Power Modules 500 ... 690 V 3 AC	Type	6SL3210-1PH28-0 . L0 6SL3210-1PH31-0 . L0 FSF	6SL3210-1PH31-2 . L0 6SL3210-1PH31-4 . L0 FSF	6SL3210-1PH31-7CL0 6SL3210-1PH32-1CL0 6SL3210-1PH32-5CL0 FSG

[1] Short-circuit-proof cables are required.

[2] Maximum overvoltage at the motor terminals <1350 V with cable lengths up to 450 m (1476 ft) shielded or 650 m (2133 ft) unshielded – maximum overvoltage at the motor terminals <1500 V with cable lengths up to 525 m (1723 ft) shielded or 800 m (2625 ft) unshielded.

Overview

Operator panel	IOP-2 and IOP-2 Handheld Intelligent Operator Panel	BOP-2 Basic Operator Panel
Description	 	
	Thanks to the high-contrast color display, menu-based operation and the wizards, commissioning of the standard drives is easy. Application wizards guide the user through the commissioning of important applications such as pumps, fans, compressors, or conveyor systems.	Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.
Possible applications	• Can be mounted directly on the inverter • Can be mounted in a control cabinet door using a door mounting kit (achievable degree of protection is IP55/ UL Type 12 enclosure) • Available as handheld version • The following languages are integrated in the IOP-2: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	• Can be mounted directly on the inverter • Can be mounted in the control cabinet door using a door mounting kit (achievable degree of protection is IP55/UL Type 12)
Quick commissioning without expert knowledge	• Standard commissioning using the clone function • For quicker access, the parameter block names can be directly entered respectively changed on the IOP-2 using the virtual keyboard. • User-defined parameter list with a reduced number of self-selected parameters • Simple commissioning of standard applications using application-specific wizards; it is not necessary to know the parameter structure • Simple local commissioning using the handheld version • Commissioning is possible largely without documentation	• Standard commissioning using the clone function
High degree of operator friendliness and intuitive operation	• Intuitive navigation by operating with a sensor control field • Graphic color display to show status values such as pressure or flow rate in the form of scalar values, bar-type diagrams, or trend displays • Status display with freely selectable units to specify physical values • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes • Simple cloning of specific settings of the IOP-2 user interface.	• 2-line display for showing up to 2 process values with text • Status display of predefined units • Direct manual operation of the drive – you can simply toggle between the automatic and manual modes
Minimization of maintenance times	• Diagnostics using plain text display, can be used locally on-site without documentation • The support function is used to determine the drive data for the Power Module, Control Unit and IOP-2 and makes this available as a two-dimensional code (data matrix/QR code) • Easily upgradable to new functional status via USB interface	• Diagnostics with menu prompting with 7-segment display

Overview

IOP-2 Intelligent Operator Panel

IOP-2 Intelligent Operator Panel

The Intelligent Operator Panel IOP-2 is a very user-friendly and powerful operator panel for the SINAMICS G120, SINAMICS G120C, SINAMICS G120P, SINAMICS G110D, SINAMICS G120D, SINAMICS G110M and SIMATIC ET 200pro FC-2.

The IOP-2 supports both newcomers and drive experts. Thanks to the membrane keyboard with a central sensor control field, high-contrast color displays, menu-based operation and application wizards, it is easy to commission drives. A drive can be essentially commissioned without having to use a printed parameter list – as the parameters are displayed in plain text, and explanatory help texts and the parameter filtering function are provided.

Application wizards interactively guide you when commissioning important applications such as conveyor technology, pumps, fans and compressors. There is a basic commissioning wizard for general commissioning.

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

The IOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the IOP-2 and downloaded into other drive units of the same type as required.

The IOP-2 can be installed in control cabinet doors using the optionally available door mounting kit.

Updating the IOP-2

The IOP-2 can be updated and expanded using the integrated USB interface.

Data to support future drive systems can be transferred from the PC to the IOP-2. Further, the USB interface allows user languages and wizards that will become available in the future to be subsequently downloaded and the firmware to be updated for the IOP-2 [1].

The IOP-2 is supplied with power via the USB interface during an update.

IOP-2 Handheld

IOP-2 Handheld

A handheld version of the IOP-2 can be ordered for mobile use. In addition to the IOP-2, it includes a housing with rechargeable batteries, a charging unit, an RS232 connecting cable, and a USB cable. The charging unit is supplied with connector adapters for Europe, the US and UK. When the batteries are fully charged, the operating time is up to 10 hours.

To connect the IOP-2 Handheld to SINAMICS G110D, SINAMICS G120D, SINAMICS G110M and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required in addition.

[1] Information on updates for the IOP-2 is available at https://support.industry.siemens.com/cs/document/67273266

Selection and ordering data

Description	Article No.
IOP-2 Intelligent Operator Panel For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G110D SINAMICS G120D SINAMICS G110M SIMATIC ET 200pro FC-2 Operating languages: English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	**6SL3255-0AA00-4JA2**
IOP-2 Handheld For use with SINAMICS G120 SINAMICS G120C SINAMICS G120P SINAMICS G110D SINAMICS G120D SINAMICS G110M SIMATIC ET 200pro FC-2 Included in the scope of delivery: • IOP-2 • Handheld housing • Rechargeable batteries (4 × AA) • Charging unit (international) • RS232 connecting cable [1] 3 m (9.84 ft) long, can be used in combination with SINAMICS G120 SINAMICS G120C SINAMICS G120P • USB cable 1 m (3.28 ft) long	**6SL3255-0AA00-4HA1**
Accessories	
Door mounting kit For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 in ... 0.12 in) Degree of protection IP55 Included in the scope of delivery: • Seal • Mounting material • Connecting cable 5 m (16.4 ft) long, also supplies voltage to the IOP-2 directly via the inverter	**6SL3256-0AP00-0JA0**
RS232 connecting cable 2.5 m (8.20 ft) long, with optical interface for connecting the IOP-2 Handheld to SINAMICS G110D SINAMICS G120D SINAMICS G110M SIMATIC ET 200pro FC-2	**3RK1922-2BP00**

Benefits

- New device design
  - Intuitive user interface – membrane keyboard with central sensor control field
  - High-contrast color display with a range of display options
  - IOP-2 device design open for future functional expansions (e.g. device functions, wizards, languages)
  - Easily upgradable to new functional status via USB interface
- Commissioning
  - Simple commissioning via wizards
  - The "Fieldbus Interface Settings" wizard is used for easy configuration of the Ethernet interface
  - Fast standard commissioning of inverters thanks to cloning function
  - For quicker access, the parameter block names can be directly entered respectively changed on the IOP-2 using the virtual keyboard.
  - Simple local commissioning on-site using the handheld version
- Operator control and monitoring
  - Simple, individual local drive control (start/stop, setpoint value specification, change in direction of rotation)
  - Application-specific scenarios such as operator concepts with additional external operating elements can be implemented easily
  - Simple cloning of specific settings of the IOP-2 user interface, such as status screen, language settings, lighting duration, date/time settings, parameter backup mode and "My Parameters" – settings made once can such be easily transferred to many further IOP-2 Intelligent Operator Panels
- Diagnostics
  - Rapid diagnostics thanks to on-site plain text display
  - Integrated plain text help function for local display and resolution of fault messages
- Support function
  - Used to determine the drive data for the Power Module, Control Unit and IOP-2 (article number, serial number, firmware version, error statuses) and makes this available as a two-dimensional code (data matrix/QR code)
  - Allows easy contact with Customer Support via a data matrix/QR code generated on the IOP-2
  - Quick access via mobile devices (e.g. smartphones, tablets) to product information, documentation, FAQs, contact persons via a two-dimensional code generated on the IOP-2 (data matrix/QR code)
  - Scanning and evaluating of the two-dimensional data matrix code using the Industry Online Support app (https://support.industry.siemens.com/cs/ww/en/sc/2067), see also: https://support.industry.siemens.com/cs/document/109748340

[1] For use in conjunction with SINAMICS G110D, SINAMICS G120D, SINAMICS G110M and SIMATIC ET 200pro FC-2, the RS232 connecting cable with optical interface is required (Article No.: **3RK1922-2BP00**). The cable must be ordered separately.

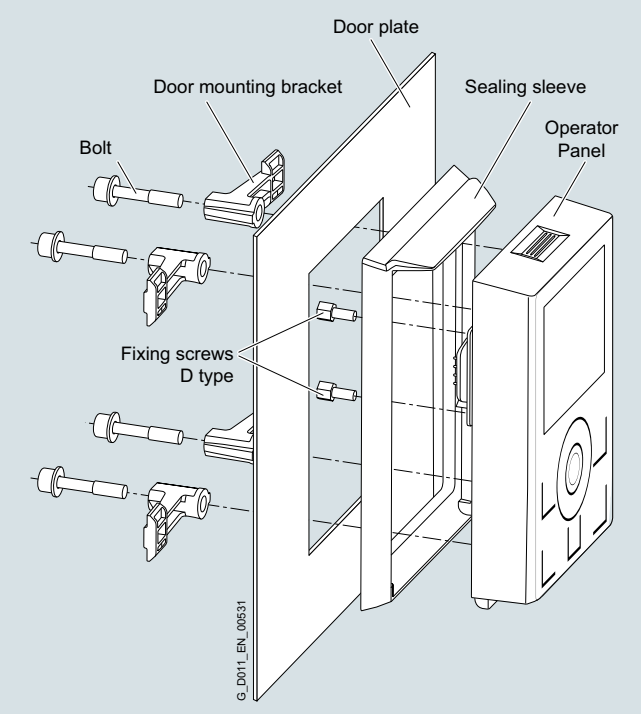
Integration

Using the IOP-2 with the inverters

	• SINAMICS G120 with CU230P-2, CU240E-2 or CU250S-2 • SINAMICS G120C • SINAMICS G120P with CU230P-2	• SINAMICS G110D • SINAMICS G120D • SINAMICS G110M • SIMATIC ET 200pro FC-2
Plugging the IOP-2 onto the inverter (Voltage supply via inverter)	✓	–
Door mounting of the IOP-2 with the door mounting kit (Voltage supply via inverter. For this purpose, the IOP-2 must be connected up by means of the connecting cable supplied with the door mounting kit.)	✓	–
Mobile use of the IOP-2 Handheld (supplied from rechargeable batteries)	✓	✓ (RS232 connecting cable with optical interface required, article number 3RK1922-2BP00)

Door mounting

Using the optionally available door mounting kit, an operator panel can be simply mounted in a control cabinet door with just a few manual operations. In the case of door mounting, the IOP-2 Operator Panel achieves degree of protection IP55/UL Type 12 enclosure.



Door mounting kit with plugged-on IOP-2

Technical specifications

	IOP-2 6SL3255-0AA00-4JA2	IOP-2 Handheld 6SL3255-0AA00-4HA1
Display	High-contrast color display, a variety of display options	
• Resolution	320 × 240 pixels	
Operator panel	Membrane keyboard with central sensor control field	
Operating languages	English, German, French, Italian, Spanish, Portuguese, Dutch, Swedish, Finnish, Russian, Czech, Polish, Turkish, Chinese Simplified	
Ambient temperature		
• During transport and storage	-40 ... +70 °C (-40 ... +158 °F)	-20 ... +55 °C (-4 ... +131 °F)
• During operation	For direct mounting on the inverter: 0 ... 50 °C (32 ... 122 °F) For installation with door mounting kit: 0 ... 55 °C (32 ... 131 °F)	0 ... 40 °C (32 ... 104 °F)
Humidity	Relative humidity < 95 %, non-condensing	
Degree of protection	For direct mounting on the inverter: IP20 For installation with door mounting kit: IP55, UL Type 12 enclosure	IP20
Dimensions (H × W × D)	106.86 × 70 × 19.65 mm (4.21 × 2.76 × 0.77 in)	195.04 × 70 × 37.58 mm (7.68 × 2.76 × 1.48 in)
Weight, approx.	0.134 kg (0.3 lb)	0.724 kg (1.6 lb)
Compliance with standards	CE, RCM, cULus, EAC, KC-REM-S49-SINAMICS	

Overview

BOP-2 Basic Operator Panel

The Basic Operator Panel BOP-2 can be used to commission drives, monitor drives in operation and input individual parameter settings.

Commissioning of standard drives is easy with the menu-prompted dialog on a 2-line display. Simultaneous display of the parameter and parameter value, as well as parameter filtering, means that basic commissioning of a drive can be performed easily and, in most cases, without a printed parameter list.

The drives are easily controlled manually using directly assigned navigation buttons. The BOP-2 has a dedicated switchover button to switch from automatic to manual mode.

Diagnostics can easily be performed on the connected inverter by following the menus.

Up to two process values can be numerically visualized simultaneously.

BOP-2 supports standard commissioning of identical drives. For this purpose, a parameter list can be copied from an inverter into the BOP-2 and when required, downloaded into other drive units of the same type.

The operating temperature of the BOP-2 is 0 °C ... 50 °C (32 °F ... 122 °F).

Selection and ordering data

Description	Article No.
BOP-2 Basic Operator Panel	**6SL3255-0AA00-4CA1**
Accessories	
Door mounting kit For mounting an operator panel in control cabinet doors with sheet steel thicknesses of 1 ... 3 mm (0.04 ... 0.12 in) Degree of protection IP55 Included in the scope of delivery: • Seal • Mounting material • Connecting cable (5 m/16.4 ft long, also supplies voltage to the operator panel directly via the inverter)	**6SL3256-0AP00-0JA0**

Benefits

- Shorten commissioning times – Easy commissioning of standard drives using basic commissioning wizards (setup)
- Minimize standstill times – Fast detection and rectification of faults (Diagnostics)
- Greater transparency in the process – The status display of the BOP-2 makes process variable monitoring easy (Monitoring)
- Direct mounting on the inverter
- User-friendly user interface:
  - Easy navigation using clear menu structure and clearly assigned control keys
  - Two-line display

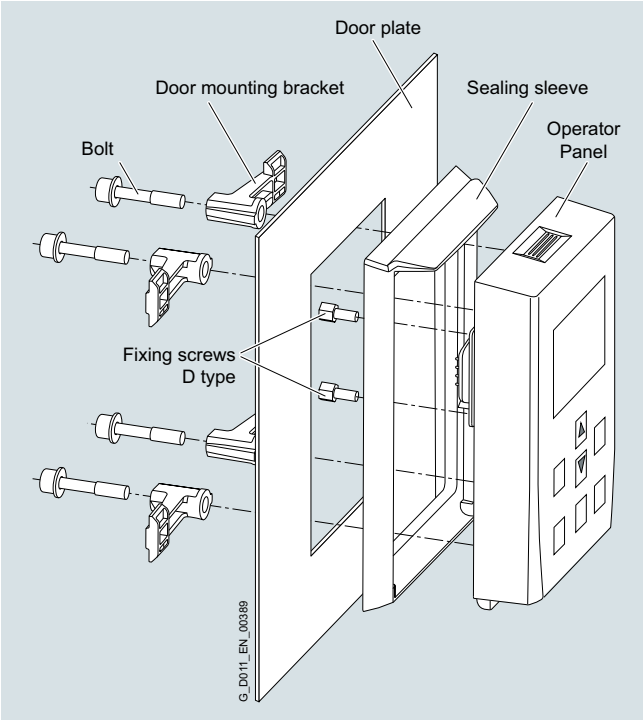
Integration

Using the BOP-2 with SINAMICS G120 inverters

	CU230P-2	CU240E-2	CU250S-2
Plugging the BOP-2 onto the inverter	✓	✓	✓
Door mounting with door mounting kit	✓	✓	✓

Door mounting

Using the optionally available door mounting kit, a BOP-2 can be simply mounted in a control cabinet door with just a few manual operations. Degree of protection IP55 is achieved for door mounting.



Door mounting kit with plugged-on BOP-2

Supplementary system components > Push-through mounting frame for PM240-2 Power Modules

Overview

It is advisable to use an optionally available mounting frame to install the push-through unit in a control cabinet. This mounting frame includes the necessary seals and frame to ensure compliance with degree of protection IP54.

If the Power Module is installed without use of the optional mounting frame, the user is responsible for ensuring that the requisite degree of protection is provided.

Tightening torque for fixing the mounting frame and the inverter:

- Frame sizes FSA to FSC: 3 to 3.5 Nm
- Frame sizes FSD and FSE: 3.5 Nm
- Frame size FSF: 5.9 Nm

For the push-through power modules, frame sizes FSD to FSF, installation handles are available for insertion without the need for a lifting device.

Selection and ordering data

Description	Article No.
Push-through mounting frame	
• For PM240-2 Power Modules degree of protection IP20, push-through variants	
- Frame size FSA	**6SL3260-6AA00-0DA0**
- Frame size FSB	**6SL3260-6AB00-0DA0**
- Frame size FSC	**6SL3260-6AC00-0DA0**
- Frame size FSD	**6SL3200-0SM17-0AA0**
- Frame size FSE	**6SL3200-0SM18-0AA0**
- Frame size FSF	**6SL3200-0SM20-0AA0**
Accessories	
Installation handles for push-through power modules, frame sizes FSD to FSF	**6SL3200-0SM22-0AA0**

Supplementary system components > Memory cards

Overview

SINAMICS SD memory card

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

- Parameter settings can be written from the memory card to the inverter or saved from the inverter to the memory card.
- Up to 100 parameter sets can be stored
- The memory card supports standard commissioning without the use of an operator panel such as the IOP-2, BOP-2 or the STARTER and SINAMICS Startdrive commissioning tools.
- If firmware is stored on the memory card and a Control Unit is installed, the firmware can be upgraded/downgraded during power-up [1].

Note:

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

Licenses can be optionally ordered for CU250S-2 Control Units in order to implement safety technology and positioning capability via the SINAMICS SD card. For further information, refer to section Control Units.

Selection and ordering data

Description	Article No.
SINAMICS SD card 512 MB	**6SL3054-4AG00-2AA0**
Optional firmware memory cards	
SINAMICS SD card 512 MB + firmware V4.7 SP10 (Multicard V4.7 SP10) NEW	**6SL3054-7TF00-2BA0**

For an overview and more information on all available firmware versions, see https://support.industry.siemens.com/cs/document/67364620

[1] You can find more information about firmware upgrades/downgrades on the Internet at https://support.industry.siemens.com/cs/document/67364620

Overview

SINAMICS G120 Smart Access

It is also easy and convenient to commission and operate the SINAMICS G120, SINAMICS G120C and SINAMICS G120P inverters of firmware V4.7 SP6 and higher using the web server module SINAMICS G120 Smart Access and a connected smartphone, tablet or laptop.

Benefits

- Wireless commissioning, operation and diagnostics via mobile device or laptop thanks to the optional SINAMICS G120 Smart Access
- Easy access to the inverter in difficult-to-access areas
- Intuitive user interface and commissioning wizard
- Free choice of terminal devices as the web server works with all common web browsers, such as iOS, Android, Windows, Linux and Mac OS

Function

- Commissioning using commissioning wizard
- Setting and saving parameters
- Testing motor in JOG mode
- Monitoring of inverter data
- Quick diagnostics
- Saving the settings and restoring to factory settings

Selection and ordering data

Description		Article No.
SINAMICS G120 Smart Access For wireless commissioning, operation and diagnostics of the following inverters using a smart-phone, tablet, or laptop • SINAMICS G120C • SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions) • SINAMICS G120P together with the CU230P-2 Control Units	NEW	**6SL3255-0AA00-5AA0**

Technical specifications

	SINAMICS G120 Smart Access 6SL3255-0AA00-5AA0
Operating system	iOS, Android, Windows, Linux, Mac OS
Languages	Support of six languages: English, French, German, Italian, Spanish, Chinese
Ambient temperature	
• During storage and transport	-40 ... +70 °C (-40 ... +158 °F)
• During operation	0 ... 50 °C (32 ... 122 °F) if the Smart Access is plugged directly into the inverter
Humidity	< 95 %, non-condensing
Degree of protection	Depending on the degree of protection of the inverter, max. IP55/UL Type 12 enclosure
Dimensions	
• Width	70 mm (2.76 in)
• Height	108.9 mm (4.29 in)
• Depth	17.3 mm (0.68 in)
Weight, approx.	0.08 kg (0.18 lb)
Compliance with standards	CE, FCC, SRRC, WPC, ANATEL, BTK

Integration

SINAMICS G120 with PM240-2 Power Module, CU240E-2 PN-F Control Unit and plugged-on SINAMICS G120 Smart Access

The optional SINAMICS G120 Smart Access is simply plugged onto the inverter and is available for the following inverters of firmware V4.7 SP6 and higher.

- SINAMICS G120C
- SINAMICS G120 together with the CU230P-2 and CU240E-2 Control Units (without fail-safe versions)
- SINAMICS G120P together with the CU230P-2 Control Units

More information can be found in Catalog D 35.

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

Description	Article No.
Brake Relay Including cable harness for connection with the Power Module	**6SL3252-0BB00-0AA0**

Technical specifications

	Brake Relay 6SL3252-0BB00-0AA0
Switching capability of the NO contact, general purpose	250 V AC / 16 A 30 V DC / 12 A
Conductor cross-section, max.	2.5 mm^2
Degree of protection	IP20
Dimensions	
• Width	68 mm (2.68 in)
• Height	63 mm (2.48 in)
• Depth	33 mm (1.30 in)
Weight, approx.	0.17 kg (0.37 lb)

Integration

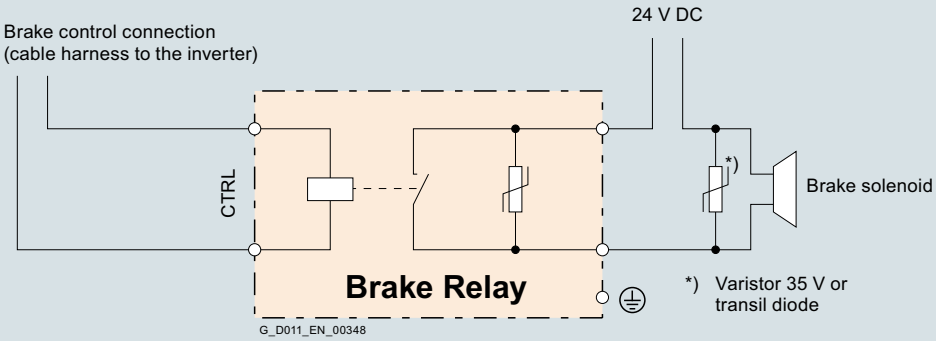
The Brake Relay has the following interfaces:

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

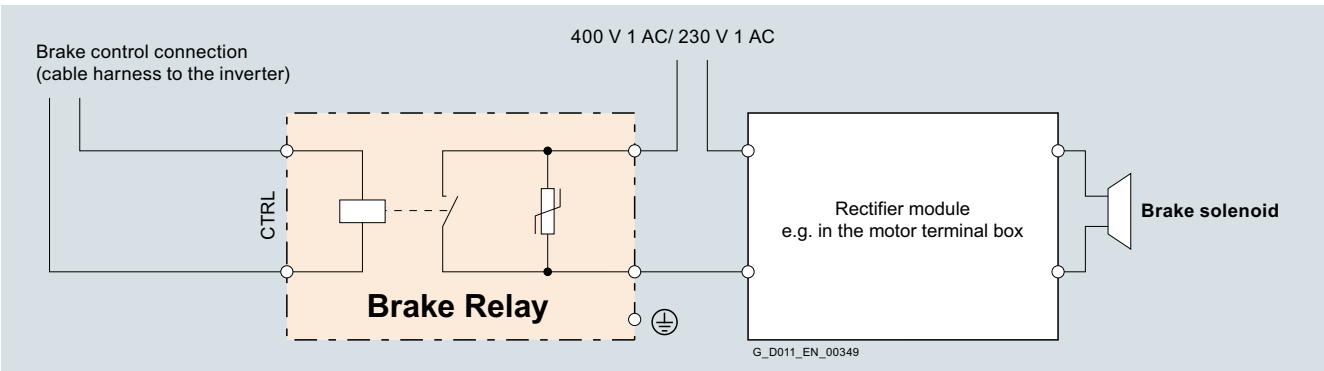
The Brake Relay can be installed on the shield connection plate near the power terminals of the Power Module.

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

The 24 V DC solenoid of the motor brake is connected via an external power supply. For 24 V DC, external surge arrestors are required (e.g. varistor, transil diode).



Connection example of 24 V DC Brake Relay



Connection example of 230 ... 400 V 1 AC Brake Relay

Overview

Safe Brake Relay

With the Safe Brake Relay, the brake is controlled in accordance with IEC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3.

Design

The Safe Brake Relay can be installed below the Power Module on the shield connection plate.

The Safe Brake Relay has the following connections and interfaces:

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

The connection between the 24 V DC supply and the Safe Brake Relay must be kept as short as possible.

The scope of supply of a Safe Brake Relay includes the following:

- 3 cable harnesses for connecting to the CTRL socket of the Power Module
  - Length 0.32 m (1.05 ft) for frame sizes FSA to FSC
  - Length 0.55 m (1.80 ft) for frame sizes FSD and FSE
  - Length 0.8 m (2.62 ft) for frame size FSF (available soon for frame size FSG).

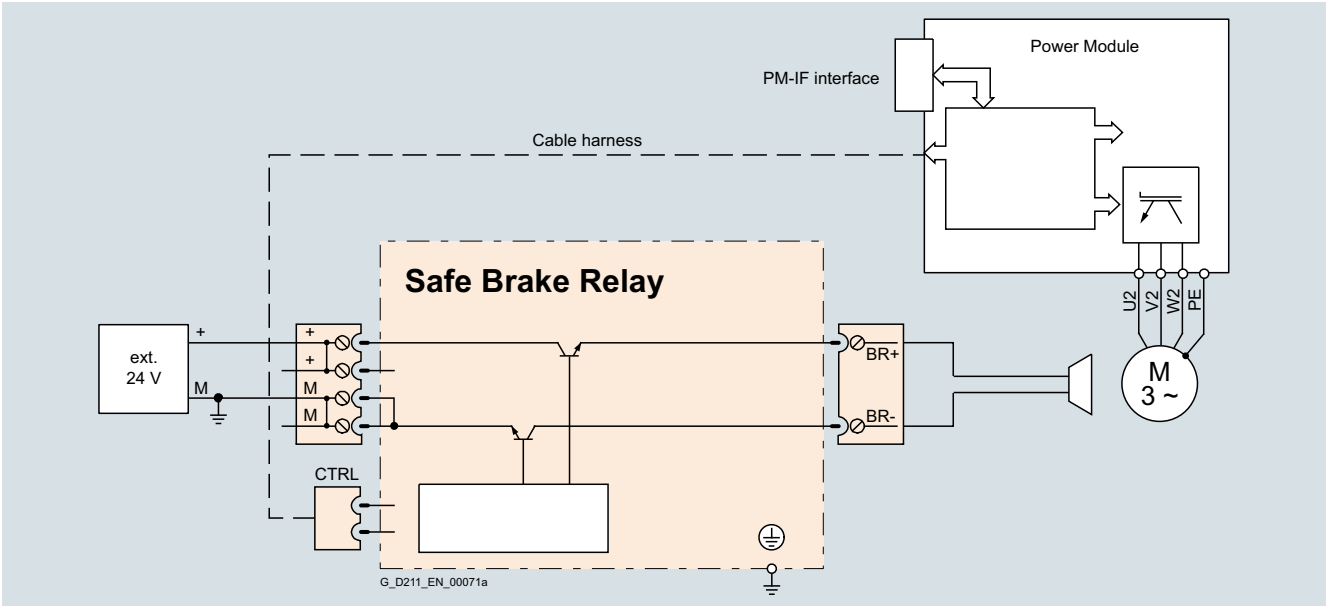
Selection and ordering data

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

Technical specifications

	Safe Brake Relay 6SL3252-0BB01-0AA0
Power supply	20.4 ... 28.8 V DC Recommended rated supply voltage 26 V DC (to compensate for voltage drop in feeder cable to 24 V DC motor brake solenoid)
Current requirement, max.	
• Motor brake	2.5 A
• At 24 V DC	0.05 A + the current requirement of motor brake
Conductor cross-section, max.	2.5 mm^2
Dimensions	
• Width	69 mm (2.72 in)
• Height	63 mm (2.48 in)
• Depth	33 mm (1.30 in)
Weight, approx.	0.17 kg (0.37 lb)

Integration



Connection example of a Safe Brake Relay

The 24 V DC solenoid of the motor brake is directly connected to the Safe Brake Relay. External over voltage limiters are not required.

Application

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

CM240NE chemical industry module

Design

- Isolated analog inputs and outputs in the chemical industry module (1 setpoint / 2 measured values)
- Isolated digital inputs and outputs in the Control Unit
- Protective separation of the motor sensor cable with respect to the enclosure and other connections using reinforced insulation of the creepage and clearances (rated impulse voltage 12 kV) according to EN 60664 1
- Certified power disconnection (94/9/EC, ATEX) of the inverter without main contactor
- Forced inverter inhibit (EMERGENCY STOP function via STO)
- NAMUR terminal strip according to NE 37

The CM240NE chemical industry module has the following interfaces:

Designation	Description
PROFIBUS	9-pin, SUB-D connector or socket to connect PROFIBUS [1]
X11 and X12	Parallel connection of the CM240NE chemical industry module with the Control Unit
X2	Terminal strip in accordance with NAMUR recommendation NE 37 (2.5 mm^2 screw terminals) • Digital inputs and outputs • Analog inputs and outputs
X3	Terminal strip in accordance with NAMUR recommendation NE 37 (2.5 mm^2 screw terminals) to connect the motor temperature sensor

[1] Cannot be used with CU250S-2 (must be mounted on a DIN rail).

Function

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

Integration

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

The CU250S-2 DP is a suitable Control Unit for this application. This is a Control Unit with integrated safety-related functions and PROFIBUS DP interface.

The following Power Module versions are used:

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

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

Chemical industry inverter comprising PM250 Power Module, CU250S-2 Control Unit and CM240NE chemical industry module

Selection and ordering data

	Article No.
CM240NE chemical industry module	**6SL3255-0BT01-0PA0**
Accessories	
Supplementary kit for rail mounting contains • Adapter for rail mounting (acc. to DIN 50022, 35 × 15 mm (1.38 × 0.59 in)) • Long cable harness	**6SL3260-4TA00-1AA6**

More information

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

https://support.industry.siemens.com/cs/document/37141544

Overview

PC inverter connection kit 2

For controlling and commissioning an inverter directly from a PC if the STARTER [1] commissioning tool or SINAMICS Startdrive has been installed on the PC. With this, the inverter can be

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

A USB cable (3 m/9.84 ft) is included in the scope of delivery.

The PC inverter connection kit 2 is compatible with the following Control Units and inverters (all communication methods):

- SINAMICS G120C
- SINAMICS G120 Control Units
  - CU230P-2
  - CU240E-2
  - CU250S-2
- SINAMICS G110M Control Units
  - CU240M
- SINAMICS G120D Control Units
  - CU240D-2
  - CU250D-2

Selection and ordering data

Description	Article No.
PC inverter connection kit 2 USB cable (3 m/9.84 ft long) for • SINAMICS G120C • SINAMICS G120 Control Units - CU230P-2 - CU240E-2 - CU250S-2 • SINAMICS G110M Control Units - CU240M • SINAMICS G120D Control Units - CU240D-2 - CU250D-2	**6SL3255-0AA00-2CA0**

[1] The STARTER commissioning tool is available on the Internet at www.siemens.com/starter

Overview

The shield connection kit offers for all signal and communication cables

- Optimum shield connection
- Strain relief

A shield connection kit contains the following:

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

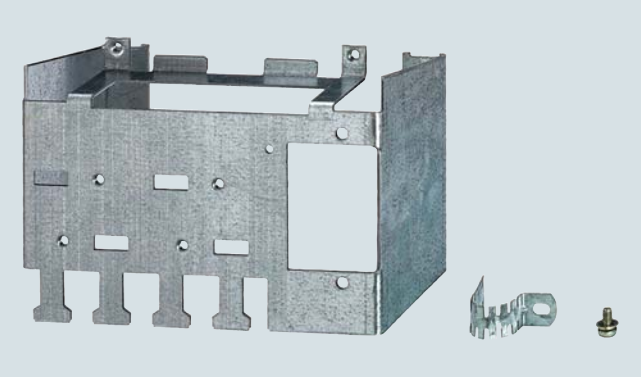
The shield connection kits are suitable for the following SINAMICS G120 Control Units:

- CU230P-2
- CU240E-2
- CU250S-2

Selection and ordering data

Description	Article No.
Shield connection kit 1 For CU230P-2 HVAC and CU230P-2 DP Control Units	**6SL3264-1EA00-0FA0**
Shield connection kit 2 For the CU240E-2 Control Unit	**6SL3264-1EA00-0HA0**
Shield connection kit 3 for CU230P-2 PN, CU240E-2 PN and CU240E-2 PN-F Control Units	**6SL3264-1EA00-0HB0**
Shield connection kit 4 for CU250S-2 Control Units	**6SL3264-1EA00-0LA0**

Overview



Shield connection kit for Power Module frame size FSB

The shield connection kit

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

The shield connection kit includes

- A shield connection plate for the required Power Module
- Connection elements and clamps for mounting
- Mounting device for Brake Relay, frame sizes FSD to FSG

A shield connection kit is supplied as standard with PM240-2 Power Modules in frame sizes FSA to FSC.

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size for the frame sizes FSD to FSG. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

Selection and ordering data

Description		Article No.
Shield connection kit for PM240-2 Power Modules		
• Frame sizes FSA to FSC		Supplied with the Power Modules, available as a spare part
• Frame sizes FSD to FSG A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered.		
• Frame size FSD		**6SL3262-1AD01-0DA0**
• Frame size FSE		**6SL3262-1AE01-0DA0**
• Frame size FSF		**6SL3262-1AF01-0DA0**
• Frame size FSG	NEW	**6SL3262-1AG01-0DA0**
Shield connection kit for PM250 Power Modules		
• Frame size FSC		**6SL3262-1AC00-0DA0**
• Frame sizes FSD and FSE		**6SL3262-1AD00-0DA0**
• Frame size FSF		**6SL3262-1AF00-0DA0**

Spare parts > Spare parts kit for Control Units

Overview

The spare parts kit contains small parts for all variants of the following SINAMICS G120 Control Units:

- CU230P-2
- CU240E-2
- CU240E-2 F
- CU250S-2

Included in the scope of delivery:

- Label set for all variants of the CU230P-2, CU240E-2, CU240E-2 F and CU250S-2 Control Units
- 2 × replacement doors (top/bottom)
- 2 × labeling strips for use on the doors
- 1 × 4, 5, 6, 7, 8, 9, 10 and 11-pole terminal blocks
- 1 × protective element for memory card slot
- 1 × screw for SUB-D interface

Selection and ordering data

Description	Article No.
Spare parts kit for Control Units CU230P-2, CU240E-2, CU240E-2 F and CU250S-2	**6SL3200-0SK01-0AA0**

Spare parts > Shield connection kits for PM240-2 Power Modules

Overview

A shield connection kit is supplied as standard with PM240-2 Power Modules (and SINAMICS G120C) in frame sizes FSA to FSC. These shield connection kits can be ordered as spare parts.

A set of shield plates is included in the scope of delivery for the motor and signal cables corresponding to the frame size for the frame sizes FSD to FSG. For the electromagnetically compatible connection of an optionally connectable braking resistor, the corresponding shield connection kit is to be ordered for frame sizes FSD to FSG.

Selection and ordering data

Description		Article No.
Shield connection kit for PM240-2 Power Modules (and SINAMICS G120C)		
• Frame size FSA		**6SL3266-1EA00-0KA0**
• Frame size FSB		**6SL3266-1EB00-0KA0**
• Frame size FSC		**6SL3266-1EC00-0KA0**
• Frame size FSD		**6SL3262-1AD01-0DA0**
• Frame size FSE		**6SL3262-1AE01-0DA0**
• Frame size FSF		**6SL3262-1AF01-0DA0**
• Frame size FSG	NEW	**6SL3262-1AG01-0DA0**

Spare parts > Mounting set for PM240-2 Power Modules

Overview

A **mounting set** can be ordered for the PM240-2 Power Modules (and SINAMICS G120C), frame sizes FSD to FSF, in degree of protection IP20. It contains the following parts:

- 1 SUB-D connector with mounting material
- 1 motor connector and 1 power supply connector
- 2 serrated strips including mounting material for connecting the shield
- 3 sleeves for inserting in the cutouts for the signal cables of the cable bonding plate
- Ferrite cores
  (only necessary for devices with integrated line filter class B)
- Screws for fixing the cable bonding plate and the cover

Selection and ordering data

Description	Article No.
Mounting set For PM240-2 Power Modules (and SINAMICS G120C) in frame sizes FSD to FSG	**6SL3200-0SK08-0AA0**

Spare parts > Terminal cover kits for frame sizes FSD to FSG

Overview

The terminal cover kit includes a replacement cover for the connecting terminals.

Terminal cover kits, which are suitable for the following SINAMICS G120 Power Modules (and SINAMICS G120C), frame sizes FSD to FSG, are available:

- PM240-2
- PM250

Selection and ordering data

Description		Article No.
Terminal cover kits for PM240-2 Power Modules (and SINAMICS G120C)		
• For frame size FSD		**6SL3200-0SM13-0AA0**
• For frame size FSE		**6SL3200-0SM14-0AA0**
• For frame size FSF		**6SL3200-0SM15-0AA0**
• For frame size FSG	NEW	**6SL3200-0SM16-0AA0**
Terminal cover kits for PM250 Power Modules		
• For frame sizes FSD and FSE		**6SL3200-0SM11-0AA0**
• For frame size FSF		**6SL3200-0SM12-0AA0**

Spare parts > Replacement connectors

Overview

A set of replacement connectors for the line feeder cable, braking resistor and motor cable is available for SINAMICS G120 PM240-2 Power Modules (and SINAMICS G120C) in frame sizes FSAA (SINAMICS G120C), FSA, FSB and FSC.

Selection and ordering data

Description	Article No.
Replacement connectors For SINAMICS G120 PM240-2 and SINAMICS G120C	
• For frame sizes FSAA and FSA	**6SL3200-0ST05-0AA0**
• For frame size FSB	**6SL3200-0ST06-0AA0**
• For frame size FSC	**6SL3200-0ST07-0AA0**

Overview

The Power Module fans are designed for extra long service life. For special requirements, replacement fans are available that can be exchanged quickly and easily.

Selection and ordering data

Rated power		PM240-2 Power Module standard variant		External fan unit
kW	hp	Type 6SL3210-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.75	1	1PB13-8 . L0	FSA	**6SL3200-0SF12-0AA0**
1.1	1.5	1PB15-5 . L0	FSB	**6SL3200-0SF13-0AA0**
1.5	2	1PB17-4 . L0		
2.2	3	1PB21-0 . L0		
3	4	1PB21-4 . L0	FSC	**6SL3200-0SF14-0AA0**
4	5	1PB21-8 . L0		
200 ... 240 V 3 AC				
5.5	7.5	1PC22-2 . L0	FSC	**6SL3200-0SF14-0AA0**
7.5	10	1PC22-8 . L0		
11	15	1PC24-2UL0	FSD	**6SL3200-0SF15-0AA0**
15	20	1PC25-4UL0		
18.5	25	1PC26-8UL0		
22	30	1PC28-0UL0	FSE	**6SL3200-0SF16-0AA0**
30	40	1PC31-1UL0		
37	50	1PC31-3UL0	FSF	**6SL3200-0SF17-0AA0**
45	60	1PC31-6UL0		
55	75	1PC31-8UL0		
380 ... 480 V 3 AC				
0.75	1	1PE12-3 . L1	FSA	**6SL3200-0SF12-0AA0**
1.1	1.5	1PE13-2 . L1		
1.5	2	1PE14-3 . L1		
2.2	3	1PE16-1 . L1		
3	4	1PE18-0 . L1		
4	5	1PE21-1 . L0	FSB	**6SL3200-0SF13-0AA0**
5.5	7.5	1PE21-4 . L0		
7.5	10	1PE21-8 . L0		
11	15	1PE22-7 . L0	FSC	**6SL3200-0SF14-0AA0**
15	20	1PE23-3 . L0		
18.5	25	1PE23-8 . L0	FSD	**6SL3200-0SF15-0AA0**
22	30	1PE24-5 . L0		
30	40	1PE26-0 . L0		
37	50	1PE27-5 . L0		
45	60	1PE28-8 . L0	FSE	**6SL3200-0SF16-0AA0**
55	75	1PE31-1 . L0		
75	100	1PE31-5 . L0	FSF	**6SL3200-0SF17-0AA0**
90	125	1PE31-8 . L0		
110	150	1PE32-1 . L0		
132	200	1PE32-5 . L0		
160	250	1PE33-0 . L0	FSG NEW	**6SL3200-0SF18-0AA0**
200	300	1PE33-7 . L0		
250	400	1PE34-8 . L0		

Selection and ordering data (continued)

Rated power		PM240-2 Power Module standard variant		External fan unit
kW	hp	Type 6SL3210-...	Frame size	Article No.
500 ... 690 V 3 AC				
11	10	1PH21-4 . L0	FSD	**6SL3200-0SF15-0AA0**
15	15	1PH22-0 . L0		
18.5	20	1PH22-3 . L0		
22	25	1PH22-7 . L0		
30	30	1PH23-5 . L0		
37	40	1PH24-2 . L0		
45	50	1PH25-2 . L0	FSE	**6SL3200-0SF16-0AA0**
55	60	1PH26-2 . L0		
75	75	1PH28-0 . L0	FSF	**6SL3200-0SF17-0AA0**
90	100	1PH31-0 . L0		
110	100	1PH31-2 . L0		
132	125	1PH31-4 . L0		
160	150	1PH31-7CL0	FSG NEW	**6SL3200-0SF18-0AA0**
200	200	1PH32-1CL0		
250	250	1PH32-5CL0		

Rated power		PM240-2 Power Module push-through variant		External fan unit
kW	hp	Type 6SL3211-...	Frame size	Article No.
200 ... 240 V 1 AC/3 AC				
0.75	1	1PB13-8 . L0	FSA	**6SL3200-0SF12-0AA0**
2.2	3	1PB21-0 . L0	FSB	**6SL3200-0SF13-0AA0**
4	5	1PB21-8 . L0	FSC	**6SL3200-0SF14-0AA0**
200 ... 240 V 3 AC				
18.5	25	1PC26-8UL0	FSD	**6SL3200-0SF25-0AA0**
30	40	1PC31-1UL0	FSE	**6SL3200-0SF27-0AA0**
55	75	1PC31-8UL0	FSF	**6SL3200-0SF28-0AA0**
380 ... 480 V 3 AC				
3	4	1PE18-0 . L1	FSA	**6SL3200-0SF12-0AA0**
7.5	10	1PE21-8 . L0	FSB	**6SL3200-0SF13-0AA0**
15	20	1PE23-3 . L0	FSC	**6SL3200-0SF14-0AA0**
37	50	1PE27-5 . L0	FSD	**6SL3200-0SF25-0AA0**
55	75	1PE31-1 . L0	FSE	**6SL3200-0SF27-0AA0**
132	200	1PE32-5 . L0	FSF	**6SL3200-0SF28-0AA0**

Note:

The fan units for the push-through variants in frame sizes FSD to FSF contain the internal fans of the corresponding standard variants and an IP55 push-through fan outside the control cabinet.

Overview

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

Selection and ordering data

Rated power		**PM250 Power Module**		**Replacement fan**
kW	hp	Type 6SL3225-...	Frame size and number of fans	Article No.
380 ... 480 V 3 AC				
7.5	10	0BE25-5AA1	FSC, 2 fans [1]	**6SL3200-0SF03-0AA0** (includes 1 replacement fan)
11	15	0BE27-5AA1		
15	20	0BE31-1AA1		
18.5	25	0BE31-5 . A0	FSD, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
22	30	0BE31-8 . A0		
30	40	0BE32-2 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
37	50	0BE33-0 . A0	FSE, 2 fans	**6SL3200-0SF04-0AA0** (includes 2 replacement fans)
45	60	0BE33-7 . A0		**6SL3200-0SF05-0AA0** (includes 2 replacement fans)
55	75	0BE34-5 . A0	FSF, 2 fans	**6SL3200-0SF06-0AA0** (includes 2 replacement fans)
75	100	0BE35-5 . A0		
90	125	0BE37-5 . A0		**6SL3200-0SF08-0AA0** (includes 2 replacement fans)

[1] Recommendation: Even if only one fan on the Power Module is defective, it is advisable to replace both. In this case, the order quantity must be doubled.

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