

SINAMICS G120 standard inverters

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

Power Modules

Overview

**PM240-2 Power Modules – 0.55 kW to 15 kW
(0.75 hp to 20 hp), degree of protection IP20**



PM240-2 Power Modules, degree of protection IP20, standard variant, frame sizes FSA to FSC



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

The new 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 frame sizes FSA to FSC are available both with and without an integrated line filter class A of compact design for 200 V and 400 V line voltages.

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

Push-through variant

The push-through variant allows the cooling fins of the Power Module to be pushed through the rear panel of the control cabinet. Push-through variants should be used in applications in which the amount of waste heat generated inside the control cabinet itself must be minimized.

Shield plates and shield connection kits are available. These can be used in the wiring installation for the Control Units and Power Modules to ensure that it complies with EMC guidelines. For further information, see [Shield connection kits and shield plates for Control Units and Power Modules](#) in section [Supplementary system components](#).

Selection and ordering data

PM240-2 Power Modules standard variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	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		kW	hp				Article No.	Article No.		
200 ... 240 V 1 AC/3 AC											
0.55	0.75	3.2	0.37	0.5	2.3	FSA	NEW	6SL3210-1PB13-0UL0	NEW	6SL3210-1PB13-0AL0	
0.75	1	4.2	0.55	0.75	3.2	FSA	NEW	6SL3210-1PB13-8UL0	NEW	6SL3210-1PB13-8AL0	
1.1	1.5	6	0.75	1	4.2	FSB	NEW	6SL3210-1PB15-5UL0	NEW	6SL3210-1PB15-5AL0	
1.5	2	7.4	1.1	1.5	6	FSB	NEW	6SL3210-1PB17-4UL0	NEW	6SL3210-1PB17-4AL0	
2.2	3	10.4	1.5	2	7.4	FSB	NEW	6SL3210-1PB21-0UL0	NEW	6SL3210-1PB21-0AL0	
3	4	13.6	2.2	3	10.4	FSC	NEW	6SL3210-1PB21-4UL0	NEW	6SL3210-1PB21-4AL0	
4	5	17.5	3	4	13.6	FSC	NEW	6SL3210-1PB21-8UL0	NEW	6SL3210-1PB21-8AL0	
200 ... 240 V 3 AC											
5.5	7.5	22	4	5	17.5	FSC	NEW	6SL3210-1PC22-2UL0	NEW	6SL3210-1PC22-2AL0	
7.5	10	28	5.5	7.5	22	FSC	NEW	6SL3210-1PC22-8UL0	NEW	6SL3210-1PC22-8AL0	
380 ... 480 V 3 AC ⁴⁾											
0.55	0.75	1.7	0.37	0.5	1.3	FSA	NEW	6SL3210-1PE11-8UL1	NEW	6SL3210-1PE11-8AL1	
0.75	1	2.2	0.55	0.75	1.7	FSA	NEW	6SL3210-1PE12-3UL1	NEW	6SL3210-1PE12-3AL1	
1.1	1.5	3.1	0.75	1	2.2	FSA	NEW	6SL3210-1PE13-2UL1	NEW	6SL3210-1PE13-2AL1	
1.5	2	4.1	1.1	1.5	3.1	FSA	NEW	6SL3210-1PE14-3UL1	NEW	6SL3210-1PE14-3AL1	
2.2	3	5.9	1.5	2	4.1	FSA	NEW	6SL3210-1PE16-1UL1	NEW	6SL3210-1PE16-1AL1	
3	4	7.7	2.2	3	5.9	FSA	NEW	6SL3210-1PE18-0UL1	NEW	6SL3210-1PE18-0AL1	
4	5	10.2	3	4	7.7	FSB	NEW	6SL3210-1PE21-1UL0	NEW	6SL3210-1PE21-1AL0	
5.5	7.5	13.2	4	5	10.2	FSB	NEW	6SL3210-1PE21-4UL0	NEW	6SL3210-1PE21-4AL0	
7.5	10	18	5.5	7.5	13.2	FSB	NEW	6SL3210-1PE21-8UL0	NEW	6SL3210-1PE21-8AL0	
11	15	26	7.5	10	18	FSC	NEW	6SL3210-1PE22-7UL0	NEW	6SL3210-1PE22-7AL0	
15	20	32	11	15	26	FSC	NEW	6SL3210-1PE23-3UL0	NEW	6SL3210-1PE23-3AL0	

PM240-2 Power Modules push-through variant

Rated power ¹⁾		Rated output current I_{rated} ²⁾ A	Power based on the base-load current ³⁾		Base-load current I_H ³⁾ A	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		kW	hp				Article No.	Article No.		
200 ... 240 V 1 AC/3 AC											
0.75	1	4.2	0.55	0.75	3.2	FSA	NEW	6SL3211-1PB13-8UL0	NEW	6SL3211-1PB13-8AL0	
2.2	3	10.4	1.5	2	7.4	FSB	NEW	6SL3211-1PB21-0UL0	NEW	6SL3211-1PB21-0AL0	
4	5	17.5	3	4	13.6	FSC	NEW	6SL3211-1PB21-8UL0	NEW	6SL3211-1PB21-8AL0	
380 ... 480 V 3 AC											
3	4	7.7	2.2	3	5.9	FSA	NEW	6SL3211-1PE18-0UL1	NEW	6SL3211-1PE18-0AL1	
7.5	10	18	5.5	7.5	13.2	FSB	NEW	6SL3211-1PE21-8UL0	NEW	6SL3211-1PE21-8AL0	
15	20	32	11	15	26	FSC	NEW	6SL3211-1PE23-3UL0	NEW	6SL3211-1PE23-3AL0	

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 or 400 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 will be available soon. Additional information is available on the Internet at www.siemens.com/siplus-drives

Technical specifications

General technical specifications

Power Modules	PM230	PM240-2	PM240	PM250
System operating voltage	380 ... 480 V 3 AC ±10 %	200 ... 240 V ±10 % 1 AC/3 AC 380 ... 480 V 3 AC ±10 %	380 ... 480 V 3 AC ±10 %	380 ... 480 V 3 AC ±10 %
Grid requirement	>100	>25	>25	>100
Short-circuit power R_{SC}		400 V: With $R_{SC} > 100$ it is advisable to install a line reactor, or alternatively, to select a Power Module with the next-higher power rating. 200 V: A line reactor is recommended with $R_{SC} > 50$	A line reactor is recommended with $R_{SC} > 100$	
Input frequency	47 ... 63 Hz			
Output frequency				
• Control mode V/f	0 ... 650 Hz (due to legal requirements, the maximum output frequency is restricted to 550 Hz with firmware V4.7 and higher)			
• Control type Vector	0 ... 240 Hz			
Pulse frequency	4 kHz Higher pulse frequencies up to 16 kHz, see derating data	4 kHz Higher pulse frequencies up to 16 kHz, see derating data	Up to 75 kW HO: 4 kHz From 90 kW HO: 2 kHz Higher pulse frequencies up to 16 kHz, see derating data	4 kHz (standard) Higher pulse frequencies up to 16 kHz, see derating data
Power factor λ	0.9	0.7	0.7 ... 0.85	0.9
Offset factor $\cos \varphi$	0.95	0.95	0.95	0.95 capacitive
Inverter efficiency	86 ... 98 %	92 ... 95 %	95 ... 98 %	95 ... 97 %
Output voltage, max. In % of input voltage	95 %	95 %	95 %	87 %
Overload capability				
• Low overload (LO) <u>Note:</u> When the overload capability is used, the base-load current I_L is not reduced.	<u>FSA to FSC:</u> $1.5 \times$ base-load current I_L (i. e. 150 % overload) for 3 s plus $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s <u>FSD to FSF:</u> $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 60 s within a cycle time of 300 s	$1.5 \times$ base-load current I_L (i. e. 150 % overload) for 3 s plus $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s	<u>Up to 90 kW (LO):</u> $1.5 \times$ base-load current I_L (i. e. 150 % overload) for 3 s plus $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s <u>110 kW and higher (LO):</u> $1.5 \times$ base-load current I_L (i. e. 150 % overload) for 1 s plus $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 59 s within a cycle time of 300 s	$1.5 \times$ base-load current I_L (i. e. 150 % overload) for 3 s plus $1.1 \times$ base-load current I_L (i. e. 110 % overload) for 57 s within a cycle time of 300 s
• High overload (HO) <u>Note:</u> When the overload capability is used, the base-load current I_H is not reduced.	<u>FSA to FSC:</u> $2 \times$ base-load current I_H (i. e. 200 % overload) for 3 s plus $1.5 \times$ base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s <u>FSD to FSF:</u> $1.5 \times$ base-load current I_H (i. e. 150 % overload) for 60 s within a cycle time of 300 s	$2 \times$ base-load current I_H (i. e. 200 % overload) for 3 s plus $1.5 \times$ base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s	<u>Up to 75 kW (HO):</u> $2 \times$ base-load current I_H (i. e. 200 % overload) for 3 s plus $1.5 \times$ base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s <u>90 kW and higher (HO):</u> $1.6 \times$ base-load current I_H (i. e. 160 % overload) for 3 s plus $1.36 \times$ base-load current I_H (i. e. 136 % overload) for 57 s within a cycle time of 300 s	$2 \times$ base-load current I_H (i. e. 200 % overload) for 3 s plus $1.5 \times$ base-load current I_H (i. e. 150 % overload) for 57 s within a cycle time of 300 s
Possible braking methods	DC braking Compound braking	DC braking Compound braking Dynamic braking with integrated braking chopper	DC braking Compound braking Dynamic braking with integrated braking chopper (optional for frame size FSGX)	Regenerative feedback in generator mode

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Power Modules	PM230	PM240-2	PM240	PM250
Degree of protection	IP20 (standard or push-through)	IP20 (standard or push-through)	IP20	IP20
Operating temperature				
• Low overload (LO)	0 ... 40 °C (32 ... 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	Frame sizes FSD to FSF: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics Frame size FSGX: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 55 °C (>104 ... 131 °F) see derating characteristics	0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
• High overload (HO)	0 ... 50 °C (32 ... 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	Frame sizes FSD to FSF: 0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics Frame size FSGX: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 55 °C (>104 ... 131 °F) see derating characteristics	0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)			
Relative humidity	< 95 % RH, condensation not permissible			
Cooling	Power units with increased air cooling using integrated fans	Internal ventilation, power units with increased air cooling by built-in fans	Internal ventilation, power units with increased air cooling by built-in fans	Internal ventilation, power units with increased air cooling by built-in fans
Installation altitude	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics	Up to 1000 m above sea level without derating, > 1000 m see derating characteristics
Protection functions	<ul style="list-style-type: none"> • 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 ¹⁾	IP20 degree of protection: 65 kA	400 V: 65 kA 230 V: 40 kA	65 kA	FSC: 40 kA FSD to FSF: 42 kA
Compliance with standards	UL, cUL ²⁾ , CE, C-Tick, SEMI F47	UL, cUL, CE, C-Tick, SEMI F47	UL, cUL, CE, C-Tick, SEMI F47	UL ³⁾ , cUL ³⁾ , CE, C-Tick, SEMI F47
CE marking	According to Low-Voltage Directive 2006/95/EC, EMC Directive 2004/108/EC			

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

²⁾ Applies to PM230 Power Modules, frame sizes FSA to FSC.

³⁾ Applies to all PM250 Power Modules with integrated line filter class A.

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Technical specifications

Line voltage 380 ... 480 V 3 AC		PM240-2 Power Modules standard variant				
Without integrated line filter		6SL3210-1PE21-1ULO	6SL3210-1PE21-4ULO	6SL3210-1PE21-8ULO	6SL3210-1PE22-7ULO	6SL3210-1PE23-3ULO
With integrated line filter class A		6SL3210-1PE21-1ALO	6SL3210-1PE21-4ALO	6SL3210-1PE21-8ALO	6SL3210-1PE22-7ALO	6SL3210-1PE23-3ALO
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	0.14	0.184	0.239	0.333	0.385
Cooling air requirement	m ³ /s	0.0092	0.0092	0.0092	0.0185	0.0185
Sound pressure level L_{pA} (1 m)	dB	<62	<62	<62	<65	<65
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current ⁴⁾						
• Rated 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						
• Conductor cross-section	mm ²	1.5 ... 6	1.5 ... 6	1.5 ... 6	6 ... 16	6 ... 16
Motor connection U2, V2, W2						
• 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.						
• 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)	100 (3.94)	100 (3.94)	100 (3.94)	140 (5.51)	140 (5.51)
• Height	mm (in)	291 (11.46)	291 (11.46)	291 (11.46)	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)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)	248 (9.76)
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 <http://support.automation.siemens.com/WWW/view/en/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.