

Overview (continued)

Overview tables

The tables on the following pages provide an overview of all converters with associated line-side and load-side components, DC link components and the available Control Units with operator panels.

SINAMICS G120P Power Modules for use in building technology for heating, air-conditioning and ventilation applications, with degree of protection IP20, 380 to 480 V 3 AC

SINAMICS G120P									
Rated power ¹⁾		Rated out-put current I_{rated} ²⁾	Power based on the base-load current I_H ³⁾		Base-load current I_H ³⁾	Power Module			
400 V	460 V		400 V	460 V		Frame size	Type	Without integrated line filter	With integrated line filter Class A (Category C2)
kW	hp	A	kW	hp	A			Article No.	Article No.
0.37	0.5	1.3	0.25	0.33	0.9	FSA	PM230	6SL3210-1NE11-3UG1	6SL3210-1NE11-3AG1
0.55	0.5	1.7	0.37	0.33	1.3			6SL3210-1NE11-7UG1	6SL3210-1NE11-7AG1
0.75	0.75	2.2	0.55	0.5	1.7			6SL3210-1NE12-2UG1	6SL3210-1NE12-2AG1
1.1	1	3.1	0.75	0.75	2.2			6SL3210-1NE13-1UG1	6SL3210-1NE13-1AG1
1.5	2	4.1	1.1	1	3.1			6SL3210-1NE14-1UG1	6SL3210-1NE14-1AG1
2.2	3	5.9	1.5	1.5	4.1			6SL3210-1NE15-8UG1	6SL3210-1NE15-8AG1
3	3	7.7	2.2	3	5.9			6SL3210-1NE17-7UG1	6SL3210-1NE17-7AG1
4	5	10.2	3	3	7.7			6SL3210-1NE21-0UG1	6SL3210-1NE21-0AG1
5.5	7.5	13.2	4	5	10.2			6SL3210-1NE21-3UG1	6SL3210-1NE21-3AG1
7.5	10	18	5.5	5	13.2			6SL3210-1NE21-8UG1	6SL3210-1NE21-8AG1
11	15	26	7.5	10	18	FSC		6SL3210-1NE22-6UG1	6SL3210-1NE22-6AG1
15	15	32	11	15	26			6SL3210-1NE23-2UG1	6SL3210-1NE23-2AG1
18.5	20	38	15	15	32			6SL3210-1NE23-8UG1	6SL3210-1NE23-8AG1
22	25	45	18.5	20	38	FSD		6SL3210-1NE24-5UL0	6SL3210-1RN24-5AL0
30	30	60	22	25	45			6SL3210-1NE26-0UL0	6SL3210-1NE26-0AL0
37	40	75	30	30	60	FSE		6SL3210-1NE27-5UL0	6SL3210-1NE27-5AL0
45	50	90	37	40	75			6SL3210-1NE28-8UL0	6SL3210-1NE28-8AL0
55	60	110	45	50	90	FSF		6SL3210-1NE31-1UL0	6SL3210-1NE31-1AL0
75	75	145	55	60	110			6SL3210-1NE31-5UL0	6SL3210-1NE31-5AL0
Push Through									
3	3	7.7	2.2	3	5.9	FSA	PM230	6SL3211-1NE17-7UG1	6SL3211-1NE17-7AG1
7.5	10	18	5.5	5	13.2	FSB		6SL3211-1NE21-8UG1	6SL3211-1NE21-8AG1
18.5	20	38	15	15	32	FSC		6SL3211-1NE23-8UG1	6SL3211-1NE23-8AG1

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 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).

SINAMICS G120P built-in and wall-mounted units

PM230 Power Modules, 0.37 kW to 90 kW

PM230 Power Modules

Selection and ordering data (continued)

PM230 Power Modules degree of protection IP20 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	PM230 Power Module degree of protection IP20 Standard variant <u>without</u> integrated line filter	PM230 Power Module degree of protection IP20 Standard variant <u>with</u> integrated line filter class A
400 V	460 V		400 V	460 V				
kW	hp		kW	hp				
Article No.								
Article No.								
380 ... 480 V 3 AC								
0.37	0.5	1.3	0.25	0.33	0.9	FSA	6SL3210-1NE11-3UG1	6SL3210-1NE11-3AG1
0.55	0.5	1.7	0.37	0.33	1.3	FSA	6SL3210-1NE11-7UG1	6SL3210-1NE11-7AG1
0.75	0.75	2.2	0.55	0.5	1.7	FSA	6SL3210-1NE12-2UG1	6SL3210-1NE12-2AG1
1.1	1	3.1	0.75	0.75	2.2	FSA	6SL3210-1NE13-1UG1	6SL3210-1NE13-1AG1
1.5	2	4.1	1.1	1	3.1	FSA	6SL3210-1NE14-1UG1	6SL3210-1NE14-1AG1
2.2	3	5.9	1.5	1.5	4.1	FSA	6SL3210-1NE15-8UG1	6SL3210-1NE15-8AG1
3	3	7.7	2.2	3	5.9	FSA	6SL3210-1NE17-7UG1	6SL3210-1NE17-7AG1
4	5	10.2	3	3	7.7	FSB	6SL3210-1NE21-0UG1	6SL3210-1NE21-0AG1
5.5	7.5	13.2	4	5	10.2	FSB	6SL3210-1NE21-3UG1	6SL3210-1NE21-3AG1
7.5	10	18	5.5	5	13.2	FSB	6SL3210-1NE21-8UG1	6SL3210-1NE21-8AG1
11	15	26	7.5	10	18	FSC	6SL3210-1NE22-6UG1	6SL3210-1NE22-6AG1
15	15	32	11	15	26	FSC	6SL3210-1NE23-2UG1	6SL3210-1NE23-2AG1
18.5	20	38	15	15	32	FSC	6SL3210-1NE23-8UG1	6SL3210-1NE23-8AG1
22	25	45	18.5	20	38	FSD	6SL3210-1NE24-5UL0	6SL3210-1NE24-5AL0
30	30	60	22	25	45	FSD	6SL3210-1NE26-0UL0	6SL3210-1NE26-0AL0
37	40	75	30	30	60	FSE	6SL3210-1NE27-5UL0	6SL3210-1NE27-5AL0
45	50	90	37	40	75	FSE	6SL3210-1NE28-8UL0	6SL3210-1NE28-8AL0
55	60	110	45	50	90	FSF	6SL3210-1NE31-1UL0	6SL3210-1NE31-1AL0
75	75	145	55	60	110	FSF	6SL3210-1NE31-5UL0	6SL3210-1NE31-5AL0

PM230 Power Modules degree of protection IP20 Push Through variant

Rated power ¹⁾		Rated output current <i>I</i> _{rated} ²⁾	Power based on the base-load current ³⁾		Base-load current <i>I</i> _H ³⁾	Frame size	PM230 Power Module degree of protection IP20 Push Through variant <u>without</u> integrated line filter	PM230 Power Module degree of protection IP20 Push Through variant with integrated line filter class <u>A</u>
400 V	460 V		400 V	460 V				
kW	hp		A	kW				
380 ... 480 V 3 AC								
3	3	7.7	2.2	3	5.9	FSA	6SL3211-1NE17-7UG1	6SL3211-1NE17-7AG1
7.5	10	18	5.5	5	13.2	FSB	6SL3211-1NE21-8UG1	6SL3211-1NE21-8AG1
18.5	20	38	15	15	32	FSC	6SL3211-1NE23-8UG1	6SL3211-1NE23-8AG1

Note:

The power data in hp units are based on the NEC/CEC standards for the North American market.

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 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).

SINAMICS G120P built-in and wall-mounted units

PM230 Power Modules, 0.37 kW to 90 kW

PM230 Power Modules

Technical specifications

General technical specifications

	PM230 Power Modules	
Degree of protection	IP55 (with IOP-2, BOP-2 or blanking cover)	IP20/UL Open Type (Standard or Push Through variants)
Power (low overload LO)	0.37 ... 90 kW	0.37 ... 75 kW
Rated output current (low overload LO)	1.3 ... 178 A	1.3 ... 145 A
Power (high overload HO)	0.25 ... 75 kW	0.25 ... 55 kW
Rated output current (high overload HO)	0.9 ... 145 A	0.9 ... 110 A
System operating voltage	380 ... 480 V $\pm 10\%$ 3 AC	
Grid requirement	>100	
Short-circuit power R_{SC}		
Input frequency	47 ... 63 Hz	
Output frequency		
• Control mode V/f	0 ... 550 Hz	
• Control type Vector	0 ... 240 Hz	
Pulse frequency	4 kHz for higher pulse frequencies up to 16 kHz, see derating data	
Power factor λ	0.9	
Offset factor $\cos \varphi$	0.95	
Inverter efficiency	$\leq 97\%$	
Output voltage, max. as % of input voltage	95 %	
Overload capability		
• Low overload (LO)	<u>Note:</u> When the overload capability is used, the base-load current I_L is not reduced. - Frame sizes FSA to FSC 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 - Frame sizes FSD to FSF 1.1 × base-load current I_L (i. e. 110 % overload) for 60 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. - Frame sizes FSA to FSC 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 - Frame sizes FSD to FSF 1.5 × base-load current I_H (i. e. 150 % overload) for 60 s within a cycle time of 300 s	
Electromagnetic compatibility	• Devices with line filter class A for applications according to Categories C3 and C2 • Devices with line filter class B for applications according to Category C2 and compliance with conducted interference requirements of Category C1	
Possible braking methods	• Devices without line filter • Devices with line filter class A for applications according to Categories C3 and C2 • Devices with line filter class B for applications according to Category C2 and compliance with conducted interference requirements of Category C1	
Operating temperature	DC braking	
• Low overload (LO)	Frame sizes FSA to FSC: -10 ... +40 °C (14 ... 104 °F) without derating Frame sizes FSD to FSF: 0 ... 40 °C (32 ... 104 °F) without derating >40 ... 60 °C (104 ... 140 °F) see derating characteristics	
• High overload (HO)	Frame sizes FSA to FSC: -10 ... +50 °C (14 ... 122 °F) without derating Frame sizes FSD to FSF: 0 ... 50 °C (32 ... 122 °F) without derating >50 ... 60 °C (122 ... 140 °F) see derating characteristics	
Relative humidity	<95 %, condensation not permissible	
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)	
Cooling	Power units with increased air cooling using integrated fans	
Installation altitude	Up to 1000 m (3281 ft) above sea level without derating, > 1000 m (3281 ft) see derating characteristics	
Protection functions	• Undervoltage • Overvoltage • Overcurrent/overload • Overtemperature • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking	
Rated short-circuit current $SCCR$ (Short-Circuit Current Rating) ¹⁾	Frame sizes FSA to FSC: 40 kA	65 kA
Compliance with standards	UL, cUL ²⁾ , CE, 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 acc. to NEC Article 409 or UL 508A/508C.

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

SINAMICS G120P built-in and wall-mounted units

PM230 Power Modules, 0.37 kW to 90 kW

PM230 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM230 Power Modules degree of protection IP20 standard variant				
Without integrated line filter		6SL3210-1NE22-6UG1	6SL3210-1NE23-2UG1	6SL3210-1NE23-8UG1	6SL3210-1NE24-5ULO	6SL3210-1NE26-0ULO
With integrated line filter class A		6SL3210-1NE22-6AG1	6SL3210-1NE23-2AG1	6SL3210-1NE23-8AG1	6SL3210-1NE24-5ALO	6SL3210-1NE26-0ALO
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	26	32	38	45	60
• Base-load current $I_L^{1)}$	A	26	32	38	45	60
• Base-load current $I_H^{2)}$	A	18	26	32	38	45
• Maximum current I_{max}	A	39	52	64	57	67
Rated power						
• Based on I_L	kW	11	15	18.5	22	30
• Based on I_H	kW	7.5	11	15	18.5	22
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	97	97	98	98	97
Power loss ³⁾ at rated current	kW	0.291	0.355	0.423	0.539	0.726
Cooling air requirement	m ³ /s (ft ³ /s)	0.019 (0.7)	0.019 (0.7)	0.019 (0.7)	0.08 (2.8)	0.08 (2.8)
Sound pressure level L_{pA} (1 m)	dB	<65	<65	<65	<60	<60
24 V DC power supply for Control Unit	A	1	1	1	1	1
Input current ⁴⁾						
• Rated current	A	27	33	39	42	56
• Based on I_H	A	19	27	33	36	42
Line supply connection U1/L1, V1/L2, W1/L3		Screw-type terminals, plug-in	Screw-type terminals, plug-in	Screw-type terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor connection U2, V2, W2		Screw-type terminals, plug-in	Screw-type terminals, plug-in	Screw-type terminals, plug-in	M6 screw studs	M6 screw studs
• Conductor cross-section	mm ²	6 ... 16	6 ... 16	6 ... 16	16 ... 35	16 ... 35
Motor cable length, max. ⁵⁾						
• Shielded	m (ft)	25 (82)	25 (82)	25 (82)	25 (82)	25 (82)
• 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)	140 (5.51)	140 (5.51)	140 (5.51)	275 (10.83)	275 (10.83)
• Height						
- Without integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	419 (16.50)	419 (16.50)
- With integrated line filter	mm (in)	355 (13.98)	355 (13.98)	355 (13.98)	512 (20.16)	512 (20.16)
• Depth						
- Without operator panel	mm (in)	165 (6.50)	165 (6.50)	165 (6.50)	204 (8.03)	204 (8.03)
- With operator panel, max.	mm (in)	245 (9.65)	245 (9.65)	245 (9.65)	275 (10.83)	275 (10.83)
Frame size		FSC	FSC	FSC	FSD	FSD
Weight, approx.						
• Without integrated line filter	kg (lb)	4.5 (9.92)	4.5 (9.92)	4.5 (9.92)	11 (24.3)	11 (24.3)
• With integrated line filter	kg (lb)	5.1 (11.25)	5.1 (11.25)	5.1 (11.25)	14 (30.87)	14 (30.87)

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 PM230 Power Modules with integrated line filter to maintain the limit values acc. to EN 61800-3 Category C2. With unshielded cables, Category C2 is not achieved.

SINAMICS G120P built-in and wall-mounted units

PM230 Power Modules, 0.37 kW to 90 kW

Line filter

Technical specifications

Line voltage 380 ... 480 V 3 AC		Line filter class B					
		6SL3203-0BE17-7BA0	6SL3203-0BE21-8BA0	6SL3203-0BE23-8BA0	6SL3203-0BE27-5BA0	6SL3203-0BE31-1BA0	6SL3203-0BE31-8BA0
Rated current	A	11.4	23.5	49.4	72	105	204
Pulse frequency	kHz	4 ... 16	4 ... 16	4 ... 16	4 ... 16	4 ... 16	4 ... 8
Line supply connection L1, L2, L3		Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals	Screw-type terminals
• Conductor cross-section	mm ²	1 ... 2.5	2.5 ... 6	6 ... 16	16 ... 50	16 ... 50	35 ... 150
Load connection U, V, W		Shielded cable	Shielded cable	Shielded cable	Shielded cable	Shielded cable	Shielded cable
• Cable cross-section	mm ²	1.5	4	10	16	35	50
• Length	m (ft)	0.45 (1.48)	0.5 (1.64)	0.54 (1.77)	1 (3.28)	1 (3.28)	1.1 (3.61)
PE connection		On housing via M5 screw stud	On housing via M5 screw stud	On housing via M6 screw studs	On housing via M6 screw studs	On housing via M8 screw studs	On housing via M10 screw studs
• Conductor cross-section	mm ²	1 ... 2.5	2.5 ... 6	6 ... 16	16 ... 50	35 ... 50	50 ... 150
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Dimensions							
• Width	mm (in)	73 (2.87)	100 (3.94)	140 (5.51)	100 (3.94)	110 (4.33)	150 (5.91)
• Height	mm (in)	202 (7.95)	297 (11.7)	359 (14.1)	400 (15.7)	480 (18.9)	517
• Depth	mm (in)	65 (2.56)	85 (3.35)	95 (3.74)	140 (5.51)	140 (5.51)	230 (9.06)
Possible as base component		Yes	Yes	Yes	No	No	No
Weight, approx.	kg (lb)	1.75 (3.86)	4 (8.82)	7.3 (16.1)	7.6 (16.8)	11.9 (26.2)	21.7 (47.8)
Suitable for PM230 Power Module degree of protection IP20 standard variant	Type	6SL3210-1NE11-3UG1 6SL3210-1NE11-7UG1 6SL3210-1NE12-2UG1 6SL3210-1NE13-1UG1 6SL3210-1NE14-1UG1 6SL3210-1NE15-8UG1 6SL3210-1NE17-7UG1	6SL3210-1NE21-0UG1 6SL3210-1NE21-3UG1 6SL3210-1NE21-8UG1	6SL3210-1NE22-6UG1 6SL3210-1NE23-2UG1 6SL3210-1NE23-8UG1	6SL3210-1NE24-5UL0 6SL3210-1NE26-0UL0	6SL3210-1NE27-5UL0 6SL3210-1NE28-8UL0	6SL3210-1NE31-1UL0 6SL3210-1NE31-5UL0
Suitable for PM230 Power Module degree of protection IP20 Push Through variant (lateral mounting only)	Type	6SL3211-1NE17-7UG1	6SL3211-1NE21-8UG1	6SL3211-1NE23-8UG1	—	—	—
• Frame size		FSA	FSB	FSC	FSD	FSE	FSF