

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 ²⁾ <i>I</i> _{rated}	Power based on the base-load current <i>I</i> _H ³⁾		Base-load current ³⁾ <i>I</i> _H	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 ²⁾ <i>I</i> _{rated}	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 Standard variant <u>without</u> integrated line filter	PM230 Power Module degree of protection IP20 Standard 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								
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 ²⁾ <i>I</i> _{rated} A	Power based on the base-load current ³⁾		Base-load current <i>I</i> _H ³⁾ A	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		kW	hp				
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 $\times$ 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	
- Frame sizes FSD to FSF	1.1 $\times$ 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 $\times$ 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	
- Frame sizes FSD to FSF	1.5 $\times$ 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	
DC braking		
Operating temperature		
• 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.