

SINAMICS G120 standard inverters

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

Power Modules

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).

SINAMICS G120 standard inverters

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

Power Modules

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 $R_{SC} > 50$ 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 $R_{SC} > 100$ 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 • Control mode Vector	0 ... 550 Hz 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 $\cos \varphi$	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) <u>Note:</u> No reduction in base-load current I_L for use of overload • High overload (HO) <u>Note:</u> No reduction in base-load current I_H for use of overload	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 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	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 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

SINAMICS G120 standard inverters

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

Power Modules

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.

SINAMICS G120 standard inverters

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

Power Modules

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		6SL3210-1PB13-0ULO	6SL3210-1PB13-8ULO	6SL3210-1PB15-5ULO	6SL3210-1PB17-4ULO	6SL3210-1PB21-0ULO
With integrated line filter class A		6SL3210-1PB13-0ALO	6SL3210-1PB13-8ALO	6SL3210-1PB15-5ALO	6SL3210-1PB17-4ALO	6SL3210-1PB21-0ALO
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.

SINAMICS S110 servo drives

0.55 kW to 132 kW (0.75 hp to 150 hp)

Air-cooled PM240-2 Power Modules in blocksize format

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 type rating 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

Type rating 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		
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		

¹⁾ Type rating 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 are available. Additional information is available on the Internet at www.siemens.com/siplus-drives

SINAMICS S110 servo drives

0.55 kW to 132 kW (0.75 hp to 150 hp)

Air-cooled PM240-2 Power Modules in blocksize format

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
• For S6 duty (40 %) I_{S6}	A	3.3	4.3	6.1	8.2	11.5
• 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
Type rating						
• Based on I_{rated}	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 (0.5)	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 current 1 AC/3 AC	A	7.5/4.3	9.6/5.5	13.5/7.8	18.1/10.5	24/13.9
• Based on I_{H} 1 AC/3 AC	A	6.6/3.8	8.4/4.8	11.8/6.8	15.8/9.1	20.9/12.1
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)
Frame size		FSA	FSA	FSB	FSB	FSB
Weight, approx.						
• Without integrated line filter	kg (lb)	1.4 (3.09)	1.4 (3.09)	2.9 (6.39)	2.9 (6.39)	2.9 (6.39)
• 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} is 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. More information can be found 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 with the type rating (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.