

System configuration

SINAMICS G120P and SINAMICS G120P Cabinet pump, fan, compressor converters

Integrated Drive Systems

Overview (continued)

SINAMICS G120P Power Modules for use in water/wastewater applications and in industrial environments, with degree of protection IP20, 380 to 480 V 3 AC

SINAMICS G120P									
Rated power ¹⁾		Rated output 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.
22	25	45	18.5	20	38	FSD	PM240P-2	6SL3210-1RE24-5UL0	6SL3210-1RE24-5AL0
30	30	60	22	25	45			6SL3210-1RE26-0UL0	6SL3210-1RE26-0AL0
37	40	75	30	30	60			6SL3210-1RE27-5UL0	6SL3210-1RE27-5AL0
45	50	90	37	40	75	FSE		6SL3210-1RE28-8UL0	6SL3210-1RE28-8AL0
55	60	110	45	50	90			6SL3210-1RE31-1UL0	6SL3210-1RE31-1AL0
75	75	145	55	60	110	FSF		6SL3210-1RE31-5UL0	6SL3210-1RE31-5AL0
90	100	178	75	75	145			6SL3210-1RE31-8UL0	6SL3210-1RE31-8AL0
110	125	205	90	100	178			6SL3210-1RE32-1UL0	6SL3210-1RE32-1AL0
132	150	250	110	125	205			6SL3210-1RE32-5UL0	6SL3210-1RE32-5AL0
160	200	300	132	150	240	GX	PM330	6SL3310-1PE33-0AA0	–
200	250	370	160	200	296			6SL3310-1PE33-7AA0	–
250	300	460	200	200	368			6SL3310-1PE34-6AA0	–
315	400	585	250	300	468	HX		6SL3310-1PE35-8AA0	–
355	450	655	250	300	491			6SL3310-1PE36-6AA0	–
400	500	735	315	350	551			6SL3310-1PE37-4AA0	–
450	500	840	355	450	672	JX		6SL3310-1PE38-4AA0	–
500	600	910	400	500	728			6SL3310-1PE38-8AA0	–
560	700	1021	450	500	786			6SL3310-1PE41-0AA0	–

¹⁾ PM240P-2: 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). PM330: Rated power based on the base-load current I_L . The base-load current I_L is based on the duty cycle for low overload (LO).

²⁾ PM240P-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

PM240P-2 Power Modules, 11 kW to 132 kW

PM240P-2 Power Modules

Integration (continued)

Maximum permissible cable lengths from the motor to the inverter when using output reactors or dv/dt filters depending on the voltage range

The following load-side power components in the appropriate frame sizes are optionally available for the Power Modules and result in the following maximum cable lengths:

PM240P-2 Power Module, frame sizes FSD and FSE	System operating voltage	Maximum permissible motor cable lengths (shielded/unshielded) in m (ft)
Without output option	380 ... 480 V 3 AC	200/300 (656/984)
Without output option, compliance with Category C2 acc. to EN 61800-3	380 ... 480 V 3 AC	150/- (492/-)
With two output reactors in series	380 ... 480 V 3 AC	350/525 (1148/1722)
With dv/dt filter plus VPL	500 ... 690 V 3 AC	300/450 (984/1476)

PM240P-2 Power Module, frame size FSF	System operating voltage	Maximum permissible motor cable lengths (shielded/unshielded) in m (ft)
Without output option	380 ... 480 V 3 AC	300/450 (984/1476)
	500 ... 690 V 3 AC	300/450 (984/1476)
Without output option, compliance with Categories C2 and/or C3 acc. to EN 61800-3	380 ... 480 V 3 AC	150/- (Category C2)
	500 ... 690 V 3 AC	150/- (Category C3)
With two output reactors in series	380 ... 480 V 3 AC	525/800 (1722/2625)
	500 ... 690 V 3 AC	525/800 (1722/2625)
With dv/dt filter plus VPL	500 ... 690 V 3 AC	300/450 (984/1476)

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 GP and SIMOTICS SD 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.

PM240P-2 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	PM240P-2 Power Module without integrated line filter	PM240P-2 Power Module with integrated line filter class A
400 V/ 690 V kW	460 V/ 575 V hp		400 V/ 690 V kW	460 V/ 575 V hp			Article No.	Article No.
380 ... 480 V 3 AC								
22	25	45	18.5	20	38	FSD	6SL3210-1RE24-5UL0	6SL3210-1RE24-5AL0
30	30	60	22	25	45	FSD	6SL3210-1RE26-0UL0	6SL3210-1RE26-0AL0
37	40	75	30	30	60	FSD	6SL3210-1RE27-5UL0	6SL3210-1RE27-5AL0
45	50	90	37	40	75	FSE	6SL3210-1RE28-8UL0	6SL3210-1RE28-8AL0
55	60	110	45	50	90	FSE	6SL3210-1RE31-1UL0	6SL3210-1RE31-1AL0
75	75	145	55	60	110	FSF	6SL3210-1RE31-5UL0	6SL3210-1RE31-5AL0
90	100	178	75	75	145	FSF	6SL3210-1RE31-8UL0	6SL3210-1RE31-8AL0
110	125	205	90	100	178	FSF	6SL3210-1RE32-1UL0	6SL3210-1RE32-1AL0
132	150	250	110	125	205	FSF	6SL3210-1RE32-5UL0	6SL3210-1RE32-5AL0
500 ... 690 V 3 AC								
11	10	14	7.5	8	11	FSD	6SL3210-1RH21-4UL0	6SL3210-1RH21-4AL0
15	15	19	11	10	14	FSD	6SL3210-1RH22-0UL0	6SL3210-1RH22-0AL0
18.5	20	23	15	15	19	FSD	6SL3210-1RH22-3UL0	6SL3210-1RH22-3AL0
22	25	27	18.5	20	23	FSD	6SL3210-1RH22-7UL0	6SL3210-1RH22-7AL0
30	30	35	22	25	27	FSD	6SL3210-1RH23-5UL0	6SL3210-1RH23-5AL0
37	40	42	30	30	35	FSD	6SL3210-1RH24-2UL0	6SL3210-1RH24-2AL0
45	50	52	37	40	42	FSE	6SL3210-1RH25-2UL0	6SL3210-1RH25-2AL0
55	60	62	45	50	52	FSE	6SL3210-1RH26-2UL0	6SL3210-1RH26-2AL0
75	75	80	55	60	62	FSF	6SL3210-1RH28-0UL0	6SL3210-1RH28-0AL0
90	100	100	75	75	80	FSF	6SL3210-1RH31-0UL0	6SL3210-1RH31-0AL0
110	100	115	90	100	100	FSF	6SL3210-1RH31-2UL0	6SL3210-1RH31-2AL0
132	125	142	110	100	115	FSF	6SL3210-1RH31-4UL0	6SL3210-1RH31-4AL0

Note:

The power data in hp units is 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 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 G120P built-in and wall-mounted units

PM240P-2 Power Modules, 11 kW to 132 kW

PM240P-2 Power Modules

Technical specifications

General technical specifications

	PM240P-2 Power Modules
System operating voltage	380 ... 480 V 3 AC $\pm 10\%$ (in operation $-20\% < 1$ min) 500 ... 690 V 3 AC $\pm 10\%$ (in operation $-20\% < 1$ min)
Grid requirement	>25
Short-circuit power R_{SC}	
Input frequency	47 ... 63 Hz
Output frequency	
• Control mode V/f	0 ... 550 Hz
• Control type Vector	0 ... 200 Hz
Pulse frequency	
• At 380 ... 480 V 3 AC $\pm 10\%$	up to 90 kW (121 hp) (LO): 4 kHz from 110 kW (148 hp) (LO): 2 kHz Higher pulse frequencies up to 16 kHz, see derating data
• At 500 ... 690 V 3 AC $\pm 10\%$	2 kHz, can be adjusted to 4 kHz
Power factor λ	0.95 at 380 ... 480 V 3 AC 0.9 at 500 ... 690 V 3 AC
Offset factor $\cos \varphi$	0.99
Inverter efficiency	>97 % at 380 ... 480 V 3 AC >98 % at 500 ... 690 V 3 AC
Output voltage, max. As % of input voltage	95 %
Overload capability	
• Low overload (LO)	1.35 \times base-load current I_L (i.e. 135 % 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>Note:</u> When the overload capability is used, the base-load current I_L is not reduced.	
• High overload (HO)	1.5 \times base-load current I_H (i.e. 150 % overload) for 60 s within a cycle time of 300 s
<u>Note:</u> When the overload capability is used, the base-load current I_H is not reduced.	
Electromagnetic compatibility	<ul style="list-style-type: none"> • Devices without line filter • Devices with line filter class A for compliance with conducted and radiated interference requirements of Category C2
Possible braking methods	<ul style="list-style-type: none"> • DC braking • Compound braking
Degree of protection	IP20
Operating temperature	
• Low overload (LO)	-20 ... +40 °C (-4 ... +104 °F) without derating >40 ... 60 °C (>104 ... 140 °F) see derating characteristics
• High overload (HO)	-20 ... +50 °C (-4 ... +122 °F) without derating >50 ... 60 °C (>122 ... 140 °F) see derating characteristics
Relative humidity	5 ... 95 %, condensation not permitted
Storage temperature	-25 ... +55 °C (-13 ... +131 °F)
Cooling	Internal ventilation, 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
Protection functions	<ul style="list-style-type: none"> • Undervoltage • Overvoltage • Overcurrent/overload • Overtemperature • Ground fault • Short-circuit • Stall protection • Motor blocking protection • Motor overtemperature • Inverter overtemperature • Parameter locking
Short-Circuit Current Rating SCCR (Short-Circuit Current Rating) ¹⁾	100 kA
Compliance with standards	UL, cUL, 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 to NEC article 409 or UL 61800-5-1.

SINAMICS G120P built-in and wall-mounted units

PM240P-2 Power Modules, 11 kW to 132 kW

PM240P-2 Power Modules

Technical specifications (continued)

PM240P-2 Power Modules

Line voltage 380 ... 480 V 3 AC		PM240P-2 Power Modules				
Without integrated line filter		6SL3210-1RE24-5UL0	6SL3210-1RE26-0UL0	6SL3210-1RE27-5UL0	6SL3210-1RE28-8UL0	6SL3210-1RE31-1UL0
With integrated line filter		6SL3210-1RE24-5ALO	6SL3210-1RE26-0ALO	6SL3210-1RE27-5ALO	6SL3210-1RE28-8ALO	6SL3210-1RE31-1ALO
Output current at 50 Hz 400 V 3 AC						
• Rated current $I_{rated}^{1)}$	A	45	60	75	90	110
• Base-load current $I_L^{1)}$	A	45	60	75	90	110
• Base-load current $I_H^{2)}$	A	38	45	60	75	90
• Maximum current I_{max}	A	61	81	102	122	149
Rated power						
• Based on I_L	kW	22	30	37	45	55
• Based on I_H	kW	18.5	22	30	37	45
Rated pulse frequency	kHz	4	4	4	4	4
Efficiency η	%	98	98	98	98	98
Power loss ³⁾ at rated current						
• Without integrated line filter	kW	0.7	0.85	1.12	1.25	1.59
• With integrated line filter	kW	0.71	0.85	1.12	1.28	1.63
Cooling air requirement	m ³ /s (ft ³ /s)	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	71.6	71.6	71.6	70.6	70.6
24 V DC power supply for Control Unit	A	1	1	1	1	1
Rated input current $I_{rated}^{4)}$		42	57	70	86	104
Line supply connection U1/L1, V1/L2, W1/L3		Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
Motor connection U2, V2, W2		Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
Feedback connection F3, R1		Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
PE connection		Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal	Screw-type terminal
• Conductor cross-section	mm ²	10 ... 35	10 ... 35	10 ... 35	25 ... 70	25 ... 70
Motor cable length ⁵⁾, max.						
• 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)
Degree of protection		IP20	IP20	IP20	IP20	IP20
Dimensions						
• Width	mm (in)	200 (7.87)	200 (7.87)	200 (7.87)	275 (10.8)	275 (10.8)
• Height	mm (in)	472 (18.6)	472 (18.6)	472 (18.6)	551 (21.7)	551 (21.7)
• Depth						
- Without operator panel	mm (in)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)	237 (9.33)
- With Control Unit and operator panel, max.	mm (in)	274.5 (10.8)	274.5 (10.8)	274.5 (10.8)	274.5 (10.8)	274.5 (10.8)
Frame size		FSD	FSD	FSD	FSE	FSE
Weight, approx.						
• Without integrated line filter	kg (lb)	16.6 (36.6)	18.3 (40.3)	18.3 (40.3)	26 (57.3)	26 (57.3)
• With integrated line filter	kg (lb)	18.3 (40.3)	19 (41.9)	19 (41.9)	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⁾ Maximum 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 $u_K = 1\%$.

⁵⁾ The specified cable lengths apply to Power Modules without output option and without compliance with the limit values for RI suppression.

SINAMICS G120P built-in and wall-mounted units

PM240P-2 Power Modules, 11 kW to 132 kW

PM240P-2 Power Modules

Technical specifications (continued)

Line voltage 380 ... 480 V 3 AC		PM240P-2 Power Modules				
Without integrated line filter		6SL3210-1RE31-5ULO	6SL3210-1RE31-8ULO	6SL3210-1RE32-1ULO	6SL3210-1RE32-5ULO	
With integrated line filter		6SL3210-1RE31-5ALO	6SL3210-1RE31-8ALO	6SL3210-1RE32-1ALO	6SL3210-1RE32-5ALO	
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	196	214	277	338	
Rated power						
• Based on I_L	kW	75	90	110	132	
• Based on I_H	kW	55	75	90	110	
Rated pulse frequency		kHz	4	4	2	2
Efficiency η		%	98	98	98	98
Power loss ³⁾ at rated current						
• Without integrated line filter	kW	1.58	2.07	2.28	2.97	
• With integrated line filter	kW	1.6	2.1	2.31	3.01	
Cooling air requirement		m ³ /s (ft ³ /s)	0.153 (5.40)	0.153 (5.40)	0.153 (5.40)	0.153 (5.40)
Sound pressure level L_{pA} (1 m)		dB	67.7	67.7	67.7	67.7
24 V DC power supply for Control Unit		A	1	1	1	1
Rated input current $I_{rated}^{4)}$		A	140	172	198	242
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 ... 120	35 ... 120	35 ... 120	35 ... 120	
Motor connection U2, V2, W2			M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm ²	35 ... 120	35 ... 120	35 ... 120	35 ... 120	
Feedback connection F3, R1			M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm ²	35 ... 2 x 120	35 ... 2 x 120	35 ... 2 x 120	35 ... 2 x 120	
PE connection			M10 screw stud	M10 screw stud	M10 screw stud	M10 screw stud
• Conductor cross-section	mm ²	35 ... 120	35 ... 120	35 ... 120	35 ... 120	
Motor cable length ⁵⁾, 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 (12.0)	305 (12.0)	305 (12.0)	305 (12.0)	
• Height	mm (in)	708 (27.9)	708 (27.9)	708 (27.9)	708 (27.9)	
• Depth						
- Without operator panel	mm (in)	357 (14.1)	357 (14.1)	357 (14.1)	357 (14.1)	
- With Control Unit and operator panel, max.	mm (in)	394.5 (15.5)	394.5 (15.5)	394.5 (15.5)	394.5 (15.5)	
Frame size			FSF	FSF	FSF	FSF
Weight, approx.						
• Without integrated line filter	kg (lb)	57 (126)	57 (126)	61 (134)	61 (134)	
• 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⁾ Maximum 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 $u_K = 1\%$.

⁵⁾ The specified cable lengths apply to Power Modules without output option and without compliance with the limit values for RI suppression.