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SINAMICS G120XE

Configured enclosed drive for industry

Technical documentation 12/2020

Overview of SINAMICS G120XE

The SINAMICS G120XE is an enclosed drive designed specifically for pumps, fans and compressors. This rugged drive is based upon the SINAMICS G120X to best meet the demands of pump, fan and compressor applications, the environment and the power supply system.

A comprehensive range of pre-designed standard options completes the package. Additionally, please consult the factory for any custom options that may be needed.

SINAMICS G120XE drives are UL listed to UL508A

Depending upon power ratings, the drive enclosure is either a wall-mounted box or a free-standing enclosure. The most common standard options can be accommodated in the base enclosure. A few options including output filters and reduced voltage soft start (RVSS) bypass require an add-on or separate options enclosure.

Attention to detail is evident in the design of the drive. For example, the enclosure ventilation fans are controlled via a relay to run only when needed, i.e. when the drive is running. Not only does this save energy costs, but it also reduces noise levels in the electrical room.

UL listing

SINAMICS G120XE is an enclosed drive listed to UL508A.

Operator interface

SINAMICS IOP-2
14 interface languages available

The door-mounted Intelligent Operator Panel IOP-2 is a high resolution color keypad that is user-friendly and a powerful operator panel. The IOP-2 allow fast local setup, fault diagnostics and intuitive operation of the G120X and simplifies the adjustment of settings during operation. It features an intuitive central multi-functional sensor control wheel.

For pump, fan and compressor applications, the IOP-2 application wizards interactively guide you without the need to know parameter numbers.

Auto / manual control is done using the membrane keyboard and the central sensor control field and there is a dedicated local / remote button.

Process values can be displayed numerically in technological units. Up to two process values can be displayed graphically as bar graphs. The IOP-2 also allows graphical trending of values.

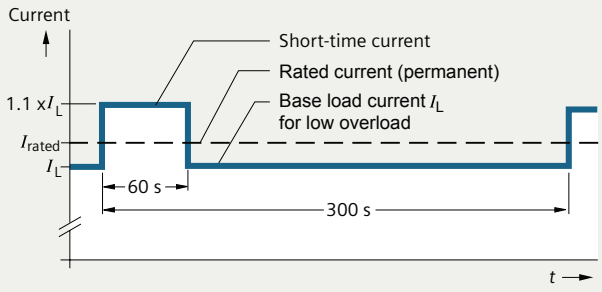
Motor and drive sizing

The Service Factor must be considered for motors operating at Service Factors beyond 1.0. Please consult factory for assistance in sizing the drive.

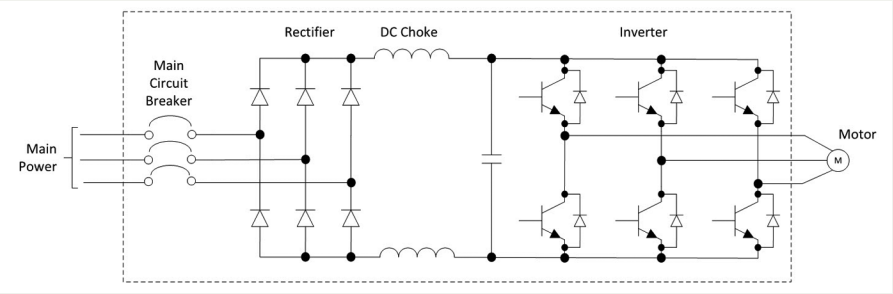
For motors with ratings larger than the drive, please consult the factory as nuisance tripping may occur if the drive is not properly sized. In sensorless vector control, the rated motor current (FLA) must be at least 1/4 of the rated drive output current. With lower motor currents, operation is possible in Volts / Hz control mode only.

Overload ratings

The SINAMICS G120XE may be operated with either light or high overload duties. The criterion for overload is that the drive is operated with its base load current before and after the overload occurs. Light overload duty is based upon 110% base load current for 60 sec. within a cycle time of 300 sec. or 150% for 60 sec. within a cycle time of 600 sec.



Power circuit configuration

Standard 6-pulse	
Application	Pumps, fans and compressors using the G120X (standard), other industrial applications can be achieved by substituting the PM240-2 for the G120X
Harmonic performance (depending upon supply impedance)	THID approx. 25–50% (with 3% line reactor option THID approx. 20–30%)
Power supply system / emergency power	Strong and weak supply systems, emergency power generators may require oversizing due to harmonics
Summary	Basic, compact and low-cost configuration

Control unit—SINAMICS G120X PN / EIP (Standard)

Application	Pump, fan and compressor drives
Control mode	V/F (Linear, square law, FCC, ECO), sensorless vector control (SLVC)
Functionality Pump-specific	Deragging protection, blockage, leakage and dry-running protection, pipe filling mode, cavitation protection, condensation protection, frost protection, multi-pump operation (pump switchover, stop mode, service mode, cascade control mode)
Fan-specific	Flying restart, automatic restart, fire mode or essential service mode (emergency systems), no load, torque and rotation (belt) monitoring with sensor, skip frequency bands, elapsed time
Energy efficiency and performance-specific	Eco mode, bypass mode, hibernation or sleep mode, energy / flow calculator, real-time clock and programmable timer
Optimize operation and increase system availability	Keep running mode, PID controller, dual ramp, multi-speed setpoints
Compatible motor types	Asynchronous (induction) motors, permanent magnet synchronous motors, synchronous reluctance motors
Inputs	6 digital (30V) 2 analog (-10–10V, 0/4–20mA)
Outputs	2 digital (Relay, 2A, 30V DC / 2A, 250V AC) 1 analog
Integrated Safety (encoderless)	Hardware-based SIL3 Safe Torque Off (STO) function with on / off switch

NOTE: Some of the control unit inputs and outputs may be use for options

Commuication bus interface

Industrial Ethernet	PROFINET, EtherNet / IP, Profibus, Modbus RTU/USS, BACnet MS/TP, WiFi via Smart Access Module (SAM)

Product specifications

Standard 6-pulse								
Light overload		High overload						
Output (at 460V, 60 Hz) HP	Baseload current for 110% overload A	Output (at 460V, 60 Hz) HP	Baseload current for 150% overload A	Related output current A	Approx. max. input current [1] A	Power module frame size	Enclosure mount type	SINAMICS G120XE enclosed drive Model No.
1	2.1	1	1.6	2.1	4.0	FSA	Wall	6SL3710-1BJ12-2AU1
1.5	3.0	1.5	2.1	3.0	4.7	FSA	Wall	6SL3710-1BJ13-1AU1
2	3.4	2	3.0	3.4	5.0	FSA	Wall	6SL3710-1BJ14-1AU1
3	4.8	3	3.4	4.8	6.6	FSA	Wall	6SL3710-1BJ16-0AU1
4	6.2	4	4.8	6.2	7.8	FSA	Wall	6SL3710-1BJ17-7AU1
5	7.6	5	6.2	7.6	11.8	FSB	Wall	6SL3710-1BJ21-0AU1
10	14	7.5	7.6	14	19.0	FSB	Wall	6SL3710-1BJ21-8AU1
15	21	10	14	21	26.5	FSC	Wall	6SL3710-1BJ22-5AU1
20	27	15	21	27	31.5	FSC	Wall	6SL3710-1BJ23-2AU1
25	34	20	27	34	36.5	FSD	Wall	6SL3710-1BJ23-8AU1
30	40	25	34	40	41.5	FSD	Wall	6SL3710-1BJ24-5AU1
40	52	30	40	52	53.3	FSD	Wall	6SL3710-1BJ26-0AU1
50	65	40	52	65	65.5	FSD	Wall	6SL3710-1BJ27-5AU1
60	77	50	65	77	78.5	FSE	Wall	6SL3710-1BJ28-9AU1
75	96	60	77	96	95.5	FSE	Wall	6SL3710-1BJ31-1AU1
100	124	75	96	124	127	FSF	Floor	6SL3710-1BJ31-5AU1
125	156	100	124	156	158	FSF	Floor	6SL3710-1BJ31-8AU1
150	180	125	156	180	181	FSF	Floor	6SL3710-1BJ32-0AU1
200	240	150	180	240	239	FSF	Floor	6SL3710-1BJ32-5AU1

[1] For Standard 6-pulse drives, an allowance of 2.0A (≤20 hp), 4.5A (≤75 hp) or 6.5A (≤200 hp) for auxiliary circuits

The SINAMICS G120XE enclosed drive includes as standard:

- NEMA 1 enclosure
- UL 508A listed
- SCCR (short circuit current rating) 65 kA
- Circuit breaker disconnect with flange mount operator handle, and mechanical door interlock
- Intelligent operator panel (IOP-2), door-mounted and wired
- Enclosure fans with associated control
- Control power transformer for internal control power
- Cable entry top or bottom, line and motor side
- Power module SINAMICS G120X with PWM IGBT inverter

Standard options

Pre-designed standard options are available to tailor the SINAMICS G120 XE enclosed drive to customer specifications, maintaining short delivery times from the factory.

Standard 6-pulse

Code	Enclosure options[1]
M12	NEMA12 filters
L50	Cabinet light and outlet
L55	Cabinet space heaters (120VAC)
L56	Motor space heater supply
Y09	Special enclosure paint color [specify color]

Code	Power circuit and protection options
L08	Output reactor
L10	Output dV/dt filter
L13	Input isolation contactor—coil wired to terminals
L15	Output sinusoidal filter
L24	3% Input reactor[2]
L27	Input fuses
L28	2 contactor bypass (output/bypass contactors with overload relay)
L29*	RVSS manual bypass (includes RVSS input and output contactor) In additional options enclosure
L32	Output isolation contactor—coil wired to terminals
L96	Input surge protective device
L98	Motor thermal overload relay (already included in option L28)
L99*	Motor protection relay (Multilin)
P10	Input voltage monitor (Siemens type 3UG4)

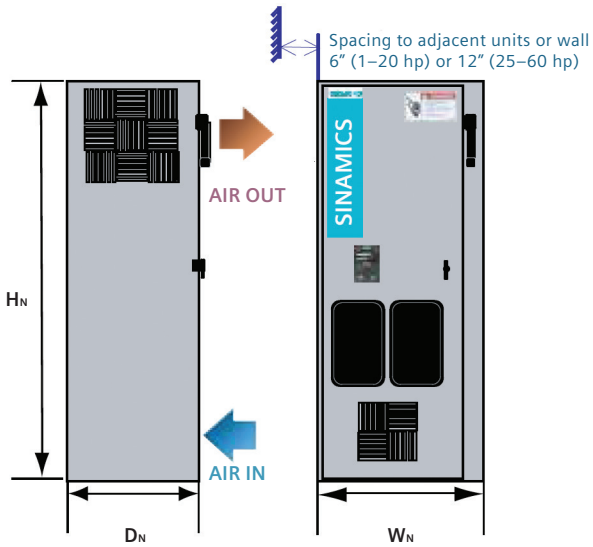
Code	Control options
E86	Isolation amplifier for one analog input
E87	Isolation amplifier for one analog output
K20	Pilot lights (qty. 3), door mounted—ready, run, fault
K21	Additional local controls (L-R and H-O-A switches, speed potentiometer, Start/Stop pushbuttons)
K22	Elapsed time (hour) meter, door-mounted, non-resettable
L87*	Ground fault monitor for ungrounded supplies
L97	RTD monitor for 8x Pt100 temperature sensors
N55	ALL STOP mushroom pushbutton, latching, coast to stop
G60	I/O expansion (additional 2 DI, 4 DO, 1AI and 2AO)
G81	Profibus communications (Profinet standard)
G83	USS, Modbus RTU, BacNet MS/TP communication

Code	Special options
N75	Expanded voltage range (380–480V supply system)
U91	cUL listing for Canada
H21	3C3 environmental protection (3C2 standard)

Please consult the factory for additional custom options
* = only for 100–200 hp (floor-standing enclosure)
[1] For wall-mounted drives, the enclosure options listed above are available only for the VFD enclosure itself, not for the separate options enclosures.
[2] This option needs to be selected when a 5% impedance is needed. The G120X modules are equipped with a DC Choke equivalent to z = 2%.

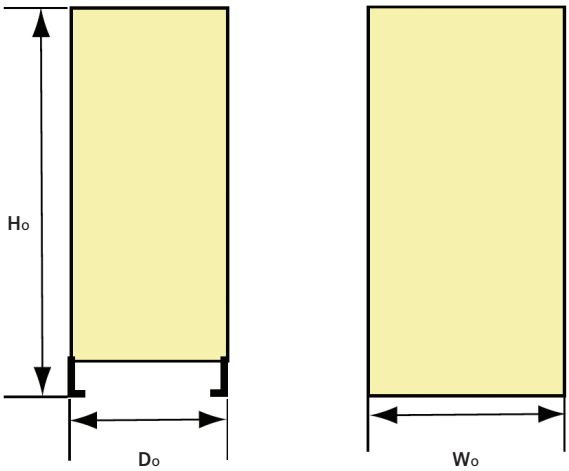
SINAMICS G120XE design data

Wall-mounted drive enclosure



Side view | Front view

Separate options enclosure (floor-standing)



Side view | Front view

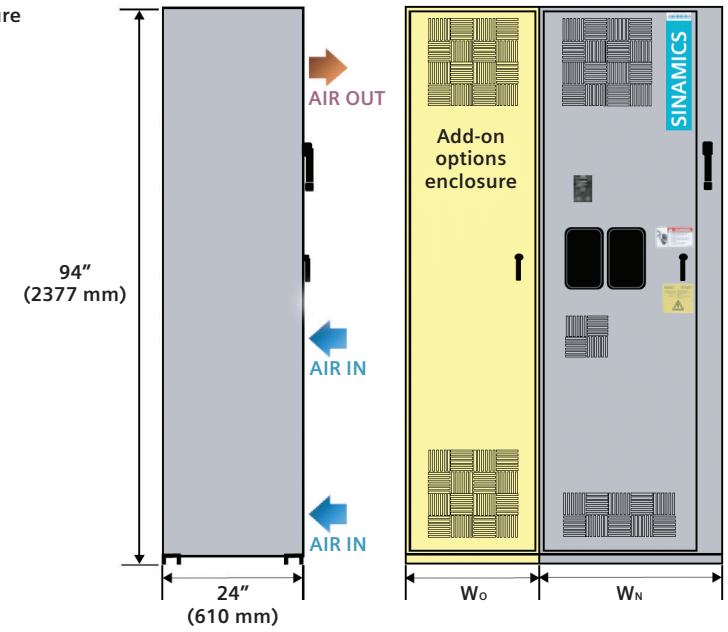
Wall-mounted drive enclosure

Model No.	Output (Light Overload) at 460V, 60 Hz	Noise level L_{PA} (1m) at 60 Hz	Cooling air flow demand	Heat loss	Weight approx.		Drive enclosure Nominal size $W_N \times D_N \times H_N$	
	hp	dB (A)	cfm	kW	lb.	kg	inch	mm
6SL3710-1BJ12-2AU1	1	65	77	0.068	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ13-1AU1	1.5	65	77	0.08	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ14-1AU1	2	65	77	0.096	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ16-0AU1	3	65	115	0.115	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ17-7AU1	4	65	115	0.148	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ21-0AU1	5	65	115	0.161	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ21-8AU1	10	65	182	0.27	230	104	16 x 13 x 43	406 x 330 x 1092
6SL3710-1BJ22-5AU1	15	65	182	0.341	230	104	18 x 13 x 43	457 x 330 x 1092
6SL3710-1BJ23-2AU1	20	65	182	0.421	230	104	18 x 13 x 43	457 x 330 x 1092
6SL3710-1BJ23-8AU1	25	67	318	0.615	330	150	26 x 16 x 46	660 x 406 x 1168
6SL3710-1BJ24-5AU1	30	67	318	0.745	330	150	26 x 16 x 46	660 x 406 x 1168
6SL3710-1BJ26-0AU1	40	67	318	0.855	330	150	26 x 16 x 46	660 x 406 x 1168
6SL3710-1BJ27-5AU1	50	67	360	1.125	330	150	26 x 16 x 46	660 x 406 x 1168
6SL3710-1BJ28-9AU1	60	67	360	1.355	330	150	26 x 16 x 46	660 x 406 x 1168
6SL3710-1BJ31-1AU1	75	67	360	1.755	330	150	26 x 16 x 46	660 x 406 x 1168

Floor-standing enclosure

Model No.	Output (Light Overload) at 460V, 60 Hz	Noise level L_{PA} (1m) at 60 Hz	Cooling air flow demand	Heat loss	Weight approx.		Drive enclosure Nominal size $W_N \times D_N \times H_N$	
	hp	dB (A)	cfm	kW	lb.	kg	inch	mm
6SL3710-1BJ31-5AU1	100	69	504	1.99	720	327	30 x 24 x 94	762 x 610 x 2377
6SL3710-1BJ31-8AU1	125	69	504	2.60	720	327	30 x 24 x 94	762 x 610 x 2377
6SL3710-1BJ32-0AU1	150	69	504	2.40	720	345	30 x 24 x 94	762 x 610 x 2377
6SL3710-1BJ32-5AU1	200	69	504	3.12	720	345	30 x 24 x 94	762 x 610 x 2377

Floor-mounted enclosure



Side view

Front view

Wall-mounted drive add-on options enclosure

Model No.	Output (Light Overload) at 460V, 60 Hz	Option enclosure L10 output dV/dt filter		Option enclosure L15 output with sinusoidal filter	
	hp	Wo x Do x Ho inch/mm	Weight inch/kg	Wo x Do x Ho inch/mm	Weight inch/kg
6SL3710-1BJ12-2AU1	1	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**20**/9
6SL3710-1BJ13-1AU1	1.5	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**21**/10
6SL3710-1BJ14-1AU1	2	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**25**/11
6SL3710-1BJ16-0AU1	3	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**25**/11
6SL3710-1BJ17-7AU1	4	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**27**/12
6SL3710-1BJ21-0AU1	5	**13 x 13 x 13** / 330 x 330 x 330	**18**/8	**13 x 13 x 14** / 330 x 330 x 356	**27**/12
6SL3710-1BJ21-8AU1	10	**13 x 13 x 13** / 330 x 330 x 330	**19**/9	**13 x 13 x 14** / 330 x 330 x 356	**34**/15
6SL3710-1BJ22-5AU1	15	**13 x 13 x 13** / 330 x 330 x 330	**22**/10	**17 x 17 x 24** / 432 x 432 x 610	**79**/36
6SL3710-1BJ23-2AU1	20	**13 x 13 x 13** / 330 x 330 x 330	**22**/10	**17 x 17 x 24** / 432 x 432 x 610	**82**/37
6SL3710-1BJ23-8AU1	25	**13 x 13 x 13** / 330 x 330 x 330	**24**/11	**17 x 17 x 24** / 432 x 432 x 610	**86**/39
6SL3710-1BJ24-5AU1	30	**13 x 13 x 13** / 330 x 330 x 330	**24**/11	**17 x 17 x 24** / 432 x 432 x 610	**95**/43
6SL3710-1BJ26-0AU1	40	**13 x 13 x 13** / 330 x 330 x 330	**32**/15	**17 x 17 x 24** / 432 x 432 x 610	**101**/46
6SL3710-1BJ27-5AU1	50	**13 x 13 x 13** / 330 x 330 x 330	**40**/18	**18 x 21 x 34** / 457 x 533 x 864	**136**/62
6SL3710-1BJ28-9AU1	60	**13 x 13 x 13** / 330 x 330 x 330	**40**/18	**18 x 21 x 34** / 457 x 533 x 864	**147**/67
6SL3710-1BJ31-1AU1	75	**13 x 13 x 13** / 330 x 330 x 330	**40**/18	**18 x 21 x 34** / 457 x 533 x 864	**147**/67

Floor-standing add-on options enclosure

Model No.	Output (Light Overload) at 460V, 60 Hz	Option enclosure L10 output dV/dt filter		Option enclosure L15 output with sinusoidal filter		Option enclosure L29 softstart bypass	
	hp	Wo inch/mm	Weight inch/kg	Wo inch/mm	Weight inch/kg	Wo inch/mm	Weight inch/kg
6SL3710-1BJ31-5AU1	100	**20** / 508	**452**/205	**20** / 508	**540** / 245	**20** / 508	**463** / 210
6SL3710-1BJ31-8AU1	125	**20** / 508	**452**/205	**20** / 508	**540** / 245	**20** / 508	**463** / 210
6SL3710-1BJ32-0AU1	150	**20** / 508	**452**/205	**24** / 610	**660** / 300	**20** / 508	**463** / 210
6SL3710-1BJ32-5AU1	200	**20** / 508	**452**/205	**24** / 610	**660** / 300	**20** / 508	**463** / 210

Technical information

Electrical	
Supply voltages and output ranges	460–480V (optionally 380–480V) 3-phase AC, ±10%, 1–200 hp
Supply systems	Grounded or ungrounded supplies
Line frequency	47–63Hz
Output frequency	Control mode V/F: 0–550Hz, Control mode Vector: 0–240Hz
Power factor fundamental approx.	0.93
Drive efficiency	6 pulse: 94–98%
Short circuit current rating	SCCR 65kA
Control method	V/F (Linear, square low, FCC, ECO), sensorless vector control (SLVC)
Fixed speeds	16 fixed frequencies
Skipped frequency ranges	4, programmable

Mechanical	
Type of enclosure and color	NEMA 1, optionally NEMA12 (ventilated), ANSI 61 gray
Type of cooling	Forced air ventilation
Noise level LpA (1 m)	65–71dB (A) at 60Hz line frequency
Environmental protection	3C2 environmental rating is standard with 3C3 available as an option

Compliance with standards and certifications	
UL listing	Listed to UL 508A

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