

SINAMICS G120X

Available in power ratings up to 700 hp (630 kW)

Technical documentation 01/2019

An infrastructure drive for pumps, fans and compressors

Siemens introduces an exciting new addition to the existing SINAMICS product portfolio—the G120X—an “infrastructure” drive up to 700 hp (630kW), which is targeted for pump, fan and compressor applications in the water/wastewater, HVAC, irrigation/agriculture and industrial chiller and refrigeration industries.

Seamless process for higher efficiency

SINAMICS G120X is simple, seamless, cost- and energy-efficient, robust, reliable and fit for digitalization. It integrates easily into existing applications, works with any standard motor (induction, synchronous and synchronous reluctance) and can be configured for cost-optimization and resource-saving operation which ultimately helps reduce total cost of ownership. SINAMICS G120X meets all the latest industry standards with regard to energy efficiency and product safety, and offers enhanced safety with SIL3-rated safety functions and up to 100kA short-circuit current rating according to UL61800-5-1.



Product family overview

SINAMICS G120X is available from
1–700 hp (FSA to FSJ)

Technical data

Line voltage and output power range	
FSA...FSG	3AC 380V (-20%)...480V (+10%) 1 hp...400 hp (0.75kW...250kW)
FSH, FSJ	3AC 380V (-15%)...480V (+10%) 400 hp...700 hp (315kW...560kW)
FSD...FSG	3AC 500V (-20%)...690V (+10%) 4 hp...250 hp (3kW...250kW)
FSH, FSJ	3AC 500V (-15%)...690V (+10%) 350 hp...700 hp (315kW...630kW)
Output voltage	3AC 0V....line voltage x 0.97
Input frequency	47 Hz...63 Hz
Output frequency	
FSA...FSG	0 Hz...550 Hz (depending upon the control mode)
FSH, FSJ	0 Hz...150 Hz (depending upon the control mode)
Fundamental power factor (Cos ϕ)	0.96...0.99
Efficiency class	IE2 (According to EN 50598-2)
Efficiency (η)	98%
Motor control	<ul style="list-style-type: none"> V/Hz control (linear, linear with flux current control / FCC, parabolic and eco mode) Sensorless less vector control (SLVC)
Supported motor types	<ul style="list-style-type: none"> Asynchronous (induction) motor Permanent magnet synchronous motor (PMSM) Synchronous reluctance motor (SRM)
Degree of protection	IP20 / UL Open Type
Operating temperature	-4° F to 113° F (-20° C to 45° C) without derating > 113° F up to 140° F (> 45° C up to 60° C) with derating For PROFINET, EtherNet/IP™ up to 55° C (131° F) with derating
Overload	
Low Overload (LO) / Variable Torque (VT)	110% x I _{Lo} for 60s
High Overload (HO) / Constant Torque (CT)	150% x I _H for 60s
Communication	PROFINET, EtherNet/IP™
Functional safety	Hardware-based SIL3 Safe Torque Off (STO) function with on / off switch
Short-circuit current rating (SCCR)	Up to 100kA



SINAMICS G120X

It's the simple, seamless and easy-to-use drive — right out of the box.

Control inputs and outputs

6 Digital Inputs (DI 0 ... DI 5)	24V (12–30V) electrically isolated, 4mA current, PNP/NPN switchable
2 Digital (Relay) Outputs (DO 0...DO 1)	Type C, 230V AC, 2A/ 30V DC, 2A for resistive, inductive or capacitive load
2 Analog Inputs (AI 0...AI 1)	Differential input 0V... 10V or -10V ... +10V: typical current drain: 0.1 mA, max. voltage 35V 0/4 mA ... 20 mA: 120 Ω input resistance, voltage < 10V, current < 80 mA
1 Analog Output (AO 0)	Not isolated, switchable between voltage (0V... 10V) and current (0/4 mA ... 20 mA) via parameter setting
1 motor temperature sensor input	PTC, KTY, PT1000, bi-metallic switch with normally closed contact
1 failsafe digital input	STO— electrically isolated
1 internal aux. supply voltage	24V DC, max. 250 mA 10V DC, max. 10 mA
1 external aux. supply voltage	24V DC (20.4 ... 28.8V DC), current consumption 0.5A
1 memory card slot	For optional SD memory cards (as a backup storage device for saving of the settings after drive commissioning, and also for a series commissioning of a several identical drives via cloning of the settings)

User interface

Standard	Intelligent Operator Panel (IOP-2)— a high-resolution graphical color keypad
Optional	Smart Access Module (SAM)— a WiFi-based web server module and engineering tool for quick setup and diagnostics in conjunction with a mobile device (PC, smartphone, tablet, etc.) Basic Operator Panel (BOP-2)— a basic keypad Blank (No operator panel / keypad)

Certification / marking

- **cUL_{us}** marking according to UL61800-5-1
- **CE** marking according to European Low-Voltage Directive 2014/35/EU, Machinery directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS directive 2011/65/EU
- Safe torque off (STO) SIL3 rating according to IEC/EN 61800-5-2
- EAC, KC, C-Tick

Application functions

Pump-specific

- Deragging or blockage protection
- Pipe filling
- Multi-pump control
 - Pump switchover
 - Stop mode
 - Service mode
 - Cascade control mode
- Blockage, leakage and dry-running protection
- Cavitation protection
- Condensation protection
- Frost protection

Fan-specific

- Flying restart
- Automatic restart
- Skip frequency bands
- Fire mode (essential service mode)
- No load, torque and rotation (belt) monitoring with sensor

Increase energy efficiency and system performance

- Eco mode
- Hibernation or sleep mode
- Bypass mode
- Energy / flow calculator
- Support to high efficiency motors (PMSM and SRM)
- Real time clock and programmable timer (3)

Optimize pump and fan operation and increase system availability

- Keep running mode
- PID controller
- Dual ramp
- Multi-speed setpoints

Protection functions

- Phase-loss detection for both supply and motor
- Overvoltage controller
- Undervoltage controller
- Drive overtemperature protection
- Loss of analog input signal monitoring
- External fault and warning monitoring (up to 3)
- Motor overtemperature protection (with and without sensor)
- Motor overload monitoring and protection
- Motor short-circuit and ground fault protection
- Speed and torque monitoring
- Blocking and stalling monitoring and protection
- Detection of missing communication telegrams
- Detection of communication bus interruption

SINAMICS G120X—dimensions and clearance distances FSA...FSJ



Frame size	Dimensions				Max. weight of frame	
	H mm (inch)	W mm (inch)	D mm (inch)	Additional depth with Operator Panel mm (inch)	No filter kg (lbs) ¹	With filter kg (lbs) ¹
FSA	232 (9.1)	73 (2.9)	209 (8.2)	9 (0.4)	3.22 (7.1)	3.42 (7.54)
FSB	275 (10.8)	100 (3.9)			5.8 (12.8)	6.13 (13.51)
FSC	295 (11.6)	140 (5.5)			7.11 (15.7)	7.63 (16.82)
FSD	472 (18.6)	200 (7.9)	239 (9.4)	9 (0.4)	18.3 (40.34)	19 (41.9)
FSE	551 (21.7)	275 (10.8)			26.4 (58.2)	28.4 (62.61)
FSF	709 (27.9)	305 (12)	360 (14.2)	9 (0.4)	66.5 (146.6)	71 (156.53)
FSG	999.4 (39.3)	305 (12)			120 (264.6)	
FSH	1696 (66.8)	548 (21.6)	393 (15.5)	-	-	159 (350.53)
FSJ	1621 (63.8)	801 (31.5)			250 (551.16)	

¹Refer to SINAMICS G120X operating instructions or rating plate of the unit to obtain weight specific to each rating / order number

SINAMICS G120X—Selection and ordering data

Voltage class 3AC 380...480V, 47...63Hz																				
Frame size	kW (400V)	hp (480V)	Rated Output Current I _r , A (480V)	Order number																
FSA	0.75	1	2.1	6	S	L	3	2	2	0	–	Y	E	1	0	–	0	F	0	
	1.1	1.5	3	6	S	L	3	2	2	0	–	Y	E	1	2	–	0	F	0	
	1.5	2	3.4	6	S	L	3	2	2	0	–	Y	E	1	4	–	0	F	0	
	2.2	3	4.8	6	S	L	3	2	2	0	–	Y	E	1	6	–	0	F	0	
	3	4	6.2	6	S	L	3	2	2	0	–	Y	E	1	8	–	0	F	0	
FSB	4	5	7.6	6	S	L	3	2	2	0	–	Y	E	2	0	–	0	F	0	
	5.5	7.5	11	6	S	L	3	2	2	0	–	Y	E	2	2	–	0	F	0	
	7.5	10	14	6	S	L	3	2	2	0	–	Y	E	2	4	–	0	F	0	
FSC	11	15	21	6	S	L	3	2	2	0	–	Y	E	2	6	–	0	F	0	
	15	20	27	6	S	L	3	2	2	0	–	Y	E	2	8	–	0	F	0	
FSD	18.5	25	34	6	S	L	3	2	2	0	–	Y	E	3	0	–	0	F	0	
	22	30	40	6	S	L	3	2	2	0	–	Y	E	3	2	–	0	F	0	
	30	40	52	6	S	L	3	2	2	0	–	Y	E	3	4	–	0	F	0	
	37	50	65	6	S	L	3	2	2	0	–	Y	E	3	6	–	0	F	0	
FSE	45	60	77	6	S	L	3	2	2	0	–	Y	E	3	8	–	0	F	0	
	55	75	96	6	S	L	3	2	2	0	–	Y	E	4	0	–	0	F	0	
FSF	75	100	124	6	S	L	3	2	2	0	–	Y	E	4	2	–	0	F	0	
	90	125	156	6	S	L	3	2	2	0	–	Y	E	4	4	–	0	F	0	
	110	150	180	6	S	L	3	2	2	0	–	Y	E	4	6	–	0	F	0	
	132	200	240	6	S	L	3	2	2	0	–	Y	E	4	8	–	0	F	0	
FSG	160	250	302	6	S	L	3	2	2	0	–	Y	E	5	0	–	0	F	0	
	200	300	361	6	S	L	3	2	2	0	–	Y	E	5	2	–	0	F	0	
	250	400	477	6	S	L	3	2	2	0	–	Y	E	5	4	–	0	F	0	
FSH	315	400	477	6	S	L	3	2	2	0	–	Y	E	5	6	–	0	C	F	0
	355	450	515	6	S	L	3	2	2	0	–	Y	E	5	8	–	0	C	F	0
	400	500	590	6	S	L	3	2	2	0	–	Y	E	6	0	–	0	C	F	0
FSJ	450	500	663	6	S	L	3	2	2	0	–	Y	E	6	2	–	0	C	F	0
	500	600	724	6	S	L	3	2	2	0	–	Y	E	6	4	–	0	C	F	0
	560	700	830	6	S	L	3	2	2	0	–	Y	E	6	6	–	0	C	F	0
User interface																				
Blank (No operator panel / keypad)											1									
BOP-2 (Basic keypad)											2									
IOP-2 (Standard—high-resolution graphical color keypad)											3									
EMC class																				
No filter (Standard—without integrated EMI / RFI filter) for FSA to FSF only													U							
Filter C2 (With integrated EMI / RFI filter Category C2) for FSA to FSG only, see Note 1													A							
Filter C3 (Standard—with integrated EMI / RFI filter Category C3) for FSG to FSJ only, see Note 1													C							

Note 1:

For frame sizes FSG, FSH and FSJ, the filter can be deactivated by removing a grounding screw / clip for applications in an ungrounded or a high-resistance grounded or a corner-grounded supply system. Please refer to the SINAMICS G120X Operating Instructions for more information.

Voltage class 3AC 500...690V, 47...63Hz																				
Frame size	kW (690V)	hp (600V)	Rated Output Current I _r , A (600V)	Order number																
FSD	3	4	5	6	S	L	3	2	2	0	-	Y	H	1	8	-	0	F	0	
	4	5	6.3	6	S	L	3	2	2	0	-	Y	H	2	0	-	0	F	0	
	5.5	7.5	9	6	S	L	3	2	2	0	-	Y	H	2	2	-	0	F	0	
	7.5	10	11	6	S	L	3	2	2	0	-	Y	H	2	4	-	0	F	0	
	11	10	14	6	S	L	3	2	2	0	-	Y	H	2	6	-	0	F	0	
	15	15	19	6	S	L	3	2	2	0	-	Y	H	2	8	-	0	F	0	
	18.5	20	23	6	S	L	3	2	2	0	-	Y	H	3	0	-	0	F	0	
	22	25	27	6	S	L	3	2	2	0	-	Y	H	3	2	-	0	F	0	
	30	30	35	6	S	L	3	2	2	0	-	Y	H	3	4	-	0	F	0	
FSE	37	40	42	6	S	L	3	2	2	0	-	Y	H	3	6	-	0	F	0	
	45	50	52	6	S	L	3	2	2	0	-	Y	H	3	8	-	0	F	0	
FSF	55	60	62	6	S	L	3	2	2	0	-	Y	H	4	0	-	0	F	0	
	75	75	80	6	S	L	3	2	2	0	-	Y	H	4	2	-	0	F	0	
	90	100	100	6	S	L	3	2	2	0	-	Y	H	4	4	-	0	F	0	
	110	125	125	6	S	L	3	2	2	0	-	Y	H	4	6	-	0	F	0	
FSG	132	150	144	6	S	L	3	2	2	0	-	Y	H	4	8	-	0	F	0	
	160	150	171	6	S	L	3	2	2	0	-	Y	H	5	0	-	0	C	F	0
	200	200	208	6	S	L	3	2	2	0	-	Y	H	5	2	-	0	C	F	0
FSH	250	250	250	6	S	L	3	2	2	0	-	Y	H	5	4	-	0	C	F	0
	315	350	345	6	S	L	3	2	2	0	-	Y	H	5	6	-	0	C	F	0
	355	400	388	6	S	L	3	2	2	0	-	Y	H	5	8	-	0	C	F	0
	400	450	432	6	S	L	3	2	2	0	-	Y	H	6	0	-	0	C	F	0
FSJ	450	500	487	6	S	L	3	2	2	0	-	Y	H	6	2	-	0	C	F	0
	500	500	546	6	S	L	3	2	2	0	-	Y	H	6	4	-	0	C	F	0
	560	600	610	6	S	L	3	2	2	0	-	Y	H	6	6	-	0	C	F	0
	630	700	679	6	S	L	3	2	2	0	-	Y	H	6	8	-	0	C	F	0
User interface																				
Blank (No operator panel / keypad)												1								
BOP-2 (Basic keypad)												2								
IOP-2 (Standard — high-resolution graphical color keypad)												3								
EMC class																				
No filter (Standard — without integrated EMI / RFI filter) for FSD to FSF only														U						
Filter C2 (With integrated EMI / RFI filter Category C2) for FSD to FSE only														A						
Filter C3 (With integrated EMI / RFI filter Category C3) for FSF to FSJ only, standard for FSG to FSJ, see Note 1														C						

Note 1:

For frame sizes FSG, FSH and FSJ, the filter can be deactivated by removing a grounding screw / clip for applications in an ungrounded or a high-resistance grounded or a corner-grounded supply system. Please refer to the SINAMICS G120X Operating Instructions for more information.

SINAMICS G120X—options and features coming soon

Options coming in 2019

- Special coating (Class 3C3) for operation in harsh or corrosive environments
- Add-on push through (PT) kit to enable UL Open Type/IP20 drive in to UL Open Type/IP20 push through drive
- Add-on IP21 (Roof) kit to convert UL Open Type/IP20 drive in to UL Open Type/IP21 drive
- Input and output reactors
- Output du/dt filter
- Output Sinusoidal filter
- Passive line harmonic filter
- EMI/RFI filters

Future enhancements coming in December 2019

- USS, Modbus RTU, BACnet MS/TP
- PROFIBUS DP
- I/O extension module
- UL Open Type/IP20 3AC 200V...240V with power range 1 hp...75 hp (0.75kW...55kW)
- UL Type 1/IP21 with power range 1 hp...200 hp (0.75kW...132kW)
- UL Type 12/IP55 with power range 1 hp...200 hp (0.75kW...132kW)

Discover the new SINAMICS G120X—usa.siemens.com/sinamics-g120x

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