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SINAMICS
low-voltage inverters

Selection and ordering guide

siemens.com/distributors-sinamics

**Electrical distributors and Siemens –
strong partners to industry and the trades.**

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All technical data is provided without any guarantee

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SINAMICS
low-voltage inverters

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- Optimally tailored portfolio of SINAMICS inverters
- The SINAMICS inverter selection tool supports you in the first step...
- General inverter selection tool
- Discussion guidelines – to help you ask important questions!
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- Using the inverter and overload capability

1 You want to save?

How? The solution:

using variable-speed drives

UP TO
65%
ENERGY SAVING

! Advantages when using inverters

✔ The required flow rate is precisely obtained with variable-speed operation

✔ Only the amount of energy that is required is actually used; enormous cost savings, especially in partial load operation

✔ Comprehensive motor protection

✔ Mechanical components such as throttles, valves and contactor combinations for Safety Integrated can be eliminated

✔ Safety functions can be simply integrated for comprehensive protection for man and machine

Energy costs are continually on the rise. You can reduce operating costs, increase productivity and save money by employing successful energy management. The potential for saving energy is everywhere, and especially when it comes to drives. For example, just in the area of pump, fan and compressor applications alone, you can slash your energy costs by 65%.

The selection and ordering guide makes it simple to find the optimum inverter to address the requirements of your customers

SINAMICS V, SINAMICS G and SINAMICS S are the low-voltage inverters from Siemens.

Basic Performance SINAMICS V series	General Performance SINAMICS G series	High Performance SINAMICS S series
SINAMICS V inverters focus on the essentials, both regarding the hardware as well as the functionality. This results in a high degree of ruggedness – but with low investment costs.	The functionality of SINAMICS G inverters is perfectly aligned for basic and medium requirements on the control dynamic performance.	SINAMICS S inverters are predestined for demanding single-axis and multi-axis applications in plant and machinery construction – as well as for the widest range of motion control tasks. **Note: SINAMICS S inverters are not included in the selection and ordering guide.**

SINAMICS offers the optimum drive for every drive application – and all drives can be configured, parameterized, commissioned and operated in a standard fashion. SINAMICS is the drive family for future-proof drive solutions.

Siemens offers electrical distributors an optimally tailored portfolio of SINAMICS inverters

Easy and compact inverters

SINAMICS V20   SINAMICS G120C

Flexible and modular inverters

SINAMICS G120   SINAMICS G120P

When operating pumps, fans and compressors, or for conveyor belt applications: Siemens supplies the optimum inverter for each and every application – with SINAMICS, the most complete drive family that is presently available in the market.

This selection and ordering guide makes it easy for you to select the optimum inverter to address your specific requirements. It also provides you with the ordering data for the following SINAMICS inverters:

- SINAMICS V20
- SINAMICS G120C
- SINAMICS G120
- SINAMICS G120P

**An inverter must be carefully selected – especially when it comes to overload capability, safety requirements and electromagnetic compatibility (EMC).
The SINAMICS inverter selection and ordering guide supports you when doing this. We cannot guarantee any of the technical data.**

1

The SINAMICS inverter selection and ordering guide helps you take the first step...

There are various inverters...	...for different motion types and applications.	How do I quickly and simply recommend the right one?

The SINAMICS selection and ordering guide makes it easy for you!

Step 1
Select the application area...

- PUMPING VENTILATING COMPRESSING
- MOVING
- PROCESSING
- MACHINING

Step 2
...and the motion type.

- CONTINUOUS
- DISCONTINUOUS

Step 3
Requirements relating to:

FUNCTIONALITY
TORQUE ACCURACY
POSITIONING
AXIS COORDINATION
SPEED ACCURACY

- BASIC
- MEDIUM
- HIGH

The selection and ordering guide provides you the answer...

...for optimum use in low-voltage and medium-voltage applications

SINAMICS – general selection guide for continuous motion

Simply select your application, and you will immediately see which SINAMICS inverter is the best choice –
for every application, power rating and performance level.

Quality[1] / Use	Continuous motion					
	Basic		Medium		High	
Pumping/ ventilating/ compressing	Centrifugal pumps Radial/axial fans Compressors	**V20 G120C G120P**	Centrifugal pumps Radial/axial fans Compressors	**G120P** G130/G150 G180[2]	Excentric screw pumps	S120
Moving	Conveyor belts Roller conveyors Chain conveyors	**V20** G110D G110M **G120C**	Conveyor belts Elevators Roller Escalators conveyors Gantry Chain cranes conveyors Ship's drives Vertical mate- Cable rial handling railways	**G120** G120D G130/G150 G180[2]	Elevators Container cranes Mine hoists Open-cast mine excavators Test stands	S120 S150 DCM
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	**V20 G120C**	Mills Agitators Mixers Centrifuges Kneaders Extruders Crushers Rotary furnaces	**G120** G130/G150 G180[2]	Extruders Winders/unwinders Leading/following drives Calenders Main press drives Printing machines	S120 S150 DCM
Machining	Main drives for • Turning • Milling • Drilling	S110	Main drives for • Drilling • Sawing	S110 S120	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	S120

[1] Requirements placed on the torque accuracy/speed accuracy/positioning accuracy/axis coordination/functionality
[2] Sector-specific inverters

SINAMICS – general selection guide for discontinuous motion

Simply select your application, and you will immediately see which SINAMICS inverter is the best choice – for every application, power rating and performance level.

Quality[1] / Use		Discontinuous motion					
		Basic		**Medium**		**High**	
Pumping/ ventilating/ compressing	Hydraulic pumps Dosing pumps	**G120**			S110	Descaling pumps Hydraulic pumps	S120
Moving	Accelerating conveyors Rack feeders	V90 **G120** G120D	Accelerating conveyors Rack feeders Cross cutters Roll changers		S110 DCM	Rack feeders Robotics Pick & place Indexing tables Cross cutters Roller feeds Engaging/disengaging	S120 DCM S210
Processing	Tubular bagging machines Single-axis motion control such as • Positioning profiles • Path profiles	V90 **G120**			S110	Servopresses, Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cam discs • Interpolation	S120 DCM S210
Machining	Axis drives for • Turning • Milling • Drilling	S110	Axis drives for • Drilling • Sawing		S110 S120	Axis drives for • Turning • Milling • Drilling • Laser • Gear cutting machining • Nibbling and • Grinding punching	S120

[1] Requirements placed on the torque accuracy/speed accuracy/positioning accuracy/axis coordination/functionality

Discussion guidelines – to help you ask important questions!

The following questions and overviews help you to recommend the optimum inverter...

1 How is the motor connected?

- 230 V / 400 V (delta / star)
- 400 V / 690 V (delta / star)

2 What is the line supply voltage?

- 1AC 200 ... 240 V
- 3AC 200 ... 240 V
- 3AC 380 ... 480 V
- 3AC 500 ... 690 V

3 What is the power or rated current of the motor?

- 0.12 kW ... 250 KW / 1.3 A ... 477 A

4 For which application will the inverter be used?

- For applications with low dynamic requirements
  (i.e. constant load: continuous operation)
  → low overload examples: centrifugal pumps, radial/axial fans, reciprocating compressors, radial compressors, vacuum pumps, agitators,...

- For high dynamic applications
  (i.e. alternating load; cyclic operation)
  → high overload examples: conveyor belts, gear wheel pumps, excentric worm pumps, mills, mixers, crushers, vertical material handling, centrifuges,...

5 Which degree of protection is required?

- IP20 (installed in an electrical cabinet)
- IP55 (distributed topology, wall/panel mounting)

6 Is integrated safety technology (Safety Integrated) required?

- **No**

- **Yes – safety functions are required[1]**
  - Is the basic Safe Torque Off function sufficient?
  - Are increased safety requirements involved? (e.g. SS1, SBC, SLS, SDI, SSM)

7 Is communication required? If yes, using which bus system?

- No, communication is not required (terminal to terminal)

- Yes, communication is required – via:
  - PROFINET, Ethernet/IP
  - PROFIBUS
  - USS/Modbus RTU
  - BACnet MS/TP
  - CANopen

8 Is an inverter with integrated filter (Class A / Class B) required to maintain electromagnetic compatibility (EMC) according to EN 61800-3?[2]

- Unfiltered inverter (Category C4 achieved)
- Inverter with Class A filter to comply with Categories C2 and C3
- Inverter with Class B filter to comply with Category C1

Note
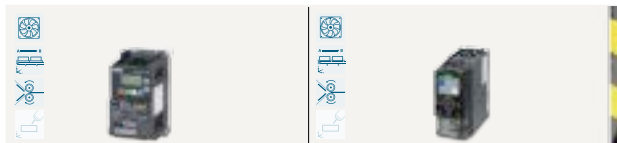Category C1 / C2: public low-voltage grid (residential, commercial)
Category C3 / C4: industrial low-voltage line supply (industry)

[1] Details about the various safety functions can be reviewed in Chapter 4 from Page 4_03!
[2] Details about EMC and Categories C1, C2, C3, C4 can be reviewed in Chapter 4 from Page 4_01!

SINAMICS product comparison

Easy and compact inverters

Flexible and modular inverters

Ques.			SINAMICS V20	SINAMICS G120C	SINAMICS G120	SINAMICS G120P
		Brief description	The cost-effective, reliable and user-friendly inverter for basic applications	Compact and versatile inverter with optimum functionality	Modular inverter – space-saving, reliable and rugged	The specialist for pump, fan and compressor applications
Ques.	2	Line voltage	1AC 200 to 240 V 3AC 380 to 480 V	3AC 380 to 480 V	1AC/3AC 200 to 240 V 3AC 380 to 480 V 3AC 500 to 690 V	3AC 380 to 480 V
Ques.	3	Power	0.12 to 30 kW (0.16 to 40 hp)	0.55 to 132 kW (0.75 to 150 hp)	0.55 to 250 kW (0.75 to 400 hp)	0.37 to 90 kW (0.5 to 125 hp)
Ques.	4	You can review the details on the overload capability (High Overload and Low Overload) on Page 1_10!				
Ques.	5	Degree of protection	IP20	IP20	IP20	IP55
Ques.	6	Integrated safety functions[1]	–	STO	STO, SS1, SBC, SLS, SDI, SSM	–
Ques.	7	Communication	USS / Modbus RTU	USS / Modbus RTU, PROFIBUS DP, PROFINET, Ethernet/IP	USS / Modbus RTU, PROFIBUS DP, PROFINET, Ethernet/IP, CANopen	USS / Modbus RTU, PROFIBUS DP, PROFINET, Ethernet/IP, BACnet MS / TP, Siemens FLN P1
		Open-loop and closed-loop control modes	V / f (linear, square-law, FCC, ECO)	V / f (linear, square-law, FCC, ECO), sensorless vector control (SLVC)	V / f (linear, square-law, FCC, ECO), vector control with / without encoder (VC / SLVC)	V / f (linear, square-law, FCC, ECO), sensorless vector control (SLVC)
Ques.	8	Electromagnetic compatibility[2]	Unfiltered, A filter, B filter	Unfiltered, A filter, B filter	Unfiltered, A filter, B filter	A filter, B filter
		TIA integration	–	Yes	Yes	Yes
		Product in detail	From Page 2_02	From Page 2_11	From Page 3_02	From Page 3_20

[1] You can review details about the various safety functions in Chapter 4 from Page 4_03!
[2] You can review details about the electromagnetic compatibility and Categories C1, C2, C3, C4 in Chapter 4 from Page 4_01!

Question 4: For which application is the inverter required?

Characteristic overload capability

M = n²
P ~ n³

M = torque
n = speed
P = power
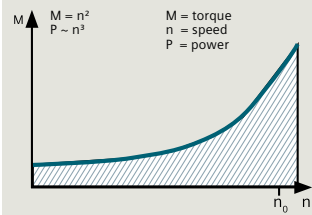
Low Overload (LO) is generally applicable for applications with low dynamic performance (constant operation, constant load), square-law torque characteristics with low breakaway torque and low speed accuracy. For example, centrifugal pumps, radial/axial fans, rotating piston blowers, radial compressors, vacuum pumps, agitators,...

M = constant
P ~ n

M = torque
n = speed
P = power
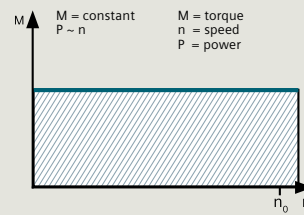
High Overload (HO) is generally applicable for applications with a high dynamic performance (cyclic operation, alternating load) as well as constant torque characteristic with a high breakaway torque.
For example: conveyor belts, gear pumps, excentric worm pumps, mills, mixers, crushers, vertical conveyors, centrifuges,...

Overload capability of the products

SINAMICS V20

Up to 15 kW (20 hp):
High Overload (HO): 150% for 60 sec. within a 300 sec. load cycle

From 18.5 kW (25 hp):
Low Overload (LO): 110% for 60 sec. within a 300 sec. load cycle
High Overload (HO): 150% for 60 sec. within a 300 sec. load cycle

SINAMICS G120C

Low Overload (LO):
150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle
High Overload (HO):
200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle

SINAMICS G120

Low Overload (LO): 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1]
High Overload (HO): 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1]

SINAMICS G120P

Low Overload (LO) for FSA–FSC:
150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1]
Low Overload (LO) for FSD–FSF:
110% for 60 sec. within a 300 sec. load cycle[1]
High Overload (HO) for FSA–FSC:
200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1]
High Overload (HO) for FSD–FSF:
150% for 60 sec. within a 300 sec. load cycle[1]

[1] When using the overload capability, the continuous output current is not reduced

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Easy and compact inverters

- Easy and compact inverters – device comparison

- SINAMICS V20 – product presentation and ordering data

- SINAMICS G120C – product presentation and ordering data

2 Easy and compact inverters – comparison between the various devices

SINAMICS V20 is a cost-effective drive solution, which sets itself apart as a result of the straightforward installation and handling. With this inverter, you can depend on fast commissioning and extremely simple operation – as well as ruggedness and cost efficiency.

SINAMICS V20 – the cost-effective, reliable and easy-to-use inverter for basic applications

SINAMICS G120C is a comprehensive all-rounder to address the widest range of applications. It defines new standards in its class regarding small frame size, high degree of service-friendliness and integrated functionality. It essentially differs from the SINAMICS V20 as a result of the integrated communication inter-faces – such as PROFIBUS DP, PROFINET, Ethernet/IP – integrated STO safety function as well as integrated vector control without encoder.

SINAMICS G120C – compact and versatile inverter with optimum functionality

The compact SINAMICS V20 and SINAMICS G120C inverters combine Control Unit and Power Module in one device – and can therefore be ordered using just one article number. They are predestined to address applications involving pumping, ventilating, conveying and moving. As a result of the compact design, they are ideally suited for space-saving side-by-side installation in control cabinets.

SINAMICS V20 –

the cost-effective, reliable and easy-to-use inverter for basic applications

0.12 to 30 kW (0.16 to 40 hp)

SINAMICS V20 is a compact inverter with an IP20 degree of protection, the Control Unit (CU) and Power Module (PM) function units are combined in one device with integrated operator panel.

! **The device comprises an Article No. as well as the optional accessories.**

Technical data

Voltage:	1AC 200 to 240 V (+/−10%); 3AC 380 to 480 V (+10% to −15%)
Power range:	0.12 to 30 kW
Degree of protection:	IP20
Control modes:	V/f (linear, square-law, FCC, ECO)
I/Os:	4 DI/2 DO/2 AI/1AO

! **Highlights**

Easy to install

Push-through and wall mounting – side-by-side mounting possible for both

Integrated USS and Modbus RTU interfaces

Integrated braking chopper for 7.5 up to 30 kW (10 up to 40 hp)

Electromagnetic compatibility (EMC) according to Category C1/C2

Easy to use

Easy commissioning with a mobile device or laptop via the web server module SINAMICS V20 Smart Access

Parameters can be read out and cloned without the power supply

Integrated connection and application macros

Keep Running Mode facilitates uninterrupted operation

Wide voltage range, advanced cooling design and coated PCBs increase ruggedness

Easy to save money

ECO mode for V/f, V²/f, integrated hibernation mode in the quiescent state

Monitoring energy and water flows

High overload capability (HO) and low overload capability (LO) for frame size FSE

SINAMICS V20 – applications

0.12 to 30 kW (0.16 to 40 hp)

Quality[1] / Use	Continuous motion		
	Basic	Medium	High
Pumping/ ventilating/ compress- ing	**Centrifugal pumps Radial/ axial fans Compressors**	Centrifugal pumps Radial/axial fans Compressors	Excentric screw pumps
Moving	**Conveyor belts Roller conveyors Chain conveyors**	Conveyor belts Roller conveyors Chain conveyors Vert. material handling Elevators Escalators Gantry cranes Ship's drives Cable railways	Elevators Container cranes Mine hoists Open-cast mining excavators Test stands
Processing	**Mills Mixers Kneaders Crushers Agitators Centrifuges**	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces	Extruders Winders/unwinders Leading/following drives Calenders Main press drives Printing machines
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding

SINAMICS V20

[1] Requirements placed on the torque accuracy/speed accuracy/positioning accuracy/ axis coordination/functionality

Today, an increasing number of applications in plant and machinery construction are demanding individual automation and drive solutions that also automate simple motion sequences with low associated requirements. With its SINAMICS V20 inverter, Siemens is offering a simple and cost-effective drive solution for these types of applications. These inverters are ideally suited for basic pump, fan and conveyor applications.

SINAMICS V20 – customer benefits

0.12 to 30 kW (0.16 to 40 hp)
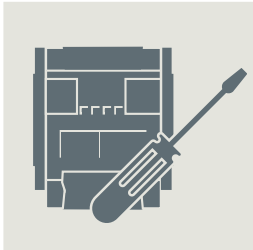
Easy to install

- Compact design allows smaller cabinets to be used
- Push-through mounting allows the cabinet to be cooled more easily
- Can be run "out-of-the-box" without other options
- Basic operator actions at a built-in Basic Operator Panel
- Easy integration into micro-automation systems, e.g. SIMATIC S7-1200
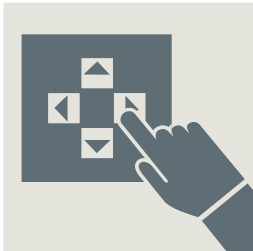
Easy to use

- Parameter cloning: end users receive a preconfigured device
- Keep Running Mode: higher productivity by avoiding production interruptions
- Ruggedness: operation is even possible if the line voltage fluctuates significantly
- Commissioning, operation and diagnostics using a wireless connection via a mobile device or laptop with the web server module SINAMICS V20 Smart Access (option)

Easy to save money

- Cost-effective basic inverter
- The integrated ECO mode for V/f and V²/f control adapts the magnetic flux in the motor (ECO mode) for energy saving

2 SINAMICS V20 – design and options

Standard fuse ⑬

⑭ Circuit breaker

① V20 Smart Access

⑩ Braking resistor, small (FSAA, FSAB, FSA, FSB, FSC)

⑩ Braking resistor, large (FSD, FSE)

⑧ Line reactor

⑦ Line filter

② V20 BOP (Basic Operator Panel)

④ BOP cable

⑨ Braking module (FSAA, FSAB, FSA, FSB, FSC)

③ BOP (Basic Operator Panel) interface

⑫ Shield connection kit

⑥ SINAMICS SD card

⑪ Output reactor

⑤ Parameter Loader

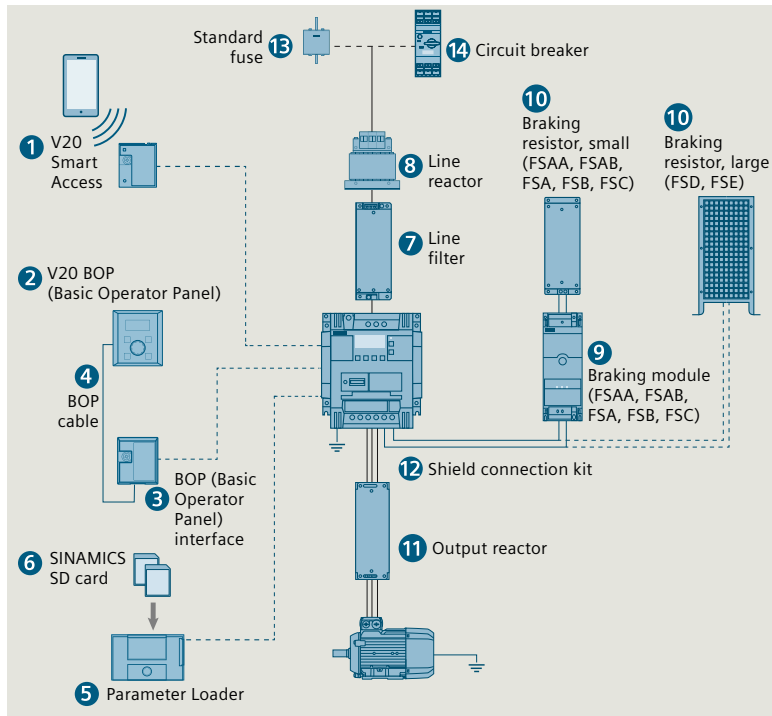| 1	SINAMICS V20 Smart Access	Commissioning, operation and diagnostics via a wireless connection using a mobile device or laptop and the web server module
2	V20 BOP	Same function as the integrated BOP (Basic Operator Panel), but can be used for remote mounting. The value and setpoint are changed by rotating the wheel. For remote mounting with IP54 and UL Type 1 enclosure protection level from outside.

3	BOP interface	• Connection between inverter and BOP • RJ45 interface is compatible with a standard network cable
4	BOP cable	The cable is not included in the scope of delivery. You can use any standard network cable with a standard RJ45 plug connector.
5	Parameter Loader	Up to 100 parameter sets with parameter settings can be written from the memory card to the inverter, or saved from the inverter to the memory card without connecting the inverter to the line supply.
6	SINAMICS SD card	Memory card (512 MB) (Standard SD cards up to 32 GB are supported)
7	Line filter	• Improved EMC performance • Longer motor cable for frame sizes FSAA, FSAB, FSA
8	Line reactor	• Reduces the harmonic current • Improves the power factor • Recommended if the input current (rms value) is higher than the rated inverter current
9	Braking module	• Shortens the deceleration ramp time • Suitable for 1AC 230 V and 3AC 400 V • Adjustable load cycle from 5% to 100% • Frame sizes FSD and FSE have an integrated braking unit
10	Braking resistor	• Dissipates regenerative energy as heat • 5% load duty cycle as default setting
11	Output reactor	Longer motor cables: • 3AC 400 V shielded and unshielded cable: 150 m for frame sizes FSA to FSD, 200 m/300 m for FSE • 1AC 230 V shielded and unshielded cable: 200 m
12	Shield connection kit	• Shield connection • Strain relief for cables
13	Standard fuses	Recommended fuse corresponding to the IEC/UL standard
14	Circuit breaker	Recommended circuit breaker corresponding to the IEC/UL standard

SINAMICS V20 – device ordering data / options

Rated data 1AC 200 V ... 240 V [1]

Rated data						Dimensions				Weight
P_rated (HO)		I_H	Article number	Fan	Frame size	W	H	D		
kW	hp	A				mm	mm	mm		kg
0.12	1/6	0.9	6SL3210-5BB11-2 ☐ V1	–	FSAA	68	132	107.8		0.7
0.25	1/3	1.7	6SL3210-5BB12-5 ☐ V1	–						
0.37	1/2	2.3	6SL3210-5BB13-7 ☐ V1	–						
0.55	3/4	3.2	6SL3210-5BB15-5 ☐ V1	–	FSAB	68	132	127.8		0.9
0.75	1	4.2	6SL3210-5BB17-5 ☐ V1	–						
1.1	1–1/2	6	6SL3210-5BB21-1 ☐ V0	1	FSB	140	135	164.5		1.8
1.5	2	7.8	6SL3210-5BB21-5 ☐ V0	1						
2.2	3	11	6SL3210-5BB22-2 ☐ V0	1	FSC	184	140	169		2.6
3	4	13.6	6SL3210-5BB23-0 ☐ V0	1						

EMC standards	
Without integrated radio interference filter	U
With integr. radio interference filter, category C2 [2] (only available for FSB and FSC from 1.1 to 3 kW)	A
With integr. radio interference filter, category C1 [3] (only available for FSAA and FSAB up to 0.75 kW)	B

[1] Single-phase devices can also be connected to two phases of a 3-phase 120/240 V supply system. The voltage between L1 and L2 should be in the range of 200 V to 240 V –10% to +10% (whether phase to phase or phase to neutral). You can find detailed information here: http://support.industry.siemens.com/cs/document/109476260
[2] Disturbance suppression limits according to EN 61800-3 category C2 use in first environment (residential, domestic). The drive system must be installed by specialized personnel under consideration of regional regulations with respect to line harmonics.
[3] Disturbance suppression limits according to EN 61800-3 category C1 use in first environment (residential, domestic). The drive system must be installed by specialized personnel under consideration of regional regulations with respect to line harmonics.
[4] See data relating to the EMC standards, Page 4_01.
[5] Additional information regarding the listed fuses and circuit breakers is provided in Catalogs LV 10, IC 10 and IC 10 AO. http://siemens.com/drives/infocenter

Options

FS	P_rated (HO) kW	Braking resistor 6SE6400-...	Line reactor 6SE6400-...	Output reactor 6SE6400-...	Shield connection kit 6SL3266-...	Line filter class B [4]	Corresponding to the IEC standard		
							Standard fuse [5]		Circuit breaker [5]
							Current in A	Article No.	Article No.
FSAA	0.12	4BC05-0AA0	3CC00-4AB3	3TC00-4AD3	1AR00-0VA0	6SL3203-0BB21-8VA0	10	3NA3803	3RV2011-1DA10
	0.25								3RV2011-1FA10
	0.37		3CC01-0AB3						3RV2011-1HA10
FSAB	0.55								3RV2011-1JA10
	0.75						16	3NA3805	3RV2011-1KA10
FSB	1.1	4BC11-2BA0	3CC02-6BB3	3TC01-0BD3	1AB00-0VA0	6SE6400-2FL02-6BB0	20	3NA3807	3RV2021-4BA10
	1.5						32	3NA3812	3RV2021-4CA10
FSC	2.2				1AC00-0VA0		35	3NA3814	3RV2021-4EA10
	3	4BC12-5CA0	3CC03-5CB3	3TC03-2CD3		–	50	3NA3820	3RV1031-4FA10

SINAMICS V20 – device ordering data

Rated data 3AC 380 V ... 480 V

0.37 to 30 kW (0.5 to 40 hp)

Rated data										Dimensions			Weight
P_{rated} (LO)		I_L 400 V [1]	I_L 480 V	P_{rated} (HO)		I_H 400 V [2]	I_H 480 V	Article number	Fan	Frame size	W mm	H mm	D mm
kW	hp	A	A	kW	hp	A	A						kg
0.37	1/2	1.3	1.3	0.37	1/2	1.3	1.3	6SL3210-5BE13-7 ☐ V0	–	FSA	90	140	145.5	1.05 (FSA without fan: 1.0)
0.55	3/4	1.7	1.7	0.55	3/4	1.7	1.7	6SL3210-5BE15-5 ☐ V0	–					
0.75	1	2.2	2.2	0.75	1	2.2	2.2	6SL3210-5BE17-5 ☐ V0	–					
1.1	1–1/2	3.1	3.1	1.1	1–1/2	3.1	3.1	6SL3210-5BE21-1 ☐ V0	1					
1.5	2	4.1	4.1	1.5	2	4.1	4.1	6SL3210-5BE21-5 ☐ V0	1					
2.2	3	5.6	4.8	2.2	3	5.6	4.8	6SL3210-5BE22-2 ☐ V0	1					
3	4	7.3	7.3	3	4	7.3	7.3	6SL3210-5BE23-0 ☐ V0	1	FSB	140	135	164.5	1.8
4	5	8.8	8.24	4	5	8.8	8.24	6SL3210-5BE24-0 ☐ V0	1					
5.5	7–1/2	12.5	11	5.5	7–1/2	12.5	11	6SL3210-5BE25-5 ☐ V0	1	FSC	184	140	169	2.6
7.5	10	16.5	16.5	7.5	10	16.5	16.5	6SL3210-5BE27-5 ☐ V0	2	FSD	240	166	172.5	4.3
11	15	25	21	11	15	25	21	6SL3210-5BE31-1 ☐ V0	2					
15	20	31	31	15	20	31	31	6SL3210-5BE31-5 ☐ V0	2					
22	30	45	40	18.5	25	38	34	6SL3210-5BE31-8 ☐ V0	2	FSE	245	206	209	6.6
30	40	60	52	22	30	45	40	6SL3210-5BE32-2 ☐ V0	2					

EMC standards	
With integrated filter, category C3 [3]	C
Without integrated filter	U

[1] The output current I_L is based on the duty cycle for low overload (LO).
[2] The output current I_H is based on the duty cycle for high overload (HO).
[3] Disturbance suppression limits according to EN 61800-3 category C3 use in second environment (industry).

SINAMICS V20 – option ordering data

Rated data 3AC 380 V ... 480 V

FS	P_{rated} (LO) kW	P_{rated} (HO) kW	Braking resistor 6SL3201-...	Line reactor 6SL3203-...	Output reactor 6SL3202-...	Shield connection kit 6SL3266-...	Line filter class B[3] 6SL3203-...	Corresponding to the IEC directive		
								Standard fuse[4]		Circuit breaker[4]
								Current in A	Article No.	Article No.
FSA	0.37	0.37	0BE14-3AA0	0CE13-2AA0	0AE16-1CA0	1AA00-0VA0	0BE17-7BA0	6	3NA3801	3RV2011-1CA10
	0.55	0.55						6	3NA3801	3RV2011-1DA10
	0.75	0.75						6	3NA3801	3RV2011-1EA10
	1.1	1.1						6	3NA3801	3RV2011-1FA10
	1.5	1.5		0CE21-0AA0				10	3NA3803	3RV2011-1HA10
	2.2	2.2	0BE21-0AA0		0AE18-8CA0			16	3NA3805	3RV2011-1JA10
FSB	3	3				1AB00-0VA0	0BE21-8BA0	16	3NA3805	3RV2011-1KA10
	4	4			0AE21-8CA0			20	3NA3807	3RV2021-4AA10
FSC	5.5	5.5	0BE21-8AA0	0CE21-8AA0		1AC00-0VA0		32	3NA3812	3RV2021-4BA10
FSD	7.5	7.5			0AE23-8CA0	1AD00-0VA0	0BE23-8BA0	63	3NA3822	3VL1103-1KM30-0AA0
	11	11	0BE23-8AA0	0CE23-8AA0				63	3NA3822	3VL1104-1KM30-0AA0
	15	15						63	3NA3822	3VL1105-1KM30-0AA0
			6SE6400-...	6SL3203-...	6SE6400-...	6SL3266-...	6SL3203-...			
FSE	22	18.5		0CJ24-5AA0	3TC03-8DD0	1AE00-0VA0	0BE27-5BA0	63	3NA3822	3VL1108-1KM30-0AA0
	30	22		0CD25-3AA0	3TC05-4DD0			80	3NA3024	3VL1108-1KM30-0AA0

[3] See specifications of the EMC standards, Chapter 4
[4] Additional information about the listed fuses and circuit breakers, see catalogs LV 10, IC 10 and IC 10 AO
siemens.com/drives/infocenter

SINAMICS V20 – accessories and spare parts

0.12 to 30 kW (0.16 to 40 hp)

Accessories

	Name		Article number
	Parameter Loader		6SL3255-0VE00-0UA1
	BOP interface [1] (Basic Operator Panel)		6SL3255-0VA00-2AA1
	SINAMICS V20 Smart Access (web server module) NEW		6SL3255-0VA00-5AA0
	Braking module 1AC 230 V: 8 A 3AC 400 V: 7 A		6SL3201-2AD20-8VA0
	V20 BOP (Basic Operator Panel)		6SL3255-0VA00-4BA1
	BOP cable	The cable is not included in the scope of delivery. You can use any standard network cable with a standard RJ45 plug connector.	
	SINAMICS SD memory card (512 MB)		6SL3054-4AG00-2AA0
	RS485 terminators (content 50 pieces)		6SL3255-0VC00-0HA0
	SINAMICS V20 training case		6AG1067-2AA00-0AB6
	DIN Rail Mounting Kit	FSA/FSAA/FSAB: FSB:	6SL3261-1BA00-0AA0 [2] 6SL3261-1BB00-0AA0
	Migration Mounting Kit to adapt frame sizes FSAA/FSAB to previous mounting hole dimensions of frame size FSA		6SL3266-1ER00-0VA0

Spare parts

	Size	Article number
	Replacement fan	
	FSA	6SL3200-0UF01-0AA0
	FSB	6SL3200-0UF02-0AA0
	FSC	6SL3200-0UF03-0AA0
	FSD	6SL3200-0UF04-0AA0
	FSE	6SL3200-0UF05-0AA0

! The accessories and the spare parts are suitable for the 1AC 230 Volt and the 3AC 400 Volt versions.

[1] BOP interface and integrated BOP-RJ45 standard connector compatible with standard Ethernet cable.
[2] For installation of FSA with fan, please refer to SINAMICS V20 manual. Installation of FSAA/AB, DIN rail mounting kit for FSA installation together with migration mounting kit.

SINAMICS V20 – technical data

SINAMICS V20	
Line voltage / line frequency	1AC 200 to 240 V (+/−10%) [1]; 3AC 380 to 480 V (−15%...+10%) with 50 / 60 Hz
Rated power / frame sizes	0.12 to 30 kW (0.16 to 40 hp) / 7 frame sizes
Mechanical design	Compact inverters that combine the function units Control Unit (CU) and Power Module (PM) in one device + optional accessories
Degree of protection	IP20 / UL open type
Ambient temperature	• In operation: −10...60 °C (14...140 °F), 40...60 °C (104...140 °F) with derating • Storage: −40...70 °C (−40...158 °F)
Relative air humidity	95% (non condensing)
Overload capability	• Up to 15 kW: High overload (HO):150 % I_H for 60 s, cycle time 300 s • From 18.5 kW: Low overload (LO): 110% I_L for 60 s, cycle time 300 s High overload (HO): 150% I_H for 60 s, cycle time 300 s
Integrated communication interfaces	USS / Modbus RTU
Signal inputs / outputs (I / O)	4 DI / 2 DO / 2 AI / 1 AO
Open- and closed-loop control modes	Linear U/f, square law U/f, multi-point U/f, flux control FCC
Safety Integrated	−
Braking	Optional braking chopper for FSAA to FSC integrated braking chopper FSD and FSE
Tool interfaces	Memory card: SINAMICS SD card, Operator Panel: parameter loader
Standards	CE, cULus, RCM, KC
Electromagnetic compatibility (EMC)	For more details, see Chapter 4: Additional information
Motor cable lengths	• Unshielded cable: 50 m for FSAA to FSD, 100 m for FSE • Shielded cable: 25 m for FSAA to FSD, 50 m for FSE • Longer motor cables are possible when using an output reactor (see options)
Energy functions	ECO mode (automatic flux reduction), energy-saving hibernation mode, energy-saving calculator
Functions	Fixed speed setpoint, PID controller

[1] Single-phase devices can also be connected to two phases of a 3-phase 120/240 V power supply. The voltage between L1 and L2 should lie between 200 V and 240 V, −10% to +10% (phase-phase or phase-neutral conductor). Detailed information is provided in the following document: http://support.industry.siemens.com/cs/document/109476260

! You can find technical documentation for the SINAMICS V20 at:
siemens.com/sinamics-v20/documentation

SINAMICS G120C –

compact and versatile inverter with optimum functionality

2

0.55 to 132 kW (0.75 to 180 hp)

SINAMICS G120C is a compact inverter with an IP20 degree of protection, where the function units Control Unit (CU) and Power Module (PM) are combined into one device.

! **The device comprises an article number as well as the optional accessories.**

Technical data

Voltage:	3AC 380 to 480 V (−20% / +10%) with 50 / 60 Hz (±5%)
Power range:	0.55 to 132 kW (0.75 to 180 hp)
Degree of protection:	IP20
Control modes:	V / f (linear, square-law, FCC, ECO), sensorless vector control (SLVC)
I / Os:	6 DI / 2 DO / 1AI / 1AO

! **Highlights**

Compact for simple installation in the smallest space

Simple commissioning and operation – completely intuitive

Perfect integration in the automation environment

Leading-edge technology for higher energy efficiency and safety

Reliable communication – all common bus systems can be used

SINAMICS G120C – applications

Quality[1]	Continuous motion		
Use	Basic	Medium	High
Pumping/ventilating/compressing	**Centrifugal pumps Radial/axial fans Compressors**	Centrifugal pumps Radial/axial fans Compressors	Excentric screw pumps
Moving	**Conveyor belts Roller conveyors Chain conveyors**	**Conveyor belts Roller conveyors Chain conveyors Vert. mat. handling Elevators Escalators Gantry cranes Ship's drives Cable railways**	Elevators Container cranes Mine hoists Open-cast mine excavators Test stands
Processing	**Mills Mixers Kneaders Crushers Agitators Centrifuges**	**Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces**	Extruders Winders/unwinders Leading/following drives Calenders Main press drives Printing machines
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding

SINAMICS G120C

[1] Requirements placed on the torque accuracy/speed accuracy/positioning accuracy/ axis coordination/functionality

The compact SINAMICS G120C inverter with its numerous built-in functions is ideally suited to control induction motors used in countless industrial areas.
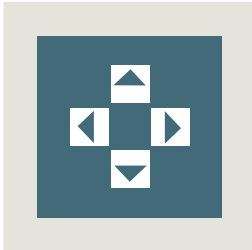
It is a real all-rounder and suitable for conveyor belts, mixers, extruders, pumps, fans, compressors and basic handling machines.

SINAMICS G120C – customer benefits

2

0.55 to 132 kW (0.75 to 180 hp)

Simple commissioning and integration

- Cloning function with BOP-2, IOP-2 or SD card
- SINAMICS Startdrive – intuitive inverter engineering and perfect interaction with SIMATIC in the Totally Integrated Automation Portal
- The TIA Portal library concept guarantees simple reusability of inverters, including the parameters and hardware components
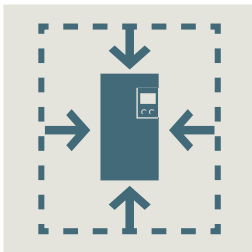
Compact

- Side-by-side mounting allows operation in the smallest space
- Frame size FSAA requires up to 30% less space when compared to frame size FSA
- Frame sizes FSD to FSF: High power ranges are especially compact
- High power density, low envelope dimensions
- Saves space in the electrical cabinet

Leading technological functions

- Coated modules permit operation in harsh industrial environments up to an ambient temperature of 60 °C
- Automatic flux reduction with V/f ECO to save energy
- Certified safety functions without requiring any external components (STO)
- Integrated energy-saving calculator reduces and monitors energy costs
- Energy-efficient, encoderless vector control facilitates high torques for low frequency setpoints
- Uses all the commonly deployed bus systems: PROFINET, EtherNet/IP, PROFIBUS, USS / Modbus RTU

SINAMICS G120C – design and options

Fuse/circuit breaker ⑩

⑥ Class B line filter

Line reactor ⑤

USB cable

Control system

BOP-2   IOP-2

① SINAMICS G120C

② ③

IOP-2 handheld ④

24 V DC

⑦ Braking resistor

PROFINET

Output reactor ⑧   ⑪ Shield plate

⑨ Motor
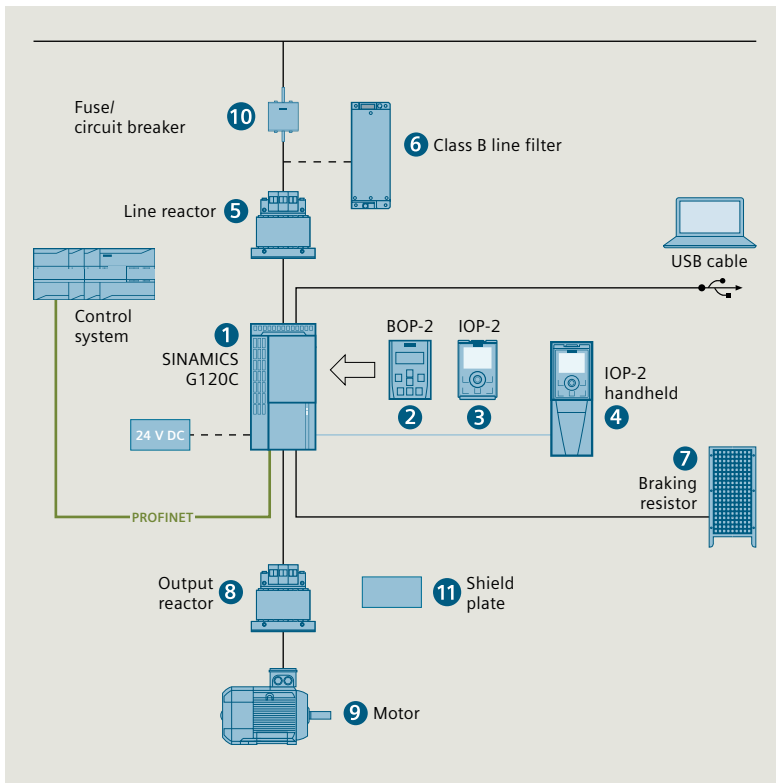
1	SINAMICS G120C (with/without Class A line filter)
2	Basic Operator Panel (BOP-2): user-friendly menu navigation and two-line display. Standard commissioning with cloning function
3	Intelligent Operator Panel (IOP-2): user-friendly and powerful operator panel. Standard applications can be simply commissioned using application-specific Wizards
4	IOP-2 handheld: simple commissioning locally on site using the handheld version of the Intelligent Operator Panel (IOP-2)
5	Line reactor: Significantly reduces the harmonics generated by the inverter into the line supply and the rms current that flows to the inverter
6	Class B line filter to achieve a higher interference suppression class
7	Braking resistor converts the braking energy into heat
8	Output reactor reduces the voltage rate of rise (du/dt) and the current peaks
9	Standard induction motor for general applications
10	Fuse/circuit breaker: overcurrent protection
11	Shield plate to simplify connecting the shields of the power and control cables. Provides strain relief and guaranties an optimal EMC level

SINAMICS G120C – device ordering data

Rated data				Article number			Frame size	Dimensions		
P_{LO} [1]	P_{LO} [1]	I_{LO} [1] _out	I_{HO} [2] _out [5]					W mm	H mm	D mm
kW	hp	A	A							
3AC 380 to 480 V										
0.55	0.75	1.7	1.3	6SL3210-1KE11-8	☐ ☐	2	FSAA	73	173	155
0.75	1.0	2.2	1.7	6SL3210-1KE12-3	☐ ☐	2				
1.1	1.5	3.1	2.2	6SL3210-1KE13-2	☐ ☐	2				
1.5	2.0	4.1	3.1	6SL3210-1KE14-3	☐ ☐	2				
2.2	3.0	5.6	4.1	6SL3210-1KE15-8	☐ ☐	2				
3	4.0	7.3	5.6	6SL3210-1KE17-5	☐ ☐	1	FSA		196	203
4	5.0	8.8	7.3	6SL3210-1KE18-8	☐ ☐	1				(226 mm with PROFI-NET)
5.5	7.5	12.5	8.8	6SL3210-1KE21-3	☐ ☐	1	FSB	100		
7.5	10	16.5	12	6SL3210-1KE21-7	☐ ☐	1				
11	15	25	16	6SL3210-1KE22-6	☐ ☐	1	FSC	140	295	
15	20	31	25	6SL3210-1KE23-2	☐ ☐	1				
18.5	25	37	31	6SL3210-1KE23-8	☐ ☐	1				
22	30	43	37	6SL3210-1KE24-4	☐ F	1	FSD	200	472	237
30	40	58	43	6SL3210-1KE26-0	☐ F	1				
37	50	68	58	6SL3210-1KE27-0	☐ F	1				
45	60	82.5	68	6SL3210-1KE28-4	☐ F	1				
55	75	103	83	6SL3210-1KE31-1	☐ F	1	FSE	275	551	237
75	100	136	103	6SL3210-1KE31-4	☐ F	1	FSF	305	708	357
90	120	164	136	6SL3210-1KE31-7	☐ F	1				
110	150	201	164	6SL3210-1KE32-1	☐ F	1				
132	180	237	201	6SL3210-1KE32-4	☐ F	1				

EMC filter	
Integrated Class A line filter [4]	A
Unfiltered version	U
Integrated communication interface	
RS485 with USS / Modbus RTU [3]	B
SUB-D with PROFIBUS DP [3]	P
PROFINET / EtherNet/IP [3]	F

[1] LO = Low Overload (continuous operation)
[2] HO = High Overload (cyclic operation)
[3] FSAA to FSC available with PROFINET, PROFIBUS, EtherNet/IP, USS/Modbus RTU
   FSD to FSF are available with PROFINET and EtherNet/IP
   B = RS485 with USS/Modbus RTU
   P = SUB-D with PROFIBUS DB
   F = PROFINET; EtherNet/IP
[4] For detailed information on complying with interference suppression classes, see the product documentation
[5] When using the overload capability, the continuous output current is not reduced

! For more detailed information about the SINAMICS G120C inverter, see Catalog D31 or visit the Siemens Industry Mall website: **mall.industry.siemens.com**

SINAMICS G120C – options and accessories

Options

	Braking resistor		Article number
	FSAA	0.55 to 1.5 kW	6SL3201-0BE14-3AA0
	FSAA / FSA	2.2 to 4 kW	6SL3201-0BE21-0AA0
	FSB	5.5 to 7.5 kW	6SL3201-0BE21-8AA0
	FSC	11 to 18.5 kW	6SL3201-0BE23-8AA0
	FSD	22 kW	JJY: 023422620001
		30 to 37 kW	JJY: 023424020001
	FSD / FSE	45 to 55 kW	JJY: 023434020001
	FSF	75 to 90 kW	JJY: 023454020001
		110 to 132 kW	JJY: 023464020001
	Line reactor		
	FSAA	0.55 to 1.1 kW	6SL3203-0CE13-2AA0
	FSAA / FSA	1.5 to 4 kW	6SL3203-0CE21-0AA0
	FSB	5.5 to 7.5 kW	6SL3203-0CE21-8AA0
	FSC	11 to 18.5 kW	6SL3203-0CE23-8AA0
	FSD / FSE / FSF	22 to 132 kW	Integrated DC reactor
	Output reactor		
	FSAA	0.55 to 2.2 kW	6SL3202-0AE16-1CA0
	FSA	3 to 4 kW	6SL3202-0AE18-8CA0
	FSB	5.5 to 7.5 kW	6SL3202-0AE21-8CA0
	FSC	11 to 18.5 kW	6SL3202-0AE23-8CA0
	FSD	22 to 37 kW	6SE6400-3TC07-5ED0
	FSD / FSE / FSF	45 to 90 kW	6SE6400-3TC14-5FD0
	FSF	110 kW	6SL3000-2BE32-1AA0
		132 kW	6SL3000-2BE32-6AA0

You can find Class B line filter, footprint braking resistor, footprint line reactor and output reactor in the D31 Catalog

Options

	Operator panels		Article number
	BOP-2	Basic Operator Panel	6SL3255-0AA00-4CA1
	IOP-2	Intelligent Operator Panel	6SL3255-0AA00-4JA2

Accessories

	Name	Article number
	IOP-2 handheld	6SL3255-0AA00-4HA1
	IOP-2 / BOP-2 door mounting kit	6SL3256-0AP00-0JA0
	PC inverter connection kit 2	6SL3255-0AA00-2CA0
	SINAMICS SD memory card 512 MB	6SL3054-4AG00-2AA0
	STARTER commissioning tool (DVD)	6SL3072-0AA00-0AG0
	SINAMICS commissioning tool Startdrive on DVD-ROM	6SL3072-4DA02-0XG0

! You can find the correct selection of fuses in the relevant inverter manual.
siemens.com/automation/service&support

For more detailed information about the SINAMICS G120C inverter, see Catalog D31 or visit the Siemens Industry Mall website: **mall.industry.siemens.com**

Supplementary products – for example footprint braking resistors or footprint line reactors – are available from selected product partners. Find out more at:
siemens.com/drives-options-partner

2

SINAMICS G120C – technical data

SINAMICS G120C	
Line voltage / line frequency	3AC 380 to 480 V (+10%...−20%) with 50 / 60 Hz +/ −5%
Rated power / frame sizes	0.55 to 132 kW (0.75 to 180 hp) / 7 frame sizes
Design	Compact inverter, which combines the Control Unit (CU) and Power Module (PM) function units in one device + optional accessories
Degree of protection	IP20 / UL open type
Operating temperature	−10 to 40 °C without derating / to 60 °C with derating
Air humidity, max	95% at 40 °C (104 °F), condensation and icing not permissible
Overload capability	Low Overload (LO): 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle High Overload (HO): 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle
Integrated communication interfaces	PROFINET, PROFIBUS DP, USS / Modbus RTU, EtherNet/IP – available for FSAA–FSC; for FSD–FSF only PROFINET
Signal inputs / outputs (I / O)	6 DI / 2 DO / 1 AI / 1 AO
Open-loop and closed-loop control modes	V / f (linear, square-law, FCC, ECO), sensorless vector control without encoder (SLVC)
Integrated safety function	Safety Integrated: Safe Torque Off (STO); controlled via terminals or PROFIsafe
Braking	Integrated braking chopper
Tool interfaces	Memory card: SD; operator panel: Basic Operator Panel (BOP-2) or Intelligent Operator Panel (IOP); PC interface: USB
Standards	CE, UL, cUL, c-tick
Fail-safe certification	Fail-safe certification, function: Safe Torque Off (STO) • According to IEC 61508 SIL 2 • According to EN ISO 13849-1 PL d and Category 3
Electromagnetic compatibility (EMC)	For more details, see Chapter 4: Additional information

Max. motor cable lengths (shielded / unshielded)		Without output reactor	With output reactor
	0.55 to 1.5 kW (LO)	150 m / 150 m [1]	150 m / 225 m [2]
	2.2 kW (LO)	125 m / 150 m [1]	150 m / 225 m [2]
	3.0 to 18.5 kW (LO)	150 m / 150 m [1]	150 m / 225 m [2]
	22 to 55 kW (LO)	200 m / 300 m	200 m / 300 m
	75 to 132 kW (LO)	300 m / 450 m	300 m / 450 m

Energy functions	Energy-saving calculator, energy usage calculator, ECO mode (automatic flux reduction)
Functions	Fixed velocity setpoint, PID controller, motor holding brake control

[1] Data referred to the non-filtered PM. Cable lengths for filtered inverters: 50 m/100 m
[2] For line voltages 415 V to 440 V: 100 m/150 m

You can find the technical documentation for the SINAMICS G120C at
**siemens.com/sinamics-g120c/documentation**

Flexible and modular inverters

- Flexible and modular inverters – comparison of the devices

- SINAMICS G120 – product presentation and ordering data

- SINAMICS G120P – product presentation and ordering data

3 Flexible and modular inverters

With its smart cooling concept, SINAMICS G120 – the rugged standard drive for universal applications in the industrial environment – can also be used under extreme ambient conditions. The drive concept allows Power Modules and Control Units to be freely combined. Depending on the particular application, SINAMICS G120 Control Units have integrated safety functions in order to reliably master potentially dangerous situations.
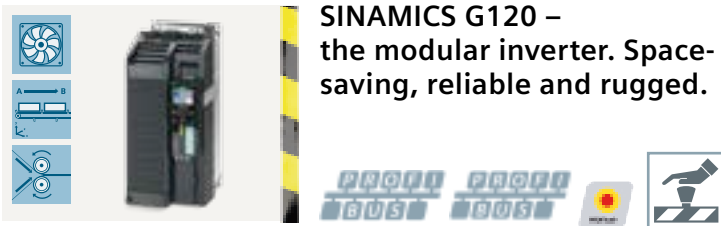
SINAMICS G120P – operator-friendly standard drives that can be simply commissioned. They are specifically used in building technology as well as the water and process industries – for HVAC applications. As a result of its simple handling, it not only provides support when optimizing existing frequency-controlled drives, but also when modernizing fixed-speed drives and for general retrofit projects.

**SINAMICS G120 –
the modular inverter. Space-saving, reliable and rugged.**

**SINAMICS G120P –
the specialist for pumps, fans and compressors.**

**As a result of the modular system, these flexible inverters can be simply selected in just two or three steps. This is because they essentially comprise two function units: Control Unit and Power Module.
SINAMICS G120 can be universally used, and is especially suitable to address the complete domain of industry and the trades – in the automobile, textile, printing and chemical sectors as well as for higher-level applications (e.g. in conveyor technology).
SINAMICS G120P is suitable for basic speed adaption, as well as for complex closed-loop control tasks in building technology, the water and process industries.**

SINAMICS G120 –

the modular inverter – space-saving, reliable and rugged

SINAMICS G120 is a modular inverter system comprising the following components:

- Control Unit: CU230P-2, CU240B-2, CU240E-2, CU250S-2
- Power Module: PM240 / PM240-2
- Optional operator panel

! The device comprises an article number and the optional accessories

Technical data

Voltage:	1 / 3AC 200 to 240 V
	3AC 380 to 480 V
	3AC 500 to 690 V
Power range:	0.55 to 250 kW
Degree of protection:	IP20
Control modes:	V / f (linear, square-law, FCC, ECO), vector control with/without encoder (VC / SLVC)
I / Os:	see technical data of the Control Units (Page 3_13 f)

! Highlights

Mechanical design
Modular design
Different cooling concepts for a higher degree of ruggedness
Functionality
Extensive range of encoder interfaces
Application-oriented control modules with a higher number of I/O
Positioning capability (EPos)
Safety Integrated: STO, SS1, SBC, SLS, SDI, SSM
Power Modules with low harmonics
Energy recovery without requiring any additional modules
Communication
Integral component of Totally Integrated Automation – with interfaces for PROFINET and PROFIBUS
Profiles that are supported: PROFIdrive, PROFIsafe, PROFIenergy
Connected to third-party systems via USS / Modbus RTU, CANopen, BACnet MS / TP, EtherNet/IP
Optimum interaction with SIMATIC control systems

SINAMICS G120 – applications

0.55 to 250 kW (0.75 to 400 hp)

Quality[1] / Use	Basic	Medium	High	Basic	Medium	High
Pumping/ ventilating/ compressing	Centrifugal pumps Radial/ axial fans Compressors	Centrifugal pumps Radial/ axial fans Compressors	Excentric screw pumps	**Hydraulic pumps Dosing pumps**		Descaling pumps Hydraulic pumps
Moving	Conveyor belts Roller conveyors Chain conveyors	**Conveyor belts Roller conveyors Chain conveyors Vert. material handling Elevators Escalators Gantry cranes Ship's drives Cable railways**	**Elevators Container cranes Mine hoists Open-cast mine excavators Test stands**	**Accelerating conveyors Rack feeders**	Accelerating conveyors Rack feeders Cross cutters Roll changers	Rack feeders Robotics Pick & place Indexing tables Cross cutters Roller feeds Engaging/disengaging
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	**Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces**	**Extruders Winders/unwinders Leading/following drives Calenders Main press drives Printing machines**	**Tubular bagging machines Single-axis motion control such as • Positioning profiles • Path profiles**		Servo presses Rolling mill drives Multi-axis motion control such as • Multi-axis positioning • Cam discs • Interpolation
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing	Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding	Axis drives for • Turning • Milling • Drilling	Axis drives for • Drilling • Sawing	Axis drives for • Turning • Milling • Drilling • Laser machining • Gear cutting • Grinding • Nibbling and punching

SINAMICS G120

SINAMICS G120

The standard SINAMICS G120 inverters are especially suitable as universal drive throughout the whole of industry and the trades. Main applications include, e.g., the automotive, textile, printing and chemical sectors as well as general higher-level applications (e.g. in conveyor technology).

3 SINAMICS G120 – customer benefits

0.55 to 250 kW (0.75 to 400 hp)

Space-saving

- Side-by-side installation: cost reduction by saving space in the electrical cabinet
- Identical housing geometry for all voltages – with and without Class A filter: integrated filter with the same frame size saves space
- Higher power density: space is saved as a result of more power in a smaller space
- Integrated basic positioning functionality: modules, such as additional positioning modules, encoder interfaces – and many more – can be eliminated
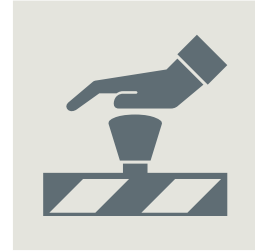
Safe

- Safety Integrated: STO, SS1, SBC, SLS, SDI, SSM
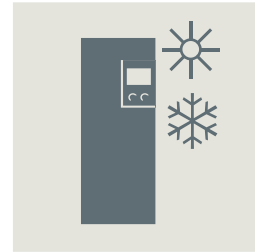
Rugged

- Push-through versions: lower temperature rise in the control cabinet – as well as flexible electrical cabinet concepts
- Components resistant to damaging gases and coated modules: compliance with environ. class 3C2 (3C3 with SIPLUS)
- Optimized Power Module design: longer motor cables possible (shielded: up to 300 m, unshielded: up to 450 m); less sensitive to line fluctuations; up to IP20
- Closed-loop control: rugged open-loop and closed-loop control modes for drives with low dynamic requirements – as well as for demanding drives with closed-loop torque and speed control

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3 SINAMICS G120 – user-friendliness through modularity

Flexible and modular inverters

Flexible combinability, high level of operator-friendliness and standard and integrated software make SINAMICS G120 the user-friendly solution from the very start.

The modularity offers many advantages:

- Parts can be simply selected
- Low costs and fast when a component has to be replaced
- Fewer parts have to be stocked
- Can be simply expanded
- High degree of reliability through integrated communication

The choice is yours

You can select between two Power Modules to address your particular requirements:
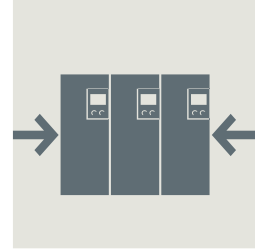
Standard braking response with braking chopper

PM240/PM240-2 Power Modules

The ideal Power Modules for standard applications in machinery construction

Selecting a Power Module
and the power-dependent options

Power Modules PM240/PM240-2

Which power is required? (LO = Low Overload; HO = High Overload); Definition of HO/LO, refer to 1_10	Is a filtered device according to Class A required?		Are external line filters required (for example to comply with specific EMC values)?		Is a braking resistor required for the particular application?	Should output filters be used, for example, in order to be able to use longer motor cables?	Is a shield plate required for the Power Module?
PM240/PM240-2 Power Modules have a braking chopper – and are suitable for a wide range of applications in general machinery construction.	The integrated EMC filter (Class A filter) is required to maintain the cable-conducted interference voltages and the radiated disturbances for installations in compliance with EN 61800-3 Category C2.		The external EMC filter (Class B filter) is also used to maintain cable-conducted interference voltages for installations according to EN 61800-3 Category C1.	Line reactors: to smooth voltage peaks, buffer commutation dips and reduce the effects of harmonics on the inverter and line supply.	Excess energy in the DC link is dissipated using the braking resistor. For frame sizes FSA to FSF, braking choppers are already integrated (electronic switch).	Output reactors reduce the voltage stress on the motor winding. Longer cables can be used between the inverter and motor.	The shield connection kit simplifies connecting the shields of supply and control cables, provides mechanical strain relief and guarantees optimum EMC behavior.

Power Modules 1/3AC PM240-2/200 V – 240 V +/–10%

Rated power LO (kW)	Rated power (hp)	Output current LO (A)	Output current HO (A)	Frame size	Unfiltered Power Modules Article number	Power Modules with integrated filter A Article number		Class A filter	Class B line filter	3AC line filter lateral mounting (Article number)	Braking resistor lateral mounting (Article number)	Output reactor [1] lateral mounting (Article number)	Shield plate for Power Modules
1 AC/3 AC 200 V ... 240 V														
0.55	0.75	3.2	2.3	FSA	6SL3210-1PB13-0UL0	6SL3210-1PB13-0AL0	The PM240-2 200V has now been completely selected.	Integrated	–	6SL3203-0CE13-2AA0	JJY:023146720008	6SL3202-0AE16-1CA0	Provided
0.75	1	4.2	3.2	FSA	6SL321□-1PB13-8UL0	6SL321□-1PB13-8AL0		Integrated	–	6SL3203-0CE13-2AA0	JJY:023146720008	6SL3202-0AE16-1CA0	Provided
1.1	1.5	6	4.2	FSB	6SL3210-1PB15-5UL0	6SL3210-1PB15-5AL0		Integrated	–	6SL3203-0CE21-0AA0	JJY:023151720007	6SL3202-0AE16-1CA0	Provided
1.5	2	7.4	6	FSB	6SL3210-1PB17-4UL0	6SL3210-1PB17-4AL0		Integrated	–	6SL3203-0CE21-0AA0	JJY:023151720007	6SL3202-0AE18-8CA0	Provided
2.2	3	10.4	7.4	FSB	6SL321□-1PB21-0UL0	6SL321□-1PB21-0AL0		Integrated	–	6SL3203-0CE21-0AA0	JJY:023151720007	6SL3202-0AE21-8CA0	Provided
3	4	13.6	10.4	FSC	6SL3210-1PB21-4UL0	6SL3210-1PB21-4AL0		Integrated	–	6SL3203-0CE21-8AA0	JJY:023163720018	6SL3202-0AE21-8CA0	Provided
4	5	17.5	13.6	FSC	6SL321□-1PB21-8UL0	6SL321□-1PB21-8AL0		Integrated	–	6SL3203-0CE21-8AA0	JJY:023163720018	6SL3202-0AE21-8CA0	Provided

Heat sink version Standard 0 / Push-through 1

3 AC 200 V ... 240 V														
5.5	7.5	22	17.5	FSC	6SL3210-1PC22-2UL0	6SL3210-1PC22-2AL0	The PM240-2 200V has now been completely selected.	Integrated	–	6SL3203-0CE23-8AA0	JJY:023433720001	6SL3202-0AE23-8CA0	Provided
7.5	10	28	22	FSC	6SL3210-1PC22-8UL0	6SL3210-1PC22-8AL0		Integrated	–	6SL3203-0CE23-8AA0	JJY:023433720001	6SL3202-0AE23-8CA0	Provided
11	15	42	35	FSD	6SL3210-1PC24-2UL0	–		–	–	Integrated DC reactor	JJY:023422620002	6SE6400-3TC07-5ED0	Provided[2]
15	20	54	42	FSD	6SL3210-1PC25-4UL0	–		–	–	Integrated DC reactor	JJY:023422620002	6SE6400-3TC07-5ED0	Provided[2]
18.5	25	68	54	FSD	6SL321□-1PC26-8UL0	–		–	–	Integrated DC reactor	JJY:023422620002	6SE6400-3TC07-5ED0	Provided[2]
22	30	80	68	FSE	6SL3210-1PC28-0UL0	–		–	–	Integrated DC reactor	JJY:023423320001	6SE6400-3TC14-5FD0	Provided[2]
30	40	104	80	FSE	6SL321□-1PC31-1UL0	–		–	–	Integrated DC reactor	JJY:023423320001	6SE6400-3TC14-5FD0	Provided[2]
37	50	130	104	FSF	6SL3210-1PC31-3UL0	–		–	–	Integrated DC reactor	JJY:023434020003	6SE6400-3TC14-5FD0	Provided[2]
45	60	154	130	FSF	6SL3210-1PC31-6UL0	–		–	–	Integrated DC reactor	JJY:023434020003	6SE6400-3TC14-5FD0	Provided[2]
55	60	178	154	FSF	6SL321□-1PC31-8UL0	–		–	–	Integrated DC reactor	JJY:023434020003	6SE6400-3TC14-5FD0	Provided[2]

Heat sink version Standard 0 / Push-through 1

[1] Frame sizes FSD–FSF secondary condition: Only rated frequency or lower permissible max. output frequency 150 Hz
[2] For frame sizes FSD–FSF, the shield plate to connect the external braking resistor is not included in the scope of delivery. It can be ordered by ordering the spare parts kit – "Accessory kit/shield connection kit."

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Power Modules 3AC PM240/PM240-2/380 V–480 V +/–10%

Rated power LO (kW)	Rated power (hp)	Output current LO (A)	Output current HO (A)	Frame size	Unfiltered Power Modules (Article number)	Power Modules with integrated Class A filter (Article number)	A Class A filter is already integrated in filtered devices up to 132 kW (Article number)	Class B line filter (base mount)³⁾ (Article number)	3AC line reactor, side mounting up to FSC⁴⁾; Integrated for FSD–FSF (Article number)	Braking resistors laterally mounted (Article number)	Output reactor¹⁾ laterally mounted (Article number)	Shield plate for Power Modules (Article number)
0.55	0.75	1.7	1.3	FSA	6SL3210-1PE11-8UL1	6SL3210-1PE11-8AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE13-2AA0	6SL3201-0BE14-3AA0	6SL3202-0AE16-1CA0	Provided
0.75	1	2.2	1.7	FSA	6SL3210-1PE12-3UL1	6SL3210-1PE12-3AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE13-2AA0	6SL3201-0BE14-3AA0	6SL3202-0AE16-1CA0	Provided
1.1	1.5	3.1	2.2	FSA	6SL3210-1PE13-2UL1	6SL3210-1PE13-2AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE13-2AA0	6SL3201-0BE14-3AA0	6SL3202-0AE16-1CA0	Provided
1.5	2	4.1	3.1	FSA	6SL3210-1PE14-3UL1	6SL3210-1PE14-3AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE21-0AA0	6SL3201-0BE14-3AA0	6SL3202-0AE16-1CA0	Provided
2.2	3	5.9	4.1	FSA	6SL3210-1PE16-1UL1	6SL3210-1PE16-1AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE21-0AA0	6SL3201-0BE21-0AA0	6SL3202-0AE16-1CA0	Provided
3	4	7.7	5.9	FSA	6SL321□-1PE18-0UL1	6SL321□-1PE18-0AL1	Integrated	6SL3203-0BE17-7BA0	6SL3203-0CE21-0AA0	6SL3201-0BE21-0AA0	6SL3202-0AE18-8CA0	Provided
4	5	10.2	7.7	FSB	6SL3210-1PE21-1UL0	6SL3210-1PE21-1AL0	Integrated	6SL3203-0BE21-8BA0	6SL3203-0CE21-8AA0	6SL3201-0BE21-8AA0	6SL3202-0AE21-8CA0	Provided
5.5	7.5	13.2	10.2	FSB	6SL3210-1PE21-4UL0	6SL3210-1PE21-4AL0	Integrated	6SL3203-0BE21-8BA0	6SL3203-0CE21-8AA0	6SL3201-0BE21-8AA0	6SL3202-0AE21-8CA0	Provided
7.5	10	18	13.2	FSB	6SL321□-1PE21-8UL0	6SL321□-1PE21-8AL0	Integrated	6SL3203-0BE21-8BA0	6SL3203-0CE21-8AA0	6SL3201-0BE21-8AA0	6SL3202-0AE21-8CA0	Provided
11	15	26	18	FSC	6SL3210-1PE22-7UL0	6SL3210-1PE22-7AL0	Integrated	6SL3203-0BE23-8BA0	6SL3203-0CE23-8AA0	6SL3201-0BE23-8AA0	6SL3202-0AE23-8CA0	Provided
15	20	32	26	FSC	6SL321□-1PE23-3UL0	6SL321□-1PE23-3AL0	Integrated	6SL3203-0BE23-8BA0	6SL3203-0CE23-8AA0	6SL3201-0BE23-8AA0	6SL3202-0AE23-8CA0	Provided
18.5	25	38	32	FSD	6SL3210-1PE23-8UL0	6SL3210-1PE23-8AL0	Integrated	–	Integrated DC reactor	JJY:023422620001	6SE6400-3TC07-5ED0	Provided⁵⁾
22	30	45	38	FSD	6SL3210-1PE24-5UL0	6SL3210-1PE24-5AL0	Integrated	–	Integrated DC reactor	JJY:023422620001	6SE6400-3TC07-5ED0	Provided⁵⁾
30	40	60	45	FSD	6SL3210-1PE26-0UL0	6SL3210-1PE26-0AL0	Integrated	–	Integrated DC reactor	JJY:023424020001	6SE6400-3TC07-5ED0	Provided⁵⁾
37	50	75	60	FSD	6SL321□-1PE27-5UL0	6SL321□-1PE27-5AL0	Integrated	–	Integrated DC reactor	JJY:023424020001	6SE6400-3TC07-5ED0	Provided⁵⁾
45	60	90	75	FSE	6SL3210-1PE28-8UL0	6SL3210-1PE28-8AL0	Integrated	–	Integrated DC reactor	JJY:023434020001	6SE6400-3TC14-5FD0	Provided⁵⁾
55	75	110	90	FSE	6SL321□-1PE31-1UL0	6SL321□-1PE31-1AL0	Integrated	–	Integrated DC reactor	JJY:023434020001	6SE6400-3TC14-5FD0	Provided⁵⁾
75	100	145	110	FSF	6SL3210-1PE31-5UL0	6SL3210-1PE31-5AL0	Integrated	–	Integrated DC reactor	JJY:023454020001	6SE6400-3TC14-5FD0	Provided⁵⁾
90	125	178	145	FSF	6SL3210-1PE31-8UL0	6SL3210-1PE31-8AL0	Integrated	–	Integrated DC reactor	JJY:023454020001	6SE6400-3TC14-5FD0	Provided⁵⁾
110	150	205	178	FSF	6SL3210-1PE32-1UL0	6SL3210-1PE32-1AL0	Integrated	–	Integrated DC reactor	JJY:023464020001	6SL3000-2BE32-1AA0	Provided⁵⁾
132	200	250	205	FSF	6SL321□-1PE32-5UL0	6SL321□-1PE32-5AL0	Integrated	–	Integrated DC reactor	JJY:023464020001	6SL3000-2BE32-6AA0	Provided⁵⁾
160	250	302	250	FSGX²⁾	6SL3224-0XE41-3UA0	–	6SL3000-0BE34-4AA0	–	–	6SL3000-1BE31-3AA0²⁾	6SL3000-2BE33-3AA0	–
200	300	370	302	FSGX²⁾	6SL3224-0XE41-6UA0	–	6SL3000-0BE34-4AA0	–	6SL3000-0CE35-1AA0	6SL3000-1BE32-5AA0²⁾	6SL3000-2BE33-8AA0	–
250	400	477	370	FSGX²⁾	6SL3224-0XE42-0UA0	–	6SL3000-0BE36-0AA0	–	6SL3000-0CE35-1AA0	6SL3000-1BE32-5AA0²⁾	6SL3000-2BE35-0AA0	–

The PM240/PM240-2 400 V has now been completely selected.

Heat sink version: Standard □ / Push-through □

1) Frame sizes FSD–FSF secondary condition: Only rated frequency or lower permissible max. output frequency 150 Hz

2) A Braking Module is additionally required for frame size FSGX: 6SL3300-1AE32-5AA0

3) An unfiltered Power Module is required in order to use the external B filter

4) For frame sizes FSA–FSC, to extend the service life, the line reactor can be omitted if the next larger Power Module is used.

5) For frame sizes FSD–FSF, the shield plate to connect the external braking resistor is not included in the scope of delivery. It can be ordered by ordering the spare parts kit – "Accessory kit/shield connection kit" – see options.

Supplementary products, for example du/dt filters and footprint braking resistors are available from selected product partners.

Find out more at:
www.siemens.com/drives-options-partner

FSA	Filtered/unfiltered: 73 x 196 x 165
FSB	Filtered/unfiltered: 100 x 291 x 165
FSC	Filtered/unfiltered: 140 x 355 x 165
FSD	Unfiltered: 275 x 419 x 204, filtered: 275 x 512 x 204
FSE	Unfiltered: 275 x 499 x 204, filtered: 275 x 635 x 204
FSF	Unfiltered: 350 x 634 x 316, filtered: 350 x 934 x 316
FSGX	Unfiltered: 326 x 1533 x 547

B — Selecting the optimum Control Unit

CU250S-2 Control Unit

How many inputs and outputs are required?

	CU230P-2	CU240E-2 F	CU240E-2	CU250S-2
Digital inputs (DI)	6	6	6	11
Failsafe DI	–	3 (opt. for 2 DI)	1 (opt. for 2 DI)	3 (opt. for 2 DI)
Digital outputs (DO)	3 (opt. 1 F-DO)	3	3	3
Fast DO/DO	–	–	–	4
Analog inputs	4	2	2	2
Analog outputs	2	2	2	2

Is integrated safety technology required?

CU230P-2	CU240E-2 F	CU240E-2	CU250S-2
No	STO (Safe Torque Off) SS1 (Safe Stop 1) SBC (Safe Brake Control)¹⁾ SLS (Safely Limited Speed)¹⁾ SSM (Safe Speed Monitor)¹⁾ SDI (Safe Direction)¹⁾	STO (Safe Torque Off)	STO (Safe Torque Off) SS1 (Safe Stop 1) SBC (Safe Brake Control)¹⁾ SLS (Safely Limited Speed)¹⁾ SSM (Safe Speed Monitor)¹⁾ SDI (Safe Direction)¹⁾ With Safety license

¹⁾ A Safe Brake Relay is required for SBC

Is an encoder used for signal feedback?

CU230P-2	CU240E-2 F	CU240E-2	CU250S-2
No	No	No	Yes

Is integrated positioning capability required?

CU230P-2	CU240E-2 F	CU240E-2	CU250S-2
No	No	No	Yes (EPos positioning functionality through Extended Function license)

A Selecting the Power Module and the power-dependent options

The optimum inverter SINAMICS G120 has now been configured!

= + +

Select the optional components

Additional components are available depending on your particular requirements – e.g. an operator panel (IOP or BOP-2) or a blanking cover

C

Select your Control Unit

B

CU230P-2 Control Unit	CU240E-2 Control Unit	CU250S-2 Control Unit
Specifically designed for general machinery construction (e.g. mixers, agitators)	Suitable for a multi-tude of applications in pump, fan and com-pressor applications	Suitable for high-quality applications (e.g. extruders and centrifuges)

Power Modules 3AC PM240-2/500 V–690 V +/–10%

Which power is required? (LO = Low Overload; HO = High Overload)					Is a filtered device according to Class A required?		Are additional external line filters required?			Is a braking resistor required as a result of the application?	Should output filters be used, to reduce voltage stress, for example?		Is a shield plate required for the Power Module?
PM240/PM240-2 Power Modules have a braking chopper – and can address a wide range of applications in general machinery construction. PM240-2, 500 V–690 V have an integrated DC link reactor as standard. As a consequence, a line reactor can be omitted.					The integrated EMC filter (Class A filter) is required to maintain the cable-conducted interference voltages and the radiated disturbances for installations in compliance with EN 61800-3 Category C2. PM240-2 690 V Power Modules, frame size FSF – only Category C3.				Reactors: to smooth voltage peaks, buffer commutation dips and reduce the effects of harmonics on inverter and line supply.	The braking resistor is used to dissipate excess DC link energy. Frame sizes FSA to FSF already have integrated braking choppers (electronic switches).	Output reactors reduce the voltage stress on the motor winding.	The du/dt filter plus Voltage Peak Limiter limits the voltage rate of rise and typical voltage peaks.	The shield connection kit simplifies connecting the shields of supply and control cables, offers mechanical strain relief and guarantees an optimum EMC behavior.
Rated power LO (kW)	Rated power (hp)	Output current LO (A)	Output current HO (A)	Frame size	Unfiltered Power Modules (Article number)	Power Modules with integrated filter A (Article number)	Class A filter is already integrated	Class B line filter	Line reactor	Braking resistors (Article number)	Output reactor (Article number)	du/dt filter plus VPL (Article number)	Shield plate for Power Modules
11	10	14	11	FSD	6SL3210-1PH21-4UL0	6SL3210-1PH21-4AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
15	15	19	14	FSD	6SL3210-1PH22-0UL0	6SL3210-1PH22-0AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
18.5	20	23	19	FSD	6SL3210-1PH22-3UL0	6SL3210-1PH22-3AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
22	25	27	23	FSD	6SL3210-1PH22-7UL0	6SL3210-1PH22-7AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
30	30	35	27	FSD	6SL3210-1PH23-5UL0	6SL3210-1PH23-5AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
37	40	42	35	FSD	6SL3210-1PH24-2UL0	6SL3210-1PH24-2AL0	Integrated	–	Integrated DC reactor	JJY:023424020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
45	50	52	42	FSE	6SL3210-1PH25-2UL0	6SL3210-1PH25-2AL0	Integrated	–	Integrated DC reactor	JJY:023434020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
55	60	62	52	FSE	6SL3210-1PH26-2UL0	6SL3210-1PH26-2AL0	Integrated	–	Integrated DC reactor	JJY:023434020002	– (but longer motor cables)	6SL3000-2DH31-0AA0	Provided [1]
75	75	80	62	FSF	6SL3210-1PH28-0UL0	6SL3210-1PH28-0AL0	Integrated	–	Integrated DC reactor	JJY:023464020002	6SL3000-2AH31-0AA0	6SL3000-2DH31-0AA0	Provided [1]
90	100	100	80	FSF	6SL3210-1PH31-0UL0	6SL3210-1PH31-0AL0	Integrated	–	Integrated DC reactor	JJY:023464020002	6SL3000-2AH31-0AA0	6SL3000-2DH31-0AA0	Provided [1]
110	100	115	100	FSF	6SL3210-1PH31-2UL0	6SL3210-1PH31-2AL0	Integrated	–	Integrated DC reactor	JJY:023464020002	6SL3000-2AH31-5AA0	6SL3000-2DH31-5AA0	Provided [1]
132	125	142	115	FSF	6SL3210-1PH31-4UL0	6SL3210-1PH31-4AL0	Integrated	–	Integrated DC reactor	JJY:023464020002	6SL3000-2AH31-5AA0	6SL3000-2DH31-5AA0	Provided [1]

The PM240-2 690 V has now been completely selected.

[1] For frame sizes FSD–FSF, the shield plate to connect the external braking resistor is not included in the scope of delivery. It can be ordered by ordering the spare parts kit – "Accessory kit/shield connection kit" – see options.

What type of communication/bus system is required?				
USS, Modbus RTU	CU230P-2 HVAC	CU240E-2	CU240E-2 F	CU250S-2
	6SL3243-0BB30-1HA3	6SL3244-0BB12-1BA1	6SL3244-0BB13-1BA1	6SL3246-0BA22-1BA0
BACnet MS/TP	CU230P-2 HVAC	–	–	–
	6SL3243-0BB30-1HA3			
PROFIBUS DP	CU230P-2 DP	CU240E-2 DP	CU240E-2 DP-F	CU250S-2 DP
	6SL3243-0BB30-1PA3	6SL3244-0BB12-1PA1	6SL3244-0BB13-1PA1	6SL3246-0BA22-1PA0
PROFINET/EtherNet/IP	CU230P-2 PN	CU240E-2 PN	CU240E-2 PN-F	CU250S-2 PN
	6SL3243-0BB30-1FA0	6SL3244-0BB12-1FA0	6SL3244-0BB13-1FA0	6SL3246-0BA22-1FA0
CANopen	–	–	–	CU250S-2 CAN
				6SL3246-0BA22-1CA0

Permissible combination with Power Modules				
PM240 [1]	Yes	Yes	Yes	Yes
PM240-2	Yes	Yes	Yes	Yes
PM250	Yes	Yes	Yes	Yes

What optional shield connection kit is required for the particular Control Unit?				
Shield connection kit 1 **6SL3264-1EA00-0FA0**	HVAC PROFIBUS	–	–	–
Shield connection kit 2 **6SL3264-1EA00-0HA0**	–	USS, Modbus RTU, PROFIBUS	USS, Modbus RTU, PROFIBUS	–
Shield connection kit 3 **6SL3264-1EA00-0HB0**	PROFINET	PROFINET	PROFINET	–
Shield connection kit 4 **6SL3264-1EA00-0LA0**	–	–	–	All versions

[1] PM240 Power Modules, frame size FSGX (i.e. from 160 kW and higher) are only released for the Basic Safety functions (STO, SS1 and SBC)

C SINAMICS G120 – ordering data for the operator panel

Operator panel	Article number	Additional depth in mm
SINAMICS IOP-2 [1] supports languages: German, English, French, Italian, Spanish, Portuguese, Dutch, Swedish, Russian, Czech, Polish, Turkish, Finnish, simplified Chinese	6SL3255-0AA00-4JA2	+19.65
SINAMICS IOP-2 handheld to use the IOP-2 as mobile device connected with the cable to SINAMICS G120, SINAMICS G120C, SINAMICS G120P, SINAMICS G110D, SINAMICS G120D, SINAMICS G110M or SIMATIC ET 200pro FC-2. Includes: IOP-2 (6SL3255-0AA00-4JA2), handheld housing, rechargeable batteries (4 x AA), charging unit (international), RS232 connecting cable (3 m), USB cable (1 m)	6SL3255-0AA00-4HA1	–
Operator Panel BOP-2 [2]	6SL3255-0AA00-4CA1	+12

[1] **Intelligent Operator Panel IOP-2**

New device design
- Intuitive user interface – membrane keypad with a central sensor control field
- High contrast color display with various display options
- IOP-2 device design, open for future expanded functionality (e.g. device functions, wizards, languages)
- Can be simply upgraded to a new function release via the USB port

Commissioning
- SINAMICS G inverters and the associated standard applications can be simply commissioned using wizards
- Cloning function for fast series commissioning of the inverters

Operator control and visualization
- Simple, individualized local drive operation (start/stop, setpoint input, direction of rotation change)
- Application-specific scenarios can be easily implemented, e.g. operating concepts with additional external operating devices

Diagnostics
- Fast diagnostics using local plaintext display
- Integrated plaintext help function for local display and to remove fault messages

[2] **Basic Operator Panel BOP-2**

Menu prompting and 2-line display mean that the inverters can be quickly and conveniently commissioned.
Simple, basic commissioning by simultaneously displaying parameters and parameter values as well as the option of filtering parameters.

C

Optional additional components and licenses

Optional additional components

Description	Article number
IOP-2 Intelligent Operator Panel with 14 user interface languages	6SL3255-0AA00-4JA2
IOP-2 mobile handheld device connected through a cable	6SL3255-0AA00-4HA1
Basic Operator Panel (BOP-2)	6SL3255-0AA00-4CA1
Door mounting kit for BOP-2/IOP-2 for installation in cabinet doors	6SL3256-0AP00-0JA0
SINAMICS memory card (SD card)	6SL3054-4AG00-2AA0
SINAMICS G120 multicard (SD card) plus license V4.7 SP6	6SL3054-7TD00-2BA0
Supplementary licenses for CU250S-2 – SD card + license Extended Functions Safety (SLS, SSM, SDI) – SD card + license Extended Functions basic positioning (EPos) – SD card + license Extended Safety + basic positioning – License Extended Functions Safety for CU250S-2 – License Extended Functions basic positioning (EPos)	6SL3054-4AG00-2AA0-Z F01 6SL3054-4AG00-2AA0-Z E01 6SL3054-4AG00-2AA0-Z F01+E01 6SL3074-0AA10-0AA0 6SL3074-7AA04-0AA0
Supplementary licenses for CU250S-2 plus firmware V4.7 SP6 – SD card + license Extended Functions Safety (SLS, SSM, SDI) + FW V4.7 SP6 – SD card + license Extended Functions basic positioning (EPos) + FW V4.7 SP6 – SD card + license Extended Functions Safety + basic positioning + FW V4.7 SP6	6SL3054-7TD00-2BA0-Z F01 6SL3054-7TD00-2BA0-Z E01 6SL3054-7TD00-2BA0-Z E01+F01
PC connecting kit 2 (for CU230P-2, CU240E-2, CU250S-2)	6SL3255-0AA00-2CA0
Brake Relay (for direct activation of a motor brake by the CU)	6SL3252-0BB00-0AA0
Safe Brake Relay (Safety version)	6SL3252-0BB01-0AA0
SINAMICS G120/G120C connector plug	6SL3200-0ST05-0AA0
SINAMICS G120/G120C fan unit	6SL3200-0SF12-0AA0
Push-through installation frame for Power Modules PM240-2 – Frame size FSA – Frame size FSB – Frame size FSC	6SL3260-6AA00-0DA0 6SL3260-6AB00-0DA0 6SL3260-6AC00-0DA0
Push-through mounting frames for PM240-2 Power Modules, FSD–FSF – Frame size FSD – Frame size FSE – Frame size FSF	6SL3200-0SM17-0AA0 6SL3200-0SM18-0AA0 6SL3200-0SM20-0AA0
Mounting handles for PM240-2 push-through Power Modules, frame sizes FSD–FSF	6SL3200-0SM22-0AA0
Accessory kit/shield connection (contains the shield plate for the external braking resistor) – Frame size FSD – Frame size FSE – Frame size FSF	6SL3262-1AD01-0DA0 6SL3262-1AE01-0DA0 6SL3262-1AF01-0DA0

Software for configuring and commissioning

Description	Article number
STARTER commissioning tool on DVD-ROM	6SL3072-0AA00-0AG0
SINAMICS Startdrive commissioning tool on DVD-ROM	6SL3072-4DA02-0XG0
SIZER for Siemens Drives engineering tool	6SL3070-0AA00-0AG0
CAD Creator	6SL3075-0AA00-0AG0

! You can find detailed information about the products and options in the current D31 Catalog, Chapter "Standard SINAMICS G120 inverters" or in the Siemens Industry Mall:
siemens.com/industrymall

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SINAMICS G120 – technical data for Power Modules

1 / 3AC 200–240 V PM240-2 IP20

0.55 to 250 kW (0.75 to 400 hp)

Mechanical data	
Degree of protection	IP20
Electrical data	
Power HO/LO (High Overload/Low Overload)	1AC: 0.37 to 3 kW (HO) / 0.55 to 4 kW (LO), 3AC: 0.37 to 45 kW (HO) / 0.55 to 55 kW (LO)
Rated output current (HO/LO)	1AC: 2.3 to 13.6 A (HO) / 3.2 to 17.5 A (LO), 3AC: 2.3 to 154 A (HO) / 3.2 to 178 A (LO)
Line voltage	1 / 3AC 200 to 240 V + / −10%
Line frequency	47 ... 63 Hz
Overload capability	Low Overload (LO): 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1] High Overload (HO): 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1]
Operating temperature	0 °C to +60 °C (122 °F) for power derating
Relative humidity	< 95% RH, condensation not permitted
Output frequency	0 ... 550 Hz (control modes V/f)[2]; 0 ... 240 Hz (vector)
Digital /analog inputs and outputs	Details on Page 3_13
Communication	
Bus interface	PROFINET, EthernNet/IP, PROFIBUS DP, CANopen, USS / Modbus RTU
Commissioning tools	
Software operating unit	StartDrive and STARTER for commissioning, PC interface: USB
Functions	
Open-loop/closed-loop control modes	V/f (linear, square-law, FCC, ECO), vector control with / without encoder (VC / SLVC)
Protection functions	Undervoltage, overvoltage, overmodulation / overload, ground fault, short circuit, stall protection, motor blocking protection, motor overtemperature, inverter overtemperature, parameter interlocking
Brake functions	Resistor brake, DC braking, motor holding brake control, compound braking
Motors that can be connected	Three-phase induction motors
Standards	
Conformance with standards	UL, cUL, CE, c-tick, SEMI F47

[1] When using the overload capability, the continuous output current is not reduced
[2] As a result of legislation, from firmware V4.7 and higher the maximum output frequency is limited to 550 Hz

You can find the technical documentation for the SINAMICS G120 at:
siemens.com/sinamics-g120/documentation

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SINAMICS G120 – technical data for Power Modules

3AC 380–480 V PM240-2 IP20

0.55 to 250 kW (0.75 to 400 hp)

Mechanical data	
Degree of protection	IP20
Electrical data	
Power HO/LO (High Overload/Low Overload)	Unfiltered: 0.37 to 200 kW (HO)/0.55 to 250 kW (LO); filtered: 0.37 to 110 kW (HO)/0.55 to 132 kW (LO)
Rated output current (HO / LO)	Unfiltered: 1.3 to 370 A (HO)/1.7 to 477 A (LO); filtered: 1.3 to 205 A (HO)/1.7 to 250 A (LO)
Line voltage	3AC 380 to 480 V +/−10%
Line frequency	47 ... 63 Hz
Overload capability	Low Overload (LO): 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1] High Overload (HO): 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1]
Operating temperature	0 °C to +60 °C (122 °F) for power derating
Relative humidity	< 95% humidity, condensation not permissible
Output frequency	0 ... 550 Hz (control modes V/f)[2]; 0 ... 240 Hz (vector)
Digital /analog inputs and outputs	Details provided on Page 3_13
Communication	
Bus interface	PROFINET, EtherNet/IP, PROFIBUS DP, CANopen, USS/Modbus RTU
Commissioning tools	
Software operator panel	StartDrive and STARTER for commissioning, PC interface: USB
Functions	
Open-loop/closed-loop control modes	V/f (linear, square-law, FCC, ECO), vector control with/without encoder (VC/SLVC)
Protective functions	Undervoltage, overvoltage, overmodulation/overload, ground fault, short circuit, stall protection, motor blocking protection, motor overtemperature, inverter overtemperature, parameter interlocking
Braking functions	Resistor brake, DC braking, motor holding brake control, compound brake
Motors that can be connected	Three-phase induction motors and synchronous motors (on request)
Standards	
Conformance with standards	UL, cUL, CE, c-tick, SEMI F47

[1] When using the overload capability, the continuous output current is not reduced
[2] As a result of legislation, from firmware V4.7 and higher, the output frequency is limited to 550 Hz

> **!** You can find the technical documentation for the SINAMICS G120 at:
> **siemens.com/sinamics-g120/documentation**

SINAMICS G120 – technical data for Power Modules

3AC 500–690 V PM240-2

11 to 55 kW (15 to 75 hp)

Mechanical data	
Degree of protection	IP20
Electrical data	
Power HO / LO (High Overload / Low Overload)	3AC: 7.5 to 110 kW (HO) / 11 to 132 kW (LO)
Rated output current (HO / LO)	3AC: 11 to 1152 A (HO) / 14 to 142 A (LO)
Line voltage	3AC 500 to 690 V + / −10%
Line frequency	47 ... 63 Hz
Overload capability	Low Overload (LO): 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1] High Overload (HO): 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1]
Operating temperature	0 °C to +60 °C (122 °F) for power derating
Relative humidity	< 95% RH, condensation not permissible
Output frequency	0 ... 550 Hz (control modes V/f)[2]; 0 ... 240 Hz (vector)
Digital / analog inputs and outputs	Details on Page 3_13
Communication	
Bus interface	PROFINET, EtherNet/IP, PROFIBUS DP, CANopen, USS / Modbus RTU
Commissioning tools	
Software operator panel	StartDrive and STARTER for commissioning, PC interface: USB
Functions	
Open-loop / closed-loop control modes	V/f (linear, square law, FCC, ECO), vector control with / without encoder (VC / SLVC)
Protective functions	Undervoltage, overvoltage, overcontrol / overload, ground fault, short circuit, stall protection, motor blocking protection, motor overtemperature, inverter overtemperature, parameter locking
Braking functions	Resistor brake, DC braking, motor holding brake control, compound brake
Motors that can be connected	Three-phase induction motors
Standards	
Conformance with standards	UL, cUL, CE, c-tick, SEMI F47

[1] When using the overload capability, the continuous output current is not reduced
[2] As a result of legislation, from firmware V4.7 and higher the maximum output frequency is limited to 550 Hz

> ! You can find the technical documentation for the SINAMICS G120 at:
> **siemens.com/sinamics-g120/documentation**

3

SINAMICS G120P –

the specialist for pumps, fans and compressors
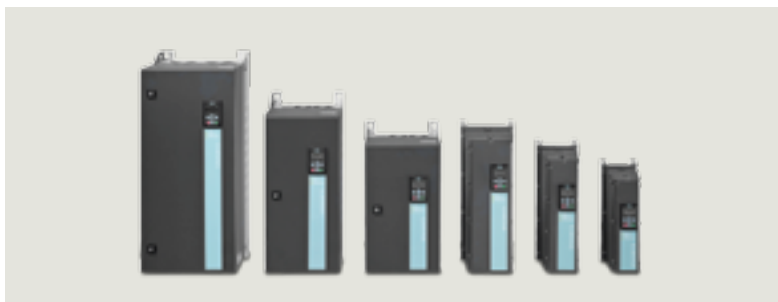
SINAMICS G120P is a modular inverter system, comprising the following components:

- CU230P-2 Control Unit
- PM230 IP55 Power Module
- (IOP / BOP-2) Operator Panel
  or a blanking cover

> **! The device comprises an article number as well as optional accessories**

Technical data

Voltage:	3AC 380 to 480 V +/−10%
Power range:	0,37 to 90 kW
Degree of protection:	IP55
Control modes:	V / f (linear, square-law, FCC, ECO), encoderless vector control (SLVC)
I / Os:	6 DI/3 DO/4 AI/2 AO

> **! Highlights – specifically developed for your building technology applications**

Summarizing: 2-zone and multi-zone control, for example for controlling the temperature in several rooms

Well protected: essential service mode – a special operating mode in case of fire

Full control: real-time clock with precise time stamp for logging faults and alarms, buffer time of up to five days, automatic switchover between daylight saving time and standard time

Freely programmable: digital time clocks to control three selectable events depending on whether a weekday / hour / minute

The series of SINAMICS G120P inverters covers a total power range from 0.37 up to 630 kW. More detailed information on chassis devices and cabinet units is provided in Catalog D35 at **siemens.com/drives/infocenter**

3 SINAMICS G120P – applications

Quality[1]		Continuous motion		
		Basic	Medium	High
Use				
Pumping/ ventilating/ compressing	**Centrifugal pumps Radial/ axial fans Compressors**		SINAMICS G120P	Excentric screw pumps
Moving	Conveyor belts Roller conveyors Chain conveyors	Conveyor belts Roller conveyors Chain conveyors Vert. material handling Elevators Escalators Gantry cranes Ship's drives Cable railways		Elevators Container cranes Mine hoists Open-cast mine excavators Test stands
Processing	Mills Mixers Kneaders Crushers Agitators Centrifuges	Mills Mixers Kneaders Crushers Agitators Centrifuges Extruders Rotary furnaces		Extruders Winders/unwinders Leading/following drives Calenders Main press drives Printing machines
Machining	Main drives for • Turning • Milling • Drilling	Main drives for • Drilling • Sawing		Main drives for • Turning • Milling • Drilling • Gear cutting • Grinding

[1] Requirements placed on the torque accuracy / speed accuracy / positioning accuracy / axis coordination / functionality

SINAMICS G120P are ideal for pump, fan and compressor applications in the industrial environment, in the process industry, water industry and for applications in building automation.

SINAMICS G120P – customer benefits

Ruggedness

- Can operate at ambient temperatures up to 60 °C
- Faults are automatically acknowledged after power failure, automatic restart
- Can synchronize to motors that are still rotating
- Resonance points in piping systems are suppressed
- Applications involving pumps and fans
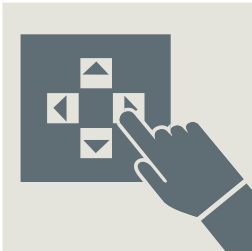
Functionality and user-friendliness

- Display as plaintext on operator panels (IOP-2) or two-line (BOP-2)
- Wall/panel mounting, directly at the installation location or installed in electrical cabinets
- Integrated Class A and B line filters for public grids
- Lower line harmonics without requiring supplementary measures, low apparent current drawn, high power factor
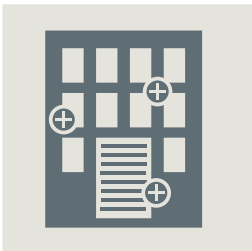
Special functions for building technology

- 2-zone and multi-zone control, for temperature control
- Essential service mode in case of fire
- real-time clock with precise time stamp for logging faults and alarms, buffer time of up to five days, automatic switchover between daylight saving time and standard time
- Digital time clocks

3

SINAMICS G120P – design

0.37 to 90 kW (0.5 to 125 hp)

SINAMICS G120P configured in four steps

1. Power Module

2. Components on the motor side

3. Control Unit

4. Operator panel

1st step:
PM230 in IP55 degree of protection

2nd step:
Output reactor

3rd step:
CU230P-2

4th step:
IOP-2 / BOP-2 or blanking cover

Modular design

SINAMICS G120P is a modular inverter system comprising the following components:

- CU230P-2 Control Unit
- PM230 IP55 Power Module
- Operator Panel or blanking cover

! **The device comprises one article number as well as optional accessories.**

The series of SINAMICS G120P inverters covers a power range from 0.37 to 690 kW. You can find detailed information on chassis devices and cabinet units in Catalog D35 under **siemens.com/drives/infocenter**

SINAMICS G120P – ordering data for Power Modules
PM230 IP55

0.37 to 90 kW (0.5 to 125 hp)

Select the Power Module ...			Wall-mounted devices	... and the components on the motor side
Degree of protection			IP55	
3AC 380–480 V	unfiltered			Output reactor [3]
PM230	Class A filter [1]		6SL3223-0DE__-_A__	
	Class B filter [2]		6SL3223-0DE__-_B__	
Rated power			**Article number**	**Article number**
kW	hp	A		
0.37	0.50	1.3	FSA	6SL3223-0DE13-7☐G1	6SL3202-0AE16-1CA0
0.55	0.75	1.7	FSA	6SL3223-0DE15-5☐G1	6SL3202-0AE16-1CA0
0.75	1.0	2.2	FSA	6SL3223-0DE17-5☐G1	6SL3202-0AE16-1CA0
1.1	1.5	3.1	FSA	6SL3223-0DE21-1☐G1	6SL3202-0AE16-1CA0
1.5	2.0	4.1	FSA	6SL3223-0DE21-5☐G1	6SL3202-0AE16-1CA0
2.2	3.0	5.9	FSA	6SL3223-0DE22-2☐G1	6SL3202-0AE16-1CA0
3.0	4.0	7.7	FSA	6SL3223-0DE23-0☐G1	6SL3202-0AE16-1CA0
4.0	5.0	10.2	FSB	6SL3223-0DE24-0☐G1	6SL3202-0AE16-8CA0
5.5	7.5	13.2	FSB	6SL3223-0DE25-5☐G1	6SL3202-0AE21-8CA0
7.5	10	18	FSB	6SL3223-0DE27-5☐G1	6SL3202-0AE21-8CA0
11	15	26	FSC	6SL3223-0DE31-1☐G1	6SL3202-0AE21-8CA0
15	20	32	FSC	6SL3223-0DE31-5☐G1	6SL3202-0AE28-8CA0
18.5	25	38	FSC	6SL3223-0DE31-8AG1	6SL3202-0AE28-8CA0
18.5	25	38	FSD	6SL3223-0DE31-8BA0	6SL3202-0AE28-8CA0
22	30	45	FSD	6SL3223-0DE32-2☐A0	6SE6400-3TC03-8DD0
30	40	60	FSD	6SL3223-0DE33-0☐A0	6SE6400-3TC05-4DD0
37	50	75	FSE	6SL3223-0DE33-7☐A0	6SE6400-3TC08-0ED0
45	60	90	FSE	6SL3223-0DE34-5☐A0	6SE6400-3TC07-5ED0
55	75	110	FSF	6SL3223-0DE35-5☐A0	6SE6400-3TC14-5FD0
75	100	145	FSF	6SL3223-0DE37-5☐A0	6SE6400-3TC15-4FD0
90	125	178	FSF	6SL3223-0DE38-8☐A0	6SE6400-3TC14-5FD0

EMC
integrated Class A EMC filter [A]
integrated Class B EMC filter [B]

Power Module · Components on the motor side · Control Unit · Operator Panel

[1] PM230 Power Modules with integrated Class A filter comply with the limit values laid down in EN 61800-3, Categories C2 and C3

[2] PM230 Power Modules with integrated Class B filter comply with the limit values laid down in EN 61800-3, Category C1 for cable-conducted interference

[3] PM230 Power Modules with output reactor permit inverter-motor cable lengths of 150 m shielded (FSA...FSC) and 200 m shielded (FSD...FSF)

SINAMICS G120P – ordering data

CU230P-2 Control Unit

0.37 to 90 kW (0.5 to 125 hp)

Select a Control Unit		
Designation	**Communication**	**Article number**
CU230P-2 PN	PROFINET (PROFIdrive, PROFIenergy) EtherNet / IP (ODVA AC / AC Drive, SINAMICS Profile)	6SL3243-0BB30-1FA0
CU230P-2 DP	PROFIBUS DP (PROFIdrive)	6SL3243-0BB30-1PA3
CU230P-2 HVAC	USS / Modbus RTU / BACnet MS/TP / FLN P1 Protocol	6SL3243-0BB30-1HA3

Power Module | Components on the motor side | Control Unit | Operator Panel
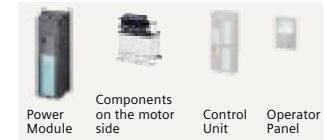
SINAMICS G120P – ordering data for accessories

Select an operator panel and the required accessories	
Designation	**Article number**
Basic Operator Panel (BOP-2)	6SL3255-0AA00-4CA1
SINAMICS IOP-2 supports languages: German, English, French, Italian, Spanish, Portuguese, Dutch, Swedish, Russian, Czech, Polish, Turkish, Finnish, simplified Chinese	6SL3255-0AA00-4JA2
IOP-2 mobile handheld device connected through a cable, includes: IOP-2 (6SL3255-0AA00-4JA2), handheld housing, rechargeable batteries (4 x AA), charging unit (international), RS232 connecting cable (3 m), USB cable (1 m)	6SL3255-0AA00-4HA1
IOP-2 / BOP-2 door mounting kit for installation in cabinet doors with sheet steel thicknesses 1...3 mm. Includes seal, installation materials and connecting cable (5 m)	6SL3256-0AP00-0JA0
SINAMICS SD memory card – 512 MB	6SL3054-4AG00-2AA0
PC inverter connection kit 2	6SL3255-0AA00-2CA0
Blanking cover for PM230 Power Modules, degree of protection IP55	6SL3256-1BA00-0AA0
Shield connection kit 1 for CU230P-2 HVAC/DP	6SL3264-1EA00-0FA0
Shield connection kit 3 for CU230P-2 PN	6SL3264-1EA00-0HB0

Power Module | Components on the motor side | Control Unit | Operator Panel

! Line reactors are not required and they must also not be used.

Instead of an operator panel, a blanking cover can be ordered for the PM230 Power Module. Degree of protection IP55 is achieved with a blanking cover or an IOP-2 / BOP-2 operator panel. Selecting the correct fuse is described in the relevant inverter manual.
siemens.com/automation/service&support

SINAMICS G120P – technical data of the PM230 IP55 Power Module

Mechanical data	
Degree of protection	IP55
Electrical data	
Power rating (Low Overload LO) Rated output current (Low Overload LO)	0.37 to 90 kW 1.3 to 178 A
Line voltage	3AC 380 to 480 V ±10%
Line frequency	47 to 63 Hz
Overload capability (Low Overload LO / High Overload HO)	Low Overload (LO) for FSA–FSC: 150% for 3 sec. plus 110% for 57 sec. within a 300 sec. load cycle[1] Low Overload (LO) for FSD–FSF: 110% for 60 sec. within a 300 sec. load cycle[1] High Overload (HO) for FSA–FSC: 200% for 3 sec. plus 150% for 57 sec. within a 300 sec. load cycle[1] High Overload (HO) for FSD–FSF: 150% for 60 sec. within a 300 sec. load cycle[1]
Operating temperature	0 °C to +60 °C (122 °F) for power derating
Relative humidity	< 95% humidity, condensation not permissible
Output frequency	0 ... 550 Hz (control modes V/f)[2]; 0 ... 240 Hz (vector)
Digital / analog inputs and outputs	6 DI / 3 DO / 4 AI / 2 AO
Communication	
Bus interface	PROFINET, EtherNet/IP, PROFIBUS DP, USS / Modbus RTU, BACnet MS / TP, Siemens FLN P1
Commissioning tools	
Software operator unit	StartDrive and STARTER for commissioning, PC interface (USB)
Functions	
Open-loop / closed-loop control modes	V / f (linear, square-law, FCC, ECO), sensorless vector control (SLVC)
Protection functions	Motor temperature monitoring with and without temperature sensor (via PTC, KTY and ThermoClick sensor, PT1000), overcurrent protection, torque monitoring, overvoltage protection (Vdc_max controller)
Brake functions	DC brake
Motors that can be connected	3-phase induction motors
Standards	
Conformance with standards	CE, c-tick, SEMI F47
Electromagnetic compatibility	For more details, see Chapter 4: Additional information

[1] When using the overload capability, the continuous output current is not reduced   [2] As a result of legislation, from firmware 4.7 the output frequency is limited to 550 Hz

! You can find the technical documentation for SINAMICS G120P at: **siemens.com/sinamics-g120p/documentation**

Control Units	CU230P-2 optimized for pumps, fans and compressors
Architecture	Application-optimized number of I/O
Mounting dimensions in mm (W x H x D)	73 x 199 x 65.5
Weight in kg	0.61
Encoder input	–
Communication functions	
PROFINET	CU230P-2 PN
PROFIBUS	CU230P-2 DP
Modbus RTU and USS	CU230P-2 HVAC
BACnet MS/TP	CU230P-2 HVAC
USB interface	1
Safety functions EC 61508 SIL 2 and EN ISO 13849-1 PL d and Category 3	
Integrated safety function STO	–
STO, SS1, SLS, SDI, SSM	–
STO, SBC, SS1	–
STO, SBC, SS1, SS2, SOS, SLS, SSM, SDI	–

Control Units	CU230P-2 optimized for pumps, fans and compressors
Electrical data	
Supply voltage	24 V DC (via Power Module or external)
Digital inputs	6
Digital inputs, fail-safe	–
Analog inputs, parameterizable	2 x (−10 to +10 V, 0/4 to 20 mA) 1 x (0/4 to 20 mA, NI1000 / PT1000) 1 x (NI1000 / PT1000)
Digital outputs	2 x (relay NO / NC, 250 V AC, 2 A, 30 V DC, 5 A) 1 x (relay NO, 30 V DC, 0.5 A)
Analog outputs	2 x (0 to 10 V, 0/4 to 20 mA)
Functions	
Open-loop/closed-loop control modes	V/f (linear, square-law, free, FFC, ECO), field-oriented closed-loop speed and torque control without encoder

Additional information

- Electromagnetic compatibility (EMC)
- Safety Integrated
- Energy efficiency
- Totally Integrated Automation – application examples
- Software and tools
- Helpful links at a glance

4 EMC filters for inverters

EMC product standard EN 61800-3

First environment:

Public low-voltage grid
(households, trades)

Second environment:

Industrial low-voltage line supply
(industry)

Category C1: Drive systems with line voltages < 1000 V and use in the first environment.

Category C2: Fixed drive systems that are not connected using plug connectors for line voltages < 1000 V. When used in the first environment, commissioning must be performed by personnel knowledgeable about EMC issues. A warning note is required.

Category C3: Drive systems for line voltages < 1000 V for exclusive use in the second environment. A warning note is required.

Category C4: Drive systems for line voltages ≥ 1000 V, for rated currents ≥ 400 A or for use in complex systems in the second environment. An EMC plan must be drawn up.

EMC filters for the second environment:

These filters comply with standard EN 61800-3 when using the inverter in the second environment. This means in practice that the device can be used in an industrial low-voltage line supply without requiring an external EMC filter.

Shielded motor cables must always be used in order to comply with the EMC product standard.

Note: The EMC product standard EN 61800-3 does not refer directly to an inverter, but to a PDS (Power Drive System); in addition to the inverter, it includes the complete circuit as well as motor and cables.

4 Electromagnetic compatibility (EMC)

SINAMICS V20 1AC 200 to 240 V
• For radio interference limit values according to EN 61800-3 Category C1/C2, use in the 1st environment (public grids)

SINAMICS V20 3AC 380 to 480 V
• For radio interference limit values according to EN 61800-3 Category C3, use in the 2nd environment (industrial line supplies), use in the 1st environment (public grids)

SINAMICS G120C 3AC 380 to 480 V
• For radio interference limit values according to EN 61800-3 Category C3, use in the 2nd environment (industrial line supplies), use in the 1st environment (public grids)

SINAMICS G120 PM240-2 / PM240 3AC 380 to 480 V, PM240-2 1 / 3AC 200 to 240 V, 3AC 500 to 690 V
• For radio interference limit values according to EN 61800-3 Category C3, use in the 2nd environment (industrial line supplies), use in the 1st environment (public grids) • For radio interference limit values according to EN 61800-3 Category C1, use in the 1st environment (public grids)

SINAMICS G120P PM230 IP55 3AC 380 to 480 V
• For radio interference limit values according to EN 61800-3 Category C2, use in the 1st environment (public grids)

4 Simply safe – twice the efficiency! Safety Integrated

"The prevention of accidents should not be seen as a piece of legislation, but as moral obligation and sound economic sense."

Werner von Siemens, 1880

Today, machines and plants are becoming increasingly more flexible and productive – last but not least as a result of new safety concepts. These facilitate faster operation, but at the same time safer operation. Conventional safety technology quickly reaches its limits. SINAMICS with Safety Integrated offers short response times and a higher degree of cost-effectiveness, as integrating the safety functions into the drives results in considerable advantages for machine builders and users alike: The machine or system becomes safer, but the costs to achieve this decrease – and the reliability of the solution has been proven around the world in many thousands of successful applications.

Conventional safety technology

Safety technology

Sense

Automation

Control

Contactors

Converters

Fieldbus

Contactors

Evaluate   Respond

Safety Integrated

Safety technology integrated in the **automation**

Sense

Evaluate

Fail-safe control

PROFINET / PROFIsafe

Respond

SINAMICS
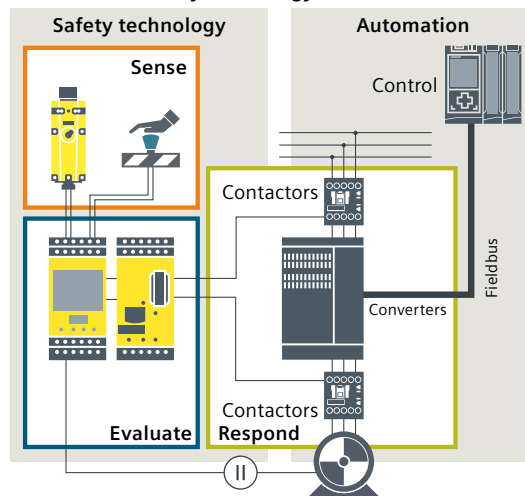
Integrated safety technology reduces the number of components and wiring costs
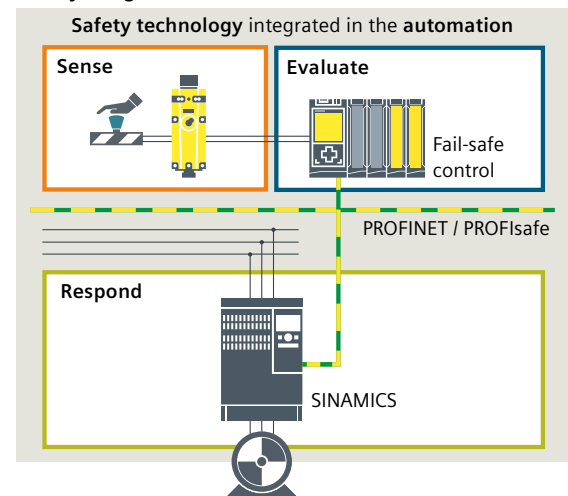
siemens.com/safety-drives

! Safety Evaluation Tool – the direct route to the documentation of a safety-related machine:
siemens.com/safety-evaluation-tool

Safety functions integrated in SINAMICS inverters

Drives	Integrated safety function*	Subdivided into two classes	Description
SINAMICS V20	None	–	–
SINAMICS G120C	STO	Function to safely stop a drive	STO (Safe Torque Off) safely switches the drive into a torque-free condition; an undesirable restart is safely prevented.
SINAMICS G120	STO	Function to safely stop a drive	STO (Safe Torque Off) safely switches the drive into a torque-free condition; an undesirable restart is safely prevented.
	SS1		With SS1 (Safe Stop 1), the drive can be quickly and safely stopped, especially for high flywheel masses and subsequent transition into STO.
	SBC	Safe Brake Control (SBC)	With SBC (Safe Brake Control), a holding brake is safely controlled and monitors the drive, especially when it involves vertical axes.
	SLS	Functions to safely monitor the speed of a drive	With SLS (Safely Limited Speed), a preset speed/velocity limit value is safely monitored, and when a limit value is violated, a fault response is initiated.
	SSM		The SSM (Safe Speed Monitor) function supplies a safety-related signal as long as the drive operates below a specified speed/feed rate velocity.
	SDI		SDI (Safe Direction) safely monitors that the drive only moves in the permitted direction. A fault response is initiated if the drive rotates in the impermissible direction.
SINAMICS G120P	None	–	–

* These safety functions are implemented according to IEC 61800-5-2

4 Safety functions for SINAMICS G120C / G120
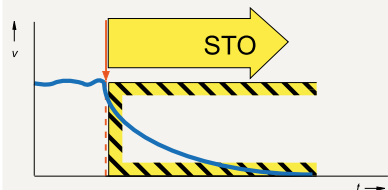
Safe Torque Off (STO)	Applications/benefits	
	• e.g. operating and maintenance personnel can safely work with the protective door open • No wearing parts as a result of the electronic shutdown. The inverter remains connected to the line supply and can still be fully diagnosed	e.g. baggage / package handling / transport, supplying, removing **Conveyor belt**
Safe Stop 1 (SS1)	**Applications/benefits**	
	• Fast and safely monitored stopping of the drive, especially for high moments of inertia	e.g. saws, unwinders, extruders, centrifuges, stacker cranes **Saw**
Safe Brake Control (SBC) with CU250S-2	**Applications/benefits**	
	• The monitored brake operates safely, even in the no-current state without requiring external components and wiring • Prevents suspended / pulling loads from sagging	e.g. cranes, winders **Crane**
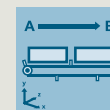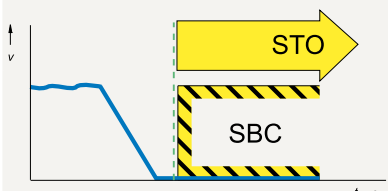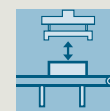
Safety functions for SINAMICS G120

Safely Limited Speed (SLS)
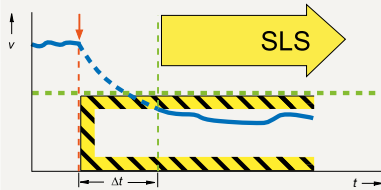
- If the safety of personnel when carrying out maintenance or setting up work is only guaranteed when operating at a reduced speed or velocity
- Shorter downtimes, simplified setting-up, external speed monitors are not required

e.g. presses, punches, winders, conveyors, grinding machines
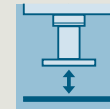
Press

Safe Direction (SDI)
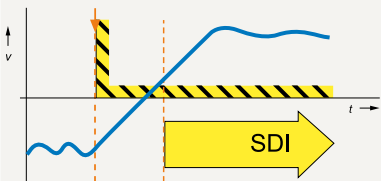
- Allows material to be fed/workpieces to be removed as long as the machine moves in the safe direction, namely away from the operator
- Higher productivity, shorter cycle times

e.g. stacker cranes, presses, unwinders
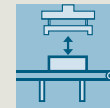
Loading gantry

Safe Speed Monitor (SSM)
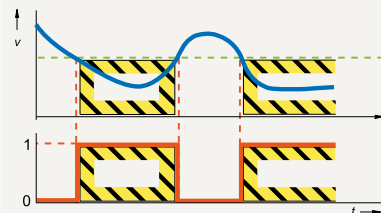
- When an uncritical speed is reached, for example a protective door can be released or a centrifuge filled

e.g. grinding machines, strip lines, drills, milling tools, packaging machines
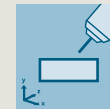
Milling tool

4 Success factor energy efficiency

UP TO
65%
ENERGY SAVING

Here, the focus is on drive technology – which represents about two thirds of the energy that industry consumes. SINAMICS inverters with intelligent functions make it all possible. Depending on the application and load profile, with their energy-saving functions, SINAMICS inverters can reduce your energy consumption.

SINAMICS inverters can slash your energy usage by up to 65% – by controlling the speed as a function of the application and by feeding regenerative energy back into the line supply when braking. What's more, integrated energy-saving functions can further reduce your power costs.

siemens.com/energy-efficient-drives

SinaSave
Based on the investment and operating costs – as well as the energy-saving potential – SinaSave calculates the expected payback time. This is a valuable decision-making tool when customers are assessing the cost-effectiveness of investing in energy-efficient products.

Energy consumption

Mechanical flow control

Energy saving

Outside the typical operating range

Flow control using a frequency inverter

Flow rate
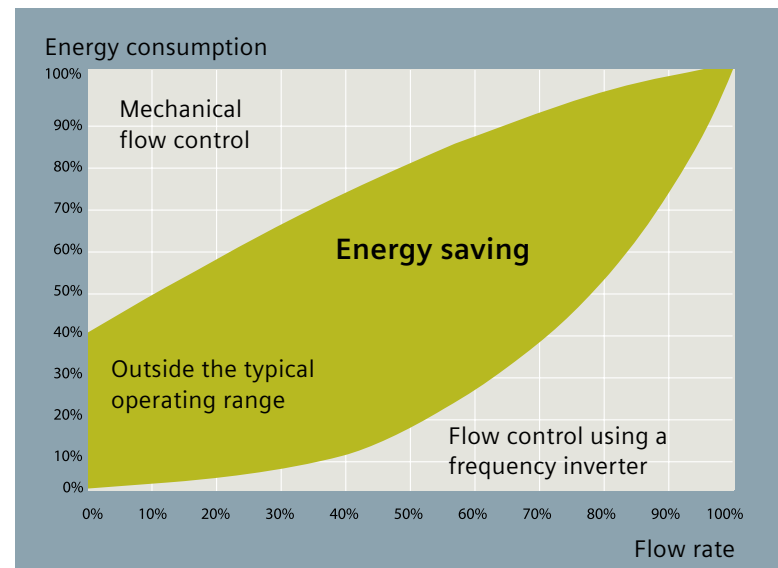
The customer advantages:

✔ Fast decision-making support

✔ Alternative concepts can be compared

✔ Transparency regarding the energy-saving potential, investment and payback time

Energy-saving functions

Ready for SIMATIC Energy Suite

SIMATIC Energy Suite as integrated option for the TIA Portal efficiently links energy management with the automation, therefore making energy usage transparent in your production environment.

Engineering costs have been significantly reduced as it is now simpler to engineer components that measure energy, e.g. the SINAMICS G inverter series.

Thanks to the standardized connection to higher-level energy management systems or Cloud-based services, you can seamlessly extend the captured energy data to create an energy management system across locations and facilities.

You can find additional information on the SIMATIC Energy Suite at **www.siemens.com/energysuite**

4 Energy-saving functions

Examples

ECO mode
In the ECO mode, the motor operating point in the partial load range is automatically adapted and optimized. This function reduces motor losses for machines that do not require the high torque over the complete operating range.

Hibernation mode
Variable-speed drives that are temporarily used are switched into the hibernation mode. The drive is automatically reactivated depending on the demand.
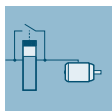
Bypass mode
Using the bypass mode, the inverter is electrically bypassed as soon as the motor frequently operates close to its operating speed. This allows inverter losses to be avoided, and the overall efficiency increases.
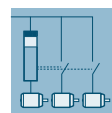
Cascading
In pump, fan and compressor applications requiring high power ratings, the complete power demand is distributed over several motors. These motors are switched in and out using partially or fully controlled cascades in conjunction with inverters, therefore facilitating an energy-efficient drive system.

Energy consumption values/energy-saving counter
During operation, the actual energy consumption can be output – or using an energy-saving counter – the amount of energy accumulated over the operating hours is compared to a fixed speed drive and the difference is output.

PROFIenergy for sustainability
SINAMICS G with PROFINET interface supports PROFIenergy. PROFIenergy is a PROFINET-based profile that allows loads to be centrally coordinated and controlled independent of any particular manufacturer and device. Further, it can also provide standardized analytical data for the energy management process.

siemens.com/energy-efficiency-production

Holistically viewing the automation and drive technology paves the way to improved production. With SINAMICS, we are consequentially implementing this concept, both in small as well as large terms. We offer you everything that allows you to efficiently work with our innovative inverters – and to create the basis so that you can seamlessly integrate them into the automation landscape.

siemens.com/tia

siemens.com/startdrive

The integration in the TIA Portal with Startdrive is applicable for SINAMICS G120C, G120P and G120. Not for SINAMICS V20.
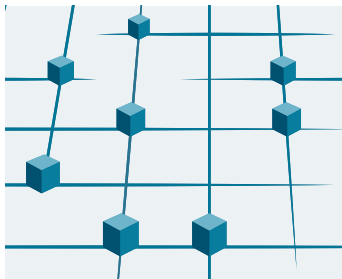
Totally Integrated Automation
Efficient interoperation of all of the automation components

Networked with the automation: Totally Integrated Automation

SINAMICS drives can be simply and efficiently integrated into the automation environment via the Totally Integrated Automation Portal (TIA Portal), our innovative engineering framework for automation tasks – using the SINAMICS Startdrive, an integral component of the TIA Portal. This simplifies engineering, commissioning and diagnostics. The TIA Portal is the core of Totally Integrated Automation. The open system architecture covers the complete production process and ensures that all of the automation components interact efficiently with one another. This is secured through consistent data management, global standards as well as standard interfaces when it comes to the hardware and software.

4 Totally Integrated Automation

It is great when skill sets complement one another

We can provide you with efficient system strategies, especially as a result of the optimum interaction between SIMATIC control systems and SINAMICS drive technology.

Here you can find examples for connecting SINAMICS drives to SIMATIC control systems:
siemens.com/sinamics-applications

Safety Integrated for drive technology and motion control:
siemens.com/safety-drives

SINAMICS G120   S7-1200 / 1500   KTP 600

PROFINET or   PROFIBUS

USB
(as alternative to parameteriza-
tion via the fieldbus)

Motor   PC/PG

Your advantages:
✔ Commissioning times are significantly reduced
✔ Reusable blocks for typical integration tasks involving SIMATIC® and SINAMICS®
✔ Screenshots provide a simple explanation of all of the configuring steps
✔ Pretested programs and blocks help to reduce errors to an absolute minimum
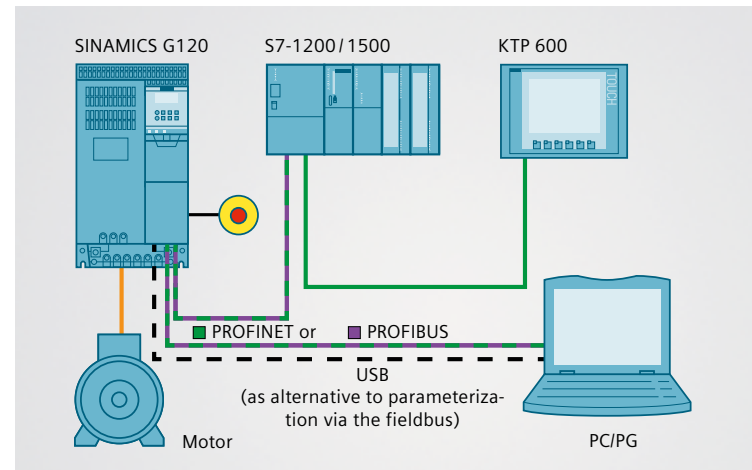
4 Seamless and integrated software for user-friendly selection, commissioning and operation

DT Configurator
Fast product selection and ordering
siemens.com/dt-configurator

SIZER[1]
Efficient engineering of a complete
drive system
siemens.com/sizer

STARTER / SINAMICS Startdrive[1]
Configuring and commissioning in the
Totally Integrated Automation Portal
siemens.com/startdrive

[1] Exception:
   SINAMICS V20 – does not require an engineering
   tool.

4 The fast and easy inverter selection tool while on the move – SINAMICS SELECTOR App

Using this App you can configure the article numbers for your SINAMICS V20, G120C, G120P and G120 inverters. SINAMICS SELECTOR navigates you quickly and simply to the correct article numbers of the following SINAMICS low-voltage inverters in the power range extending from 0.12 kW up to 630 kW:

And this is how it functions:

Select:

- Your application, your specified technical criteria – or directly the required SINAMICS inverter
- Then select the required rated power as well as the device options
- Select the required accessories

You can then save the selection and send it by email.

You can permanently save your firmware and contact data – as well as the recommended email text – in the settings.

The preselection serves as specification basis when ordering from a distributor – or selected products can be simply transferred into the shopping basket in the Siemens Mall.

	Description	Languages	Link
SIEMENS You can quickly find the article number even when you are on the road using the SINAMICS SELECTOR App (can also be used offline)	**SINAMICS SELECTOR App**		**Can be downloaded at no charge from the Play Store and App Store** **or the android version can be directly downloaded** **siemens.de/ sinamics-apps** **siemens.com/ sinamics-selector**

Helpful links at a glance

General topics

SINAMICS low-voltage inverters:
siemens.com/distributors-sinamics

Product information:
siemens.com/sinamics-v20
siemens.com/sinamics-g120c
siemens.com/sinamics-g120
siemens.com/sinamics-g120p

References:
siemens.com/automation/references

Applications:
siemens.com/sinamics-applications

Product configurator & tools

Determining energy-saving potential:
siemens.com/sinasave

Product configuration:
siemens.com/dt-configurator

Engineering tool
siemens.com/sizer

Commissioning software:
siemens.com/starter, siemens.com/startdrive

SINAMICS SELECTOR App:
siemens.com/sinamics-selector

Value-added topics

PROFINET:
siemens.com/profinet

Safety Integrated:
siemens.com/safety-drives

Energy efficiency:
siemens.com/energy-efficient-drives

Planning Efficiency™:
siemens.com/planning-efficiency

Siemens Product Partner for drive options –
individual options for our drives:
siemens.com/drives-options-partner

Information resources (catalogs, brochures):
siemens.com/drives/infocenter

Newsletter:
industry.siemens.com/newsletter

Support

Online support:
support.industry.siemens.com

Online support App:
siemens.com/industry/onlinesupportapp

Technical support:
siemens.com/automation/support-request

4 Sales-supporting marketing resources
Global website

	Description	Languages	Link
	Global website Overview of SINAMICS inverters as well as a comparison between them	🇩🇪🇺🇸	**siemens.de/distributors-sinamics** **siemens.com/distributors-sinamics**

	Description	Languages	Article number
	Brochure **SINAMICS V20 –** **the cost-effective, reliable and easy-** **to-use inverter for basic applications**	🇩🇪🇺🇸	**E20001-A90-P670-V9** **E20001-A90-P670-V9-7600** Download: **siemens.com/drives/infocenter**
	Brochure **SINAMICS G120C –** **compact and versatile inverter with** **optimum functionality**	🇩🇪🇺🇸	**E80001-A360-P210-V7** **E80001-A360-P210-V7-7600** Download: **siemens.com/drives/infocenter**
	Brochure **SINAMICS G120P –** **the specialist for industrial applications** **and building technology**	🇩🇪🇺🇸	**E20001-A310-P670-V5** **E20001-A310-P670-V5-7600** Download: **siemens.com/drives/infocenter**
	Brochure **SINAMICS G120 –** **the modular inverter: space-saving,** **safe, reliable and rugged**	🇩🇪🇺🇸	**E80001-A400-P210-V6** **E80001-A400-P210-V6-7600** Download: **siemens.com/drives/infocenter**

4 The article number can be directly selected using the SINAMICS paper selection sliders

	Description	Languages	Article number
	Paper selection slider SINAMICS V20	🇩🇪 🇺🇸	**E20001-Y270-P670-V3** **E20001-Y270-P670-V3-7600** Download: **siemens.com/drives/infocenter**
	Paper selection slider SINAMICS G120C	🇩🇪 🇺🇸	**E80001-Y930-P210-V5** **E80001-Y930-P210-V5-7600** Download: **siemens.com/drives/infocenter**
	Paper selection slider SINAMICS G120P	🇩🇪 🇺🇸	**E80001-Y940-P210-V4** **E80001-Y940-P210-V4-7600** Download: **siemens.com/drives/infocenter**
	Paper selection slider SINAMICS G120	🇩🇪 🇺🇸	**E80001-Y650-P210-V5** **E80001-Y650-P210-V5-7600** Download: **siemens.com/drives/infocenter**

2017

January — Week 1 2 3 4 5 6
Day						
Monday		2	9	16	23	30
Tuesday		3	10	17	24	31
Wednesday		4	11	18	25	
Thursday		5	12	19	26	
Friday		6	13	20	27	
Saturday		7	14	21	28	
Sunday	**1**	**8**	**15**	**22**	**29**	

February — Week 6 7 8 9 10
Day					
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	
Thursday	2	9	16	23	
Friday	3	10	17	24	
Saturday	4	11	18	25	
Sunday	**5**	**12**	**19**	**26**	

March — Week 10 11 12 13 14
Day					
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	31
Saturday	4	11	18	25	
Sunday	**5**	**12**	**19**	**26**	

April — Week 14 15 16 17 18
Day					
Monday		3	10	17	24
Tuesday		4	11	18	25
Wednesday		5	12	19	26
Thursday		6	13	20	27
Friday		7	14	21	28
Saturday	1	8	15	22	29
Sunday	**2**	**9**	**16**	**23**	**30**

May — Week 19 20 21 22 23
Day					
Monday	1	8	15	22	29
Tuesday	2	9	16	23	30
Wednesday	3	10	17	24	31
Thursday	4	11	18	25	
Friday	5	12	19	26	
Saturday	6	13	20	27	
Sunday	**7**	**14**	**21**	**28**	

June — Week 23 24 25 26 27
Day					
Monday		5	12	19	26
Tuesday		6	13	20	27
Wednesday		7	14	21	28
Thursday	1	8	15	22	29
Friday	2	9	16	23	30
Saturday	3	10	17	24	
Sunday	**4**	**11**	**18**	**25**	

July — Week 27 28 29 30 31 32
Day						
Monday		3	10	17	24	31
Tuesday		4	11	18	25	
Wednesday		5	12	19	26	
Thursday		6	13	20	27	
Friday		7	14	21	28	
Saturday	1	8	15	22	29	
Sunday	**2**	**9**	**16**	**23**	**30**	

August — Week 32 33 34 35 36
Day					
Monday		7	14	21	28
Tuesday	1	8	15	22	29
Wednesday	2	9	16	23	30
Thursday	3	10	17	24	31
Friday	4	11	18	25	
Saturday	5	12	19	26	
Sunday	**6**	**13**	**20**	**27**	

September — Week 36 37 38 39 40
Day					
Monday		4	11	18	25
Tuesday		5	12	19	26
Wednesday		6	13	20	27
Thursday		7	14	21	28
Friday	1	8	15	22	29
Saturday	2	9	16	23	30
Sunday	**3**	**10**	**17**	**24**	

October — Week 40 41 42 43 44 45
Day						
Monday		2	9	16	23	30
Tuesday		3	10	17	24	31
Wednesday		4	11	18	25	
Thursday		5	12	19	26	
Friday		6	13	20	27	
Saturday		7	14	21	28	
Sunday	**1**	**8**	**15**	**22**	**29**	

November — Week 45 46 47 48 49
Day					
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	
Saturday	4	11	18	25	
Sunday	**5**	**12**	**19**	**26**	

December — Week 49 50 51 52 53
Day					
Monday		4	11	18	**25**
Tuesday		5	12	19	**26**
Wednesday		6	13	20	27
Thursday		7	14	21	28
Friday	1	8	15	22	29
Saturday	2	9	16	23	30
Sunday	**3**	**10**	**17**	**24**	**31**

2018

January — Week 1 2 3 4 5
Day					
Monday	**1**	8	15	22	29
Tuesday	2	9	16	23	30
Wednesday	3	10	17	24	31
Thursday	4	11	18	25	
Friday	5	12	19	26	
Saturday	6	13	20	27	
Sunday	**7**	**14**	**21**	**28**	

February — Week 5 6 7 8 9
Day					
Monday		5	12	19	26
Tuesday		6	13	20	27
Wednesday		7	14	21	28
Thursday	1	8	15	22	
Friday	2	9	16	23	
Saturday	3	10	17	24	
Sunday	**4**	**11**	**18**	**25**	

March — Week 9 10 11 12 13
Day					
Monday		5	12	19	26
Tuesday		6	13	20	27
Wednesday		7	14	21	28
Thursday	1	8	15	22	29
Friday	2	9	16	23	30
Saturday	3	10	17	24	31
Sunday	**4**	**11**	**18**	**25**	

April — Week 13 14 15 16 17 18
Day						
Monday		2	9	16	23	30
Tuesday		3	10	17	24	
Wednesday		4	11	18	25	
Thursday		5	12	19	26	
Friday		6	13	20	27	
Saturday		7	14	21	28	
Sunday	**1**	**8**	**15**	**22**	**29**	

May — Week 18 19 20 21 22
Day					
Monday		7	14	21	28
Tuesday	1	8	15	22	29
Wednesday	2	9	16	23	30
Thursday	3	10	17	24	31
Friday	4	11	18	25	
Saturday	5	12	19	26	
Sunday	**6**	**13**	**20**	**27**	

June — Week 22 23 24 25 26
Day					
Monday		4	11	18	25
Tuesday		5	12	19	26
Wednesday		6	13	20	27
Thursday		7	14	21	28
Friday	1	8	15	22	29
Saturday	2	9	16	23	30
Sunday	**3**	**10**	**17**	**24**	

July — Week 26 27 28 29 30 31
Day						
Monday		2	9	16	23	30
Tuesday		3	10	17	24	31
Wednesday		4	11	18	25	
Thursday		5	12	19	26	
Friday		6	13	20	27	
Saturday		7	14	21	28	
Sunday	**1**	**8**	**15**	**22**	**29**	

August — Week 31 32 33 34 35
Day					
Monday		6	13	20	27
Tuesday		7	14	21	28
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	31
Saturday	4	11	18	25	
Sunday	**5**	**12**	**19**	**26**	

September — Week 35 36 37 38 39
Day					
Monday		3	10	17	24
Tuesday		4	11	18	25
Wednesday		5	12	19	26
Thursday		6	13	20	27
Friday		7	14	21	28
Saturday	1	8	15	22	29
Sunday	**2**	**9**	**16**	**23**	**30**

October — Week 40 41 42 43 44
Day					
Monday	1	8	15	22	29
Tuesday	2	9	16	23	30
Wednesday	3	10	17	24	31
Thursday	4	11	18	25	
Friday	5	12	19	26	
Saturday	6	13	20	27	
Sunday	**7**	**14**	**21**	**28**	

November — Week 44 45 46 47 48
Day					
Monday		5	12	19	26
Tuesday		6	13	20	27
Wednesday		7	14	21	28
Thursday	1	8	15	22	29
Friday	2	9	16	23	30
Saturday	3	10	17	24	
Sunday	**4**	**11**	**18**	**25**	

December — Week 48 49 50 51 52 53
Day						
Monday		3	10	17	24	31
Tuesday		4	11	18	**25**	
Wednesday		5	12	19	**26**	
Thursday		6	13	20	27	
Friday		7	14	21	28	
Saturday	1	8	15	22	29	
Sunday	**2**	**9**	**16**	**23**	**30**	

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